Annual Report 2019

NOVARTIS

Annual Report 2019

Chairman's letter

Novartis delivered strong performance in 2019. New product launches together with a disciplined focus on costs and operational efficiency helped us increase sales, operating income and operating profit margin. Looking ahead, we are well positioned to continue our growth trajectory as we pursue our goal of driving science-based medical innovation.

With the successful spin-off of our former eye care division, Alcon, in early 2019, we concluded a major step in our portfolio transformation to create a more focused medicines company. We are active in disease areas with high unmet needs and have a leading portfolio of highly innovative drugs, including recently launched breast cancer therapy *Piqray*, eye care treatment *Beovu*, multiple sclerosis drug *Mayzent*, and our gene therapy *Zolgensma* for spinal muscular atrophy.

Going forward, we continue to strive for business excellence across all our divisions and functions. We are continually streamlining our business services and production platforms. We are also introducing innovative digital technologies to support our research, development and production efforts. As the digitization of our operations and the overall healthcare industry gains pace, we are also taking action to minimize cyber risks and protect patient data.

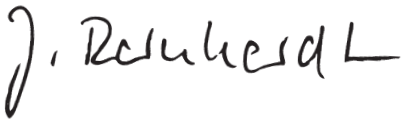
As a global healthcare leader, we are working to spearhead cutting-edge medical development. Our recent moves in the areas of gene therapies, radioligand therapies and digital health reflect our position at the forefront of scientific discovery. To develop breakthrough therapies that can help change the practice of medicine, we are intent on attracting the best industry talent, collaborating with leading technology partners, and pursuing acquisitions to strengthen and expand high-tech therapy platforms.

We have also established clear environmental, social and governance (ESG) targets for our management. With a view to reaching the highest international environmental standards, we aim to become carbon neutral by 2025, and plastic and water neutral by 2030, and have put processes in place to minimize the carbon footprint of our supply chain. Likewise, the implementation of our Access Principles is gaining pace with the approval of innovative medicines in low- and middle-income countries, including migraine treatment *Aimovig* and cancer drug *Kisqali*.

Although we still have work to do, we are also making good progress in efforts to enhance our integrity standards as part of a broader cultural transformation. In our strengthened governance framework, our Ethics, Risk & Compliance (ERC) function is developing a principles-based Code of Ethics to support our employees in navigating the increasingly complex healthcare landscape and managing associated risks. The Board of Directors and the Executive Committee are fully committed to further improving our business ethics principles to become one of the most trusted healthcare partners in the industry.

I thank you for the confidence you have placed in our company and am pleased to be able to propose a dividend increase of 4% to CHF 2.95 at the next Annual General Meeting.

Sincerely,



Joerg Reinhardt
Chairman of the Board of Directors

CEO's letter

The Novartis team works tirelessly to bring life-changing medical innovation to the world. We had a strong year in 2019 – delivering on our strategy, producing strong financial results, and making a significant impact on society by improving and extending the lives of people across the globe.

In April, we took an important step with the spin-off of our former Alcon eye care devices division, further transforming Novartis into a focused medicines company.

Our research and development teams launched five all-new medicines in 2019, from our groundbreaking gene therapy *Zolgensma*, to the first targeted biologic medicine for sickle cell disease patients. We also advanced the development of more than 25 potential blockbuster treatments that we hope to launch in the coming years. This progress shows the power of our innovation engine, and of our people.

We are taking steps to make our treatments available to more people worldwide by integrating access strategies into the core of our business. Our work to tackle sickle cell disease is one example. *Adakveo*, our new treatment for this life-threatening, inherited blood disorder, was approved for use in the US last November. At the same time, we launched a collaboration in Ghana to expand diagnosis and treatment of the disease and to strengthen the broader healthcare system – an approach that could become a model for other African countries.

We are increasingly recognized as a leader in our industry in integrating data science and digital technologies into all aspects of our work – from discovering new medicines in the lab to improving manufacturing efficiency and serving our customers more effectively. We are making progress on 12 major projects to deploy key digital technologies and data analytics at scale, and we're collaborating with other companies to accelerate our efforts in areas such as artificial intelligence.

There's significant work underway to transform how we operate, expand our capabilities and make us more efficient. In our manufacturing operations, we are adding capabilities in areas such as cell therapies, where we now have processing capacity in place on every major continent. In business services, we're getting smarter at procurement and redesigning our work to get at the root of inefficiencies, such as how we prepare marketing materials across the company.

Delivering on our strategy supported our financial performance in 2019. Strength in key products helped us post net sales of USD 47.4 billion, up 9%, measured in constant currencies (cc). Our core operating income rose 17% (cc) to USD 14.1 billion, increasing core margin by 1.9 percentage points (cc) to 29.7%.

I'm incredibly grateful for the hard work of our employees, whose passion and commitment is driving our momentum on every front. They are helping us transform our company culture, which I believe will be a core performance driver for Novartis. It will take time, but after visiting Novartis sites in nearly 40 countries since I took over as CEO two years ago and seeing the results from our internal surveys, I'm confident our culture change is taking hold.

The progress we made this past year is helping set the foundation for a remarkable future for our company as we strive to create long-term value for patients, for society and for our shareholders. Thank you for your support as we continue reimagining medicine together.

Sincerely,

Vas Narasimhan
Chief Executive Officer

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* "Item 5. Operating and Financial Review and Prospects" together with the sections on compounds in development and key development projects of our divisions (see "Item 4. Information on the Company—Item 4.B Business overview") constitute the Operating and Financial Review ("Lagebericht"), as defined by the Swiss Code of Obligations.

Introduction and use of certain terms

Novartis AG and its consolidated affiliates publish consolidated financial statements expressed in US dollars. Our consolidated financial statements responsive to Item 18 of this Annual Report on Form 20-F (Annual Report) are prepared in accordance with International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board (IASB). "Item 5. Operating and Financial Review and Prospects," together with the sections on products in development and key development projects of our businesses (see "Item 4. Information on the Company—Item 4.B. Business overview"), constitute the Operating and Financial Review ("Lagebericht"), as defined by the Swiss Code of Obligations.

Unless the context requires otherwise, the words "we," "our," "us," "Novartis," "Group," "Company," and similar words or phrases in this Annual Report refer to Novartis AG and its consolidated affiliates. However, each Group company is legally separate from all other Group companies and manages its business independently through its respective board of directors or similar supervisory body or other top local management body, if applicable. Each executive identified in this Annual Report reports directly to other executives of the Group company that employs the executive, or to that Group company's board of directors.

In this Annual Report, references to "US dollars," "USD" or "$" are to the lawful currency of the United States of America, and references to "CHF" are to Swiss francs; references to the "United States" or to "US" are to the United States of America, references to the "European Union" or to "EU" are to the European Union and its 28 member states, references to "Latin America" are to Central and South America, including the Caribbean, and references to "Australasia" are to Australia, New Zealand, Melanesia, Micronesia and Polynesia, unless the context otherwise requires; references to the "EC" are to the European Commission; references to "associates" are to employees of our affiliates; references to the "SEC" are to the US Securities and Exchange Commission; references to the "FDA" are to the US Food and Drug Administration; references to the "EMA" are to the European Medicines Agency, an agency of the EU, and references to the "CHMP" are to the Committee for Medicinal Products for Human Use of the EMA; references to "ADR" or "ADRs" are to Novartis American Depositary Receipts, and references to "ADS" or "ADSs" are to Novartis American Depositary Shares; references to the "NYSE" are to the New York Stock Exchange, and references to "SIX" are to the SIX Swiss Exchange; references to "ECN" are to the Executive Committee of Novartis; references to "GSK" are to GlaxoSmithKline plc, references to "AAA" are to Advanced Accelerator Applications S.A., references to "AveXis" are to AveXis, Inc., references to "Endocyte" are to Endocyte, Inc., and references to "Takeda" are to Takeda Pharmaceutical Company Limited.

All product names appearing in italics are trademarks owned by or licensed to Group companies. Product names identified by a "®" or a "™" are trademarks that are not owned by or licensed to Group companies and are the property of their respective owners.

Forward-looking statements

This Annual Report contains certain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, Section 21E of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), and the United States Private Securities Litigation Reform Act of 1995, as amended. Other written materials filed with or furnished to the SEC by Novartis, as well as other written and oral statements made to the public, may also contain forward-looking statements. Forward-looking statements can be identified by words such as "potential," "expected," "will," "planned," "pipeline," "outlook," "may," "could," "would," "anticipate," "seek," or similar terms, or by express or implied discussions regarding potential new products, potential new indications for existing products, or regarding potential future revenues from any such products; or regarding the potential outcome, or financial or other impact on Novartis, of the acquisition of The Medicines Company, the proposed divestiture of certain portions of our Sandoz Division business in the US, and other transactions described; or regarding the potential impact of share buybacks; or regarding potential future sales or earnings of the Group or any of its divisions or potential shareholder returns; or regarding potential future credit ratings of the Group; or by discussions of strategy, plans, expectations or intentions. Such forward-looking statements are based on the current beliefs and expectations of management regarding future events, and are subject to significant known and unknown risks and uncertainties. Should one or more of these risks or uncertainties materialize, or should underlying assumptions prove incorrect, actual results may vary materially from those set forth in the forward-looking statements. You should not place undue reliance on these statements.

In particular, our expectations could be affected by, among other things:

- Global trends toward healthcare cost containment, including ongoing government, payer and general public pricing and reimbursement pressures and requirements for increased pricing transparency;
- Uncertainties regarding potential significant breaches of information security or disruptions of our information technology systems;
- Uncertainties regarding the success of key products and commercial priorities;
- Our ability to obtain or maintain proprietary intellectual property protection, including the ultimate extent of the impact on Novartis of the loss of patent protection and exclusivity on key products that commenced in prior years and is expected to continue this year;
- Uncertainties in the research and development of new healthcare products, including clinical trial results and additional analysis of existing clinical data;
- Regulatory actions or delays or government regulation generally, including potential regulatory actions or delays with respect to the proposed transactions or the development of the products described in this Annual Report;
- Uncertainties regarding actual or potential legal proceedings, including, among others, litigation and other legal disputes with respect to the proposed transactions, product liability litigation, litigation and investigations regarding sales and marketing practices, intellectual property disputes and government investigations generally;
- Our reliance on outsourcing key business functions to third parties;
- Our ability to comply with data privacy laws and regulations, and uncertainties regarding potential significant breaches of data privacy;
- Safety, quality, data integrity or manufacturing issues;
- Uncertainties in the development or adoption of potentially transformational technologies and business models;
- The potential that the strategic benefits, synergies or opportunities expected from our recent and proposed future transactions may not be realized or may take longer to realize than expected;
- Uncertainties involved in predicting shareholder returns;
- Our performance on environmental, social and governance measures;

- Political, economic and trade conditions, including uncertainties regarding the effects of ongoing instability in various parts of the world;
- Uncertainties regarding the effects of recent and anticipated future changes in tax laws and their application to us;
- Uncertainties regarding future global exchange rates; and
- Uncertainties regarding future demand for our products.

Some of these factors are discussed in more detail in this Annual Report, including under "Item 3. Key Information—Item 3.D. Risk factors," "Item 4. Information on the Company," and "Item 5. Operating and Financial Review and Prospects." Should one or more of these risks or uncertainties materialize, or should underlying assumptions prove incorrect, actual results may vary materially from those described in this Annual Report as anticipated, believed, estimated or expected. We provide the information in this Annual Report as of the date of its filing. We do not intend, and do not assume any obligation, to update any information or forward-looking statements set out in this Annual Report as a result of new information, future events or otherwise.

PART I

Item 1. Identity of Directors, Senior Management and Advisers

Not applicable.

Item 2. Offer Statistics and Expected Timetable

Not applicable.

Item 3. Key Information

3.A Selected financial data

The selected financial information set out below has been extracted from our consolidated financial statements prepared in accordance with IFRS as issued by the IASB. Our consolidated financial statements for the years ended December 31, 2019, 2018 and 2017, are included in "Item 18. Financial Statements" in this Form 20-F.

All financial data should be read in conjunction with "Item 5. Operating and Financial Review and Prospects." All financial data presented in this Form 20-F are qualified in their entirety by reference to the consolidated financial statements and their notes.

	Year ended December 31,				
(USD millions, except per share information)	**2019**	2018	2017	2016	2015
INCOME STATEMENT DATA[1]					
Net sales to third parties from continuing operations	**47 445**	**44 751**	**42 338**	**41 975**	**42 641**
Operating income from continuing operations	**9 086**	**8 403**	**8 702**	**8 248**	**8 522**
Income from associated companies	659	6 438	1 108	703	266
Interest expense	– 850	– 932	– 750	– 675	– 637
Other financial income and expense	45	186	42	– 385	– 433
Income before taxes from continuing operations	**8 940**	**14 095**	**9 102**	**7 891**	**7 718**
Taxes	– 1 793	– 1 295	– 1 603	– 1 095	– 1 066
Net income from continuing operations	**7 147**	**12 800**	**7 499**	**6 796**	**6 652**
Net (loss) / income from discontinued operations before gain on distribution of Alcon Inc. to Novartis shareholders	– 101	– 186	204	– 98	376
Gain on distribution of Alcon Inc. to Novartis AG shareholders	4 691				
Net income related to portfolio transformation transactions					10 766
Net income from discontinued operations	**4 590**	**– 186**	**204**	**– 98**	**11 142**
Group net income	**11 737**	**12 614**	**7 703**	**6 698**	**17 794**
Attributable to:					
Shareholders of Novartis AG	11 732	12 611	7 703	6 712	17 783
Non-controlling interests	5	3	0	– 14	11
Basic earnings per share (USD)					
Continuing operations	3.12	5.52	3.20	2.86	2.77
Discontinued operations	2.00	– 0.08	0.08	– 0.04	4.63
Total	5.12	5.44	3.28	2.82	7.40
Diluted earnings per share (USD)					
Continuing operations	3.08	5.46	3.17	2.84	2.72
Discontinued operations	1.98	– 0.08	0.08	– 0.04	4.57
Total	5.06	5.38	3.25	2.80	7.29
Cash dividends[2]	6 645	6 966	6 495	6 475	6 643
Cash dividends per share in CHF[3]	2.95	2.85	2.80	2.75	2.70
Personnel cost from continuing operations[4, 5]	13 843	13 515	12 009	11 950	11 336
Full-time equivalent associates of continuing operations at year-end[5]	103 914	104 780	102 467	99 747	99 624

[1] Continuing operations include the businesses of the Innovative Medicines and Sandoz Divisions and Corporate activities. Discontinued operations include the Alcon business, which was divested in 2019; the Animal Health and Vaccines businesses divested in 2015; and the Consumer Health business, which was contributed also in 2015 into a new entity, GlaxoSmithKline Consumer Healthcare Holdings Ltd. (GSK Consumer Healthcare), where Novartis had a 36.5% interest. This newly created entity was sold during 2018 to GSK. To reflect these transactions, Novartis reported the Group's financial results for 2019 to 2015 as "continuing operations" and "discontinued operations," as required by IFRS.

[2] Cash dividends represent cash payments in the applicable year that generally relates to earnings of the previous year.

[3] Cash dividends per share represent dividends proposed that relate to earnings of the current year. Dividends for 2015 through 2018 were approved at the respective AGMs, and dividends for 2019 will be proposed to the Annual General Meeting on February 28, 2020, for approval.

[4] Personnel cost include wages, salaries, allowances, commissions and bonuses to staff, overtime, awards, holiday pay, severance payments and social welfare expenses.

[5] Own employees.

	Year ended December 31,				
(USD millions)	**2019**	2018	2017	2016	2015
BALANCE SHEET DATA					
Cash, cash equivalents, and marketable securities and derivative financial instruments	11 446	15 964	9 485	7 777	5 447
Inventories	5 982	6 956	6 867	6 255	6 226
Other current assets	11 235	11 836	11 856	10 899	11 172
Non-current assets	88 866	110 000	104 871	105 193	108 711
Assets of disposal group held for sale[1]	841	807			
Total assets	**118 370**	**145 563**	**133 079**	**130 124**	**131 556**
Trade accounts payable	5 424	5 556	5 169	4 873	5 668
Other current liabilities	22 809	24 000	18 234	17 336	18 040
Non-current liabilities	34 555	37 264	35 449	33 024	30 726
Liabilities of disposal group held for sale[1]	31	51			
Total liabilities	**62 819**	**66 871**	**58 852**	**55 233**	**54 434**
Issued share capital and reserves attributable to shareholders of Novartis AG	55 474	78 614	74 168	74 832	77 046
Non-controlling interests	77	78	59	59	76
Total equity	**55 551**	**78 692**	**74 227**	**74 891**	**77 122**
Total liabilities and equity	**118 370**	**145 563**	**133 079**	**130 124**	**131 556**
Net assets	55 551	78 692	74 227	74 891	77 122
Outstanding share capital	856	875	869	896	890
Total outstanding shares (millions)	2 265	2 311	2 317	2 374	2 374

[1] The disposal group held for sale relate to the assets and liabilities of the pending divestment of the Sandoz US dermatology business and generic US oral solids portfolio to Aurobindo Pharma USA Inc., as announced on September 6, 2018 (see "Item 18. Financial Statements—Note 2. Significant pending transactions").

Cash dividends per share

Cash dividends are translated into US dollars at the Bloomberg Market System Rate on the payment date. Because we pay dividends in Swiss francs, exchange rate fluctuations will affect the US dollar amounts received by holders of ADRs.

Year earned	Month and year paid	Total dividend per share (CHF)	Total dividend per share (USD)
2015	March 2016	2.70	2.70
2016	March 2017	2.75	2.72
2017	March 2018	2.80	2.94
2018	March 2019	2.85	2.84
2019[1]	March 2020	2.95	3.04[2]

[1] Dividend to be proposed at the Annual General Meeting on February 28, 2020, and to be distributed March 5, 2020.

[2] Translated into US dollars at the December 31, 2019, rate of USD 1.032 to the Swiss franc. This translation is an example only, and should not be construed as a representation that the Swiss franc amount represents, or has been or could be converted into US dollars at that or any other rate.

3.B Capitalization and indebtedness

Not applicable.

3.C Reasons for the offer and use of proceeds

Not applicable.

3.D Risk factors

Our businesses face significant risks and uncertainties. You should carefully consider all of the information set forth in this Annual Report and in other documents we file with or furnish to the SEC, including the following risk factors, before deciding to invest in or to maintain an investment in any Novartis securities. Our business, as well as our financial condition or results of operations, could be materially adversely affected by any of these risks, as well as other risks and uncertainties not currently known to us or not currently considered material.

Pressures on pricing and reimbursement for our products affect our business and may impact our future financial results.

Our businesses are operating in an ever more challenging environment, with significant pressures on the pricing of our products and on our ability to obtain and maintain satisfactory rates of reimbursement for our products by governments, insurers and other payers. The growth of overall healthcare costs as a percentage of gross domestic product in many countries means that governments and payers are under intense pressure to control healthcare spending even more tightly than in the past. These pressures are particularly strong given the increasing demand for healthcare resulting from the aging of the global population and associated increases in noncommunicable diseases, and the resulting impact on healthcare budgets. These pressures are further compounded by significant controversies and intense political debate and publicity about prices for pharmaceuticals that some consider excessive, including government regulatory efforts, funding restrictions, legislative proposals, policy interpretations, investigations and legal proceedings regarding pharmaceutical pricing practices. Global pressures on pricing may negatively impact, in parallel, both our product pricing and our market access.

In addition to ongoing public and political pressures to limit the prices we charge for our products, we face numerous cost-containment measures imposed by governments and other payers, including government-imposed industrywide price reductions, mandatory pricing systems, reference pricing systems, payers limiting access to treatments based on cost-benefit analyses, imports of drugs from lower-cost countries to higher-cost countries, shifting of the payment burden to patients through higher co-payments and co-pay accumulator programs, limiting physicians' ability to choose among competing medicines, mandatory substitution of generic drugs for the patented equivalent, pressure on physicians to reduce the prescribing of patented prescription medicines, increasing pressure on intellectual property protections, and growing requirements for increased transparency on pricing. For more information on such price controls, see "Item 4. Information on the Company—Item 4.B Business overview—Innovative Medicines—Price controls."

We expect these challenges to continue and to increase in 2020 and beyond, as political pressures mount and healthcare payers around the globe, including government-controlled health authorities, insurance companies and managed care organizations, step up initiatives to reduce the overall cost of healthcare, restrict access to higher-priced new medicines, increase the use of generics and impose overall price cuts. These factors may materially affect our ability to achieve an acceptable return on our investments in the research and development of our products, may impact our ability to invest in the research and development of new products, and could have a material adverse impact on our business, financial condition, or results of operations, as well as on our reputation.

Significant breaches of information security or disruptions of our information technology systems could adversely affect our business.

We are heavily dependent on critical, complex and interdependent information technology systems, including internet-based systems, some of which are managed by third-party service providers, to support our business processes. We routinely experience cybersecurity attacks and incidents on such networks and systems, and while to date none of these incidents have been material to us, like many companies, we expect to continue to experience similar cybersecurity threats and attacks in the future. Cybersecurity threats and attacks take many forms and the size, age and complexity of our information technology systems make them potentially vulnerable to external and internal security threats; outages; malicious intrusions and attacks; cybercrimes, including state-sponsored cybercrimes; malware; misplaced or lost data; programming or human errors; or other similar events. While we have devoted and continue to devote significant resources and management attention to cybersecurity, information management and business continuity efforts, we may not be able to prevent future outages, security incidents or other breaches in our systems from having a material adverse effect on our business, financial condition, results of operations, or reputation.

A significant information security or other event, such as a disruption or loss of availability of one or more of our information technology systems, could negatively impact important business processes, such as the conduct of scientific research and clinical trials, the submission of data and information to health authorities, our manufacturing and supply chain processes, our shipments to customers, our compliance with legal obligations, and communication between employees and with third parties. Information technology issues could also lead to the compromise of trade secrets or other intellectual property that could be sold and used by competitors to accelerate the development or manufacturing of competing products; to the compromise of personal financial and health information; and to the compromise of information technology security data such as usernames, passwords and encryption keys, as well as security strategies and information about network infrastructure, which could allow unauthorized parties to gain access to additional systems or data. In addition, mal-

functions in software or other medical devices that make significant use of information technology could lead to a risk of direct harm to patients.

For business reasons we have outsourced significant parts of our IT infrastructure to third-party providers, and we currently use these providers to perform business-critical IT services for us. We are therefore vulnerable to service interruptions by these providers and we may experience interruptions, delays or outages in IT service availability in the future due to a variety of factors outside of our control. Outages and capacity constraints could arise from a number of causes such as technical failures, natural disasters, fraud or security attacks. Interruptions in the service provided by these third parties could affect our ability to perform critical tasks.

In addition, we face potential difficulties in integrating the IT systems of the businesses that we acquire, including replacing, integrating or working with separate IT systems used by such companies, and transferring relevant data from such separate systems and their third-party providers. See also "—We may not successfully achieve our goals in transactions or reorganizations," below.

Our dependence upon information technology, breaches of data security, technology disruptions, or other impacts from the use of interconnected technologies, could disrupt our business operations and result in enforcement actions or liability, including potential government fines and penalties, claims for damages, and shareholders' litigation. Any significant events of this type could require us to expend significant resources beyond those we already invest to remediate any damage, to further modify or enhance our protective measures, and to enable the continuity of our business, and could have a material adverse effect on our business, financial condition, results of operations, and reputation.

Our financial performance depends on the commercial success of key products and commercial priorities.

Our financial performance, including our ability to replace revenue and income lost to generic, biosimilar and other competition and to grow our business, depends heavily on the commercial success of our key products. If any of our major products were to become subject to problems such as changes in prescription growth rates, unexpected side effects, loss of intellectual property protection, data integrity issues, supply chain issues or other product shortages, regulatory proceedings, changes in labeling, publicity affecting doctor or patient confidence in the product, material product liability litigation, or pressure from new or existing competitive products, the adverse impact on our revenue and profit could be significant. In addition, our revenue and profit could be significantly impacted by the timing and rate of commercial acceptance of key new products. The commercial success of our key products and launches in the face of increasing competition and pressures on pricing requires significant attention and focus from members of our key management. See also "—Pressures on pricing and reimbursement for our products affect our business and may impact our future financial results," above, with regard to the impact of pricing and reimbursement issues on the commercial success of our products.

All of our businesses face intense competition from new products and technological advances from competitors, and physicians, patients and third-party payers may choose our competitors' products instead of ours if they perceive them to be safer, more effective, easier to administer, less expensive, more convenient or more cost-effective. We cannot predict with accuracy the timing of the introduction of products that compete with ours or the related effect on our sales. However, products significantly competitive to our major products – including *Cosentyx, Lucentis, Gilenya, Tasigna, Kisqali, Kymriah, Entresto* and *Beovu* – are on the market, and others are in development. In addition, numerous companies from around the world are seeking to enter the healthcare field to take advantage of their expertise in digital and other new technologies. See "—We may fail to develop or take advantage of transformational technologies and business models," below.

Such competitive products could significantly affect the revenue from our products and our results of operations. This impact could also be compounded to the extent such competition results in us making significant additional investments in research and development, or in marketing and sales.

Our products face losses of intellectual property protection.

Major products of our Innovative Medicines Division, as well as certain products of our Sandoz Division, are protected by patent and other intellectual property rights, which provide us with exclusive rights to market those products for a limited time and give us an opportunity to recoup our investments in research and development. However, the strength and duration of those intellectual property rights can vary significantly from product to product and country to country, and they may be successfully challenged by third parties or governmental authorities. The resulting loss of market exclusivity for one or more important products has had, and can be expected to continue to have, a material adverse effect on our results of operations.

The introduction of generic or biosimilar competition for a patented branded medicine typically results in a significant and rapid reduction in net sales and operating income for the branded product because generic or biosimilar manufacturers typically offer their versions at sharply lower prices. Such competition can occur after successful challenges to intellectual property rights or the regular expiration of the patent term or other intellectual property rights. Such competition can also result from the entry of generic or biosimilar versions of another medicine in the same therapeutic class as one of our drugs or in a competing therapeutic class, from a Declaration of Public Interest or the compulsory licensing of our drugs by governments, or from a general weakening of intellectual property and governing laws in certain countries around the world. In addition, generic or biosimilar manufacturers may sometimes conduct so-called "launches at risk" of products that are still under legal challenge for infringement, or whose patents are still under legal challenge for validity, before final resolution of legal proceedings.

We also rely in all aspects of our businesses on unpatented proprietary technology, know-how, trade secrets and other confidential information, which we seek to protect through various measures, including confidentiality agreements with licensees, employees, third-party collaborators, and consultants who may have access to such information. If these agreements are breached or our other protective measures should fail, then our contractual or other remedies may not be adequate to cover our losses.

Some of our best-selling products have begun or are about to face significant competition due to the end of market exclusivity resulting from the expiry of patent or other intellectual property protection, or from successful or otherwise resolved challenges to patent protection.

- Our former top-selling product *Gleevec/Glivec* continues to face generic competition in major markets.

- Patent protection for *Exjade* in the US has expired. Generic versions of *Exjade* are available in the US.

- In the US, for *Afinitor*, we have resolved patent litigation. Generic versions of the three lower dosage strengths of *Afinitor* are available in the US; additional generic competition may start in mid-2020. We have resolved patent litigation relating to *Afinitor Disperz*.

- Patent protection for the marketed forms of our *Sandostatin* products has expired. Generic versions of *Sandostatin* SC are available in the US, the EU and Japan. While there is currently no generic competition in the US or Japan for *Sandostatin LAR*, the long-acting version of *Sandostatin* that represents the majority of our *Sandostatin* sales, such generic competition may arise in the future. Generic versions of *Sandostatin LAR* are available in some EU markets.

- Intellectual property protection for a number of additional major products is either being challenged or will expire at various times in the coming years, raising the possibility of generic or biosimilar competition. Among these products that may begin to face generic or biosimilar competition in one or more major markets during the next three years are our remaining everolimus products or their remaining dosage strengths (*Afinitor/Votubia* and *Zortress/Certican*), *Jadenu*, *Lucentis* and potentially *Gilenya*. For more information on the patent and generic competition status of our Innovative Medicines Division's products, see "Item 4. Information on the Company—Item 4.B Business overview—Innovative Medicines—Intellectual property."

In 2020, we expect a potentially significant impact on our net sales from products that have already lost intellectual property protection, as well as products that may lose protection during the year. Because we typically have substantially reduced marketing and research and development expenses related to products that are in their final years of exclusivity, the initial loss of intellectual property protection for a product during the year could also have an impact on our operating income for that year in an amount corresponding to a significant portion of the product's lost sales. The magnitude of the impact of generic or biosimilar competition on our income could depend on a number of factors, including the time of year at which the generic or biosimilar competitor is launched; the ease or difficulty of manufacturing a competitor product and obtaining regulatory approval to market it; the number of generic or biosimilar competitor products approved, including whether, in the US, a single competitor is granted an exclusive marketing period; whether an authorized generic is launched; the geographies in which generic or biosimilar competitor products are approved, including the strength of the market for generic or biosimilar pharmaceutical products in such geographies, and the comparative profitability of branded pharmaceutical products in such geographies; and our ability to successfully develop and launch profitable new products to replace the income lost to generic or biosimilar competition.

With respect to major products for which the patents are expiring or are successfully challenged, the loss of exclusivity of these products could have a material adverse effect on our business, financial condition, or results of operations. In addition, should we unexpectedly lose exclusivity on additional products as a result of patent litigation or other reasons, this could also have a material adverse effect on our business, financial condition, or results of operations, both due to the loss of revenue and earnings, and the difficulties in planning for such losses.

Our research and development efforts may not succeed.

We engage in extensive and costly research and development activities, both through our own dedicated resources and through collaborations with third parties, in an effort to identify and develop new products that address unmet and changing medical needs, are accepted by patients and physicians, are reimbursed by payers, and are commercially successful. Our ability to grow our business; to replace sales lost due to branded competition, entry of generics, or other reasons; and to bring to market products and medical advances that take advantage of new and potentially disruptive technologies, depends in significant part upon the success of these efforts. However, developing new healthcare products and bringing them to market is a costly, lengthy and uncertain process. In spite of our significant investments, there can be no guarantee that our research and development activities will produce commercially successful new products that will enable us to replace revenue and income lost to generic and other competition and to grow our business.

Research and development of new products of our Innovative Medicines Division can take approximately 10 to 15 years, from discovery to commercial product launch. Failure can occur at any point in the process, including in later stages after substantial investment. With limited available intellectual property protections, the longer it takes to develop a product, the less time there may be for us to recoup our research and development costs. New products must undergo intensive preclinical and clinical testing, and must be approved by means of highly complex, lengthy and expensive approval processes that can vary from country to country.

Further, to achieve approvals of new products and new indications, regulatory authorities continue to establish new and increasingly rigorous requirements in the already lengthy and expensive process of obtaining regulatory approvals and reimbursement for pharmaceutical products.

Similarly, the post-approval regulatory burden has also increased. Approved drugs are subject to various requirements such as risk evaluation and mitigation strategies (REMS), risk management plans, comparative effectiveness studies, health technology assessments, and requirements to conduct post-approval Phase IV clinical trials to gather additional safety and other data on products. These requirements have the effect of making the maintenance of regulatory approvals for our products increasingly expensive, and further heightening the risk of recalls, product withdrawals, loss of market share, and loss of revenue and profitability.

There is also the risk that we may fail to identify significant new product candidates for development or potentially disruptive new technologies, and so may fail to take advantage of potential new innovations.

Our Sandoz Division has made, and expects to continue to make, significant investments in the development of biotechnology-based, "biologic" medicines intended for sale as bioequivalent or "biosimilar" versions of currently marketed biotechnology products. While the development of such products typically is significantly less costly and complex than the development of the equivalent originator medicines, it is nonetheless significantly more costly and complex than that for typical small-molecule generic products. In addition, many countries do not yet have fully developed legislative or regulatory pathways to facilitate the development of biosimilars and permit their sale in a manner in which they are readily substitutable for the originator product. Further delays or difficulties that may arise in the development or marketing of biosimilars could put at risk the significant investments that Sandoz has made, and will continue to make, in its Biopharmaceuticals business. Sandoz also achieves significant revenue opportunities when it secures and maintains exclusivity periods granted for generic products in certain markets – particularly the 180-day exclusivity period granted in the US by the Hatch Waxman Act for first-to-file generics. Failure to obtain and maintain such exclusivity periods or to successfully develop and market biosimilars could have a material adverse effect on the success of the Sandoz Division and the Group as a whole.

Further, our research and development activities must be conducted in an ethical and compliant manner. Among other things, we must be concerned with patient safety, data privacy, Current Good Clinical Practices (cGCP) requirements, data integrity, the fair treatment of patients, and animal welfare requirements. Should we fail to properly manage such issues, we risk injury to third parties, damage to our reputation, negative financial consequences as a result of potential claims for damages, sanctions and fines, and the potential that our investments in research and development activities could have no benefit to the Group.

If we are unable to maintain a flow of successful, cost-effective new products and new indications for existing products that will sustain and grow our business, cover our substantial research and development costs and the decline in sales of older products that become subject to generic or other competition, and take advantage of technological and medical advances, then this could have a material adverse effect on our business, financial condition, or results of operations.

For a further description of the approval processes that must be followed to market our products, see the sections headed "Regulation" included in the descriptions of our Innovative Medicines and Sandoz Divisions under "Item 4. Information on the Company—Item 4.B Business overview."

We could be impacted by new laws and regulations; failures to comply with laws; legal proceedings; and government investigations.

We are obligated to comply with the laws of all of the countries in which we operate and sell products with respect to an extremely wide and growing range of activities. Such legal requirements are extensive and complex. New requirements may be imposed on us as a result of changing government and public expectations regarding the healthcare industry, and acceptable corporate behavior generally.

For example, we are faced with new laws and regulations requiring more transparency in how we do business, including with respect to our interactions with healthcare professionals and organizations. These laws and regulations include requirements that we disclose payments or other transfers of value made to healthcare professionals and organizations, as well as information relating to the costs and prices for our products. Such measures, including any additional such measures that may be put in place, could have a material adverse impact on our business, financial condition, or results of operations.

In addition, companies and executives in our industry continue to face significant government investigations, legal proceedings and law enforcement activities worldwide, and various US, federal and state, and international laws and regulations, including those pertaining to government benefit programs, reimbursement, rebates, price reporting and regulation, and healthcare fraud and abuse. Such activities can involve criminal proceedings, and can retroactively challenge practices previously considered to be legal. There is also a risk that governance for our medical and patient support activities, and our interactions with patient organizations, may be inadequate or fail, or that we may undertake activities based on improper or inadequate scientific justification. Our failure to comply with applicable requirements for such activities could result in adverse regulatory or legal action, damage our reputation, and have a significant negative impact on our financial results.

The laws and regulations relevant to the healthcare industry are broad in scope and are subject to change and evolving interpretations, which could require us to incur substantial costs associated with compliance or to alter one or more of our sales or marketing practices. In addition, violations of these laws, or allegations of such violations, could disrupt our business and result in a material adverse effect on our business and results of operations. A number of our subsidiaries across each of our divisions are, or may in the future be, subject to var-

ious investigations and legal proceedings, including proceedings regarding sales and marketing practices, pricing, corruption, trade regulation and embargo legislation, product liability, commercial disputes, employment and wrongful discharge, antitrust matters, securities, insider trading, occupational health and safety, environmental matters, tax, cybersecurity, data privacy and intellectual property.

In addition, our use of the internet, social media and mobile tools also carries risks related to potential violations of rules regulating the promotion of prescription medicines and the potential loss of confidential information, trade secrets or other intellectual property. There continue to be significant uncertainties as to the rules that apply to such communications and as to the interpretations that health authorities will apply in this context, and as a result, despite our efforts to comply with applicable rules, there is a risk that our use of the internet, social media and mobile technologies may cause us to be found in violation of applicable regulations.

Our Sandoz Division may from time to time seek approval to market a generic version of a product before the expiration of patents claimed by the marketer of the patented product. We do this in cases where we believe that the relevant patents are invalid or unenforceable, or would not be infringed by our generic product. As a result, affiliates of our Sandoz Division frequently face patent litigation, and in certain circumstances, we may make the business decision to market a generic product even though patent infringement actions are still pending. Should we elect to do so and conduct a so-called "launch at risk," we could face substantial damages if the final court decision is adverse to us.

For information on significant legal matters pending against us, see "Item 18. Financial Statements—Note 20. Provisions and other non-current liabilities" and "Item 18. Financial Statements—Note 28. Commitments and contingencies."

To help us in our efforts to comply with the many requirements that impact us, we have a significant global ethics and compliance program in place, and we devote substantial time and resources to efforts to ensure that our business is conducted in a lawful and publicly acceptable manner. Despite our efforts, any actual or alleged failure to comply with law or with heightened public expectations could lead to substantial liabilities that may not be covered by insurance, or to other significant losses, and could affect our business, financial position and reputation.

Legal proceedings and investigations are inherently unpredictable, and large judgments sometimes occur. As a consequence, we may in the future incur judgments that could involve large payments, including the potential repayment of amounts allegedly obtained improperly, and other penalties, including treble damages. In addition, such legal proceedings and investigations, even if meritless, may affect our reputation, may create a risk of potential exclusion from government reimbursement programs in the US and other countries, and may lead to civil litigation. As a result, having taken into account all relevant factors, we have in the past and may again in the future enter into major settlements of such claims without bringing them to final legal adjudication by courts or other such bodies, despite having potentially significant defenses against them, in order to limit the risks they pose to our business and reputation. Such settlements may require us to pay significant sums of money and to enter into corporate integrity or similar agreements, which are intended to regulate company behavior for extended periods.

Any such judgments or settlements, and any accruals that we may take with respect to potential judgments or settlements, could have a material adverse impact on our business, financial condition, or results of operations, as well as on our reputation.

Our reliance on outsourcing key business functions to third parties heightens the risks faced by our businesses.

For business reasons, we outsource the performance of certain key business functions to third parties, and invest a significant amount of effort and resources into doing so, including to manage and oversee such third parties. Such outsourced functions can include research and development collaborations, manufacturing operations, warehousing and distribution activities, certain finance functions, marketing activities, data management and others. We may particularly rely on third parties in developing countries, including for the sales, marketing and distribution of our products, and to obtain the intermediate and raw materials used in the manufacture of our products. Some of these third parties do not have internal compliance resources comparable to those within our organization.

Our reliance on outsourcing and third parties for the research and development or the manufacturing of our products poses certain risks, including misappropriation of our intellectual property, failure of the third party to comply with regulatory and quality assurance requirements, unexpected supply disruptions, breach of the research and development or manufacturing agreement by the third party, and the unexpected termination or nonrenewal of the agreement by the third party.

In addition, governments and the public expect major corporations, including Novartis, to take responsibility for and report on compliance with various human rights, responsible sourcing and environmental practices, as well as other actions of their third-party contractors around the world. Examples of this include the conflict minerals disclosure requirements in the US, and the UK Modern Slavery Act.

Ultimately, if third parties fail to meet their obligations to us, we may lose our investment in the collaborations or fail to receive the expected benefits of our agreements with such third parties. In addition, should any of these third parties fail to comply with the law or our standards, or should they otherwise act inappropriately in the course of their performance of services for us, there is a risk that we could be held responsible for their acts, that our reputation may suffer, and that penalties may be imposed upon us. Any such failures by third parties could have a material adverse effect on our business, financial condition, results of operations, or reputation.

Compliance with data privacy laws and regulations is complex and could expose us to a variety of risks.

We operate in an environment that relies on the collection, processing, analysis and interpretation of large sets

of patients' and other individuals' personal information, including via social media and mobile technologies, and that also, in many situations, requires that data to freely flow across borders of numerous countries in which there are different, and potentially conflicting, data privacy laws in effect. For example, the EU General Data Protection Regulation (GDPR), which took effect in May 2018, and the California Consumer Privacy Act, which took effect in January 2020, impose stringent requirements on how we and third parties with whom we contract collect, share, export or otherwise process personal information, and provide for significant penalties for noncompliance. Breaches of our systems or those of our third-party contractors, or other failures to protect the data we collect from misuse or breach by third parties, could expose such personal information to unauthorized persons.

Any event involving the substantial loss of personal information or other privacy violations could give rise to significant liability, reputational harm, damaged relationships with business partners, and potentially substantial monetary penalties under laws enacted or being enacted around the world. Such events could also lead to restrictions on our ability to use personal information and/or transfer personal information across country borders.

The manufacture of our products is complex and highly regulated.

The manufacture of our products relies on technically complex processes and, in some cases, highly specialized raw materials, and is highly regulated. Deviations, difficulties or delays in production, or failure to obtain specialized raw materials, have in the past resulted in some of the following, and may in the future result in: shut-downs, work stoppages, approval delays, voluntary market withdrawals, product recalls, penalties, supply disruptions or shortages, increased costs, product liability or reputational harm. In addition, whether our products and the related raw materials are manufactured at our own dedicated manufacturing facilities or by third parties, we must ensure that all manufacturing processes comply with current Good Manufacturing Practices (cGMP) and other applicable regulations. Failure to comply with cGMP requirements have in the past resulted in some of the following legal or regulatory actions, and may in the future result in possible legal or regulatory actions, such as warning letters, suspension of manufacturing, seizure of products, injunctions, voluntary recall of products, failure to secure product approvals, or debarment. Any of these events could have a material adverse effect on our business, financial condition and results of operations.

The technically complex manufacturing processes required to manufacture many of our products increase the risk of production failures and product recalls, and can increase the cost of producing our goods. Many of our products require a supply of highly specialized raw materials, such as cell lines, tissue samples, bacteria, viral strains and radioisotopes. For some of our products and raw materials, we rely on a single source of supply for ingredients or relevant components. In addition, we manufacture and sell a number of sterile products, biologic products and products involving advanced therapy platforms, such as CAR-T therapies, gene therapies and radioligand therapies, all of which are particularly complex and involve highly specialized manufacturing technologies. As a result, even slight deviations at any point in their production processes or in material used may lead to production failures or recalls. See also "—We may not successfully achieve our goals in transactions or reorganizations," below, with regard to our efforts to reorganize our product manufacturing organization, and "—Climate change, extreme weather events, earthquakes and other natural disasters could adversely affect our business," below.

We may fail to develop or take advantage of transformational technologies and business models.

Rapid progress in medical and digital technologies and in the development of sometimes radical new business models is substantially transforming numerous industries around the world, creating new businesses and new opportunities for revenue and profit, while sometimes quickly rendering established businesses uncompetitive or obsolete. Such transformations, both positive and negative, may impact the healthcare industry, and numerous companies from the digital technology and other industries are seeking to enter the healthcare field.

To take advantage of these opportunities, Novartis has embarked upon a digital transformation strategy, with the goal of making Novartis an industry leader in leveraging advanced analytics and other new technologies. We expect to invest substantial resources into efforts to improve the way we use data in drug discovery and development; to improve the ways we engage with patients, doctors and other stakeholders; and to automate business processes. Our success in these efforts will depend on many factors, including a cultural change among our employees, attracting and retaining employees with appropriate skills and mindsets, and successfully innovating across a variety of technology fields. However, there is no guarantee that these efforts will succeed, that we will successfully transform our business model, or that we will be able to do so at any particular cost or in the necessary time frame.

At the same time, other companies with specialized expertise or business models and substantial resources are entering the healthcare field, from research and development to pharmaceutical distribution, potentially disrupting our relationships with patients, healthcare professionals, customers, distributors and suppliers, with unknown potential consequences for us. In addition, we face new competitors from different regions of the world, including China, which is aggressively expanding its role in the sciences and in many industries. Such new competitors may successfully impact our share of the healthcare value chain, or even develop products or technologies that could make our products uncompetitive or obsolete.

If our digital transformation efforts, or our efforts to bring advanced therapy platforms to market, should fail, then there is a risk that we may fail to create the innovative new products, tools or techniques that the new medical and digital technologies may make possible, or that we may fail to create them as quickly and efficiently as such technologies may enable. We may also lose opportunities to engage with our stakeholders and to profit from improved business processes, and we may lose the

resources devoted to these efforts to transform our business. At the same time, should third parties successfully enter the healthcare field with disruptive new technologies or business models, then we potentially may see our business supplanted in whole or in part by these new entrants. Any such events could have a material adverse effect on our business, financial condition, or results of operations.

We may not successfully achieve our goals in transactions or reorganizations.

As part of our strategy, from time to time we acquire and divest products or entire businesses, and enter into strategic alliances and collaborations. For example, we previously announced plans to divest the Sandoz US dermatology business and US oral solids portfolio, and we recently completed the spin-off of our Alcon Division, the acquisition of the assets associated with *Xiidra*, and the acquisition of The Medicines Company.

Our alliances and acquisitions are a significant source of our growth, yet our efforts may be impacted by our ability to identify products or businesses that are suitable for acquisition; by governmental regulation, including market concentration limitations; and by overtures from competitors that may increase the prices of potential targets. Once an acquisition is agreed upon with a third party, we may not be able to complete the acquisition in a timely manner or at all, nor can there be assurance that pre-acquisition due diligence will have identified all possible issues that might arise with regard to an acquisition. Our efforts on acquisitions and divestments can also divert management's attention from our existing businesses.

Further, after an acquisition, efforts to develop and market acquired products, to integrate the acquired business or to achieve expected synergies may not meet expectations, or may otherwise not be successful, as a result of difficulties in retaining key personnel, customers and suppliers, or differences in corporate culture, standards, controls, processes and policies. Acquisitions can also result in liabilities being incurred that were not known at the time of acquisition, or the creation of tax or accounting issues. Acquired businesses are not always in full compliance with legal, regulatory or Company standards, including, for example, cGMP or cGCP standards, requiring remediation efforts that could be costly and time-consuming. Also, our strategic alliances and collaborations with third parties may not achieve their intended goals and objectives in any particular time frame, or at all.

Similarly, we cannot ensure that we will be able to successfully divest or spin off businesses or other assets that we have identified for this purpose, or that any completed divestment or spin-off will achieve the expected strategic benefits, operational efficiencies or opportunities, or that the divestment or spin-off will ultimately maximize shareholder value.

In addition, as part of our strategy, from time to time we reassess the optimal organization of our business, such as our ongoing efforts to centralize and optimize our manufacturing and business services organizations. The expected benefits of such reorganizations may never be fully realized or may take longer to realize than expected. There can be no certainty that the businesses and functions involved will be successfully integrated into the new organizations, that key personnel will be retained, or that we will be able to attract talent during ongoing transformations and reorganizations. Disruption from reorganizations may make it more difficult to maintain relationships with customers, employees or suppliers; could result in shortfalls in program oversight; could negatively impact our reputation; and may result in the Group not achieving the expected productivity and financial benefits.

If we fail to successfully address these risks, or to devote adequate resources to them, we may fail to achieve our strategic objectives, including our growth strategy, or otherwise may not realize the intended benefits of the acquisition, divestiture, strategic alliance, spin-off or reorganization.

Environmental, social and governance matters may impact our business and reputation.

Increasingly, in addition to the importance of their financial performance, companies are being judged by their performance on a variety of environmental, social and governance (ESG) matters, which are considered to contribute to the long-term sustainability of companies' performance.

A variety of organizations measure the performance of companies on such ESG topics, and the results of these assessments are widely publicized. In addition, investment in funds that specialize in companies that perform well in such assessments are increasingly popular, and major institutional investors have publicly emphasized the importance of such ESG measures to their investment decisions. Topics taken into account in such assessments include, among others, the company's efforts and impacts on climate change and human rights, ethics and compliance with law, and the role of the company's board of directors in supervising various sustainability issues. In addition to the topics typically considered in such assessments, in our healthcare industry, issues of the public's ability to access our medicines are of particular importance.

We actively manage a broad range of such ESG matters, taking into consideration their expected impact on the sustainability of our business over time, and the potential impact of our business on society and the environment. However, in light of investors' increased focus on ESG matters, there can be no certainty that we will manage such issues successfully, or that we will successfully meet society's expectations as to our proper role. Any failure or perceived failure by us in this regard could have a material adverse effect on our reputation and on our business, share price, financial condition, or results of operations, including the sustainability of our business over time.

See also "—Our reliance on outsourcing key business functions to third parties heightens the risks faced by our businesses," above, and "—Climate change, extreme weather events, earthquakes and other natural disasters could adversely affect our business," below.

Falsified products could harm our patients and reputation.

Our industry continues to be challenged by the vulnerability of distribution channels to falsified medicines

(which includes counterfeit and stolen medicines under the definition of the World Health Organization). The presence of falsified medicines is growing in terms of the markets affected and on the internet. Falsified medicines pose patient safety risks and can be seriously harmful or life-threatening. They are often visually indistinguishable from genuine medicines and usually require a forensic authentication process of the packaging and/or the actual medicine to ascertain their falsified nature and determine their likely impact on patient safety. Reports of adverse events related to falsified medicines and increased levels of falsified medicines in the healthcare system affect patient confidence in our genuine medicines and in healthcare systems in general. These events could also cause us substantial reputational and financial harm, and potentially lead to litigation if the adverse event from the falsified medicine is mistakenly attributed to the genuine one. Thefts of our genuine products from warehouses or plants, or while in-transit, which are then not properly stored and are later sold through unauthorized channels, could adversely impact patient safety, our reputation and our business. Further, there is a direct financial loss when, for example, falsified medicines replace sales of genuine medicines, or genuine medicines are recalled following discovery of falsified products.

Political and economic instability may impact our results.

Unpredictable political conditions currently exist in various parts of the world, including a backlash in certain areas against free trade, anti-immigrant sentiment, anti-corporatist sentiment, social unrest, fears of terrorism, and the risk of direct conflicts between nations. In the US, for example, the presidential administration's imposition of tariffs and opposition to free-trade agreements, including the recent tariffs imposed by the US and China, and the possibility of additional tariffs or other trade restrictions relating to trade between the US and other countries, could have a negative impact on international trade in general and our business in particular. Given that the status of trade negotiations remains subject to change, we cannot be certain of the nature or extent of the potential impact on our business. For example, if tariffs on pharmaceutical products or active pharmaceutical ingredients (APIs) were increased, this could impact the profitability of our products. Furthermore, significant conflicts continue in certain parts of the world. Collectively, such unstable conditions could, among other things, disturb the international flow of goods and increase the costs and difficulties of international transactions, which could significantly impact time to market and our ability to supply our products to patients in an un-disrupted fashion, and further erode reimbursement levels for innovative therapies.

As a result of the UK's Brexit vote, the British government has been in the process of negotiating the terms of the UK's future relationship with the EU, requiring us to make certain contingency plans for scenarios in which the UK and the EU do not reach a mutually satisfactory understanding as to that relationship. We cannot predict whether there will be any such understanding, or if such an understanding is reached, whether its terms will vary in ways that result in greater restrictions on imports and exports between the UK and EU countries, and increased regulatory complexities that could materially adversely impact our business operations in the UK.

In addition, local economic conditions may adversely affect the ability of payers, as well as our distributors, customers, suppliers and service providers, to pay for our products, or otherwise to buy necessary inventory or raw materials, and to perform their obligations under agreements with us. Although we make efforts to monitor these third parties' financial condition and their liquidity, our ability to do so is limited, and some of them may become unable to pay their bills in a timely manner, or may even become insolvent, which could negatively impact our business or results of operations. These risks may be elevated with respect to our interactions with fiscally challenged government payers, or with third parties with substantial exposure to such payers.

Financial market issues may also result in a lower return on our financial investments, and a lower value on some of our assets. Alternatively, inflation could accelerate, which could lead to higher interest rates, increasing our costs of raising capital. Uncertainties around future central bank and other economic policies in the US and EU, as well as high debt levels in certain other countries, could also impact world trade. Sudden increases in economic, currency or financial market volatility in different countries have also impacted, and may continue to unpredictably impact, our business or results of operations, including the conversion of our operating results into our reporting currency, the US dollar, as well as the value of our investments in our pension plans. For further information on such risks, see "—Foreign exchange fluctuations may adversely affect our earnings and the value of some of our assets," and "—Any inaccuracy in the assumptions and estimates used to calculate our pension plan and other post-employment obligations could substantially increase our pension-related expenses," below. See also "Item 5. Operating and Financial Review and Prospects—Item 5.B Liquidity and capital resources—Effects of currency fluctuations," "Item 5. Operating and Financial Review and Prospects—Item 5.B Liquidity and capital resources—Condensed consolidated balance sheets," "Item 18. Financial Statements—Note 15. Trade receivables" and "Item 18. Financial Statements—Note 29. Financial instruments—additional disclosures."

Similarly, increased scrutiny of corporate taxes and executive pay may lead to significant business disruptions or other adverse business conditions, and may interfere with our ability to attract and retain qualified personnel. See "—Changes in tax laws or their application could adversely affect our financial results" and "—An inability to attract and retain qualified personnel could adversely affect our business," below.

Our business may be impacted by economic and financial conditions directly affecting consumers. Given the requirements in certain countries that patients directly pay an increasingly large portion of their own healthcare costs, there is a risk that consumers may cut back on prescription drugs to help cope with rising costs.

At the same time, significant changes and potential future volatility in the financial markets, in the consumer and business environment, in the competitive landscape, and in the global political and security landscape make

it increasingly difficult for us to predict our revenues and earnings into the future. As a result, any revenue or earnings guidance or outlook that we have given or might give may be overtaken by events, or may otherwise turn out to be inaccurate. Though we endeavor to give reasonable estimates of future revenues and earnings at the time we give such guidance, based on then-current knowledge and conditions, there is a significant risk that such guidance or outlook will turn out to be incorrect.

Separately and collectively, such factors may have a material adverse effect on our revenues, results of operations, financial condition and, if circumstances worsen, our ability to raise capital at reasonable rates.

Our indebtedness could adversely affect our operations.

As of December 31, 2019, we had USD 20.4 billion of non-current financial debt and USD 7.0 billion of current financial debt. Our current and long-term debt requires us to dedicate a portion of our cash flow to service interest and principal payments and, if interest rates rise, this amount may increase. As a result, our existing debt may limit our ability to use our cash flow to fund capital expenditures, to engage in transactions, or to meet other capital needs, or otherwise may place us at a competitive disadvantage relative to competitors that have less debt. Our debt could also limit our flexibility to plan for and react to changes in our business or industry, and increase our vulnerability to general adverse economic and industry conditions, including changes in interest rates or a downturn in our business or the economy. We may also have difficulty refinancing our existing debt or incurring new debt on terms that we would consider to be commercially reasonable, if at all.

Intangible assets and goodwill on our books may lead to significant impairment charges.

We carry a significant amount of goodwill and other intangible assets on our consolidated balance sheet, primarily due to acquisitions, including, in particular, substantial goodwill and other intangible assets obtained as a result of our acquisitions including *Xiidra*, Endocyte, AveXis, AAA, and certain oncology assets from GSK. As a result, we may incur significant impairment charges in the future if the fair value of the intangible assets and the groupings of cash-generating units containing goodwill would be less than their carrying value on the Group's consolidated balance sheet at any point in time.

We regularly review for impairment our long-lived intangible and tangible assets, including identifiable intangible assets, investments in associated companies, and goodwill. Goodwill, intangible assets with an indefinite useful life, acquired research projects not ready for use, and acquired development projects not yet ready for use are subject to impairment review at least annually. Other long-lived assets are reviewed for impairment when there is an indication that an impairment may have occurred. Impairment testing under IFRS may lead to impairment charges in the future. Any significant impairment charges could have a material adverse effect on our results of operations and financial condition. In 2019, for example, we recorded intangible asset impairment charges of USD 1.1 billion.

For a detailed discussion of how we determine whether an impairment has occurred, what factors could result in an impairment, and the impact of impairment charges on our results of operations, see "Item 5. Operating and Financial Review and Prospects—Item 5.A Operating results—Critical accounting policies and estimates—Impairment of goodwill, intangible assets and property, plant and equipment," "Item 18. Financial Statements—Note 1. Significant accounting policies" and "Item 18. Financial Statements—Note 11. Goodwill and intangible assets."

Competition, failure to adapt to changing business conditions, and complexities in the development of biosimilars may impact the success of our Sandoz Division.

Sandoz faces intense competition from companies that market patented pharmaceutical products as well as strong competition from other generic and biosimilar pharmaceutical companies, which aggressively compete for market share, including through significant price competition. Such competitive actions may increase the costs and risks associated with our efforts to introduce and market such products, may delay the introduction or marketing of such products, and may further limit the prices at which we are able to sell these products and impact our results of operations. In particular, in the US in past years, industrywide price competition among generic pharmaceutical companies and consolidation of buyers caused significant declines in sales and profits of Sandoz. In light of this, we agreed to sell the Sandoz US dermatology business and generic US oral solids portfolio to Aurobindo Pharma USA Inc. This transaction is expected to be completed in the first quarter of 2020 pending regulatory approval. There is no certainty that the remaining Sandoz US business will be commercially successful. Sandoz has also announced a refined strategy, with the objective of being an industry leader as a focused generics company, which bears risk in a competitive environment in which other generics companies strive to also launch first and in which originators rigorously defend the exclusivity of their products. The refined strategy touches many fundamental areas of the Sandoz organization, including portfolio strategy, resource allocation, production, development, sales and governance. These changes may fail to achieve their intended goals, and may negatively affect the motivation of employees in certain parts of Sandoz.

In addition, Sandoz has invested heavily in the development of biosimilar drugs, with the expectation that such products offer the potential for higher profitability. If Sandoz should fail in its efforts to develop and market biosimilars, due to the fact that their development is more difficult and expensive than the development of standard generic drugs, or if the developing biosimilars regulations do not ultimately favor the development and sale of such products, or if we are unable to sell our biosimilar products for a sufficient price, then this could have an adverse effect on the success of our Sandoz Division, and we may fail to achieve expected returns on the investments by Sandoz in the development of biosimilars.

See also "—Our research and development efforts may not succeed" above, with regard to the risks involved in our efforts to develop biosimilars and differentiated

generic products and to obtain exclusivity periods, and "—Ongoing consolidation among our distributors and retailers is increasing both the purchasing leverage of key customers and the concentration of credit risk," below, with respect to the impact of such consolidation on our pricing.

Changes in tax laws or their application could adversely affect our financial results.

Our multinational operations are taxed under the laws of the countries and other jurisdictions in which we operate. However, the integrated nature of our worldwide operations can produce conflicting claims from revenue authorities in different countries as to the profits to be taxed in the individual countries, including potential disputes relating to the prices our subsidiaries charge one another for intercompany transactions, known as transfer pricing. The majority of the jurisdictions in which we operate have double tax treaties with other foreign jurisdictions, which provide a framework for mitigating the impact of double taxation on our revenues and capital gains. However, mechanisms developed to resolve such conflicting claims are largely untried, and can be expected to be very lengthy.

In recent years, tax authorities around the world have increased their scrutiny of company tax filings, and have become more rigid in exercising any discretion they may have. As part of this, the Organization for Economic Co-operation and Development (OECD) has proposed a number of tax law changes under its Base Erosion and Profit Shifting (BEPS 2015 Agenda) Action Plans to address issues of transparency, coherence and substance. In addition, in 2019 the OECD launched a new initiative on behalf of the G20 to minimize profit shifting by working toward a global tax framework that ensures that corporate income taxes are paid where consumption takes place and also introduces a global standard on minimum taxation combined with new tax dispute resolution processes. The respective principles are currently being evaluated.

Most of the rules of the EU Anti-Tax Avoidance Directive, which seeks to prevent tax avoidance by companies and to ensure that companies pay appropriate taxes in the markets where profits are effectively made and business is effectively performed, apply as of January 1, 2019. The EU also adopted a new Directive on Administrative Cooperation (DAC6) in 2018, which seeks additional reporting. In addition, the European Commission continues to extend the application of its policies seeking to limit fiscal aid by member states to particular companies, and the related investigation of the member states' practices regarding the issuance of rulings on tax matters relating to individual companies.

These OECD and EU tax reform initiatives also need local country implementation, including in our home country of Switzerland, which may result in significant changes to established tax principles. Although we have taken steps to be in compliance with the evolving OECD and EU tax initiatives, and will continue to do so, significant uncertainties remain as to the outcome of these efforts.

In Switzerland, the Basel-Stadt Cantonal Tax Reform was approved by voters in February 2019, with parts retroactive from January 1, 2019. In May 2019, Swiss voters approved the Swiss Federal Tax Reform. With the enactment of this tax reform, new elements were introduced into law as of January 1, 2020. These include the abolishment of special taxed regimes, notional interest deduction, and an implementation of a Patent-Box, which provides tax advantages on income generated from intellectual property rights. Some of the new elements as well as the transition rules for the Swiss tax reform might be regarded as not completely aligned with OECD and EU regulations, and might require subsequent amendments, the need for and impact of which are difficult to predict.

In the US, the Tax Cuts and Jobs Act, enacted at the end of 2017, included significant changes to US corporate income tax law. Though we continue to monitor regulations and other guidance issued by the US Department of the Treasury, it is uncertain whether the application of new guidance, particularly with respect to the tax limitation of interest deductions and qualification of base erosion payments, will have a material effect on our financial position and results of operations.

In general, such tax reform efforts will require us to continually assess our organizational structure against tax policy trends, could lead to an increased risk of international tax disputes and an increase in our effective tax rate, and could adversely affect our financial results.

Foreign exchange fluctuations may adversely affect our earnings and the value of some of our assets.

Changes in exchange rates between the US dollar, our reporting currency, and other currencies can result in significant increases or decreases in our reported sales, costs and earnings as expressed in US dollars, and in the reported value of our assets, liabilities and cash flows.

In addition to ordinary market risk, there is a risk that countries could take affirmative steps that could significantly impact the value of their currencies. Such steps could include "quantitative easing" measures and potential withdrawals by countries from common currencies. In addition, countries facing local financial difficulties, including countries experiencing high inflation rates and highly indebted countries facing large capital outflows, may impose controls on the exchange of foreign currency. In Argentina, for example, where we have subsidiary operations, the government authorized currency exchange controls in 2019. Currency exchange controls could limit our ability to distribute retained earnings from our local affiliates, or to pay intercompany payables due from those countries. See "—Political and economic instability may impact our results," above.

Despite measures undertaken to reduce or hedge against foreign currency exchange risks, because a significant portion of our earnings and expenditures are in currencies other than the US dollar, including expenditures in Swiss francs that are significantly higher than our revenue in Swiss francs, any such exchange rate volatility may negatively and materially impact our results of operations and financial condition, and may impact the reported value of our net sales, earnings, assets and liabilities. In addition, the timing and extent of such volatility can be difficult to predict. Further, depending on the movements of particular foreign exchange rates, we may be materially adversely affected at a time when the same

currency movements are benefiting some of our competitors.

For more information on the effects of currency fluctuations on our consolidated financial statements and on how we manage currency risk, see "Item 5. Operating and Financial Review and Prospects—Item 5.B Liquidity and capital resources—Effects of currency fluctuations" and "Item 18. Financial Statements—Note 29. Financial instruments—additional disclosures."

Ongoing consolidation among our distributors and retailers is increasing both the purchasing leverage of key customers and the concentration of credit risk.

Increasingly, a significant portion of our global sales is made to a relatively small number of drug wholesalers, retail chains and other purchasing organizations. For example, our three most important customers globally are all in the US, and accounted for approximately 23%, 17% and 10%, respectively, of net sales in 2019. The largest trade receivables outstanding were for these three customers, amounting to 14%, 12% and 7%, respectively, of the Group's trade receivables at December 31, 2019. The trend has been toward further consolidation among distributors and retailers, particularly in the US. As a result, we may be affected by fluctuations in the buying patterns of such customers, and these customers are gaining additional purchasing leverage, increasing the pricing pressures facing our businesses. These pressures can particularly impact our Sandoz Division, the generic products of which can often be obtained from numerous competitors. Moreover, we are exposed to a concentration of credit risk as a result of this concentration among our customers. If one or more of our major customers experienced financial difficulties, the effect on us would be substantially greater than in the past, and could include a substantial loss of sales and an inability to collect amounts owed to us. Such events could have a material adverse effect on our business, financial condition, or results of operations.

An inability to attract and retain qualified personnel could adversely affect our business.

We highly depend upon skilled personnel in key parts of our organization, and we invest heavily in recruiting, training and retaining qualified individuals, including significant efforts to enhance the diversity of our workforce. The loss of the service of key personnel – including senior members of our scientific and management teams, high-quality researchers and development specialists, and skilled personnel in developing countries – could delay or prevent the achievement of major business objectives.

Our future growth will demand talented associates and leaders, yet the market for talent has become increasingly competitive. Emerging Growth Markets, in particular China and India, are expected to continue to be an important source of growth, but in many of these countries there is a limited pool of executives with the training and international experience needed to work successfully in a global organization like Novartis. In addition, we are undertaking a cultural transformation to an "inspired, curious and unbossed" organization, which is a core organizational imperative. Inability to successfully implement this cultural change may result in cynicism and disengagement of our associates, as well as impede our ability to retain key talent in strategically important areas. This risk is augmented by ongoing organizational changes, as well as changes to our culture and leadership expectations that may conflict with some leaders' preferred leadership styles. Consequently, we may fail to retain key talent, who may possess capabilities that are rare and highly sought in the marketplace, unless they are appropriately engaged, motivated and incentivized. The departure of key talent could have a material adverse effect on our business performance, results of operations and reputation.

In addition, shifting demographic trends are expected to result in fewer students, fewer graduates and fewer people entering the workforce in the Western world in the near future. Moreover, many members of younger generations around the world have changing expectations toward careers, engagement and the integration of work in their overall lifestyles.

The supply of talent for certain key functional and leadership positions is decreasing, and a talent gap is visible for some professions and geographies. Recruitment is increasingly regional or global in specialized fields such as clinical development, biosciences, chemistry and information technology. In addition, the geographic mobility of talent is expected to decrease in the future, with talented individuals in developed and developing countries anticipating ample career opportunities closer to home than in the past. This decrease in mobility may be worsened by anti-immigrant sentiments in many countries, and laws discouraging immigration. See "—Political and economic instability may impact our results," above.

In addition, our ability to hire qualified personnel also depends on the flexibility to reward superior performance and to pay competitive compensation. Laws and regulations on executive compensation, including legislation in our home country, Switzerland, may restrict our ability to attract, motivate and retain the required level of qualified personnel.

We face intense competition for an increasingly limited pool of qualified individuals from numerous pharmaceutical and biotechnology companies, universities, governmental entities, other research institutions, other companies seeking to enter the healthcare space, and companies in other industries. As a result, despite significant efforts on our part, we may be unable to attract and retain qualified individuals in sufficient numbers, which could have an adverse effect on our business, financial condition, or results of operations.

Environmental liabilities may adversely impact our financial results.

The environmental laws of various jurisdictions impose actual and potential obligations on us to remediate contaminated sites, including in connection with activities in the past by businesses that are no longer part of Novartis. In some cases, these remediation efforts may take many years. While we have set aside substantial provisions for worldwide environmental liabilities, there is no guarantee that additional costs will not be incurred beyond the amounts for which we have provided in the Group consolidated financial statements. If environmental contam-

ination related to our facilities or products adversely impacts third parties, if we fail to properly manage the safety of our facilities and the environmental risks, or if we are required to further increase our provisions for environmental liabilities in the future, this could have a material adverse effect on our business, financial condition, results of operations, and reputation.

See also "Item 4. Information on the Company—Item 4.D Property, plants and equipment—Environmental matters" and "Item 18. Financial Statements—Note 20. Provisions and other non-current liabilities."

Climate change, extreme weather events, earthquakes and other natural disasters could adversely affect our business.

In recent years, extreme weather events and changing weather patterns such as storms, flooding, droughts and temperature changes have become more common. As a result, we are potentially exposed to varying natural disaster or extreme weather risks such as hurricanes, tornadoes, droughts or floods, or other events that may result from the impact of climate change on the environment, such as sea level rise. For example, some of our production facilities that depend on the availability of significant water supplies are located in areas where water is increasingly scarce. Other facilities are located in places that, because of increasingly violent weather events, sea level rise, or both, are increasingly at risk of substantial flooding. As a result, we could experience increased production or other costs, business interruptions, destruction of facilities, and loss of life, all of which could have a material adverse effect on our business, financial condition, or results of operations.

In addition, our corporate headquarters, the headquarters of our Innovative Medicines Division, and certain of our major Innovative Medicines Division production and research facilities are located near earthquake fault lines in Basel, Switzerland. Other major facilities are located near major earthquake fault lines in various locations around the world. In the event of a major earthquake, we could experience business interruptions, destruction of facilities, and loss of life, all of which could have a material adverse effect on our business, financial condition, or results of operations.

The potential impacts of climate change may also include increased operating costs associated with additional regulatory requirements and investments in reducing energy, water use and greenhouse gas emissions.

Any inaccuracy in the assumptions and estimates used to calculate our pension plan and other post-employment obligations could substantially increase our pension-related expenses.

We sponsor pension and other post-employment benefit plans in various forms. These plans cover a significant portion of our current and former associates. While most of our plans are now defined contribution plans, certain of our associates remain participants in defined benefits plans. For these defined benefits plans, we are required to make significant assumptions and estimates about future events in calculating the present value of expected future plan expenses and liabilities. These include assumptions used to determine the discount rates we apply to estimated future liabilities and rates of future compensation increases. Assumptions and estimates used by Novartis may differ materially from the actual results we experience in the future, due to changing market and economic conditions, higher or lower withdrawal rates, or longer or shorter life spans of participants, among other variables. For example, in 2019, a decrease in the interest rate we apply in determining the present value of expected future defined benefit obligations of one-quarter of 1% would have increased our year-end defined benefit pension obligation for plans in Switzerland, the US, the UK, Germany and Japan, which represent 95% of the Group total defined benefit pension obligation, by USD 0.8 billion. Any differences between our assumptions and estimates and our actual experience could require us to make additional contributions to our pension funds. Further, additional employer contributions might be required if plan funding falls below the levels required by local rules. Either such event could have a material effect on our results of operations and financial condition.

For more information on obligations under retirement and other post-employment benefit plans and underlying actuarial assumptions, see "Item 5. Operating and Financial Review and Prospects—Item 5.A Operating results—Critical accounting policies and estimates—Retirement and other post-employment benefit plans" and "Item 18. Financial Statements—Note 25. Post-employment benefits for associates."

Holders of ADRs may not be able to exercise pre-emptive rights attached to shares underlying ADRs.

If a capital increase is approved, then our shareholders would generally have certain pre-emptive rights to obtain newly issued shares in an amount proportional to the nominal value of the shares they already hold. These pre-emptive rights could be excluded in certain limited circumstances with the approval of a resolution adopted at a general meeting of shareholders by a supermajority of two thirds of the votes. Pre-emptive rights, if not excluded, are transferable during the subscription period relating to a particular offering of shares and may be quoted on the SIX. US holders of ADRs may not be able to exercise the pre-emptive rights attached to the shares underlying their ADRs unless a registration statement under the US Securities Act of 1933 is effective with respect to such rights and the related shares, or an exemption from this registration requirement is available. In deciding whether to file such a registration statement, we would evaluate the related costs and potential liabilities, as well as the benefits of enabling the exercise by ADR holders of the pre-emptive rights associated with the shares underlying their ADRs. We cannot guarantee that a registration statement would be filed or that, if filed, it would be declared effective. If pre-emptive rights could not be exercised by an ADR holder, JPMorgan Chase Bank, N.A., as depositary, would, if possible, sell the holder's pre-emptive rights and distribute the net proceeds of the sale to the holder. If the depositary determines, in its discretion, that the rights could not be sold, the depositary might allow such rights to lapse. In either case, the interest of ADR holders in Novartis would be diluted and, if the depositary allowed rights to lapse, holders of ADRs would not realize any value from the pre-emptive rights.

Item 4. Information on the Company

4.A History and development of Novartis

Novartis AG

Novartis AG was incorporated on February 29, 1996, under the laws of Switzerland as a stock corporation ("Aktiengesellschaft") with an indefinite duration. On December 20, 1996, our predecessor companies, Ciba-Geigy AG and Sandoz AG, merged into this new entity, creating Novartis. We are domiciled in and governed by the laws of Switzerland. Our registered office is located at the following address:

Novartis AG
Lichtstrasse 35
CH-4056 Basel, Switzerland
Telephone: +41-61-324-1111
Web: www.novartis.com

Novartis is a multinational group of companies specializing in the research, development, manufacturing and marketing of healthcare products led by innovative pharmaceuticals and also including high-quality generic pharmaceuticals. Novartis AG, our Swiss holding company, owns, directly or indirectly, all of our significant operating companies. For a list of our significant operating subsidiaries, see "Item 18. Financial Statements—Note 32. Principal Group subsidiaries and associated companies."

The SEC maintains an internet site at http://www.sec.gov that contains reports, information statements, and other information regarding issuers that file electronically with the SEC.

Important corporate developments 2017-January 2020

The following timeline includes all important corporate developments in 2019 and January 2020, and only significant acquisitions, divestments, alliances and related corporate activities in 2018 and 2017.

2020

January
Novartis announces that its Board of Directors is nominating Bridgette Heller for election to the Board at our Annual General Meeting on February 28, 2020. Bridgette Heller brings more than 35 years of experience at Fortune 100 companies and held several executive positions in the consumer goods and healthcare industry among others at Danone, Merck & Co as well as Johnson & Johnson.

On January 6 Novartis completed its previously announced acquisition of The Medicines Company for USD 85 per share, or a total consideration of approximately USD 9.7 billion in cash on a fully diluted basis. The acquisition broadened the Novartis cardiovascular portfolio by adding inclisiran, an investigational cholesterol-lowering therapy.

2019

November
Novartis announces that its Sandoz Division has entered into an agreement for the acquisition of the Japanese business of Aspen Global Incorporated (AGI). Under the agreement, Sandoz will acquire the shares in Aspen Japan K.K. and associated assets held by AGI. Pursuant to the agreed terms of the transaction, on closing we will pay an initial cash consideration of EUR 300 million (approximately USD 336 million). In addition, deferred consideration is due to AGI, upon fulfillment of certain conditions after closing, currently estimated at approximately EUR 100 million (approximately USD 112 million). We have received all relevant approvals and this transaction is expected to be completed in the first quarter of 2020.

October
Novartis announces that its Board of Directors is nominating Dr. Simon Moroney for election to the Board at our Annual General Meeting on February 28, 2020. Dr. Moroney is one of the co-founders of the Germany-based biotechnology company MorphoSys AG and served as its CEO until September 1, 2019.

Novartis announces that the previously announced share buyback of up to USD 5 billion was completed in the third quarter of 2019, with a total of 55.8 million shares for USD 5.0 billion repurchased since the announcement in June 2018.

September
Novartis announces that its Sandoz Division has entered into a worldwide commercialization agreement with Polpharma Biologics to commercialize and distribute a proposed natalizumab biosimilar that is in Phase III clinical development for the treatment of relapsing-remitting multiple sclerosis (RRMS).

July
Novartis announces that it has completed the previously announced acquisition of the assets associated with *Xiidra* worldwide from Takeda Pharmaceutical Company Limited as of July 1, 2019. The purchase price consists of a USD 3.4 billion upfront payment, customary purchase price adjustments of USD 0.1 billion, and the potential milestone payments of up to USD 1.9 billion, which Takeda is eligible to receive upon the achievement of specified commercialization milestones.

June
Novartis announces the appointment of Marie-France Tschudin as President, Novartis Pharmaceuticals, and a member of the ECN, reporting to the CEO of Novartis, effective June 7, 2019. Marie-France Tschudin succeeds Paul Hudson, who left Novartis to take the CEO position of a multinational pharmaceuticals company.

May
Novartis announces the completion of the previously announced acquisition of IFM Tre, Inc., a privately held, US-based biopharmaceutical company focused on developing anti-inflammatory medicines targeting the NLRP3 inflammasome. The acquisition gives Novartis full rights to IFM Tre's portfolio of NLRP3 antagonists.

April
Novartis announces that Sandoz has entered into an agreement with EirGenix, Inc., to commercialize in all markets, excluding China and Taiwan, a proposed trastuzumab biosimilar, currently in Phase III clinical development for treatment of human epidermal growth factor receptor 2-positive (HER2+) breast and specific gastric cancer tumors.

Novartis announces the appointment of Richard Saynor as CEO of Sandoz and a member of the ECN, reporting to the CEO of Novartis. Richard Saynor became CEO of Sandoz effective July 15, 2019, following the March 2019 announcement that Richard Francis would step down as CEO of Sandoz, effective on March 31, 2019.

Novartis announces the completion of the spin-off of its Alcon eye care devices business through a dividend in kind distribution to holders of Novartis shares and ADRs, with each holder receiving one Alcon share for every five Novartis shares or ADRs held on April 8, 2019, at the close of business.

Novartis announces that AveXis has signed an agreement to purchase an advanced biologics therapy manufacturing campus in Longmont, Colorado, for USD 30 million.

March
Novartis announces that on March 22, 2019, certain important conditions precedent for the 100% spin-off of the Alcon eye care business have been met, including receipt of certain necessary authorizations and rulings, and that the completion of the transaction, by way of a distribution of a dividend in kind to Novartis shareholders and ADR holders, is expected to occur on April 9, 2019.

Novartis announces that it is joining the Global Chagas Disease Coalition.

February
Novartis announces that on February 28, 2019, Novartis shareholders approved the proposed 100% spin-off of the Alcon eye care division, as previously endorsed by the Novartis Board of Directors, subject to certain conditions precedent, such as no material adverse events and receipt of necessary authorizations.

Novartis announces that shareholders authorized share buybacks within the framework of an eighth share repurchase program to repurchase shares for cancellation up to a maximum of CHF 10 billion until the Annual General Meeting of Novartis in 2022.

January
Novartis announces that its Board of Directors is nominating Patrice Bula for election to the Board at our Annual General Meeting on February 28, 2019. As executive vice president and head of strategic business units, marketing, sales and Nespresso, Mr. Bula is a member of the executive board of Nestlé SA, a position he took up in 2011.

2018

December
Novartis announces that on December 21, 2018, it completed the previously announced acquisition of Endocyte, a US-based biopharmaceutical company focused on developing radioligand and CAR-T therapies for cancer treatment, in a transaction valued at approximately USD 2.1 billion.

Novartis announces an offer to acquire Cell*for*Cure from LFB. Cell*for*Cure, a French company, is one of the first and largest contract development and manufacturing organizations producing cell and gene therapies in Europe.

The acquisition was completed in March 2019 and Cell*for*Cure became a wholly owned Novartis manufacturing site managed by NTO.

November
Novartis announces that Alcon had filed an initial Form 20-F registration statement with the SEC in relation to the previously announced intention of Novartis to spin off the Alcon Division as an independent, publicly traded company.

October
Novartis announces that it has entered into a clinical development agreement with Pfizer Inc. (Pfizer) that will include a study combining tropifexor and one or more Pfizer compounds for the treatment of nonalcoholic steatohepatitis (NASH).

Novartis announces that it has entered into a licensing and equity agreement with Boston Pharmaceuticals for the development of three novel anti-infective drug candidates that are part of the Novartis Infectious Diseases portfolio, which have the potential to address the need for new agents to treat antibiotic-resistant Gram-negative infections. Under the terms of the agreement, Boston Pharmaceuticals acquired worldwide rights to two complementary candidates targeting carbapenem-resistant enterobacteriaceae (CRE), and one candidate targeting Pseudomonas infections.

September
Novartis announces it has agreed to sell selected portions of its Sandoz US portfolio, specifically the Sandoz US dermatology business and generic US oral solids portfolio, to Aurobindo Pharma USA Inc., for USD 0.8 billion in cash and potential earn-outs. This transaction is expected to be completed in the first quarter of 2020 pending regulatory approval.

Novartis announces that it plans to continue the transformation of its manufacturing network and services businesses, including a planned workforce reduction in Switzerland over a four-year period. Novartis also plans to continue the ongoing transfer of transactional activities to the five global service centers within Novartis Business Services, and to begin to transfer managerial service capabilities to these service centers.

July
Novartis announces that it has signed a renewed Memorandum of Understanding with the World Health Organization to extend its agreement for the donation of *Egaten* (triclabendazole) for the treatment of liver fluke (fascioliasis) until 2022.

Novartis announces that it has entered into an exclusive in-license agreement with Galapagos NV and MorphoSys AG for an investigational biologic compound, MOR106, a novel antibody directed against IL-17C. This transaction became effective on September 10, 2018. In October 2019, we announced the end of the clinical development program for MOR106 in atopic dermatitis.

June
Novartis announces its intention to seek shareholder approval for a 100% spin-off of its Alcon Division into a standalone public company.

Novartis announces that it will initiate a share buyback of up to USD 5 billion to be executed by the end of 2019.

Novartis announces the completion on June 1, 2018, of its previously announced divestment to GlaxoSmithKline PLC of its 36.5% stake in GSK Consumer Healthcare Holdings Ltd. for a payment of USD 13.0 billion in cash. The divestment brings to an end Novartis participation in its consumer healthcare joint venture with GSK, which was formed in 2015 as part of the Novartis portfolio transformation.

May
Novartis announces the completion of its previously announced cash tender offer to purchase all the outstanding shares of common stock of AveXis, a US-based clinical stage gene therapy company. This acquisition was completed on May 15, 2018.

April
Novartis announces that its Sandoz Division has entered into a collaboration with Pear Therapeutics to commercialize and continue development of novel prescription digital therapeutics, including reSET® for patients with substance use disorder and reSET-O® for patients with opioid use disorder who are currently receiving buprenorphine. Novartis announced the commercial launch of reSET® for patients with substance use disorder in November 2018 and announced FDA clearance of reSET-O® for patients with opioid use disorder in December 2018 and launch in January 2019. In October 2019, we announced that Pear will assume sole responsibility for commercializing both reSET® and reSET-O®.

Novartis announces a five-year commitment to the fight against malaria in conjunction with the 7th Multilateral Initiative on Malaria Conference and the Malaria Summit of the Commonwealth Heads of Government meeting. As part of its commitment, Novartis will invest more than USD 100 million over the next five years to advance research and development of next-generation treatments to combat emerging resistance to artemisinin and other currently

used antimalarials. The Company will also implement an equitable pricing strategy to maximize patient access in malaria-endemic countries when these new treatments become available.

March
Novartis announces that it has entered into a collaboration and licensing agreement with the Wyss Institute for Biologically Inspired Engineering at Harvard University and the Dana-Farber Cancer Institute, both in the US, to develop biomaterial systems for its portfolio of immuno-oncology therapies.

Novartis announces an additional strategic alliance with Science 37 to design and initiate up to 10 new clinical trials over the next three years, which are intended to blend virtual and traditional clinical trial models, with increasing degrees of decentralization toward a mostly "site-less" model.

Novartis announces a collaboration with Pear Therapeutics to develop novel prescription digital therapeutics (software applications designed to effectively treat disease and improve clinical outcomes for patients) for schizophrenia and multiple sclerosis.

February
Novartis announces an alliance with the Bill & Melinda Gates Foundation to advance development of Novartis drug candidate KDU731 for the treatment of cryptosporidiosis.

Novartis completes euro (EUR) denominated bond offerings totaling EUR 2.25 billion.

January
Novartis announces successful completion of its previously announced tender offer and subsequent offering period for all of the then-outstanding ordinary shares, including ordinary shares represented by American Depositary Shares (ADSs), of AAA, a radiopharmaceutical company that develops, produces and commercializes molecular nuclear medicines – including *Lutathera* (lutetium Lu 177 dotatate/lutetium (^{177}Lu) oxodotreotide), a first-in-class radioligand therapy product for neuroendocrine tumors – and diagnostic products. Following completion of the tender offer and subsequent offering period, Novartis ownership in AAA was 98.7% of all outstanding ordinary shares.

Novartis announces a licensing agreement and a manufacturing and supply agreement with Spark Therapeutics to develop, register and commercialize in markets outside the US voretigene neparvovec, a gene therapy approved as *Luxturna* in the EU in November 2018 for the treatment of patients with vision loss due to a genetic biallelic mutation of the RPE65 (retinal pigment epithelial 65kDa protein) gene and who have enough viable retinal cells.

Novartis announces a global collaboration between Sandoz and Biocon Ltd. to develop, manufacture and commercialize multiple biosimilars in immunology and oncology.

2017

November
Novartis announces an expanded collaboration with Amgen and the US-based Banner Alzheimer's Institute to collaborate on a new Generation Study 2 to assess whether investigational BACE1 inhibitor CNP520 can prevent or delay the symptoms of Alzheimer's disease in a high-risk population. In July 2019, we announced the decision to discontinue the investigation of CNP520 in two Phase II/III studies.

October
Novartis announces that it has made significant progress in its ongoing strategic review of the Alcon Division and has examined all options, ranging from retaining the business to a capital markets solution (e.g., an IPO or a spin-off).

Novartis announces that its over-the-counter ophthalmic products and certain surgical diagnostic products will transfer from the Innovative Medicines Division to the Alcon Division effective January 1, 2018.

September
Novartis announces a collaboration with the University of California, Berkeley to establish the Novartis-Berkeley Center for Proteomics and Chemistry Technologies.

June
Novartis announces that it has entered into a clinical research collaboration in which Bristol-Myers Squibb is to investigate the safety, tolerability and efficacy of *Mekinist* (trametinib) in combination with Opdivo® (nivolumab) and Opdivo® + Yervoy® (ipilimumab) regimen as a potential treatment option for metastatic colorectal cancer in patients with microsatellite stable tumors where the tumors are proficient in mismatch repair (MSS mCRC pMMR).

Novartis announces a collaboration with IBM Watson Health to explore development of a cognitive solution that uses real-world data and advanced analytical techniques, with the aim to provide better insights on the expected outcomes of breast cancer treatment options.

May
Novartis announces the launch of Better Hearts Better Cities, an innovative initiative to address the high rates of high blood pressure in low-income urban communities.

April
Novartis announces an expanded collaboration agreement with Amgen to co-commercialize erenumab (AMG 334) in the US, currently being investigated for the prevention of migraine. This agreement builds on the previously announced 2015 global collaboration between Novartis and Amgen.

Novartis announces that it has entered into a clinical trial agreement with Allergan plc to conduct a Phase IIb study involving the combination of a Novartis FXR agonist and Allergan's cenicriviroc for the treatment of nonalcoholic steatohepatitis (NASH).

Novartis announces that it has exercised an option to in-license ECF843, a recombinant form of human lubricin from Lubris, LLC, for ophthalmic indications worldwide (outside Europe). This transaction closed and Novartis received its exclusive license on April 21, 2017.

March
Novartis completes euro-denominated bond offerings totaling EUR 1.85 billion.

February
Novartis completes a USD 3 billion bond offering under its SEC Registration Statement on Form F-3.

January
Novartis announces that it is considering options for the Alcon Division. The review will explore all options, ranging from retaining all or part of the business to separation via a capital markets transaction (e.g., IPO or spin-off), in order to determine how best to maximize value for our shareholders.

Novartis announces that it is initiating a share buyback of up to USD 5.0 billion in 2017 under existing shareholder authority.

Novartis announces that it has entered into a collaboration and option agreement with Ionis Pharmaceuticals, Inc. (Ionis), and its affiliate Akcea Therapeutics, Inc. (Akcea), to license two investigational treatments with the potential to significantly reduce cardiovascular risk in patients suffering from high levels of lipoproteins known as Lp(a) and ApoCIII. In addition, Novartis entered into a stock purchase agreement with Ionis and Akcea. This transaction was completed on February 14, 2017.

4.B Business overview

Overview

Our purpose is to reimagine medicine to improve and extend people's lives. We use innovative science and technology to address some of society's most challenging healthcare issues. We discover and develop breakthrough treatments and find new ways to deliver them to as many people as possible. We also aim to reward those who invest their money, time and ideas in our company. Our vision is to be a trusted leader in changing the practice of medicine. Our strategy is to build a leading, focused medicines company powered by advanced therapy platforms and data science. As we implement our strategy, we have five priorities to shape our future and help us continue to create value for our company, our shareholders and society: unleash the power of our people; deliver transformative innovation; embrace operational excellence; go big on data and digital; and build trust with society.

In 2019, Novartis achieved net sales from continuing operations of USD 47.4 billion, while net income from continuing operations amounted to USD 7.1 billion and total net income to USD 11.7 billion. Headquartered in Basel, Switzerland, our Group companies employed 104 000 full-time equivalent associates as of December 31, 2019. Our products are sold in approximately 155 countries around the world.

The Group comprises two global operating divisions:

- Innovative Medicines: innovative patent-protected prescription medicines
- Sandoz: generic pharmaceuticals and biosimilars

In April 2019, we completed the previously announced spin-off of Alcon into a separately traded standalone company. To comply with IFRS, Novartis has separated the Group's reported financial data for the current and prior years into "continuing" and "discontinued" operations. Discontinued operations include the Alcon eye care devices business and certain Corporate activities attributable to the Alcon business prior to the spin-off, the gain on distribution of Alcon to Novartis AG shareholders and certain other expenses related to the spin-off. Except where noted, this Annual Report focuses on continuing operations that includes the businesses of our Innovative Medicines and Sandoz Divisions, as well as continuing Corporate activities.

Our divisions are supported by the following organizational units: the Novartis Institutes for BioMedical Research, Global Drug Development, Novartis Technical Operations and Novartis Business Services. The financial results of these organizational units are included in the results of the divisions for which their work is performed. The Novartis Institutes for BioMedical Research (NIBR) is the innovation engine of Novartis, which conducts drug discovery research and early clinical development trials for our Innovative Medicines Division. Approximately 5 600 full time equivalent scientists, physicians and business professionals at NIBR are working to discover new medicines for various diseases at sites located in the US, Switzerland and China. For more information about NIBR, see "—Innovative Medicines—Research and development—Research program" below.

Our Global Drug Development (GDD) organization oversees drug development activities for our Innovative Medicines Division and collaborates with our Sandoz Division on development of its biosimilars portfolio. GDD works collaboratively with NIBR and with the Innovative Medicines and Sandoz Divisions to execute our overall pipeline strategy. The GDD organization includes centralized global functions such as Regulatory Affairs and Global Development Operations, as well as Global Development units aligned with our business franchises. GDD includes approximately 11 000 full-time equivalent associates worldwide.

Novartis Technical Operations (NTO) manages manufacturing operations, supply chain, and quality across our Innovative Medicines and Sandoz Divisions. As the Novartis portfolio evolves, we continue to transform our operations to help ensure we can deliver the innovation and expertise needed to enable the production of new medical technologies, while increasing efficiency. NTO is expected to enhance capacity planning and adherence to quality standards, and to lower costs through simplification, standardization and external spend optimization. NTO includes approximately 25 100 full-time equivalent associates and 60 manufacturing sites across our Innovative Medicines and Sandoz Divisions.

Novartis Business Services (NBS), our shared services organization, delivers integrated solutions to all Novartis divisions and units worldwide. NBS seeks to drive efficiency and effectiveness across Novartis by simplifying and standardizing services across six service domains: human resources, real estate and facility services, procurement, information technology, commercial and medical support activities, and financial reporting and accounting operations. NBS has approximately 10 000 full-time equivalent associates in more than 30 countries. NBS works to leverage the full scale of Novartis to create value across the Company and to free up resources to invest in innovation and our product pipeline. NBS continues to transfer the delivery of selected services to its five Global Service Centers in Dublin, Ireland; Hyderabad, India; Kuala Lumpur, Malaysia; Mexico City, Mexico; and Prague, Czech Republic.

As of January 1, 2019, Novartis Internal Audit, our SpeakUp Office (formerly Business Practices Office) and Global Security were combined into one function called Novartis Business Assurance & Advisory (NBAA).

In 2019 we created a new Global Health and Corporate Responsibility (GH&CR) function to support the integration of our activities in the areas of ethics, pricing and access, global health and corporate responsibility into our core business strategy, and to help align our initiatives, funding and communications in these areas.

Innovative Medicines Division

Our Innovative Medicines Division researches, develops, manufactures, distributes and sells patented prescription medicines to enhance health outcomes for patients and healthcare providers. Innovative Medicines is organized into two global business units: Novartis Oncology and Novartis Pharmaceuticals. Novartis Pharmaceuticals consists of the following global business franchises: Ophthalmology; Neuroscience; Immunology, Hepatology and Dermatology; Respiratory; Cardiovascular, Renal and Metabolism; and Established Medicines.

Sandoz Division

Our Sandoz Division develops, manufactures, distributes and sells prescription medicines as well as pharmaceutical active substances that are not protected by valid and enforceable third-party patents. Sandoz is organized globally into three franchises: Retail Generics; Anti-Infectives and Biopharmaceuticals. In Retail Generics, Sandoz develops, manufactures and markets active ingredients and finished dosage forms of small molecule pharmaceuticals to third parties across a broad range of therapeutic areas, as well as finished dosage form anti-infectives sold to third parties. In Anti-Infectives, Sandoz manufactures and supplies active pharmaceutical ingredients and intermediates – mainly antibiotics – for internal use by Retail Generics and for sale to third-party customers. In Biopharmaceuticals, Sandoz develops, manufactures and markets protein- or other biotechnology-based products, including biosimilars, and provides biotechnology manufacturing services to other companies.

Alcon Division (discontinued operations)

Prior to the April 9, 2019 completion of the spin-off, our Alcon Division researched, developed, manufactured, distributed and sold a broad range of eye care products. Alcon was organized into two global business franchises; Surgical and Vision Care. Alcon also provided services, training, education and technical support for both the Surgical and Vision Care businesses.

Corporate activities

We separately report the results of Corporate activities. The financial results of our Corporate activities include the costs of the Group headquarters and those of corporate coordination functions in major countries. In addition, Corporate includes other items of income and expense that are not attributable to specific segments, such as certain revenues from intellectual property rights and certain expenses related to post-employment benefits, environmental remediation liabilities, charitable activities, donations and sponsorships.

Innovative Medicines

Overview

Our Innovative Medicines Division is a world leader in offering patent-protected medicines to patients and physicians. The Innovative Medicines Division researches, develops, manufactures, distributes and sells patented pharmaceuticals, and is composed of two global business units: Novartis Oncology and Novartis Pharmaceuticals.

The Novartis Oncology business unit is responsible for the commercialization of products in the areas of cancer and hematologic disorders. The Novartis Pharmaceuticals business unit is organized into the following global business franchises responsible for the commercialization of various products in their respective therapeutic areas: Ophthalmology; Neuroscience; Immunology, Hepatology and Dermatology; Respiratory; Cardiovascular, Renal and Metabolism; and Established Medicines.

The Innovative Medicines Division is the larger of our two divisions in terms of consolidated net sales. It reported consolidated net sales of USD 37.7 billion in 2019, which represented 79% of the Group's net sales.

The product portfolio of the Innovative Medicines Division includes a significant number of key marketed products, many of which are among the leaders in their respective therapeutic areas.

Innovative Medicines Division products

The following summaries describe certain key marketed products in our Innovative Medicines Division, listed according to year-end net sales within each franchise. While we typically seek to sell our marketed products throughout the world, not all products and indications are available in every country. Therefore, the indications described in these summaries may vary by country. In addition, a product may be available under different brand names depending on country and indication. Some of the products described below have lost patent protection or are otherwise subject to generic competition. Others are subject to patent challenges by potential generic competitors. Please see "—Intellectual property" for general information on intellectual property and regulatory data protection, and for further information on the status of patents and exclusivity for Innovative Medicines Division products.

Key marketed products
Novartis Oncology business unit
Oncology

- *Tasigna* (nilotinib) is an oral signal transduction inhibitor of the BCR-ABL tyrosine kinase. *Tasigna* is approved in the US, the EU, Japan and other countries for the treatment of:
  - Adults and children with Philadelphia chromosome-positive chronic myeloid leukemia (Ph+ CML) in the chronic and/or accelerated phase who are resistant or intolerant to existing treatment
  - Newly diagnosed adults and children with Ph+ CML in the chronic phase

- *Sandostatin* SC (octreotide acetate for injection) and *Sandostatin LAR* (octreotide acetate for injectable suspension) are somatostatin analogs approved in the US, the EU, Japan and other countries for the treatment of:
  - Adults with acromegaly, a chronic disease caused by the oversecretion of growth hormone, whose condition is not adequately controlled by surgery or radiotherapy
  - Patients with certain symptoms associated with carcinoid tumors and other types of functional gastrointestinal and pancreatic neuroendocrine tumors

  Sandostatin LAR is also approved in:
  - The EU and other countries for the treatment of patients with advanced neuroendocrine tumors of the midgut or of unknown primary tumor origin
  - Japan for the treatment of patients with neuroendocrine tumors of the gastrointestinal tract

- *Afinitor/Votubia* (everolimus) is an oral inhibitor of the mTOR pathway. *Afinitor* is approved in the US, the EU, Japan and other countries for oncology indications that vary by country. It is approved for the treatment of:
  - Postmenopausal women with advanced hormone receptor-positive (HR+)/human epidermal growth factor receptor 2-negative (HER2-) breast cancer, in combination with the medicine exemestane, when certain other medicines have not worked
  - Adults with renal cell carcinoma (advanced kidney cancer) when certain other medicines have not worked
  - Adults with a type of cancer known as neuroendocrine tumor (NET) of the pancreas, and non-symptomatic NET of the stomach, intestine (gastrointestinal) or lung that has progressed and cannot be treated with surgery (*Afinitor* is not indicated for use in people with carcinoid tumors that actively produce hormones)

  Everolimus is approved for additional indications as *Afinitor/Afinitor Disperz* in the US, Japan and other countries, and as *Votubia* (tablets and dispersible tablets) in the EU. The following indications vary by country:
  - Adults with a kidney tumor called angiomyolipoma, which occurs with a genetic condition called tuberous sclerosis complex (TSC), when the tumor does not require immediate surgery (tablet formulation only)
  - Adults and children who have TSC and a brain tumor called subependymal giant cell astrocytoma (SEGA) when the tumor cannot be removed completely by surgery
  - Adults and children aged 2 years and older who have TSC and certain types of seizures (epilepsy), as an added treatment to other antiepileptic medicines (dispersible tablet formulation only)

  Everolimus is available under the trade names *Zortress/Certican* for use in transplantation. It is exclusively licensed to Abbott Laboratories and sublicensed to Boston Scientific for use in drug-eluting stents.

- *Promacta/Revolade* (eltrombopag) is a once-daily oral thrombopoietin receptor agonist that works by stimulating bone marrow cells to produce platelets. It is approved in the US, the EU, Japan and other countries for the treatment of:
  - A bleeding disorder called chronic immune (idiopathic) thrombocytopenia in patients who have had an inadequate response or are intolerant to other treatments
  - Thrombocytopenia in patients with chronic hepatitis C to allow them to initiate and maintain interferon-based therapy

  Promacta/Revolade is also approved in:
  - The US and other countries as first-line therapy for adults and children aged 2 years and older with severe aplastic anemia (SAA)
  - Japan as first-line therapy for adults with SAA
  - The EU and other countries for adults with SAA who are resistant to other treatments

  Promacta/Revolade is marketed under a research, development and license agreement between Novartis and RPI Finance Trust (dba Royalty Pharma), as assignee of Ligand Pharmaceuticals.

- *Tafinlar* + *Mekinist* (dabrafenib + trametinib) is an oral combination therapy. *Tafinlar* and *Mekinist* are kinase inhibitors of the BRAF and MEK1/2 proteins, respectively, approved in combination in the US, the EU, Japan and other countries for the treatment of:
  - Adults with unresectable (not removable through surgery) or metastatic melanoma with a BRAF V600 mutation
  - Adults with stage III melanoma with a BRAF V600 mutation as an adjuvant treatment
  - Adults with advanced non-small cell lung cancer with a BRAF V600 mutation

  Additionally, the combination is approved in the US and other countries for the treatment of:
  - Adults with locally advanced or metastatic anaplastic thyroid cancer with a BRAF V600 mutation

  Tafinlar and *Mekinist* are also indicated as single agents to treat patients with unresectable or metastatic melanoma with a BRAF V600 mutation. Novartis has worldwide exclusive rights to develop, manufacture and commercialize trametinib granted by Japan Tobacco Inc.

- *Gleevec/Glivec* (imatinib mesylate/imatinib) is an oral kinase inhibitor. *Gleevec* is approved in the US for the treatment of:
  - Newly diagnosed adults and children with Ph+ CML in the chronic phase
  - Adults in the chronic, accelerated or blast crisis phase of Ph+ CML after failure of interferon-alpha therapy
  - Adults with relapsed or refractory Philadelphia chromosome-positive acute lymphoblastic leukemia (Ph+ ALL)
  - Newly diagnosed children with Ph+ ALL, in combination with chemotherapy
  - Adults with KIT (CD117)-positive gastrointestinal stromal tumors (GISTs) that cannot be surgically removed and/or have spread to other parts of the body
  - Adults who have had their KIT (CD117)-positive GIST completely surgically removed
  - Adults with advanced hypereosinophilic syndrome (HES) and/or chronic eosinophilic leukemia (CEL) who have a rearrangement of two genes called FIP1L1 and PDGFR-alpha

  Glivec is approved in the EU, Japan and other countries for the treatment of:
  - Newly diagnosed adults and children with Ph+ CML for whom bone marrow transplantation is not considered as the first line of treatment
  - Adults and children in the chronic phase of Ph+ CML after failure of interferon-alpha therapy, or in the accelerated or blast crisis phase of Ph+ CML
  - Adults with relapsed or refractory Ph+ ALL, as monotherapy
  - Newly diagnosed adults and children with Ph+ ALL, in combination with chemotherapy
  - Adults with KIT (CD117)-positive GISTs that cannot be surgically removed and/or have spread to other parts of the body
  - Adults with advanced HES and/or chronic CEL with the FIP1L1-PDGFR-alpha rearrangement
  - Adults who have had their KIT (CD117)-positive GIST completely surgically removed and who are at significant risk of relapse

  Gleevec/Glivec is also approved in other rare cancers, including:
  - In the US and the EU for the treatment of adults with myelodysplastic/myeloproliferative diseases, a group of diseases of the blood and bone marrow
  - In the US for the treatment of adults with aggressive systemic mastocytosis (a form of mast cell disease), and adults with dermatofibrosarcoma protuberans (a rare skin cancer) when surgery is not possible or the disease has spread

- *Jakavi* (ruxolitinib) is an oral inhibitor of the JAK1 and JAK2 tyrosine kinases that is the first therapy approved in the EU, Japan and other countries to treat two kinds of myeloproliferative neoplasms, a group of related and rare blood cancers characterized by the overproduction of blood cells in the bone marrow. It is approved for the treatment of:
  - Adults with myelofibrosis, including primary myelofibrosis, post-polycythemia vera myelofibrosis and post-essential thrombocythemia myelofibrosis
  - Adults with polycythemia vera who are resistant or intolerant to a medication called hydroxyurea

  Novartis licensed ruxolitinib from Incyte Corporation for development and commercialization in the indications of oncology, hematology and graft-versus-host disease outside the US. Incyte Corporation markets ruxolitinib as Jakafi® in the US.

- *Exjade* and *Jadenu* (deferasirox) are oral iron chelators approved in the US, the EU, Japan and other countries for the treatment of:
  - Adults and children aged 2 years and older who have chronic iron overload due to blood transfusions
  - Adults and children aged 10 years and older who have chronic iron overload with non-transfusion-dependent thalassemia (a group of blood disorders that do not require regular blood transfusions)

- *Votrient* (pazopanib) is an oral tyrosine kinase inhibitor that targets a number of growth factors to limit new blood vessel and tumor growth. *Votrient* is approved in the US and Japan for the treatment of:
  - Adults with advanced renal cell carcinoma (RCC)
  - Adults with advanced soft tissue sarcoma (STS) who have received chemotherapy (it is not known if *Votrient* is effective in treating adipocytic STS or certain gastrointestinal tumors)

  Votrient is also approved in the EU for the treatment of:
  - Adults with advanced RCC as first-line therapy, and adults with advanced RCC who have received cytokine therapy for advanced disease
  - Adults with certain subtypes of advanced STS who have received chemotherapy for metastatic disease or whose cancer has progressed within 12 months after neoadjuvant therapy

- *Kisqali* (ribociclib) is an oral cyclin-dependent kinase inhibitor. It is approved in the US, the EU and other countries for the treatment of:
  - Pre-, peri- and postmenopausal women with HR+/HER2- advanced or metastatic breast cancer, in combination with an aromatase inhibitor as initial endocrine-based therapy
  - Postmenopausal women with HR+/HER2- locally advanced or metastatic breast cancer, in combination with fulvestrant as initial endocrine based-therapy or following disease progression on endocrine therapy

  Kisqali was developed by the Novartis Institutes for BioMedical Research under a research collaboration with Astex Pharmaceuticals.

- *Lutathera* (lutetium Lu 177 dotatate/lutetium (^{177}Lu) oxodotreotide) is an intravenous radioligand therapy approved in the US for the treatment of:
  - Adults with somatostatin receptor-positive gastroenteropancreatic neuroendocrine tumors (GEP-

NETs), including foregut, midgut and hindgut neuroendocrine tumors

Lutathera is also approved in the EU and other countries for the treatment of:
- Adults with unresectable or metastatic, progressive, well-differentiated (G1 and G2), somatostatin receptor-positive GEP-NETs

- *Kymriah* (tisagenlecleucel) suspension for intravenous infusion is a CD19-directed genetically modified autologous chimeric antigen receptor T-cell (CAR-T) therapy. *Kymriah* is approved in the US, the EU, Japan and other countries for the treatment of:
  - Patients up to 25 years old with B-cell acute lymphoblastic leukemia that is refractory or in second or later relapse
  - Adults with relapsed or refractory diffuse large B-cell lymphoma after two or more lines of systemic therapy

- *Piqray* (alpelisib) is an oral kinase inhibitor. It is approved in the US and other countries for the treatment of:
  - Postmenopausal women, and men, with HR+/HER2- advanced or metastatic breast cancer with a PIK3CA mutation, in combination with fulvestrant following disease progression on or after an endocrine-based regimen

  Piqray received US approval in May 2019.

- *Adakveo* (crizanlizumab) is a humanized monoclonal antibody that binds to P-selectin, a cell adhesion protein that plays a central role in the multicellular interactions that can lead to vaso-occlusion in sickle cell disease. Delivered as an intravenous infusion, *Adakveo* is approved in the US to:
  - Reduce the frequency of vaso-occlusive crises (VOCs), or pain crises, in patients aged 16 years and older with sickle cell disease

  Adakveo received US approval in November 2019.

Novartis Pharmaceuticals business unit

Ophthalmology

- *Lucentis* (ranibizumab) is a recombinant, humanized, high-affinity antibody fragment that binds to vascular endothelial growth factor A (VEGF-A), a protein that causes the growth of blood vessels in the eye, which can lead to vision loss. *Lucentis* is an injectable anti-VEGF therapy specifically designed for the eye, minimizing systemic exposure. It is approved in the EU, Japan and other countries. Approvals and indications vary by country:
  - Adults with neovascular (wet) age-related macular degeneration (AMD)
  - Adults with visual impairment due to choroidal neovascularization (CNV)
  - Adults with CNV secondary to pathologic myopia
  - Adults with visual impairment due to diabetic macular edema
  - Adults with visual impairment due to macular edema secondary to retinal vein occlusion (branch and central retinal vein occlusion)
  - Adults with moderately severe to severe non-proliferative diabetic retinopathy and proliferative diabetic retinopathy
  - Preterm infants with retinopathy of prematurity (ROP) in zone I (stage 1+, 2+, 3 or 3+) or zone II (stage 3+), or aggressive posterior ROP

  Lucentis is licensed from Genentech, and Novartis holds the rights to commercialize the product outside the US. Genentech holds the rights to commercialize *Lucentis* in the US. For further information, see "Item 18. Financial Statements—Note 27. Transactions with related parties—Genentech/Roche."

- *Xiidra* (lifitegrast) is a prescription eye drop designed to block the interaction between LFA-1 and ICAM-1, inhibiting the formation of the immunological synapse and reducing inflammation. *Xiidra* is approved in the US and other countries for the treatment of:
  - The signs and symptoms of dry eye disease in patients over 17 years old

  Novartis acquired *Xiidra* from Takeda Pharmaceutical Company Limited and began recording sales as of July 1, 2019. *Xiidra* is marketed in the US. It is not currently marketed in the EU or Japan.

- *Beovu* (brolucizumab) is an injectable, humanized single-chain antibody fragment that acts as an anti-VEGF agent. It is approved in the US for the treatment of:
  - Patients with neovascular (wet) age-related macular degeneration

  Beovu received US approval in October 2019.

Immunology, Hepatology and Dermatology[1]

- *Cosentyx* (secukinumab) is an injectable fully human monoclonal antibody that specifically inhibits interleukin-17A (IL-17A), a cytokine involved in the pathogenesis of psoriasis, ankylosing spondylitis and psoriatic arthritis. It is approved in the US, the EU, Japan and other countries for the treatment of:
  - Adults with moderate-to-severe plaque psoriasis
  - Adults with active ankylosing spondylitis
  - Adults with active psoriatic arthritis

  Cosentyx is also approved in Japan for the treatment of:
  - Adults with pustular psoriasis

[1] *Xolair* sales for all indications are reported in the Respiratory franchise.

- *Ilaris* (canakinumab) is an injectable, selective, high-affinity, fully human monoclonal antibody that inhibits interleukin-1 beta (IL-1 beta), a key cytokine (a type of protein) in the inflammatory pathway. *Ilaris* is approved in the US, the EU, Japan and other countries for the treatment of:
  - Adults and children with cryopyrin-associated periodic syndromes
  - Adults and children with tumor necrosis factor receptor-associated periodic syndrome
  - Adults and children with hyperimmunoglobulin D syndrome/mevalonate kinase deficiency
  - Adults and children with familial Mediterranean fever
  - Adults and children with systemic juvenile idiopathic arthritis

  Ilaris is also approved in the EU for the treatment of:
  - Adults with Still's disease
  - Adults with refractory acute gouty arthritis

Neuroscience

- *Gilenya* (fingolimod) is an oral sphingosine-1-phosphate (S1P) receptor modulator that has a reversible lymphocyte redistribution effect and readily crosses the blood-brain barrier to bind to the S1P receptors based in the central nervous system. It is approved in the US for the treatment of:
  - Adults and children aged 10 years and older with relapsing forms of multiple sclerosis, including clinically isolated syndrome, relapsing-remitting multiple sclerosis (RRMS) and active secondary progressive multiple sclerosis (SPMS)

  Gilenya is also approved in the EU for the treatment of:
  - Adults and children aged 10 years and older who have highly active RRMS despite treatment with at least one disease-modifying agent, or who have rapidly evolving severe RRMS

  Gilenya is licensed from Mitsubishi Tanabe Pharma Corporation.

- *Zolgensma* (onasemnogene abeparvovec-xioi) is a gene therapy delivered as a single-dose intravenous infusion. It is designed to provide a functional copy of the human survival motor neuron (SMN) gene to halt disease progression through sustained SMN protein expression. *Zolgensma* is approved in the US for the treatment of:
  - Children less than 2 years old who have spinal muscular atrophy with biallelic mutations in the SMN1 gene

  Zolgensma received US approval in May 2019 and is marketed by AveXis, a Novartis company.

- *Aimovig* (erenumab-aooe/erenumab) is a once-monthly injection that can be self-administered or administered by another trained person. It is specifically designed to block the calcitonin gene-related peptide receptor (CGRP-R), which plays a critical role in migraine. It is approved:
  - In the US for the prevention of migraine in adults
  - In the EU for the prevention of migraine in adults who have at least four migraine days per month

  Aimovig is launched in 38 countries. Novartis and Amgen co-commercialize *Aimovig* in the US, where Amgen records sales. Novartis has exclusive commercialization rights for all ex-US territories, excluding Japan. The collaboration continues during the previously announced litigation between the companies and will remain in force until and unless a final court decision terminates the agreements.

- *Mayzent* (siponimod) is an oral, selective S1P receptor modulator. It binds selectively to the S1P receptor subtypes 1 and 5, and penetrates the central nervous system, where it may impact central nervous system inflammation and repair mechanisms. *Mayzent* is approved:
  - In the US for the treatment of adults with relapsing forms of multiple sclerosis, including clinically isolated syndrome, relapsing-remitting multiple sclerosis (RRMS) and active secondary progressive multiple sclerosis (SPMS)
  - In the EU for the treatment of adults with SPMS with active disease

  Mayzent received US approval in March 2019 and EU approval in January 2020.

Respiratory

- *Xolair* (omalizumab) is an injectable prescription medicine and the only approved antibody designed to target and block immunoglobulin E (IgE). It is approved in the US, the EU, Japan and other countries for the treatment of:
  - Adults and children aged 6 years and older with moderate-to-severe, or severe, persistent allergic asthma
  - Adults and children aged 12 years and older with chronic spontaneous urticaria/chronic idiopathic urticaria (hives)

  Xolair is also approved in Japan for the treatment of:
  - Patients with severe seasonal allergic rhinitis (hay fever)

  Xolair is provided as lyophilized powder for reconstitution, and as liquid formulation in a pre-filled syringe. Novartis co-promotes *Xolair* with Genentech in the US and shares a portion of operating income, but Novartis does not record any US sales. Novartis records all sales of *Xolair* outside the US. For further information, see "Item 18. Financial Statements—Note 27. Transactions with related parties—Genentech/Roche."

Cardiovascular, Renal and Metabolism

- *Entresto* (sacubitril/valsartan) is an oral, first-in-class angiotensin receptor/neprilysin inhibitor. It enhances the protective neurohormonal systems of the heart (the neprilysin system) while simultaneously suppressing the harmful system (the renin-angiotensin-aldosterone system). *Entresto* is approved in the US, the EU and other countries for the treatment of:

- Adults who have symptomatic chronic heart failure with reduced ejection fraction (HFrEF)

Entresto is also approved in the US for the treatment of:
- Children aged 1 year and older who have symptomatic heart failure with systemic left ventricular systolic dysfunction

Entresto is approved in 112 countries.

Established Medicines

- *Galvus/Equa* (vildagliptin) is an oral inhibitor of the DPP-4 enzyme. It is approved in the EU, Japan and other countries for the treatment of:
  - Adults with type 2 diabetes when used as monotherapy; in dual combination with metformin, a sulfonylurea or a thiazolidinedione; in triple combination with a sulfonylurea and metformin; and as an add-on to insulin (with or without metformin)

  An oral single-pill combination of vildagliptin and metformin, marketed as *Eucreas/EquMet/GalvusMet*, is also approved in the EU, Japan and other countries for the treatment of type 2 diabetes. Sumitomo Dainippon Pharma Co. Ltd. promotes *Equa* and *EquMet* in Japan.

- *Diovan* (valsartan) is an oral angiotensin II receptor blocker (ARB). It is approved in the US, the EU, Japan and other countries for the treatment of:
  - Adults and children with hypertension (high blood pressure)
  - Patients with heart failure
  - Patients with left ventricular failure and/or left ventricular systolic dysfunction following a myocardial infarction (heart attack)
  - Hypertensive patients who have impaired glucose tolerance and are at risk of heart disease

  An oral single-pill combination of valsartan and hydrochlorothiazide, marketed as *Diovan HCT/Co-Diovan*, is also approved in the US, the EU, Japan and other countries for the treatment of hypertension.

- *Exforge* (valsartan and amlodipine besylate) is an oral single-pill combination of the ARB valsartan and the calcium channel blocker amlodipine besylate. It is approved in the US, the EU, Japan and other countries for the treatment of:
  - Adults with hypertension

  An oral single-pill combination of valsartan, amlodipine besylate and hydrochlorothiazide, marketed as *Exforge HCT*, is also approved in the US, the EU, Japan and other countries for the treatment of hypertension.

- *Zortress/Certican* (everolimus) is an oral inhibitor of the mTOR pathway. It is approved in the US, the EU, Japan and other countries for the prophylaxis of:
  - Organ rejection in adults at low to moderate immunological risk receiving an allogeneic kidney or liver transplant

  It is also approved in the EU and Japan for the prophylaxis of:
  - Organ rejection in adults receiving a heart transplant

  Everolimus is available under the trade names *Afinitor/Votubia* for use in oncology. It is exclusively licensed to Abbott Laboratories and sublicensed to Boston Scientific for use in drug-eluting stents.

- *Egaten* (triclabendazole) is an oral narrow-spectrum anthelmintic agent that inhibits a parasitic flatworm's motility and interferes with the worm's microtubular structure and function. *Egaten* is approved in the US, France and Egypt for the treatment of:
  - Patients aged 6 years and older with fascioliasis, a parasitic infection commonly known as liver fluke infestation

  Egaten received US approval in February 2019. It is the only medicine for fascioliasis recommended by the World Health Organization (WHO) and is on the WHO Model List of Essential Medicines. Novartis has been donating *Egaten* to the WHO for the treatment of fascioliasis since 2005.

Compounds in development

The following table and paragraph summaries provide an overview of the key Innovative Medicines Division projects currently in the Confirmatory Development stage and may also describe certain projects in the Exploratory Development stage. Projects are listed in alphabetical order by project code, or by product name where applicable. Projects include those seeking to develop potential uses of new molecular entities as well as potential additional indications or new formulations for already marketed products. The table below, entitled "Projects added to and subtracted from the development table since 2018," highlights changes to the table entitled "Selected development projects" from the previous year.

Compounds and new indications in development are subject to required regulatory approvals and, in certain instances, contractual limitations. These compounds and indications are in various stages of development throughout the world. It may not be possible to obtain regulatory approval for any or all of the new compounds and new indications referred to in this Form 20-F in any country or in every country. See "—Regulation" for further information on the approval process.

The year that each project entered the current phase of development disclosed below refers to the year in which the decision to enter the phase was made. This may be different from the year in which the first patient received the first treatment in the related clinical trial. A reference to a project being in registration means that an application has been submitted to a health authority for marketing approval.

Selected development projects

Project/ product	Common name	Mechanism of action	Potential indication	Business franchise	Formulation/ route of administration	Year project entered current development phase	Planned filing dates/current phase
ABL001	asciminib	BCR-ABL inhibitor	Chronic myeloid leukemia, 3rd line	Oncology	Oral	2016	2021/III
ACZ885	canakinumab	Anti-interleukin-1 beta monoclonal antibody	2nd line non-small cell lung cancer	Oncology	Subcutaneous injection	2017	2021/III
			1st line non-small cell lung cancer	Oncology	Subcutaneous injection	2017	2021/III
			Adjuvant non-small cell lung cancer	Oncology	Subcutaneous injection	2017	2022/III
AVXS-101[1]	onasemnogene abeparvovec	Survival motor neuron (SMN) gene replacement therapy	Spinal muscular atrophy (IV formulation)	Neuroscience	Intravenous infusion	2018	US approved EU registration
			Spinal muscular atrophy (IT formulation)[2]	Neuroscience	Intrathecal injection	2018	2020/I
AVXS-201	TBD	Methyl-CpG binding protein 2 (MECP2) gene replacement therapy	Rett syndrome	Neuroscience	Intrathecal injection	2018	2023/I
BYL719[3]	alpelisib	PI3K-alpha inhibitor	PIK3CA mutant hormone receptor-positive (HR+)/human epidermal growth factor receptor 2-negative (HER2-) postmenopausal advanced breast cancer, 2nd line (+ fulvestrant)	Oncology	Oral	2018	US approved EU registration
			PIK3CA-related overgrowth spectrum	Oncology	Oral	2019	2020/III
			Triple negative breast cancer	Oncology	Oral	2019	2023/III
			Hormone receptor-negative (HR-)/human epidermal growth factor receptor 2-positive (HER2+) advanced breast cancer	Oncology	Oral	2019	2023/III
			Ovarian cancer	Oncology	Oral	2019	2023/III
			Head and neck squamous cell carcinoma	Oncology	Oral	2019	≥2024/III
CEE321	TBD	Pan-JAK inhibitor	Atopic dermatitis	Immunology, Hepatology and Dermatology	Topical	2019	≥2024/II
CFZ533	iscalimab	Blocking, non-depleting, anti-CD40 monoclonal antibody	Solid organ transplantation	Immunology, Hepatology and Dermatology	Intravenous infusion	2017	2023/II
			Sjögren's syndrome	Immunology, Hepatology and Dermatology	Intravenous infusion	2018	≥2024/II
Cosentyx	secukinumab	Anti-interleukin-17 monoclonal antibody	Non-radiographic axial spondyloarthritis	Immunology, Hepatology and Dermatology	Subcutaneous injection	2015	US/EU registration
			Psoriatic arthritis head-to-head study versus Humira® (adalimumab)	Immunology, Hepatology and Dermatology	Subcutaneous injection	2015	2020/III
			Ankylosing spondylitis head-to-head study versus Sandoz biosimilar *Hyrimoz* (adalimumab)	Immunology, Hepatology and Dermatology	Subcutaneous injection	2015	2022/III
			Hidradenitis suppurativa	Immunology, Hepatology and Dermatology	Intravenous infusion	2017	2022/III
			Giant cell arteritis	Immunology, Hepatology and Dermatology	Intravenous infusion	2018	≥2024/II
			Lichen planus	Immunology, Hepatology and Dermatology	Intravenous infusion	2019	≥2024/II
CSJ117	TBD	Anti-thymic stromal lymphopoietin monoclonal antibody fragment	Severe asthma	Respiratory	Inhalation	2018	2023/II
ECF843	TBD	Boundary lubricant	Dry eye	Ophthalmology	Eye drops	2017	2022/II
Entresto	valsartan and sacubitril (as sodium salt complex)	Angiotensin receptor/ neprilysin inhibitor	Chronic heart failure with preserved ejection fraction	Cardiovascular, Renal and Metabolism	Oral	2012	2020/III
			Post-acute myocardial infarction	Cardiovascular, Renal and Metabolism	Oral	2015	2021/III

[1] Approved in the US as *Zolgensma* for spinal muscular atrophy (IV formulation)

[2] The FDA has placed a partial clinical hold on AVXS-101 intrathecal trials for spinal muscular atrophy patients based on findings in a small preclinical animal study.

[3] Approved in the US as *Piqray* for PIK3CA mutant HR+/HER2- postmenopausal advanced breast cancer, 2nd line (+ fulvestrant)

Project/ product	Common name	Mechanism of action	Potential indication	Business franchise	Formulation/ route of administration	Year project entered current development phase	Planned filing dates/current phase
INC280	capmatinib	c-MET inhibitor	Non-small cell lung cancer	Oncology	Oral	2014	US registration
			Solid tumors	Oncology	Oral	2019	≥2024/II
Jakavi	ruxolitinib	JAK1/2 inhibitor	Acute graft-versus-host disease	Oncology	Oral	2016	2021/III
			Chronic graft-versus-host disease	Oncology	Oral	2016	2021/III
KAE609	cipargamin	PfATP4 inhibitor	Malaria	Established Medicines	Oral	2012	≥2024/II
			Severe malaria	Established Medicines	Oral	2019	≥2024/II
KAF156	ganaplacide	Imidazolopiperazines derivative	Malaria	Established Medicines	Oral	2014	≥2024/II
Kisqali	ribociclib	CDK4/6 inhibitor	HR+/HER2- breast cancer (adjuvant)	Oncology	Oral	2018	2022/III
KJX839	inclisiran	Small-interfering RNA (PCSK9)	Hyperlipidemia	Cardiovascular, Renal and Metabolism	Subcutaneous injection	2019	US/EU registration
			Secondary prevention of cardiovascular events in patients with elevated levels of LDL-C	Cardiovascular, Renal and Metabolism	Subcutaneous injection	2019	≥2024/III
Kymriah	tisagen-lecleucel	CD19-targeted chimeric antigen receptor T-cell immunotherapy	Relapsed/refractory follicular lymphoma	Oncology	Intravenous infusion	2017	2021/II
			Relapsed/refractory diffuse large B-cell lymphoma in 1st relapse	Oncology	Intravenous infusion	2018	2021/III
			Relapsed/refractory diffuse large B-cell lymphoma (+ pembrolizumab)	Oncology	Intravenous infusion	2017	≥2024/II
LAM320	clofazimine	Mycobacterial DNA binding	Multidrug-resistant tuberculosis	Established Medicines	Oral	2016	2021/III
LJC242	tropifexor, cenicriviroc (in fixed-dose combination)	FXR agonist and CCR2/5 inhibitor	Nonalcoholic steatohepatitis	Immunology, Hepatology and Dermatology	Oral	2017	≥2024/II
LJN452	tropifexor	FXR agonist	Nonalcoholic steatohepatitis	Immunology, Hepatology and Dermatology	Oral	2015	≥2024/II
LMI070	branaplam	SMN2 RNA splicing modulator	Spinal muscular atrophy	Neuroscience	Oral	2017	≥2024/II
LNP023	TBD	Factor B inhibitor	IgA nephropathy	Cardiovascular, Renal and Metabolism	Oral	2018	2023/II
			C3 glomerulopathy	Cardiovascular, Renal and Metabolism	Oral	2018	2023/II
			Paroxysmal nocturnal hemoglobinuria	Cardiovascular, Renal and Metabolism	Oral	2019	2023/II
			Membranous nephropathy	Cardiovascular, Renal and Metabolism	Oral	2018	≥2024/II
LOU064	TBD	BTK inhibitor	Chronic spontaneous urticaria	Immunology, Hepatology and Dermatology	Oral	2017	2023/II
^{177}Lu-PSMA-617	TBD	Targeted DNA destruction via beta-particle radiation	Metastatic castration-resistant prostate cancer	Oncology	Intravenous infusion	2018	2020/III
LXE408	TBD	Kinetoplastid proteasome inhibitor	Visceral leishmaniasis	Established Medicines	Oral	2019	≥2024/II
MBG453	TBD	TIM-3 antagonist	Myelodysplastic syndrome	Oncology	Intravenous infusion	2018	2021/II
			Acute myeloid leukemia	Oncology	Intravenous infusion	2019	≥2024/II
OMB157	ofatumumab	Anti-CD20 monoclonal antibody	Relapsing multiple sclerosis	Neuroscience	Subcutaneous injection	2015	US/EU registration
PDR001	spartalizumab	Anti-PD-1 monoclonal antibody	Metastatic BRAF V600+ melanoma (w/ *Tafinlar* + *Mekinist*)	Oncology	Intravenous infusion	2017	2020/III
			Metastatic melanoma (combo)	Oncology	Intravenous infusion	2017	2023/II
QBW251	TBD	CFTR potentiator	Chronic obstructive pulmonary disease	Respiratory	Oral	2017	≥2024/II
QGE031	ligelizumab	High-affinity anti-IgE monoclonal antibody	Chronic spontaneous urticaria/ chronic idiopathic urticaria	Immunology, Hepatology and Dermatology	Subcutaneous injection	2017	2021/III
QMF149	indacaterol, mometasone furoate (in fixed-dose combination)	Long-acting beta$_2$-adrenergic agonist and inhaled corticosteroid	Asthma	Respiratory	Inhalation	2019	EU registration

Project/ product	Common name	Mechanism of action	Potential indication	Business franchise	Formulation/ route of administration	Year project entered current development phase	Planned filing dates/current phase
QVM149	indacaterol, mometasone furoate, glyco-pyrronium bromide (in fixed-dose combination)	Long-acting beta$_2$-adrenergic agonist, long-acting muscarinic antagonist and inhaled corticosteroid	Asthma	Respiratory	Inhalation	2019	EU registration
RTH258[4]	brolucizumab	Anti-VEGF single-chain antibody fragment	Neovascular (wet) age-related macular degeneration	Ophthalmology	Intravitreal injection	2019	US approved EU registration
			Diabetic macular edema	Ophthalmology	Intravitreal injection	2017	2021/III
			Retinal vein occlusion	Ophthalmology	Intravitreal injection	2018	2023/III
			Proliferative diabetic retinopathy	Ophthalmology	Intravitreal injection	2019	2023/III
SAF312	TBD	TRPV1 antagonist	Chronic ocular surface pain	Ophthalmology	Topical	2019	≥2024/II
SEG101[5]	crizanlizumab	P-selectin inhibitor	Sickle cell disease	Oncology	Intravenous infusion	2019	US approved EU registration
TQJ230	TBD	Anti-apo(a) antisense oligonucleotide	Secondary prevention of cardiovascular events in patients with elevated levels of lipoprotein(a)	Cardiovascular, Renal and Metabolism	Subcutaneous injection	2018	≥2024/III
UNR844	TBD	Reduction of disulfide bonds	Presbyopia	Cardiovascular, Renal and Metabolism	Eye drops	2017	≥2024/II
VAY736	ianalumab	Anti-BAFF (B-cell-activating factor) monoclonal antibody	Autoimmune hepatitis	Immunology, Hepatology and Dermatology	Subcutaneous injection	2016	≥2024/II
			Primary Sjögren's syndrome	Immunology, Hepatology and Dermatology	Subcutaneous injection	2015	≥2024/II
VPM087	TBD	Interleukin-1 beta neutralization monoclonal antibody	Colorectal cancer, 1st line; renal cell carcinoma, 1st line	Oncology	Intravenous infusion	2018	≥2024/I
Xolair	omalizumab	Anti-IgE monoclonal antibody	Nasal polyps	Respiratory	Subcutaneous injection	2017	US/EU registration
			Food allergy	Respiratory	Subcutaneous injection	2019	2021/III
ZPL389	adriforant	Histamine H4 receptor antagonist	Atopic dermatitis	Immunology, Hepatology and Dermatology	Oral	2017	≥2024/II

[4] Approved in the US as *Beovu* for neovascular (wet) age-related macular degeneration

[5] Approved in the US as *Adakveo* for sickle cell disease

Key development projects

- ABL001 (asciminib) is an investigational oral BCR-ABL inhibitor that binds to the allosteric site of its target (BCR-ABL1). A broad clinical development program is investigating ABL001 as a monotherapy and as a combination therapy for the treatment of chronic myeloid leukemia (CML). This program includes the Phase III ASCEMBL third-line study, and the Phase II ASC-4MORE first-line study of ABL001 plus imatinib in patients with CML in chronic phase without achieving deep molecular response. Novartis is studying ABL001 in patients with and without genetic mutations that make them resistant to many targeted CML therapies.

- ACZ885 (canakinumab) is an injectable human monoclonal antibody designed to bind to human interleukin-1 beta (IL-1 beta). ACZ885 was first approved as *Ilaris* in 2009 for cryopyrin-associated periodic syndromes, a group of rare auto-inflammatory disorders. At the 2017 European Society of Cardiology Congress, Novartis presented data from CANTOS, a Phase III study evaluating quarterly injections of ACZ885 in people with a prior heart attack and inflammatory atherosclerosis. A blinded, pre-planned analysis of these data revealed a 77% reduction in lung cancer mortality and a 67% reduction in lung cancer cases in patients treated with 300 mg of ACZ885. These findings suggest the potential benefit of inhibiting tumor-promoting inflammation in cancer treatment. Based on these CANTOS findings, Novartis initiated three Phase III studies of ACZ885 in lung cancer: the CANOPY trials. Study outcomes may begin to be reported in 2021. During 2019, Novartis presented Trials in Progress (TiP) updates at the American Society of Clinical Oncology (ASCO) annual meeting, and an overview of the Phase III CANOPY trials at the European Society for Medical Oncology (ESMO) Congress.

- AVXS-101 (onasemnogene abeparvovec, approved in the US as *Zolgensma*) is a gene therapy designed to address the genetic root cause of spinal muscular atrophy (SMA) by providing a functional copy of the human survival motor neuron (SMN) gene to halt disease progression through sustained SMN protein expression. The US Food and Drug Administration (FDA) approved the intravenous formulation of AVXS-101 as *Zolgensma* in May 2019 for the treatment of pediatric patients less than 2 years old who have SMA with biallelic mutations in the SMN1 gene. Regulatory reviews are underway in

Europe, with a CHMP opinion anticipated in the first quarter of 2020, and in Japan, with a decision anticipated in the first half of 2020. AVXS-101 is in ongoing clinical studies, including the global Phase III STR1VE clinical program (consisting of STR1VE-US, STR1VE-EU and STR1VE-AP) to evaluate the intravenous formulation of AVXS-101 in patients who have SMA type 1, and the multinational Phase III SPR1NT trial in presymptomatic patients who have SMA with two or three copies of the SMN2 gene. Additionally, AVXS-101 intrathecal administration is being studied in a Phase I/II STRONG trial in patients who have SMA type 2 and three copies of the SMN2 gene. The STRONG trial is currently on partial clinical hold based on findings in a small preclinical animal study, and the Company is working with the FDA to determine next steps to resume dosing. New data from trials were presented at 2019 congresses, including the American Academy of Neurology Annual Meeting.

- BYL719 (alpelisib, approved in the US as *Piqray*) is an orally bioavailable, alpha-specific PI3K inhibitor approved in combination with fulvestrant for the treatment of postmenopausal women, and men, with HR+/HER2-, PIK3CA-mutated, advanced or metastatic breast cancer. *Piqray* received FDA approval based on results of the Phase III SOLAR-1 trial, which showed that *Piqray* plus fulvestrant nearly doubled median progression-free survival compared to fulvestrant alone. Novartis is conducting a Phase II open-label trial, called BYLieve, to evaluate BYL719 plus fulvestrant or letrozole in patients with HR+/HER2-, PIK3CA-mutated advanced breast cancer who have progressed on prior therapy. Novartis is also planning to evaluate BYL719 in triple negative breast cancer; head and neck squamous cell carcinoma; ovarian cancer; and PIK3CA-related overgrowth spectrum, for which BYL719 received FDA breakthrough therapy designation.

- CFZ533 (iscalimab), delivered subcutaneously as an injection, is a fully human, Fc-silenced IgG1 monoclonal antibody that blocks the CD40 receptor. CFZ533 is in clinical development to prevent graft rejection after organ transplantation and to treat several autoimmune diseases, including Sjögren's syndrome. In the proof-of-concept study, CFZ533 demonstrated the ability to preserve graft function and pristine histology, confirming preclinical in vivo data. Recruitment is underway for two Phase II studies in kidney and liver transplant recipients (CIRRUS I and CONTRAIL I, respectively), and for a Phase II study in patients with Sjögren's syndrome (TWINSS).

- *Cosentyx* (secukinumab) is an injectable fully human monoclonal antibody that specifically inhibits interleukin-17A (IL-17A). In August and December 2019, Novartis submitted positive data to the EMA and the FDA, respectively, from the Phase III PREVENT trial, which evaluated the efficacy and safety of *Cosentyx* in patients with non-radiographic axial spondyloarthritis. In November 2019, Novartis disclosed first results from the EXCEED head-to-head trial comparing *Cosentyx* to Humira® (adalimumab) in patients with active psoriatic arthritis (PsA). While narrowly missing statistical significance for superiority in ACR20, the primary endpoint of the EXCEED trial, *Cosentyx* showed numerically higher results versus Humira®. *Cosentyx* is in a Phase III head-to-head trial versus the Sandoz biosimilar *Hyrimoz* (adalimumab) in ankylosing spondylitis; Phase III trials in pediatric psoriasis, juvenile idiopathic arthritis and hidradenitis suppurativa; and a Phase II trial in giant cell arteritis.

- *Entresto* (sacubitril/valsartan) is an oral, first-in-class angiotensin receptor/neprilysin inhibitor. Novartis is conducting multiple studies of sacubitril/valsartan as part of the FortiHFy clinical program, designed to generate additional data on sacubitril/valsartan and increase understanding of heart failure. The PIONEER-HF and TRANSITION studies both read out in 2018 and confirmed safety and superiority of *Entresto* versus enalapril in patients with chronic heart failure with reduced ejection fraction (HFrEF) who were stabilized following admission to the hospital for an acute decompensated heart failure event. The PROVE and EVALUATE trials read out in 2019. The PROVE-HF trial showed significant improvements in measures of cardiac structure and function at six months and one year in HFrEF patients; EVALUATE-HF results complemented PROVE-HF findings. The FortiHFy program also includes studies to investigate sacubitril/valsartan use in novel indications and expanded patient populations. These include PARAGON-HF and PARALLAX-HF, Phase III trials of sacubitril/valsartan in patients with chronic heart failure with preserved ejection fraction (HFpEF). Results of PARAGON-HF were published in September 2019, and while the trial narrowly missed its primary endpoint with a 13% treatment effect against an active valsartan comparator, the totality of evidence suggests that treatment with sacubitril/valsartan may result in clinically important benefits in HFpEF. US regulatory submission for HFpEF is on track for early 2020. PARALLAX-HF enrollment is complete and results are expected to be presented in 2020. Other trials include PARADISE-MI, a Phase III trial in patients at high risk of developing heart failure after a heart attack (post-acute myocardial infarction). Enrollment is ongoing and results are expected in 2020. Additionally, PARALLEL-HF is a Phase III trial for HFrEF patients in Japan (Novartis reported results in March 2019, and a marketing authorization submission in Japan is under review), and PANORAMA-HF is a Phase III trial in pediatric patients with heart failure (enrollment is ongoing and results are expected in 2021).

- INC280 (capmatinib) is an investigational oral, potent and selective MET inhibitor. The GEOMETRY trial – a Phase II study in adult patients with advanced non-small cell lung cancer (NSCLC) harboring MET exon 14 skipping mutations – is ongoing, as are additional early-stage studies in combination with other compounds. During 2019, Novartis presented primary efficacy results from the GEOMETRY trial at ASCO, and the FDA granted breakthrough therapy designation to INC280 as a first-line treatment for patients with metastatic MET exon 14 skipping-mutated (METex14) NSCLC. Breakthrough therapy designation covers both treatment-naive patients and patients previously

treated with platinum-based chemotherapy. INC280 is licensed by Novartis from Incyte Corporation. Under the Collaboration and License Agreement, Novartis has exclusive worldwide development and commercialization rights to INC280, and Incyte Corporation maintains certain rights to exercise options for both co-development and co-detailing in the US.

- KAF156 (ganaplacide) belongs to a novel class of antimalarial compounds called imidazolopiperazines. It has the potential to clear malaria infection, including resistant strains, and to block the transmission of the malaria parasite. As demonstrated in a Phase IIa proof-of-concept trial, the compound is fast-acting and potent across multiple stages of the parasite's lifecycle, rapidly clearing both Plasmodium falciparum and Plasmodium vivax parasites. A Phase IIb study tested multiple dosing combinations and dosing schedules of KAF156 and lumefantrine in adults and adolescents, and confirmed good safety and efficacy of all doses. The safety and efficacy of the combination will now be evaluated in younger children.

- *Kisqali* (ribociclib) is an oral, cyclin-dependent kinase inhibitor. Novartis continues to investigate *Kisqali* in patients with HR+/HER2- breast cancer, and it is the only CDK4/6 inhibitor to achieve statistically significant overall survival in two Phase III trials with two distinct patient populations. Novartis presented overall survival results from MONALEESA-7 at ASCO 2019 and from MONALEESA-3 at ESMO 2019, and continues to assess *Kisqali* in MONALEESA-2, COMPLEEMENT-1 and the NataLEE adjuvant trial. These trials are evaluating *Kisqali* in multiple endocrine therapy combinations across a broad range of patients, including men and premenopausal women. *Kisqali* was developed by the Novartis Institutes for BioMedical Research under a research collaboration with Astex Pharmaceuticals.

- KJX839 (inclisiran) is a long-acting, small-interfering RNA (siRNA) administered twice a year as a subcutaneous injection. It is in development in atherosclerotic cardiovascular disease and primary hyperlipidemia (including familial hypercholesterolemia) for patients who have already had an event like a heart attack or stroke, or who are risk-equivalent. Pivotal Phase III trial results were presented at the European Society of Cardiology Congress and the American Heart Association Scientific Sessions in 2019 by The Medicines Company, prior to its acquisition by Novartis. A cardiovascular outcomes study, ORION-4, is ongoing.

- *Kymriah* (tisagenlecleucel) is a CD19-directed genetically modified autologous chimeric antigen receptor T-cell (CAR-T) therapy delivered as an intravenous infusion. Since 2018, Novartis has initiated six trials for new or expanded indications for *Kymriah* – diffuse large B-cell lymphoma (DLBCL) in second line, high-risk pediatric acute lymphoblastic leukemia (ALL), relapsed/refractory follicular lymphoma, pediatric non-Hodgkin lymphoma, relapsed/refractory DLBCL in combination with ibrutinib, and relapsed/refractory DLBCL in combination with pembrolizumab – as well as a study of *Kymriah* in adult ALL planned for a 2020 start. Novartis and the University of Pennsylvania's Perelman School of Medicine developed *Kymriah* under a global collaboration. Please see "—Alliances and acquisitions" below for additional information related to our collaboration with the University of Pennsylvania.

- LJN452 (tropifexor) is an oral, highly potent and selective nonsteroidal multimodal farnesoid X receptor (FXR) agonist in development as both a monotherapy and a combination therapy for the treatment of nonalcoholic steatohepatitis (NASH). LJN452 is designed to target the three major facets of NASH (steatosis, inflammation and fibrosis), and has demonstrated the ability to reduce all three in animal models. Recruitment is complete for two Phase II studies: FLIGHT FXR (the monotherapy study) and TANDEM (the combination study with cenicriviroc). Additional collaborative studies are underway to explore the role of LJN452 as a backbone in combination therapies.

- LNP023 is an oral, selective factor B inhibitor of the alternative complement pathway. It is in development for the treatment of rare complement-driven renal diseases, including IgA nephropathy, membranous nephropathy and C3 glomerulopathy. LNP023 is also in development for the treatment of paroxysmal nocturnal hemoglobinuria. Phase II studies in all indications are initiated.

- ^{177}Lu-PSMA-617, delivered as an intravenous infusion, is an investigational radioligand therapy in development for metastatic castration-resistant prostate cancer (mCRPC). Designed to target the prostate-specific membrane antigen present in most patients with mCRPC, ^{177}Lu-PSMA-617 potentially offers a differentiated targeted treatment option. A Phase III study of ^{177}Lu-PSMA-617 in patients with mCRPC, called VISION, is ongoing.

- *Lutathera* (lutetium Lu 177 dotatate/lutetium (^{177}Lu) oxodotreotide) is an intravenous radioligand therapy. A randomized Phase III trial called NETTER-1 continues to assess overall survival in patients who received *Lutathera* and long-acting octreotide to treat inoperable, progressive, well-differentiated (Grade 1 and Grade 2), somatostatin receptor-positive midgut neuroendocrine tumors.

- OMB157 (ofatumumab), administered as a subcutaneous injection, is a fully human monoclonal antibody that works by binding to the CD20 molecule on the B-cell surface and inducing B-cell depletion. OMB157 is in development to treat multiple sclerosis (MS). Novartis announced in August 2019 that the Phase III ASCLEPIOS I and II studies met their primary endpoints in patients with relapsing forms of MS. Compared to Aubagio® (teriflunomide), OMB157 showed a statistically significant reduction in the number of confirmed relapses, evaluated as the annualized relapse rate; highly significant suppression of both Gd+ T1 lesions and new or enlarging T2 lesions; and a relative risk reduction in three- and six-month confirmed disability worsening in pre-specified pooled analyses.

Novartis is conducting a registration study for OMB157 in Japan, which started in March 2018.

- PDR001 (spartalizumab), delivered as an intravenous infusion, is an investigational PD-1 antagonist that may restore the ability of immune cells to induce cell death and fight cancer. Novartis is evaluating PDR001 in combination with *Tafinlar* + *Mekinist* in a Phase III trial (COMBI-i) for unresectable or metastatic BRAF V600 mutation-positive melanoma, and presented results from the safety run-in part and biomarker cohort at ASCO in 2019. Novartis is also evaluating PDR001 as a combination therapy with other Novartis drugs in clinical trials for different tumor types, including metastatic melanoma.

- QAW039 (fevipiprant) is an investigational, novel, once-daily pill that blocks the DP_2 pathway, a regulator of the inflammatory cascade. In December 2019, Novartis announced that development of QAW039 in asthma would be discontinued after the Phase III LUSTER-1 and LUSTER-2 core registration trials did not meet the clinically relevant threshold for reduction in asthma attacks (exacerbations) in moderate to severe patients with unresolved asthma despite treatment with inhaled therapies. In addition, as announced in October 2019, results of the Phase III ZEAL-1 and ZEAL-2 studies did not meet the primary efficacy endpoint of lung function (FEV_1) improvement in patients with moderate asthma.

- QGE031 (ligelizumab), administered subcutaneously as a once-monthly single injection, is a next-generation, high-affinity anti-IgE monoclonal antibody that is highly potent in blocking the IgE/FceR1 pathway. QGE031 is in clinical development for the treatment of chronic spontaneous urticaria/chronic idiopathic urticaria (CSU/CIU). In a CSU/CIU Phase IIb study, a clear dose response was demonstrated and a higher percentage of CSU/CIU patients had complete symptom control with QGE031 72 mg or 240 mg than with omalizumab 300 mg or placebo. QGE031 is being investigated in two ongoing Phase III twin trials, PEARL 1 and PEARL 2, which are recruiting more than 2 000 patients across 48 countries.

- RTH258 (brolucizumab, approved in the US as *Beovu*) is an injectable, humanized, single-chain antibody fragment that acts as an anti-vascular endothelial growth factor (anti-VEGF) agent. The FDA approved RTH258 as *Beovu* in October 2019 for the treatment of neovascular (wet) age-related macular degeneration, and regulatory filings are under review in the EU, Japan and certain other countries. RTH258 is in clinical development for diabetic macular edema and retinal vein occlusion.

- SEG101 (crizanlizumab, approved in the US as *Adakveo*) is a humanized monoclonal antibody that binds to P-selectin, a cell adhesion protein that plays a central role in the multicellular interactions that can lead to vaso-occlusion in sickle cell disease. It is delivered as an intravenous infusion. The FDA approved SEG101 as *Adakveo* in November 2019 to reduce the frequency of vaso-occlusive crises (VOCs), or pain crises, in patients aged 16 years and older with sickle cell disease. Novartis continues to study SEG101 in sickle cell disease through the SENTRY clinical trial program, which includes SOLACE-adults, SOLACE-kids, STAND, SPARTAN and STEADFAST. These studies are evaluating SEG101 for the treatment of VOCs in children and adults, as well as priapism and other complications, such as sickle cell nephropathy.

- TQJ230 is an injectable antisense oligonucleotide designed to target elevated lipoprotein(a) (Lp(a)), which increases the risk of heart disease. The results of a Phase II trial announced in 2018 showed that TQJ230 reduced Lp(a) in patients by as much as 80%. The Lp(a) HORIZON trial, a Phase III trial in patients with established cardiovascular disease and elevated Lp(a), was initiated in December 2019. Results are expected in 2024. Novartis licensed TQJ230 from Akcea Therapeutics, Inc., an affiliate of Ionis Pharmaceuticals, Inc., in February 2019.

- UNR844 is a potential first-in-class topical treatment in development for presbyopia, a common age-related loss of near-distance vision characterized by a progressive inability to focus on objects nearby, making everyday activities (such as reading) a challenge. UNR844 is believed to work through the reduction of disulfide bonds, softening the crystalline lens. In a Phase I/II masked, placebo-controlled proof-of-concept study, 50 patients were treated daily for 90 days with topical UNR844, and 25 patients were treated with placebo. UNR844 showed a statistically significant difference to placebo in binocular distance-corrected near vision at all time points measured (from Day Eight). At Day 90, 82% of participants treated with UNR844 had 20/40 binocular near vision (or 0.30 LogMAR) versus 48% in the placebo group. Near vision of 20/40 allows for the majority of near-vision tasks in most people. UNR844 was acquired by Novartis through the acquisition of Encore Vision, Inc. in January 2017.

- ZPL389 (adriforant) is a once-daily oral H4 receptor antagonist. It is in Phase II clinical development for the treatment of atopic dermatitis (AD) to evaluate its benefit on key outcomes, such as reduction of the severity of AD lesions and reduction of itch. The Phase II ZEST study is investigating the effect of several doses of ZPL389 versus placebo. ZPL389 has already demonstrated significant clinical and statistical improvements in eczema lesions, leading to a 50% reduction in Eczema Area and Severity Index (EASI) score compared to placebo after eight weeks of treatment, with a favorable safety profile in the proof-of-concept study.

Projects added to and subtracted from the development table since 2018

Project/product	Potential indication	Change	Reason
ABL001	Chronic myeloid leukemia, 1st line	Removed	Development discontinued
AVXS-101	Spinal muscular atrophy type 1 (IV formulation)	Now disclosed as spinal muscular atrophy (IV formulation)	
	Spinal muscular atrophy type 2/3 (IT formulation)	Now disclosed as spinal muscular atrophy (IT formulation)	
BAF312	Secondary progressive multiple sclerosis	Commercialized as *Mayzent*	
BYL719	Hormone receptor-positive (HR+)/human epidermal growth factor receptor 2-negative (HER2-) advanced breast cancer (postmenopausal women), 2nd line (+ fulvestrant)	Now disclosed as PIK3CA mutant hormone receptor-positive (HR+)/human epidermal growth factor receptor 2-negative (HER2-) postmenopausal advanced breast cancer, 2nd line (+ fulvestrant)	
	PIK3CA-related overgrowth spectrum	Added	Entered Confirmatory Development
	Triple negative breast cancer	Added	Entered Confirmatory Development
	Hormone receptor-negative (HR-)/human epidermal growth factor receptor 2-positive (HER2+) advanced breast cancer	Added	Entered Confirmatory Development
	Ovarian cancer	Added	Entered Confirmatory Development
	Head and neck squamous cell carcinoma	Added	Entered Confirmatory Development
CAD106	Alzheimer's disease	Removed	Development discontinued
CEE321	Atopic dermatitis	Added	Entered Confirmatory Development
CNP520	Alzheimer's disease	Removed	Development discontinued
Cosentyx	Giant cell arteritis	Added	Entered Confirmatory Development
	Lichen planus	Added	Entered Confirmatory Development
EMA401	Peripheral neuropathic pain	Removed	Development discontinued
HDM201	Acute myeloid lymphoma	Removed	Development discontinued
INC280	Non-small cell lung cancer (EGFR mutation)	Removed	Development discontinued
	Solid tumors	Added	Entered Confirmatory Development
KAE609	Severe malaria	Added	Entered Confirmatory Development
KJX839	Hyperlipidemia	Added	Acquired with acquisition of The Medicines Company
	Secondary prevention of cardiovascular events in patients with elevated levels of LDL-C	Added	Acquired with acquisition of The Medicines Company
Kymriah	Chronic lymphocytic leukemia	Removed	Development discontinued
LCI699	Cushing's disease	Removed	Divested to Recordati S.p.A.
LNP023	C3 glomerulopathy	Added	Entered Confirmatory Development
	Paroxysmal nocturnal hemoglobinuria	Added	Entered Confirmatory Development
Lucentis	Retinopathy of prematurity	Commercialized	
	Diabetic retinopathy	Commercialized	
LXE408	Visceral leishmaniasis	Added	Entered Confirmatory Development
MBG453	Myelodysplastic syndrome	Added	Entered Confirmatory Development
	Acute myeloid leukemia	Added	Entered Confirmatory Development
MOR106	Atopic dermatitis	Removed	Development discontinued
PDR001	Malignant melanoma (combo)	Now disclosed as metastatic melanoma (combo)	
Promacta/ Revolade	Severe aplastic anemia, 1st line	Removed	Development discontinued
QAW039	Asthma	Removed	Development discontinued
RTH258	Neovascular age-related macular degeneration	Now disclosed as neovascular (wet) age-related macular degeneration	
	Proliferative diabetic retinopathy	Added	Entered Confirmatory Development
Rydapt	Acute myeloid leukemia (FLT3 wild type)	Removed	Development discontinued
SAF312	Chronic ocular surface pain	Added	Entered Confirmatory Development
TQJ230	Secondary prevention of cardiovascular events in patients with elevated levels of lipoprotein(a)	Added	Entered Confirmatory Development
VAY785	Nonalcoholic steatohepatitis	Removed	Development discontinued
Xolair	Food allergy	Added	Entered Confirmatory Development

Principal markets

The Innovative Medicines Division sells products in approximately 155 countries worldwide. Net sales are generally concentrated in the US, Europe, Japan and China. The following table sets forth the aggregate 2019 net sales of the Innovative Medicines Division by region:

Innovative Medicines

	2019 net sales to third parties	
	USD millions	%
United States	13 789	37
Europe	12 818	34
Asia, Africa, Australasia	8 458	22
Canada and Latin America	2 649	7
Total	**37 714**	**100**
Of which in Established Markets*	28 573	76
Of which in Emerging Growth Markets*	9 141	24

* Emerging Growth Markets comprise all markets other than the Established Markets of the US, Canada, Western Europe, Japan, Australia and New Zealand.

Many of our Innovative Medicines Division products are used for chronic conditions that require patients to consume the product over long periods of time, ranging from months to years. However, certain of our marketed products and development projects, such as gene therapies, are administered only once. Net sales of the vast majority of our products are not subject to material changes in seasonal demand.

Production

Our primary goal is to ensure the uninterrupted, timely and cost-effective supply of products that meet all product specifications and quality standards. The manufacturing of our products is highly regulated by governmental health authorities around the world, including the FDA and EMA. In addition to regulatory requirements, many of our products involve technically complex manufacturing processes or require highly specialized raw materials.

We manufacture our products at facilities worldwide, producing active pharmaceutical ingredients in our own facilities or purchasing them from third-party suppliers (see also "—Item 4.D Property, plants and equipment"). Across our network, we maintain state-of-the-art processes, with quality as a priority, and require our suppliers to adhere to the same high standards we expect from our own people and processes. Those processes include fermentation, chemical syntheses and precipitation, as well as sterile processing. We are constantly working to improve our existing manufacturing processes and to develop new ones, and to review and adapt our manufacturing network to meet our needs and those of our patients and customers.

We produce raw materials for manufacturing in-house or we purchase them from a number of third-party suppliers. Where possible, we maintain multiple supply sources so that the business is not dependent on a single or limited number of suppliers. However, our ability to do so may at times be limited by regulatory or other requirements. We monitor market developments that could have an adverse effect on the supply of essential materials. Our suppliers of raw materials are required to comply with applicable regulations and Novartis quality standards.

Because the manufacturing of our products is complex and highly regulated by governmental health authorities, supply is never guaranteed. If we or our third-party suppliers fail to comply with applicable regulations, then there could be a product recall or other disruption to our production activities. We have experienced supply interruptions for our products in the past, and there can be no assurance that supply will not be interrupted again in the future. However, we have implemented a global manufacturing strategy to maximize business continuity in case of such events.

Marketing and sales

The Innovative Medicines Division serves customers with 24 779 field force representatives, as of December 31, 2019, including supervisors and administrative personnel. These trained representatives present the therapeutic risks and benefits of our products to physicians, pharmacists, hospitals, insurance groups, managed care organizations and other healthcare professionals.

The marketplace for healthcare is evolving: Customer groups beyond prescribers have increasing influence on treatment decisions and guidelines, while patients continue to become more informed stakeholders in their healthcare decisions and look for solutions to meet their changing needs. Novartis is responding by adapting our business practices to engage appropriately with patients, customer groups and other stakeholders, including by delivering innovative solutions to drive education, access and improved patient care. Additionally, in the US, certain products can be advertised via digital and traditional media channels, including the internet, television, newspapers and magazines.

Although specific distribution patterns vary by country, Novartis generally sells its prescription drugs primarily to wholesale and retail drug distributors, hospitals, clinics, government agencies and managed healthcare providers. The growing number of so-called "specialty" drugs in our portfolio has resulted in increased engagement with specialty pharmacies. In the US, specialty pharmacies continue to grow as a distribution channel for specialty products, with an increasing number of health plans mandating use of specialty pharmacies to monitor specialty drug utilization and costs.

Novartis pursues co-promotion/co-marketing opportunities as well as licensing and distribution agreements with other companies in various markets, when economically attractive.

In the US, the US Centers for Medicare & Medicaid Services (CMS) is the largest single payer for healthcare services as a result of continuing changes in healthcare economics and an aging population. In addition, both commercial and government-sponsored managed care organizations continue to be among the largest groups of payers for healthcare services in the US. In other countries, national health services are often the only significant payer for healthcare services. In an effort to control prescription drug costs, almost all managed care organizations and national health services use formularies that list specific drugs that may be reimbursed and/or the level of reimbursement for each drug. Managed care organizations and national health services also increasingly use cost-benefit analyses to determine whether or not newly approved drugs will be added to a formulary and/or the level of reimbursement for that drug, and to determine whether or not to continue to reimburse existing drugs. We have dedicated teams that actively seek to optimize patient access, including formulary positions, for our products.

The trend toward consolidation among distributors and retailers of Innovative Medicines Division products continues in the US and internationally, both within country and across countries. This has increased our customers' purchasing leverage and resulted in increased pricing pressure on our products. Moreover, we are exposed to increased concentration of credit risk as a result of the consolidation among our customers.

In addition, drug pricing is an increasingly prominent issue in many countries as healthcare spending continues to rise. Pricing is a particularly complex issue for cell and gene therapies because of their high costs and the expectation that one treatment will have a long-term, if not lifelong, benefit.

In 2019, AveXis, a Novartis company, formed an agreement with Accredo Health Group, Inc. in the US to offer a pay-over-time option of up to five years for *Zolgensma* to help ease possible short-term budget constraints for customers. Additionally, AveXis offers payers outcome-based agreements for *Zolgensma* based on measures included in the clinical trial program, and has these agreements in place with both commercial and Medicaid contracts. In these agreements, if a patient has a significant negative outcome during a five-year period, AveXis reimburses a percentage of the cost of the therapy relative to the time passed.

Also in the US, Novartis has established an outcome-based framework for one of the approved indications of *Kymriah*, whereby the product invoice is linked to a successful outcome for each patient at an agreed milestone. Novartis also offers outcome-based agreements for approved indications of *Kymriah* in certain countries other than the US. These typically involve a full upfront payment of the product with a partial refund in case of failed outcomes, or installment payments based on successful patient outcomes at agreed milestones for one or both of the approved indications of *Kymriah*. In addition, Novartis is in discussions with payers about potentially offering similar agreements for *Luxturna*.

Competition

The global pharmaceutical market is highly competitive. We compete against other major international corporations that have substantial financial and other resources, as well as against smaller companies that operate regionally or nationally. Competition within the industry is intense and extends across a wide range of activities, including pricing, product characteristics, customer service, sales and marketing, and research and development.

Like other companies selling patented pharmaceuticals, Novartis faces challenges from companies selling competing patented products. Generic forms of our products may follow the expiry of intellectual property protection, and generic companies may also gain entry to the market through successfully challenging our intellectual property rights. We use legally permissible measures to defend those rights. See also "—Intellectual property" below. We also may face competition from over-the-counter (OTC) products that do not require a prescription from a physician.

There is ongoing consolidation in the pharmaceutical industry. At the same time, new entrants are looking to use their expertise to establish or expand their presence in healthcare, including technology companies seeking to benefit from the increasing importance of data and data management in our industry.

Research and development

The discovery and development of a new drug usually requires approximately 10 to 15 years from the initial research to bringing a drug to market. This includes approximately six to eight years from Phase I clinical trials to market entry. At each of these steps, there is a substantial risk that a compound will not meet the requirements to progress further. In such an event, we may be required to abandon the development of a compound in which we have made a substantial investment.

We manage our research and development expenditures across our entire portfolio in accordance with our strategic priorities. We make decisions about whether or not to proceed with development projects on a project-by-project basis. These decisions are based on the project's potential to meet a significant unmet medical need or to improve patient outcomes, the strength of the science underlying the project, and the potential of the project (subject to the risks inherent in pharmaceutical development) to generate significant positive financial results for the Company. Once a management decision has been made to proceed with the development of a particular molecule, the level of research and development investment required will be driven by many factors. These include the medical indications for which it is being developed, the number of indications being pursued, whether the molecule is of a chemical or biological nature, the stage of development, and the level of evidence necessary to demonstrate clinical efficacy and safety.

Research program

Our research program is conducted by the Novartis Institutes for BioMedical Research (NIBR), which was established in 2002 and is the research and early development innovation engine of Novartis. NIBR is responsible for the discovery of new medicines for diseases with unmet medical need. We focus our work in areas where we believe we can have the most impact for patients. This requires the hiring and retention of highly talented employees, a focus on fundamental disease mechanisms that are relevant across different disease areas, continuous improvement in technologies for drug discovery and potential therapies, close alliances with clinical colleagues, and the establishment of strategic external alliances.

Approximately 5 600 full-time-equivalent scientists, physicians and business professionals work at NIBR sites in Basel, Switzerland; Cambridge, Massachusetts; East Hanover, New Jersey; San Diego, California; Emeryville, California; and Shanghai, China. They contribute to research into disease areas such as cardiovascular and metabolic diseases, neuroscience, oncology, muscle disorders, ophthalmology, autoimmune diseases and respiratory diseases. Research at the Friedrich Miescher Institute and the Genomics Institute of the Novartis Research Foundation focuses on basic genetic and genomic research, and the Novartis Institute for Tropical Diseases (NITD), in Emeryville, California, focuses on discovering new medicines to fight tropical diseases, including malaria and cryptosporidiosis.

All drug candidates go through proof-of-concept trials to enable an early assessment of the safety and efficacy of the drug while collecting basic information on pharmacokinetics and tolerability, and adhering to the guidance for early clinical testing set forth by health authorities. Following proof of concept, our Global Drug Development unit conducts confirmatory trials on the drug candidates.

In July 2018, we announced the decision to exit antibacterial and antiviral research. While the science for these programs is compelling, we decided to prioritize our resources in other areas where we believe we are better positioned to develop innovative medicines that will have a positive impact for patients. Since then, we have executed two out-licensing deals with Gilead and Boston Pharmaceuticals for assets from our infectious diseases portfolio. The San Francisco Bay Area remains home to NITD and global drug discovery teams focused on "undruggable" targets in collaboration with the Novartis-Berkeley Center for Proteomics and Chemistry Technologies.

In November 2019, we announced that we will discontinue early discovery research at NIBR's Shanghai site and focus our research and development activities there on expanding the scale and scope of our early clinical development and later-stage clinical trial operations to help accelerate the development of new medicines.

Development program

Our Global Drug Development (GDD) organization oversees drug development activities for our Innovative Medicines Division. GDD works collaboratively with NIBR to execute our overall pipeline strategy. The GDD organization includes centralized global functions such as Regulatory Affairs and Global Development Operations, and global Development Units aligned with our business franchises. GDD was created to improve resource allocation, technology implementation and process standardization to further increase innovation. GDD includes approximately 11 000 full-time equivalent associates worldwide.

The traditional model of development consists of three phases:

Phase I: The first clinical trials of a new compound – generally performed in a small number of healthy human volunteers – to assess the drug's safety profile, including the safe dosage range. These trials also determine how a drug is absorbed, distributed, metabolized and excreted, and the duration of its action.

Phase II: Clinical studies performed with patients who have the target disease, with the aim of continuing the Phase I safety assessment in a larger group, assessing the efficacy of the drug in the patient population, and determining the appropriate doses for further evaluation.

Phase III: Large-scale clinical studies with several hundred to several thousand patients, which are conducted to establish the safety and efficacy of the drug in specific indications for regulatory approval. Phase III trials may also be used to compare a new drug against a current standard of care to evaluate the overall benefit-risk relationship of the new medicine.

In each of these phases, physicians monitor volunteer patients closely to assess the potential new drug's safety and efficacy.

Though we use this traditional model, we have tailored the development process to be simpler, more flexible and efficient. We divide the development process into two stages: Exploratory Development to establish proof of concept, followed by Confirmatory Development to confirm the concept in large numbers of patients. Exploratory Development consists of clinical proof-of-concept (PoC) studies, which are small clinical trials (typically involving in the range of between five and 15 patients) that combine elements of traditional Phase I/II testing. NIBR conducts these customized trials, which are designed to give early insights into issues such as safety, efficacy and toxicity for a drug in a given indication. Once a positive proof of concept has been established, the drug moves to the Confirmatory Development stage and becomes the responsibility of GDD. Confirmatory Development has elements of traditional Phase II/III testing and includes trials aimed at confirming the safety and efficacy of the drug in the given indication, leading up to submission of a dossier to health authorities for approval. This stage can also include trials that compare the drug to the current standard of care for the disease in order to evaluate the drug's overall benefit-risk profile. Further, with new treatment approaches such as gene therapy for rare diseases, elements of Exploratory and Confirmatory Development may be combined and suffice for registration under certain conditions such as high unmet medical need and clinical data showing highly favorable benefit-risk. In these cases, additional post-approval studies may be required by the regulatory authorities to continue to gather important data to further support approval.

The vast amount of data that must be collected and evaluated makes clinical testing the most time-consuming and expensive part of new drug development. The next stage in the drug development process is to seek registration for the new drug. For more information, see "—Regulation."

Our Innovation Management Board (IMB) manages our activities at each phase of clinical development. The IMB is responsible for all major aspects of our development portfolio and oversees our drug development budget as well as major project phase transitions and milestones following a positive proof-of-concept outcome, including transitions to Confirmatory Development and the decision to submit a regulatory application to the health authorities. The IMB is also responsible for the endorsement of overall development strategy, the endorsement of development project priorities, and decisions on project discontinuations. Our Chief Executive Officer chairs the IMB, and other representatives from Novartis senior management, with expertise spanning multiple fields, are among its core and extended membership.

Alliances and acquisitions

Our Innovative Medicines Division enters into business development agreements with other pharmaceutical and biotechnology companies and with academic and other institutions to develop new products and access new markets. We license products that complement our current product line and are appropriate to our business strategy. We focus on strategic alliances and acquisition activities for key disease areas and indications that we expect to be growth drivers in the future. We review products and compounds we are considering licensing, using the same criteria that we use for our own internally discovered drugs.

In January 2020, we completed the acquisition of US-based biopharmaceutical company The Medicines Company. The acquisition broadened the Novartis cardiovascular portfolio by adding KJX839 (inclisiran), an investigational cholesterol-lowering therapy.

In October 2019, we announced the discontinuation of the clinical development program for MOR106 in atopic dermatitis. We announced an exclusive licensing agreement in July 2018 with biotech companies Galapagos NV and MorphoSys AG regarding this compound. Under the agreement, Novartis acquired the exclusive global development and marketing rights to MOR106 for atopic dermatitis and all other potential indications. This transaction became effective on September 10, 2018.

In October 2019, certain affiliates of Recordati S.p.A. acquired the worldwide rights from Novartis to Signifor®, Signifor® *LAR* and LCI699 (osilodrostat). This transaction supports our oncology strategy to focus on medicines that have the potential to transform the standard of care for patients in four distinct cancer treatment platforms: targeted therapies, radioligand therapies, cell and gene therapies, and immunotherapies.

In October 2019, we announced a multiyear research and development collaboration with Microsoft. This alliance is expected to bolster our artificial intelligence capabilities to help accelerate the discovery, development and commercialization of medicines for patients worldwide.

In September 2019, Novartis and the University of Pennsylvania (Penn) entered into a new focused agreement on chimeric antigen receptor T-cell (CAR-T) clinical trials and concluded our seven-year research and development alliance, per the contractual terms. The new agreement allows each organization to pursue its own research in cell and gene therapies. Novartis and Penn will continue to collaborate on certain CAR-T research trials.

In September 2019, we signed a collaboration and exclusive option agreement with IFM Due, Inc., a subsidiary of IFM Therapeutics LLC, to develop a group of immunotherapies that inhibit the cGAS/STING pathway for the potential treatment of serious inflammatory and autoimmune diseases.

In July 2019, we announced the decision to discontinue the investigation of the BACE1 inhibitor CNP520 (umibecestat) in two Phase II/III studies in the Alzheimer's Prevention Initiative Generation Program. This study was launched through an expanded collaboration with Amgen Inc. and Banner Alzheimer's Institute, announced in November 2017, to assess whether CNP520 can prevent or delay the symptoms of Alzheimer's disease in a high-risk population.

In July 2019, we announced that we completed the acquisition of *Xiidra* (lifitegrast) from Takeda Pharmaceutical Company Limited, and we began recording sales as of July 1, 2019. *Xiidra* is the first and only prescription treatment approved to treat both signs and symptoms of dry eye by inhibiting inflammation caused by the disease. For additional information, see "Item 18. Financial Statements—Note 2. Significant transactions—Significant transactions in 2019—Innovative Medicines – acquisition of *Xiidra*."

In May 2019, we completed the acquisition of IFM Tre, Inc., a subsidiary of IFM Therapeutics LLC focused on developing anti-inflammatory medicines targeting the NLRP3 inflammasome (a key component of the innate immune system). This acquisition includes full rights to IFM Tre's portfolio of NLRP3 inhibitors. For additional information, see "Item 18. Financial Statements—Note 2. Significant transactions—Significant transactions in 2019—Innovative Medicines – acquisition of IFM Tre, Inc."

In April 2019, Novartis completed a USD 75 million investment in Poseida Therapeutics, a privately held biotechnology company focused on gene therapies. Poseida Therapeutics has a pipeline of next-generation CAR-T product candidates, including a BCMA CAR-T in Phase II clinical development for the treatment of relapsed/refractory multiple myeloma. Our investment entitles us to appoint a director to the company's board of directors.

In February 2019, Novartis announced that it is exercising its option to license the rights to develop and commercialize TQJ230 from Akcea Therapeutics, Inc., an affiliate of Ionis Pharmaceuticals, Inc., for targeted cardiovascular therapy. If approved, TQJ230 could be the first treatment that specifically targets elevated levels of lipoprotein(a).

In February 2019, we completed the acquisition of Cell*for*Cure, a French company specializing in the development and manufacture of cell and gene therapies. This acquisition strengthened our CAR-T therapy manufacturing capacity and builds on a previous agreement with

Cell*for*Cure to produce CAR-T therapies, including *Kymriah* (tisagenlecleucel).

For additional information, see "Item 18. Financial Statements—Note 2. Significant transactions—Significant transactions in 2018."

Regulation

The international pharmaceutical industry is highly regulated. Regulatory authorities around the world administer numerous laws and regulations regarding the testing, approval, manufacturing, importing, labeling and marketing of drugs, and review the safety and efficacy of pharmaceutical products. Extensive controls exist on the non-clinical and clinical development of pharmaceutical products. These regulatory requirements, and the implementation of them by local health authorities around the globe, are a major factor in determining whether a substance can be developed into a marketable product, and the amount of time and expense associated with that development.

Health authorities, including those in the US, the EU and Japan, have high standards of technical evaluation. The introduction of new pharmaceutical products generally entails a lengthy approval process. Products must be authorized or registered prior to marketing, and such authorization or registration must subsequently be maintained. In recent years, the registration process has required increased testing and documentation for the approval of new drugs, with a corresponding increase in the expense of product introduction.

To register a pharmaceutical product, a registration dossier containing evidence establishing the safety, efficacy and quality of the product must be submitted to regulatory authorities. Generally, a therapeutic product must be registered in each country in which it will be sold. In every country, the submission of an application to a regulatory authority does not guarantee that approval to market the product will be granted. Although the criteria for the registration of therapeutic drugs are similar in most countries, the formal structure of the necessary registration documents and the specific requirements, including risk tolerance, of the local health authorities can vary significantly from country to country. Even if a drug is registered and marketed in one country, the registration authority in another country may request additional information from the pharmaceutical company prior to registration or even reject the product. A drug may be approved for different indications in different countries.

The registration process generally takes between six months and several years, depending on the country, the quality of the data submitted, the efficiency of the registration authority's procedures, and the nature of the product. Many countries provide for accelerated processing of registration applications for innovative products of particular therapeutic interest. In recent years, the US, the EU and Japan have made efforts to harmonize registration requirements in order to achieve shorter development and registration times for medical products. However, the requirement in many countries to negotiate selling prices or reimbursement levels with government regulators and other payers can substantially extend the time until a product may finally be available to patients.

The following provides a summary of the regulatory processes in the principal markets served by Innovative Medicines Division affiliates:

United States

In the US, applications for drug registration are submitted to and reviewed by the FDA. The FDA regulates the testing, manufacturing, labeling and approval for marketing of pharmaceutical products intended for commercialization in the US. The FDA continues to monitor the safety of pharmaceutical products after they have been approved for sale in the US market. The pharmaceutical development and registration process is typically intensive, lengthy and rigorous. When a pharmaceutical company has gathered data that it believes sufficiently demonstrates a drug's safety, efficacy and quality, then the company may file a New Drug Application (NDA) or Biologics License Application (BLA), as applicable, for the drug. The NDA or BLA must contain all the scientific information that has been gathered about the drug. This typically includes information regarding the clinical experiences of patients tested in the drug's clinical trials. A Supplemental New Drug Application (sNDA) or BLA amendment must be filed for new indications for a previously approved drug.

Once an application is submitted, the FDA assigns reviewers from its staff, including experts in biopharmaceutics, chemistry, clinical microbiology, pharmacology/toxicology, and statistics. After a complete review, these content experts provide written evaluations of the NDA or BLA. These recommendations are consolidated and are used by senior FDA staff in its final evaluation of the NDA or BLA. Based on that final evaluation, the FDA then provides to the NDA or BLA's sponsor an approval, or a "complete response" letter if the NDA or BLA application is not approved. If not approved, the letter will state the specific deficiencies in the NDA or BLA that need to be addressed. The sponsor must then submit an adequate response to the deficiencies in order to restart the review procedure.

Once the FDA has approved an NDA, BLA, sNDA or BLA amendment, the company can make the new drug available for physicians and other healthcare providers to prescribe. The drug owner must submit periodic reports to the FDA, including any cases of adverse reactions. For some medications, the FDA requires additional post-approval studies (Phase IV) to evaluate long-term effects or to gather information on the use of the product under specified conditions.

Throughout the life cycle of a product, the FDA requires compliance with standards relating to good laboratory, clinical and manufacturing practices. The FDA also requires compliance with rules pertaining to the manner in which we may promote our products.

European Union

In the EU, there are three main procedures for application for authorization to market pharmaceutical products in more than one EU member state at the same time: the centralized procedure, the mutual recognition procedure and the decentralized procedure. It is also possible to obtain a national authorization for products intended for

commercialization in a single EU member state only, or for additional indications for licensed products. The procedure used for first authorization must continue to be followed for subsequent changes, e.g., to add an indication for a licensed product.

Under the centralized procedure, applications are made to the EMA for an authorization that is valid for the European Union (all member states). The centralized procedure is mandatory for all biotechnology products; new chemical entities in cancer, neurodegenerative disorders, diabetes, AIDS, autoimmune diseases and other immune dysfunctions; advanced therapy medicines, such as gene therapy, somatic cell therapy and tissue-engineered medicines; and orphan medicines (medicines for rare diseases). It is optional for other new chemical entities, innovative medicinal products, and medicines for which authorization would be in the interest of public health. When a pharmaceutical company has gathered data that it believes sufficiently demonstrates a drug's safety, efficacy and quality, the company may submit an application to the EMA. The EMA then receives and validates the application, and the specialized committee for human medicines, the CHMP, appoints a rapporteur and co-rapporteur to review it. The entire review cycle must be completed within 210 days, although there is a "clock stop" at Day 120 to allow the company to respond to questions set forth in the rapporteur and co-rapporteur's assessment report. When the company's complete response is received by the EMA, the clock restarts on Day 121. If there are further aspects of the dossier requiring clarification, the CHMP will issue further questions at Day 180, and may also request an oral explanation, in which case the sponsor must not only respond to the further questions but also appear before the committee to justify its responses. On Day 210, the CHMP will take a vote to recommend the approval or non-approval of the application, and their opinion is transferred to the EC. The final EC decision under this centralized procedure is a decision that is applicable to all member states. This decision occurs 60 days, on average, after a positive CHMP recommendation.

Under both the mutual recognition procedure (MRP) and the decentralized procedure (DCP), the assessment is led by one member state, called the reference member state (RMS) which then liaises with other member states, known as the concerned member states. In the MRP, the company first obtains a marketing authorization in the RMS, which is then recognized by the concerned member states in 90 days. In the DCP, the application is done simultaneously in the RMS and all concerned member states. During the DCP, the RMS drafts an assessment report within 120 days. Within an additional 90 days, the concerned member states review the application and can issue objections or requests for additional information. On Day 90, each concerned member state must be assured that the product is safe and effective, and that it will cause no risks to the public health. Once an agreement has been reached, each member state grants national marketing authorizations for the product.

After receiving the marketing authorizations, the company must submit periodic safety reports to the relevant health authority (EMA for the centralized procedure, national health authorities for DCP or MRP). In addition, pharmacovigilance measures must be implemented and monitored, including the collection, evaluation and expedited reporting of adverse events, and updates to risk management plans. For some medications, post-approval studies (Phase IV) may be imposed to complement available data with additional data to evaluate long-term effects (called a Post-Approval Safety Study, or PASS) or to gather additional efficacy data (called a Post-Approval Efficacy Study, or PAES).

European marketing authorizations have an initial duration of five years. The holder of the marketing authorization must actively apply for its renewal after this first five-year period. As part of the renewal procedure, the competent authority will perform a full benefit-risk review of the product. Should the authority conclude that the benefit-risk balance is no longer positive, the marketing authorization can be suspended or revoked. Once renewed, the marketing authorization is valid for an unlimited period. If the holder does not apply for renewal, the marketing authorization automatically lapses. Any marketing authorization that is not followed within three years of its granting by the actual placing on the market of the corresponding medicinal product ceases to be valid.

Japan

In Japan, applications for new products are made through the Pharmaceutical and Medical Devices Agency (PMDA). Once an NDA is submitted, a review team is formed, which consists of specialized officials of the PMDA, including those with expertise in chemistry, manufacturing, clinical and non-clinical development, and biostatistics. While a team evaluation is carried out, a data reliability survey and inspections for good clinical practice (GCP), good laboratory practice (GLP) and good manufacturing practice (GMP) are carried out by the Office of Non-clinical and Clinical Compliance of the PMDA. Preliminary team evaluation results are passed to the PMDA's external experts, who then provide their opinion about approvability to the PMDA. After a further team evaluation, a report is provided to the Ministry of Health, Labor and Welfare (MHLW); the MHLW makes a final determination for approval and refers this to the Council on Drugs and Foods Sanitation, which then advises the MHLW on final approvability. Marketing and distribution approvals require a review to determine whether the company is capable of managing manufacturing and distribution appropriately per the business license for the type of drug concerned, and to confirm the accreditation of manufacturing sites and testing facilities for the applied new product.

Once the MHLW has approved the application, the company can make the new drug available for physicians to prescribe. After that, the MHLW lists its National Health Insurance price within 60 days (or 90 days) from the approval, and physicians can obtain reimbursement. For some medications, the MHLW requires intensive surveillance (called early post-marketing phase vigilance) for six months after launch, and/or additional post-approval studies (Phase IV) to further evaluate safety and/or to gather information on the use of the product under specified conditions. The MHLW also requires the drug's sponsor to submit periodic safety update reports. Within three months from the specified re-examination period,

which is designated at the time of the approval of the application for the new product, the company must submit a re-examination application to enable the drug's safety and efficacy to be reassessed against approved labeling by the PMDA and MHLW.

Price controls

In most of the markets where we operate, the prices of pharmaceutical products are subject to both direct and indirect price controls and to drug reimbursement programs with varying price control mechanisms. Due to increasing political pressure and governmental budget constraints, we expect these mechanisms to remain robust – and potentially even to be strengthened – and to have a continued negative influence on the prices we are able to charge for our products.

Direct governmental efforts to control prices

United States: In the US, President Donald Trump and Congressional leaders declared the reduction of drug prices as a key priority in 2019. Among the various proposals introduced by the Administration, House of Representatives or Senate were options that would impose price controls, introduce reference pricing to countries outside the US, permit medicine imports from Canada, and make changes to drug reimbursement in Medicare Parts B/D and Medicaid. It is anticipated that focus on drug pricing will continue at the federal level in 2020. Additionally, by the end of 2019, 17 US states had passed legislation intended to impact pricing or requiring price transparency reporting. These states are California, Connecticut, Colorado, Delaware, Indiana, Louisiana, Maine, Maryland, Massachusetts, Nevada, New Hampshire, New York, Ohio, Oregon, Texas, Vermont and Washington. The disclosure requirements vary by state. Many states require multiple types of reporting, including for new drug applications, new drug launches, prior notice of price increases, and quarterly or annual reporting. It is expected in 2020 that state legislatures will continue to focus on drug pricing and that similar bills will be passed in more states.

Europe: In Europe, our operations are subject to significant price and marketing regulations. Many governments are introducing healthcare reforms in a further attempt to curb increasing healthcare costs. In some member states, these include reforms to permit the reimbursed use of off-label medicines, despite the presence of licensed alternatives on the market. In the EU, governments influence the price of pharmaceutical products through their control of national healthcare systems that fund a large part of the cost of such products to patients. The downward pressure on healthcare costs in general in the EU, particularly with regard to prescription drugs, is intense. Increasingly strict analyses are applied when evaluating the entry of new products, and as a result, access to innovative medicines is limited based on strict cost-benefit assessments. In addition, prices for marketed products are referenced within member states and across international borders, further impacting individual EU member state pricing. Member states also collaborate to enhance pricing transparency and have started conducting joint health technology assessments, joint pricing negotiations and/or joint purchasing. As an additional control for healthcare budgets, some EU countries have passed legislation to impose further mandatory rebates for pharmaceutical products and/or financial claw-backs on the pharmaceutical industry. The calculation of these rebates and claw-backs may lack transparency in some cases and can be difficult to predict.

Japan: In 2019, the MHLW introduced a cost-effectiveness assessment and implemented an ad-hoc price revision to coincide with a consumption tax increase on October 1. That followed new drug tariffs that became effective from April 2018 after the Japanese government reviewed the National Health Insurance (NHI) price calculation methods for new products and the price revision rule for existing products. Also in 2018, the MHLW implemented a price maintenance scheme with a narrower scope and fewer products, and increased the frequency of price cuts from every other year to annually beginning in 2021. The Japanese government is continuing deliberations on healthcare reform with the goal of sustaining universal coverage under the NHI program, and is addressing the efficient use of drugs, including promoting the use of generic drugs.

Rest of world: Many other countries are taking steps to control prescription drug prices. China – one of our most important Emerging Growth Markets – conducted national price negotiations in 2017 for 36 drugs without any generic equivalent, and in 2018 for 17 oncology drugs directly linked to national drug reimbursement, which applied to over 1.3 billion residents covered by the employee and resident medical insurance scheme. It also conducted a national procurement pilot on certain generic drugs at the end of 2018 and in 2019. These efforts resulted in price reductions of more than 50% on average for the drugs subject to these programs. In November 2019, the National Healthcare Security Administration announced that 70 additional drugs have obtained reimbursement access through negotiations, with an average price reduction of 60.7%. Drug prices in China may further decline due to ongoing national health reform. However, reimbursement access is accelerating and broadening coverage as the government aims to resolve the public issue of accessibility and the high cost of healthcare services. In August 2019, Canada published amendments to its patented medicines regulations to introduce three new economics-based price regulatory factors and the concept of affordability in price assessments; to update the schedule of comparator countries to include 11 countries with similar consumer protection priorities, economic wealth and marketed medicines as Canada and to exclude Switzerland and the US from the list; and to require reporting of all confidential discounts and rebates. These changes have a planned effective date of July 1, 2020. Innovative Medicines Canada (IMC), the local industry association, and 16 member companies (including Novartis) are contesting the changes via an Application for Judicial Review with the Federal Court. The Patented Medicine Prices

Review Board (PMPRB) issued its draft guidelines to the new amendments of the patented medicines regulations; a written consultation period is now open, providing stakeholders with 60 days (until January 31, 2020) to provide their perspectives on the draft. In Colombia, the government took steps in 2016 to unilaterally reduce the price of *Glivec* by up to 43% through a local procedural mechanism called a Declaration of Public Interest. We continue to contest the appropriateness of the government's unprecedented use of this mechanism to control the price of a prescription drug and to manage its healthcare budget. Its use could become more widespread if upheld in this case, potentially leading to a more systemic impact on drug pricing.

Regulations favoring generics and biosimilars

In response to rising healthcare costs, most governments and private medical care providers have established reimbursement schemes that favor the substitution of generic pharmaceuticals for more expensive brand-name pharmaceuticals. All US states have generic substitution statutes. These statutes permit or require the dispensing pharmacist to substitute a less expensive generic drug instead of an original patented drug. Other countries, including many European countries, have similar laws. We expect that the pressure for generic substitution will continue to increase. In addition, the US, the EU and other jurisdictions are increasingly crafting laws and regulations encouraging the development of biosimilar versions of biologic drugs, which can also be expected to have an impact on pricing.

Cross-border sales

Price controls in one country can have an impact in other countries as a result of cross-border sales. In the EU, products that we have sold to customers in countries with stringent price controls can be legally resold to customers in other EU countries at a lower price than the price at which the product is otherwise available in the importing country (known as parallel trade). In North America, products that we have sold to customers in Canada – which has relatively stringent price controls – are sometimes resold into the US, again at a lower price than the price at which the product is otherwise sold in the US. Such imports from Canada and other countries into the US are currently illegal. However, given the increased focus on pharmaceutical prices in the US, the Trump Administration, certain members of the US Congress, and several US states continue to explore regulatory and legislative ways to allow the safe importation of pharmaceutical products into the US from select countries, including Canada. Four US states (Colorado, Florida, Maine and Vermont) have enacted drug importation laws, but the US Secretary of the Department of Health and Human Services must certify that each state's importation plan is safe and cost-effective before it can be implemented.

We expect that pressures on pricing will continue worldwide and will likely increase. Because of these pressures, there can be no certainty that in every instance we will be able to charge prices for a product that, in a particular country or in the aggregate, would enable us to earn an adequate return on our investment in that product.

Intellectual property

We attach great importance to intellectual property – including patents, trademarks, copyrights, know-how and research data – in order to protect our investment in research and development, manufacturing and marketing. For example, we seek intellectual property protection under applicable laws for significant product developments in major markets. Among other things, patents may cover the products themselves, including the product's active ingredient or ingredients and its formulation. Patents may cover processes for manufacturing a product, including processes for manufacturing intermediate substances used in the manufacture of the product. Patents may also cover particular uses of a product, such as its use to treat a particular disease, or its dosage regimen. In addition, patents may cover assays or tests for certain diseases or biomarkers – which can improve patient outcomes when administered with certain drugs – as well as assays, research tools and other techniques used to identify new drugs. The protection afforded, which may vary from country to country, depends upon the type of patent, its duration and its scope of coverage.

In the US and other countries, the law recognizes that product development and review by the FDA and other health authorities can take an extended period, and permits an extension of patent term for a period related to the time taken for the conduct of clinical trials and for the health authority's review. However, the length of this extension and the patents to which it applies cannot be known in advance and can only be determined after the product is approved. In practice, it is not uncommon for patent term extensions (PTEs) to not fully compensate the owner of a patent for the time it took to develop the product and receive marketing authorization. As a result, it is rarely the case that a product will have a full patent term at the time it is approved by the FDA and other health authorities.

In addition to patent protection, various countries offer data or marketing exclusivities for a prescribed period of time. Data exclusivity generally precludes a potential competitor from filing a regulatory application that relies on the sponsor's clinical trial data, or the regulatory authority from approving the application for a set period of time. The data exclusivity period can vary depending upon the type of data included in the sponsor's application. When it is available, market exclusivity, unlike data exclusivity, may preclude a competitor from obtaining marketing approval for a product even if a competitor's application relies on its own data. Data exclusivity and market exclusivity periods generally run from the date a product is approved, and so their expiration dates cannot be known with certainty until the product approval date is known.

United States

Patents

In the US, a patent issued for an application filed today will receive a term of 20 years from the earliest application filing date, subject to potential patent term adjustments for delays in patent issuance based upon certain delays in prosecution by the United States Patent and Trademark Office (USPTO). A US pharmaceutical patent

that claims a product, method of treatment using a product, or method of manufacturing a product may also be eligible for a PTE. This type of extension may only extend the patent term for a maximum of five years, and may not extend the patent term beyond 14 years from regulatory approval. Only one patent may be extended for any product based on FDA delay.

Data and market exclusivity

In addition to patent exclusivities, the FDA may provide data or market exclusivity, which runs in parallel to any patent protection.

- A new small-molecule active pharmaceutical ingredient receives five years of regulatory data exclusivity, during which time a competitor generally may not submit or obtain approval of an application to the FDA based on a sponsor's clinical data.

- For a small-molecule active pharmaceutical ingredient, the FDA may also request that a sponsor conduct pediatric studies and, in exchange, it will grant an additional six-month period of pediatric market exclusivity if the FDA accepts the data, the sponsor makes a timely application for approval for pediatric treatment, and the sponsor has either a patent-based or regulatory-based exclusivity period for the product that can be extended.

- Orphan drug exclusivity provides seven years of market exclusivity for drugs designated by the FDA as orphan drugs, meaning drugs that treat rare diseases. During this period, a potential competitor generally may not market the same or similar drug for the same indication even if the competitor's application does not rely on data from the sponsor.

- A new biologic active pharmaceutical ingredient receives 12 years of market exclusivity, during which time a competitor generally may not market the same or similar drug.

European community

Patents

Patent applications in Europe may be filed in the European Patent Office (EPO) or in a particular country in Europe. The EPO system permits a single application to be granted for the EU plus other non-EU countries such as Switzerland and Turkey. When the EPO grants a patent, it is then validated in the countries that the patent owner designates. The term of a patent granted by the EPO or a European country office is generally 20 years from the earliest application filing date. Pharmaceutical patents can be granted a further period of exclusivity under the Supplementary Protection Certificate (SPC) system. SPCs are designed to compensate the owner of the patent for the time it took to receive marketing authorization of a product by the European health authorities. An SPC may be granted to provide, in combination with the patent, up to 15 years of exclusivity from the date of the first European marketing authorization. However, an SPC cannot last longer than five years. The SPC duration may be extended by a further six months if the product is the subject of an agreed pediatric investigation plan. The post-grant phase of patents, including the SPC system, is currently administered on a country-by-country basis under national laws that, while differing, are intended to (but do not always) have the same effect.

Data and market exclusivity

In addition to patent exclusivity, the EU provides a system of regulatory data exclusivity for authorized human medicines that runs in parallel to any patent protection. The system for drugs being approved today is usually referred to as "8+2+1" because it provides: an initial period of eight years of data exclusivity, during which a competitor cannot rely on the relevant data; a further period of two years of market exclusivity, during which the data can be used to support applications for marketing authorization but a competitive product cannot be launched; and a possible one-year extension of the market exclusivity period if, during the initial eight-year data exclusivity period, the sponsor registered a new therapeutic indication with "significant clinical benefit." This system applies both to national and centralized authorizations.

The EU also has an orphan drug exclusivity system for medicines similar to the US system. If a medicine is designated as an orphan drug, then it benefits from 10 years of market exclusivity after it is authorized, during which time an application for the same or similar medicine for the same indication will not generally be accepted or granted. Under certain circumstances, this exclusivity can be extended with a two-year pediatric extension.

Japan

Patents

In Japan, the patent term granted is 20 years from the earliest application filing date, subject to potential PTEs. A PTE can be granted for up to five years to compensate for the time needed to obtain the Japanese marketing authorization. A Japanese PTE may apply to only a subset of the approved indications for a particular product.

Data and market exclusivity

Japan has a regulatory data protection system called a "re-examination period" of eight years for new chemical entities and of four to six years for new indications and formulations, and a 10-year orphan drug exclusivity system.

Third-party patents and challenges to intellectual property

Third parties can challenge our patents, patent term extensions and marketing exclusivities, including pediatric extensions and orphan drug exclusivity, through various proceedings. For example, patents in the US can be challenged in the USPTO through various proceedings, including Inter Partes Review (IPR) proceedings. They may also be challenged through patent infringement litigation under the Abbreviated New Drug Application (ANDA) provisions of the Hatch-Waxman Act or the Biologics Price Competition and Innovation Act (BPCIA). In the EU, patents may be challenged through oppositions in the EPO, or national patents may be challenged in national courts or national patent offices. In Japan, patents may be challenged in the Japan Patent Office and

in national courts. The outcomes of such challenges can be difficult to predict.

In addition to directly challenging our intellectual property rights, in some circumstances a competitor may be able to market a generic version of one of our products by, for example, designing around our intellectual property or marketing the generic product for non-protected indications. Despite data exclusivity protections, a competitor could opt to incur the costs of conducting its own clinical trials and preparing its own regulatory application, and avoid our data exclusivity protection altogether. There is a risk that some countries may seek to impose limitations on the availability of intellectual property protections for pharmaceutical products, or on the extent to which such protections may be enforced. For example, a review of several intellectual property rights is currently ongoing in the EU (orphan drug exclusivity, pediatric extensions and SPCs), which could lead to legislative changes in the scope and/or term of protection under those rights. Also, even though we may own, co-own or in-license patents protecting our products, and conduct pre-launch freedom-to-operate analyses, a third party may nevertheless claim that one of our products infringes a third-party patent for which we do not have a license.

As a result, there can be no assurance that our intellectual property will protect our products or that we will be able to avoid adverse effects from the loss of intellectual property protection or from third-party patents in the future.

Intellectual property protection for certain key marketed products and compounds in development

We present below additional details regarding intellectual property protection for certain Innovative Medicines Division products and compounds in development. For each, we identify issued, unexpired patents by general subject matter and, in parentheses, years of expiry in, if relevant, the US, the EU and Japan. The identified patents are owned, co-owned or exclusively in-licensed by Novartis and relate to the product or to the method of treatment or its use as it is currently approved and marketed or, in the case of a compound in development, as it is currently submitted to the FDA and/or the EMA for approval. Identification of an EU patent refers to national patents in EU countries and/or to the national patents that have been derived from a patent granted by the EPO. Novartis may own or control additional patents, for example, relating to compound forms, methods of treatment or use, formulations, processes, synthesis, purification and detection.

We identify unexpired regulatory data protection periods and, in parentheses, years of expiry if the relevant marketing authorizations have been authorized or granted. The term "RDP" refers to regulatory data protection, regulatory data exclusivity, and data re-examination protection systems. We identify certain unexpired patent term extensions and marketing exclusivities and, in parentheses, years of expiry if they are granted; their subject matter scope may be limited and is not specified. Marketing exclusivities and patent term extensions include orphan drug exclusivity (ODE), pediatric exclusivity (PE), patent term extension (PTE) and supplementary protection certificate (SPC). We designate them as "pending" if they have been applied for but not granted and years of expiry are estimable. Such pending applications may or may not ultimately be granted.

In the case of the EU, identification of a patent, patent term extension, marketing exclusivity or data protection means grant, authorization and maintenance in at least one country and possibly pending or found invalid in others.

For each product below, we indicate whether there is current generic or biosimilar competition for one or more product versions in one or more approved indications in each of the major markets for which intellectual property is disclosed. We identify ongoing challenges to the disclosed intellectual property that have not been finally resolved, including IPRs if instituted by the USPTO. Challenges identified as being in administrative entities, such as national patent offices, include judicial appeals from decisions of those entities. Resolution of challenges to the disclosed intellectual property, which in the EU may involve intellectual property in one or more EU countries, may include settlement agreements under which Novartis permits or does not permit future launch of generic versions of our products before expiration of that intellectual property. We identify certain material terms of such settlement agreements where they could have a material adverse effect on our business. In other cases, such settlement agreements may contain confidentiality obligations restricting what may be disclosed.

For additional information regarding commercial arrangements with respect to these products, see "— Key marketed products."

Novartis Oncology business unit

Oncology

- *Tasigna*. US: Patent on compound (2023), PE (2024); three patents on salt forms (2026, 2027, 2028), three PEs (2027, 2028, 2029); patent on polymorph compound form (2026), PE (2027); two patents on capsule form (2026, 2027), two PEs (2027, 2028); patent on method of treatment (2032), PE (2032). EU: Patent on compound (2023); patent on salt form (2026); patent on polymorph compound form (2026); patent on capsule form (2027); patent on method of treatment (2030). Japan: Patent on compound (2023), two PTEs (2024, 2028); patent on salt form (2026), PTE (2031); patent on polymorph compound form (2026), two PTEs (2030, 2031); patent on capsule form (2027), two PTEs (2030, 2031); patent on method of use (2030).

  There is no generic competition in the US, the EU or Japan. In the US, generic manufacturers have filed ANDAs challenging certain patents other than the compound patent. The EU method-of-treatment patent and the capsule form patent are being opposed in the EPO. The EU polymorph compound form patent was upheld as valid by the Opposition Division at the EPO.

- *Sandostatin* SC and *Sandostatin LAR*.

Sandostatin SC. There is no patent protection in the US, the EU or Japan. There is generic competition in the US, the EU and Japan.

Sandostatin LAR. There is no patent protection in the US, the EU or Japan. There is generic competition in some EU markets but no generic competition in the US or Japan.

- *Afinitor/Votubia* and *Afinitor Disperz/Votubia* dispersible tablets. US: Patent on compound (2014), PTE (2019), PE (2020); patent on dispersible tablet formulation (2022), PE (2023); patent on antioxidant (2019), PE (2020); patent on tuberous sclerosis complex (TSC)/subependymal giant cell astrocytoma (SEGA) use (2022), PE (2022); patent on breast cancer use (2022), PE (2022); patent on renal cell carcinoma use (2025), PE (2026); patent on pancreatic neuroendocrine tumor use (2028). EU: Patent on dispersible tablet formulation (2022); two patents on breast cancer use (2022, 2022); patent on renal cell carcinoma use (2022); patent on neuroendocrine tumors of pancreatic origin (2022); patent on TSC/SEGA use (2022); patent on neuroendocrine tumors of lung origin use (2022); patent on TSC/SEGA and TSC/acute myeloid leukemia (AML) use (2027); ODE (*Votubia*, tuberous sclerosis) (2021). Japan: Patent on dispersible tablet formulation (2022); patent on breast cancer use (2022); patent on pancreatic neuroendocrine tumor use (2026); patent on renal cell carcinoma use (2022); patent on gastrointestinal and lung neuroendocrine tumor use (2026), PTE (2027); patent on TSC/SEGA and TSC/AML use (2027); ODE (tuberous sclerosis tablet) (2022); ODE (tuberous sclerosis dispersible tablet) (2022).

  There is no generic competition in Japan. There is generic competition in the EU and the US. In the US, the compound patent and renal cell carcinoma use patent were challenged in ANDA proceedings against generic manufacturers, and the patents were upheld. The US pancreatic neuroendocrine tumor use patent is being challenged in IPR proceedings in the USPTO. In the US, Novartis has resolved patent litigation with certain generic manufacturers. There is generic competition in the US for the three lower-dosage strengths for *Afinitor*. Additional generic competition in the US may start in mid-2020. Novartis has resolved patent litigation relating to *Afinitor Disperz*. The EU breast cancer use patent, the EU TSC/SEGA use patent, the EU renal cell carcinoma use patent, and the EU patents on neuroendocrine tumors of pancreatic origin and of lung origin are being opposed in the EPO. National enforcement and validity actions are also ongoing on some of these patents in certain countries.

- *Promacta/Revolade*. US: Patent on compound (2021), PTE (2022), PE (2023); two patents on compound (2021, 2021), two PEs (2021, 2021); patent on thrombocytopenia use (2021), PE (2021); patent on method of enhancing platelet production (2021), PE (2021); patent on method of enhancing platelet production (2023), PE (2023); patent on salt form (2025); PE (2026); four patents on tablet formulations of different dose strengths (2027) (4), PE (2028) (4); ODE on severe aplastic anemia patients with an insufficient response to immunosuppressive therapy (2021), PE (2022); ODE on severe aplastic anemia patients in combination with standard immunosuppressive therapy (2025). EU: Patent on compound (2021), SPC (2025); patent on salt form (2023); patent on formulation (2027); RDP (2020). Japan: Patent on compound (2021), PTE (2025); patent on salt form (2023), PTE (2023); patent on formulation (2027); RDP (2020). There is no generic competition in the US, the EU or Japan. In the US, generic manufacturers have filed ANDAs challenging certain patents other than the compound patent. The EU formulation patent is being opposed in the EPO.

- *Tafinlar* and *Mekinist*.

  Tafinlar. US: Two patents on compound (2030, 2030); patent on method of treatment (2029); ODE (2020). EU: Patent on compound (2029); RDP (2023). Japan: Patent on compound (2031). There is no generic competition in the US, the EU or Japan.

  Mekinist. US: Patent on compound (2025), PTE (2027); patent on method of treatment (2025); three patents on formulation (2032) (3); ODE (2020). EU: Patent on compound (2025), SPC (2029); RDP (2025). Japan: Patent on compound (2025); patent on method of use (2025); patent on formulation (2031). There is no generic competition in the US, the EU or Japan.

  Use of *Mekinist* with *Tafinlar* or *Tafinlar* with *Mekinist*. US: Patent on combination (2030); patent on method of use of combination (2030); RDP (2020); ODE on melanoma with certain mutations (2021); ODE on non-small cell lung cancer (2024). EU: RDP (2025). Japan: Patent on method of use of combination (2030). There is no generic competition in the US, the EU or Japan.

- *Gleevec/Glivec*. US: Patent on gastrointestinal stromal tumor (GIST) use (2021), PE (2022). EU: Patent on GIST use (2021); patent on tablet formulation (2023). Japan: Patent on GIST use (2021); patent on tablet formulation (2023).

  There is generic competition in the US, the EU and Japan. Novartis is taking steps in some EU countries to enforce the GIST use patent. The EU GIST use patent is being challenged in one EU country. The EU tablet formulation patent is being challenged in the EPO.

- *Jakavi*. EU: Patent on compound (2026), SPC (2027); patent on salt form (2028); patent on compound for polycythemia vera (PV) use (2026); patent on salt form for PV use (2028); RDP (2023). Japan: Patent on compound (2026), three PTEs (2028, 2030, 2031); patent on salt form (2028), three PTEs (2028, 2030, 2031); patent on method of use (2026), two PTEs (2027, 2028); RDP (2022). There is no generic competition in the EU or Japan. The EU salt patent is being opposed in the EPO. The EU patent on salt form for PV use is also being opposed in the EPO.

- *Exjade* and *Jadenu*.

  Exjade. US: There is no patent protection for *Exjade* in the US. EU: Patent on compound (2017), SPC (2021), PE (2022); patent on dispersible tablet formulation (2023). Japan: Patent on compound (2017), PTE (2021); patent on dispersible tablet formulation (2023). There is generic competition in the US. There is no generic competition in the EU or Japan.

  Jadenu (marketed as *Exjade* FCT in the EU and Japan). The compound patents for *Exjade* also protect *Exjade* FCT (EU/Japan). US: Patent on film-coated tablet formulation (2034). EU: Two patents on film-coated tablet formulation (2034, 2034). There is generic competition in the US. There is no generic competition in the EU or Japan. In the US, Novartis has resolved patent litigation relating to the US formulation patent with a generic manufacturer. In the EU, the formulation patents are being opposed in the EPO.

- *Votrient*. US: Patent on compound (2021), PTE (2023); two patents on compound (2021, 2021). EU: Patent on compound (2021), SPC (2025); RDP (2021). Japan: Patent on compound (2021), two PTEs (2025, 2026). There is no generic competition in the US, the EU or Japan.

- *Kisqali*. US: Three patents on compound (2028, 2030, 2031), pending PTE (2031); three patents on methods of treatment (2029, 2029, 2031); patent on salt form (2031); RDP (2022). EU: Patent on compound (2027); patent on compound (2029), SPC (2032); patent on methods of use (2029); RDP (2027). Japan: Two patents on compound (2027, 2029). *Kisqali* is not marketed in Japan. There is no generic competition in the US or the EU.

- *Lutathera*. US: RDP (2023); ODE (2025). EU: RDP (2027); ODE (2027). *Lutathera* is not marketed in Japan. There is no generic competition in the US or the EU.

- *Kymriah*. US: Seven patents on cells and/or pharmaceutical compositions comprising the cells (2031) (7); four patents on methods of use of cells and/or pharmaceutical compositions comprising the cells (2031) (4); RDP (2029), PE (2030); ODE for relapsed or refractory (r/r) pediatric acute lymphoblastic leukemia (2024), PE (2025); ODE for r/r diffuse large B-cell lymphoma (2025), PE (2025). EU: One patent on methods of use (2031), SPC (2033); RDP (2028); ODE (2028), PE (2030). Japan: Two patents on pharmaceutical compositions (2031, 2031), PTE (2034); two patents on cells, pharmaceutical compositions and use (2031, 2031), PTE (2033); two patents on CAR-T-associated cytokine release syndrome use (2033, 2033); ODE (2029). There is no generic competition in the US, the EU or Japan.

- *Piqray*. US: Patent on compound (2029); patent on compound and use (2030); RDP (2024). EU: Patent on compound and use (2029). Japan: Patent on compound and use (2029). *Piqray* is not marketed in the EU or Japan. There is no generic competition in the US.

- *Adakveo*. US: Patent on composition of matter (2028), PTE pending (2032); patent on method of use (2027); RDP (2031). EU: Patent on composition of matter (2027). Japan: There is no patent protection for *Adakveo* in Japan. *Adakveo* is not marketed in the EU or Japan. There is no generic competition in the US.

Novartis Pharmaceuticals business unit

Ophthalmology

- *Lucentis*. EU: Patent on composition of matter (2018), SPC (2022). Japan: Patent on composition of matter (2018), PTE for pathologic myopia (2021), PTE for retinal vein occlusion (2023), PTE for diabetic macular edema (2023). There is no generic competition in the EU or Japan.

- *Xiidra*. US: Patent on compound (2024); three patents on compound and use (2024) (2), (2025); patent on formulation (2024); five patents on method of treatment (2024, 2024, 2026, 2029, 2029); two patents on polymorph compound form (2029, 2029); RDP (2021). PTE pending. EU: Three patents on compound and use of compound (2024, 2026, 2026). Japan: Patent on compound (2024); patent on the use of the compound and formulation (2026); patent on formulation (2033). There is no generic competition in the US. *Xiidra* is not marketed in the EU or Japan.

- *Beovu*. US: Patent on composition of matter (2029), PTE pending (2033); patent on method of treatment (2029); patent on nucleic acid molecule (2029); patent on antibodies (2023); patent on dosing regimen (2035); RDP (2031). EU: Patent on composition of matter (2029); patent on antibodies (2023). Japan: Patent on composition of matter (2029); patent on antibodies (2023). There is no generic competition in the US. *Beovu* is not marketed in the EU or Japan.

Immunology, Hepatology and Dermatology

- *Cosentyx*. US: Patent on composition of matter (2026), PTE (2029); patent on psoriasis use (2032); patent on ankylosing spondylitis use (2033); RDP (2027). EU: Patent on composition of matter (2025), SPC (2030), PE (2030); patent on psoriasis use (2031); RDP (2026). Japan: Patent on composition of matter (2025), three PTEs (2026, 2028, 2029); patent on psoriasis use (2031), three PTEs (2032, 2032, 2033); patent on psoriatic arthritis use (2031); RDP (2022). There is no generic competition in the US, the EU or Japan.

- *Ilaris*. US: Patent on composition of matter (2024); patent on cryopyrin-associated periodic syndromes (CAPS) use (2026); patent on familial Mediterranean fever (FMF) use (2026); patent on systemic onset juvenile idiopathic arthritis (SJIA) use (2027); patent on hyperimmunoglobulin D syndrome (HIDS) and tumor necrosis factor receptor-associated periodic syndrome (TRAPS) use (2028); patent on formulation (2029); RDP (2021). EU: Patent on composition of matter (2021), SPC (2024), PE (2025); patent on SJIA use (2026); patent on FMF use (2026); patent on formulation (2029); RDP (2020). Japan: Patent on composition

of matter (2021), two PTEs (2024, 2026); patent on familial cold urticaria, neonatal onset multisystem inflammatory disease, SJIA and FMF use (2026); patent on Muckle-Wells syndrome use (2026); patent on formulation (2029); ODE for CAPS (2021); ODE for FMF, HIDS and TRAPS (2026); ODE for SJIA (2028). There is no generic competition in the US, the EU or Japan.

Neuroscience

- *Gilenya*. US: Patent on dosage regimen (2027), PE (2027); patent on 0.25 mg formulation (2032), PE (2032); patent on method of treatment (2027); RDP for pediatric use and 0.25 mg (2021), PE (2021). EU: RDP (2022); patent on formulation (2024), SPC (2026); patent on 0.25 mg formulation (2032). Japan: ODE (2021); two patents on formulation (2024, 2024). There is no generic competition in the US, the EU or Japan. In the US, the ANDA proceedings challenging the compound patent and extensions expiring in 2019 have been resolved and the patent upheld. The dosage regimen patent is being challenged in ANDA proceedings against generic manufacturers. In parallel, an appeal against a USPTO decision upholding the patent in IPR proceedings is ongoing. Novartis is taking steps to enforce the US dosage regimen patent and the method of treatment patent against generic manufacturers.

- *Zolgensma*. US: Two patents on vector (2024, 2026); ODE for spinal muscular atrophy (SMA) in patients less than 2 years old with biallelic mutations in the SMN1 gene (2026); RDP (2031). EU: Two patents on vector (2024, 2028); two patents on method of use (2028, 2028). Japan: Patent on vector (2024); patent method of use (2028). *Zolgensma* is not marketed in the EU or Japan. There is no generic competition in the US.

- *Aimovig*. US (co-commercialized with Amgen): Patent on composition of matter (2031); patent on dose/regimen for migraine prevention (2036); RDP (2030). EU: Patent on composition of matter (2029), SPC (2033); RDP (2028). There is no generic competition in the US or the EU.

- *Mayzent*. US: Patent on compound (2024); RDP (2024); patent on treatment initiation use (2030). PTE pending. EU: Patent on compound (2024); patent on solid form (2029); patent on treatment initiation use (2029); patent on formulation (2032); RDP (2030). Japan: Patent on compound (2024); patent on solid form (2029); two patents on formulation (2032, 2032); patent on patient subgroup use (2033). *Mayzent* is not marketed in Japan. There is no generic competition in the US or the EU.

Respiratory

- *Xolair*. US: Two patents on syringe formulation (2021, 2024). EU: Two patents on syringe formulation (2021, 2024). Japan: Two patents on syringe formulation (2021, 2024). There is no generic competition in the US, the EU or Japan.

Cardiovascular, Renal and Metabolism

- *Entresto*. US: Four patents on combination (2023) (4), PE (2023 (3), 2024); two patents on complex (2026, 2027), PE (2027, 2027); RDP (2020), PE (2021); RDP for new pediatric patient population (2022), PE (2023). PTE pending. EU: Patent on combination (2023), SPC (2028); patent on complex (2026), SPC (2030); RDP (2025). Japan: Patent on combination (2023); patent on complex (2026); patent on formulation (2028). There is no generic competition in the US or the EU. *Entresto* is not marketed in Japan. The EU complex patent is being opposed in the EPO. In the US, the combination and complex patents are being challenged in ANDA proceedings against generic manufacturers.

Established Medicines

- *Galvus* and *Eucreas*. EU: Patent on compound (2019), SPC (2022); patent on combination (2021), SPC (2022); patent on *Galvus* formulation (2025); patent on *Eucreas* formulation (2026). Japan: Patent on compound (2019), three PTEs (2022, 2024, 2024); patent on combination (2021); patent on *Galvus* formulation (2025), PTE (2025); patent on *Eucreas* formulation (2026), PTE (2028). *Galvus/Eucreas* is not marketed in the US. There is generic competition for *Galvus* and *Eucreas* in some EU countries. There is no generic competition in Japan. The EU *Galvus* and *Eucreas* formulation patents are being opposed in the EPO.

- *Diovan* and *Co-Diovan/Diovan HCT*. *Diovan*: There is generic competition in the US, the EU and Japan. *Co-Diovan/Diovan HCT*: There is generic competition in the US, the EU and Japan.

- *Exforge* and *Exforge HCT*.

  Exforge. US: There is no patent protection for *Exforge* combination in the US. EU: There is no patent protection for *Exforge* combination in the EU. Japan: There is no patent protection for *Exforge* combination in Japan. There is generic competition in the US, the EU and Japan.

  Exforge HCT. US: Patent on *Exforge HCT* combination (2023); patent on formulation (2023). EU: There is no patent protection for *Exforge HCT* combination in the EU. Japan: Patent on *Exforge HCT* combination (2023). There is generic competition in the US and the EU. There is no generic competition in Japan.

- *Zortress/Certican*. US: Patent on compound (2014), PTE (2019), PE (2020); patent on dispersible tablet formulation (2022), PE (2023); patent on antioxidant (2019), PE (2020). EU: Patent on dispersible tablet formulation (2022). Japan: Patent on dispersible tablet formulation (2022). There is no generic competition in the US, the EU or Japan. In the US, the compound patent has been upheld as valid after a challenge in ANDA proceedings against generic manufacturers.

- *Egaten*. US: RDP (2024); ODE (2026). EU: There is no patent protection for *Egaten* in the EU. Japan: There is no patent protection for *Egaten* in Japan. *Egaten* is not

marketed in Japan. There is no generic competition in the US or the EU.

Compounds in development
We provide the following patent information for non-marketed compounds in development that have been submitted to the FDA and/or the EMA for registration but have not yet been approved by either agency. Unless noted, the information below does not include anticipated or potential patent term extensions (PTEs or SPCs), or RDP, both of which generally are not applied for or granted until a product is approved or marketed. For these products, Novartis will seek all appropriate RDP, will continue to seek additional intellectual property protection for significant product developments, and will apply for patent term extensions in keeping with the great importance we attach to intellectual property to protect our investments in research and development, manufacturing and marketing.

- INC280 (capmatinib). US: Patent on compound (2027); patent on salt form (2031); patent on method of use (2029); patent on formulation (2035). EU: Patent on compound (2027); patent on salt form (2029). Japan: Patent on compound (2027); patent on salt form (2029).

- KJX839 (inclisiran). US: Patent on composition of matter (2034), anticipated PTE (2035). EU: Patent on composition of matter (2033), anticipated SPC (2036). Japan: Patent on composition of matter (2033).

- OMB157 (ofatumumab, for multiple sclerosis). US: Patent on compound (2031). EU: Three patents on compound (2023 (3)); two patents on formulation (2028, 2028). Japan: Two patents on compound (2023, 2023); two patents on formulation (2028, 2028).

- QMF149 (indacaterol acetate/mometasone furoate). US: Patent on compound (2020); three patents on combination (2020, 2021, 2023); three patents on formulation (2020, 2020, 2021); patent on device (2028); patent on salt form (2029). EU: Patent on compound (2020); patent on formulation (2020); patent on combination (2021); patent on device (2025); patent on salt form (2027). Japan: Patent on compound (2020); patent on device (2025); patent on salt form (2027).

- QVM149 (indacaterol acetate/glycopyrronium bromide/mometasone furoate). US: Patent on compound (2020); five patents on combination (2020 (3), 2021, 2023); eight patents on formulation (2020 (3), 2021 (5)); two patents on method of use (2021, 2021); patent on device (2028); patent on salt form (2029). EU: Patent on compound (2020); patent on formulation (2020); patent on combination (2021); patent on device (2025); patent on salt form (2027). Japan: Patent on compound (2020); two patents on formulation (2025, 2025); patent on combination (2025); patent on device (2025); patent on salt form (2027).

Sandoz

Our Sandoz Division is a global leader in generic pharmaceuticals and biosimilars, and sells products in well over 100 countries. In 2019, the Sandoz Division achieved consolidated net sales of USD 9.7 billion, representing 21% of the Group's total net sales. Sandoz develops, manufactures and markets finished dosage form medicines as well as intermediary products including active pharmaceutical ingredients.

Sandoz is organized globally into three franchises: Retail Generics, Anti-Infectives and Biopharmaceuticals. In Retail Generics, Sandoz develops, manufactures and markets active ingredients and finished dosage forms of small molecule pharmaceuticals to third parties across a broad range of therapeutic areas, as well as finished dosage form anti-infectives sold to third parties. In Anti-Infectives, Sandoz manufactures and supplies active pharmaceutical ingredients and intermediates – mainly antibiotics – for internal use by Retail Generics and for sale to third-party customers. In Biopharmaceuticals, Sandoz develops, manufactures and markets protein- or other biotechnology-based products, including biosimilars, and provides biotechnology manufacturing services to other companies.

The Sandoz strategic ambition is to be the world's leading and most valued generics company (including biosimilars). Under Sandoz CEO Richard Saynor, the divisional strategy has been refined to focus on three areas: developing a broad and consistent pipeline of off-patent launches across key geographies and major therapeutic areas; positioning Sandoz to be "first in" by having a strong pipeline with a concentration on being first to market, and to be "last out" by way of competitive costs and stable supply; and instilling a true "generic mindset," with a focus on priorities, simple and rapid decision-making, and focused resource allocation.

In 2018, Novartis announced an agreement to sell selected portions of its Sandoz US portfolio, specifically the Sandoz US dermatology business and generic US oral solids portfolio, to Aurobindo Pharma USA Inc., for USD 0.8 billion in cash and potential earn-outs. These businesses had net sales of approximately USD 1.1 billion in 2019. The sale includes the Sandoz US generic and branded dermatology businesses as well as its dermatology development center. As part of the transaction, Aurobindo will acquire the manufacturing facilities in Wilson, North Carolina, and in Hicksville and Melville, New York. Following the transaction, the Sandoz US portfolio

will include primarily biosimilars and complex generics such as injectable, respiratory and ophthalmic products. The transaction is expected to be completed in the first quarter of 2020 pending regulatory approval.

Sandoz is a market leader in biosimilars, with a total of eight approved and marketed products and a pipeline of over 10 molecules, including publicly announced commercialization agreements with BioCon, Gan & Lee, EirGenix and Polpharma Biologics. Availability of our biosimilars varies by country.

In November 2019, we announced the planned acquisition of the Japanese business of Aspen Global Incorporated. Aspen's portfolio in Japan consists of off-patent medicines with a focus on anesthetics and specialty brands. We have received all relevant approvals and this transaction is expected to be completed in the first quarter of 2020.

We received a CRL from the FDA in 2018 for our submission for a generic form of fluticasone propionate and salmeterol inhalation powder, for oral inhalation (GSK's Advair®). In January 2020 we decided to discontinue the generic Advair® development program in the US, following a recent review of data read-outs.

Key marketed products

The Sandoz global portfolio covers a wide range of therapeutic areas. The following are some of the Sandoz key marketed products in each of its franchises (availability varies by market):

Retail Generics

Product	Originator drug	Description
Amoxicillin/clavulanic acid	Augmentin®	Antibiotic
Zoledronic acid	*Aclasta*	Osteoporosis treatment
Acetylsteine	*Various*	Mucolytic agent
Fentanyl	*Various*	Pain treatment

Anti-Infectives

Active ingredients	Description
Oral and sterile penicillins	Anti-infectives
Oral and sterile cephalosporins	Anti-infectives
Clavulanic acid and mixtures with clavulanic acid	ß-lactam inhibitors
Classical and semisynthetic erythromycins	Anti-infectives
Intermediates	**Description**
Various cephalosporin intermediates	Anti-infectives
Erythromycin base	Anti-infectives
Various crude compounds produced by fermentation	Cyclosporine, ascomysin, rapamycin, mycophenolic acid, etc.

Biopharmaceuticals

Product	Originator drug	Description
Omnitrope	Genotropin®	Recombinant human growth hormone
Binocrit and Epoetin alfa *Hexal*	Eprex®/Erypo®	Recombinant protein used for anemia
Zarzio, *Zarxio* and *Filgrastim Hexal*	Neupogen®	Recombinant protein used in oncology
Glatopa	Copaxone®	Treatment for multiple sclerosis (MS)
Erelzi [1]	Enbrel®	Treatment for multiple inflammatory diseases
Rixathon	MabThera®	Treatment for blood cancers and immunological diseases
Hyrimoz	Humira®	Treatment for multiple inflammatory diseases
Zessly	Remicade®	Treatment for gastroenterological, rheumatological and dermatological diseases
Ziextenzo	Neulasta®	Treatment to reduce duration of chemotherapy-induced neutropenia and incidence of chemotherapy-induced febrile neutropenia with the exception of chronic myeloid leukemia and myelodysplastic syndromes

[1] Approved in the US in 2016. Launch in the US pending final resolution of litigation with Amgen, which markets Enbrel®. The US District Court of New Jersey ruled against Sandoz on August 9, 2019; Sandoz respectfully disagrees with the ruling and submitted an appeal. The appeals court hearing is scheduled for March 4, 2020.

Biosimilars in Phase III development and registration

The following table describes Sandoz biosimilar projects that are in Phase III clinical trials (including filing preparation) and registration:

Project/ product [1]	Common name	Mechanism of action	Potential indication/indications	Therapeutic areas	Route of administration	Current phase
GP2017	adalimumab	TNF-α inhibitor	Arthritides (rheumatoid arthritis, ankylosing spondylitis, psoriatic arthritis), plaque psoriasis and others (same as originator)	Immunology	Subcutaneous	EU: Approved US: Approved[2]
GP2411 [3]	denosumab	RANKL inhibitor	Osteoporosis, bone loss, prevention of bone complications in cancer that has spread to the bone (indications vary in US and EU)	Endocrinology, Neurology	Subcutaneous	Phase III
EGI014A1 [4]	trastuzumab	Anti HER2 monoclonal antibody	Breast and gastric tumors	Oncology	Intravenous	Phase III
DST356A1 [5]	natalizumab	Anti-Alpha 4 (α4) integrin monoclonal antibody	Monotherapy for remitting relapsing forms of multiple sclerosis (RRMS); in US second line treatment for active Crohn's disease	Neurology, Immunology (US only)	Intravenous	Phase III

[1] LA-EP2006 (pegfilgrastim) was approved and launched in the EU as *Ziextenzo* in November 2018 and was approved and launched in the US in November 2019.
[2] Launched as *Hyrimoz* in the EU in October 2018. Also in October 2018, we announced a global resolution of all intellectual property-related litigation with AbbVie concerning adalimumab. Under the terms of the agreement, AbbVie grants us a non-exclusive license to AbbVie's intellectual property relating to Humira®, beginning on certain dates in certain countries in which AbbVie has intellectual property. We are not entitled to launch *Hyrimoz* in the US until the second half of 2023.
[3] Development in collaboration with Hexal AG.
[4] Development in collaboration with EirGenix, Inc.
[5] Development in collaboration with Polpharma Biologics.

Principal markets

The two largest generics markets in the world – the US and Europe – are the principal markets for Sandoz. The following table sets forth the aggregate 2019 net sales of Sandoz by region:

Sandoz

	2019 net sales to third parties	
	USD millions	%
Europe	5 115	53
United States	2 491	26
Asia, Africa, Australasia	1 341	14
Canada and Latin America	784	7
Total	**9 731**	**100**
Of which in Established Markets*	7 111	73
Of which in Emerging Growth Markets*	2 620	27

* Emerging Growth Markets comprise all markets other than the Established Markets of the US, Canada, Western Europe, Japan, Australia and New Zealand.

Many Sandoz products are used for chronic conditions that require patients to consume the product over long periods of time, from months to years. Sales of our anti-infective products and over-the-counter cough and cold products are subject to seasonal variation. Sales of the vast majority of our other products are not subject to material changes in seasonal demand.

Production

For information on the production of our products, see "—Item 4.B Business overview—Innovative Medicines—Production."

Due to impurities found in the active ingredients batches sourced from third-party manufacturers, we recalled Sandoz valsartan, losartan and ibersartan products in the second half of 2018 and first quarter of 2019, and ranitidine film-coated tablets in the second half of 2019, from several markets, in line with our quality standards for all of our marketed products.

Marketing and sales

Sandoz sells a broad portfolio of products, including the products of our Retail Generics franchise and biosimilars, to wholesalers, pharmacies, hospitals and other healthcare outlets. Sandoz adapts its marketing and sales approach to local decision-making processes, depending on the structure of the market in each country.

In response to rising healthcare costs, many governments and private medical care providers, such as health maintenance organizations, have instituted reimburse-

ment schemes that favor the substitution of bioequivalent generic versions of originator pharmaceutical products, such as those sold by our Retail Generics franchise. In the US, statutes have been enacted by all states that permit or require pharmacists to substitute a less expensive generic product for the brand-name version of a drug that has been prescribed to a patient. Generic use is growing in Europe, but penetration rates in many EU countries (as a percentage of volume) remain well below those in the US.

Recent trends have been toward continued consolidation among distributors and retailers of Sandoz products, both in the US and internationally, which has increased our customers' purchasing leverage.

Legislative or regulatory changes can have a significant impact on our business in a country. In Germany, for example, healthcare reforms have increasingly shifted decision-making from physicians to insurance funds.

Our Anti-Infectives franchise supplies active pharmaceutical ingredients and intermediates – mainly antibiotics – for internal use by Retail Generics and for sale to the pharmaceutical industry worldwide.

Our Biopharmaceuticals franchise operates in an emerging business environment, particularly in the US. Regulatory pathways for approving biosimilar products are either relatively new or still in development, and policies have not yet been fully defined or implemented for the automatic substitution and reimbursement of biosimilars in many markets, including the US. As a result, in many of these markets, our biosimilar products are marketed as branded competitors to the originator products.

Competition

The market for generic products is characterized by increasing demand for high-quality pharmaceuticals that can be marketed at lower costs due to comparatively minimal initial research and development investments. Increasing pressure on healthcare expenditures and numerous patent and data exclusivity period expirations have encouraged more generic product launches, resulting in increased competition among the companies selling generic pharmaceutical products, leading to ongoing price pressure. In particular, Sandoz faces increased industrywide pressure on prices for generic products, particularly in the US, driven by factors including customer consolidation and growing competition from other manufacturers of generic medicines. These factors contributed to a decline in US sales that began in 2017 and continued through 2019.

In addition, research-based pharmaceutical companies are participating directly in the generic conversion process by licensing their patented products to generic companies (so-called "authorized generics"). Consequently, generic companies that were not otherwise in a position to launch a specific product may participate in the market using the innovator's product authorization. Authorized generics serve as a business opportunity for Sandoz when the product of a research-based pharmaceutical company loses patent protection and Sandoz secures a license from the research-based pharmaceutical company to launch the authorized generic of that product.

Development and registration

Development of Sandoz Biopharmaceuticals is jointly overseen by Sandoz and by GDD and is mostly executed by GDD. Development and registration activities for Retail Generics products, and certain registration activities for Biopharmaceuticals products, continue to be overseen directly by Sandoz.

Before a generic pharmaceutical may be marketed, intensive technical and clinical development work must be performed to demonstrate, in bioavailability studies, the bioequivalence of the generic product to the reference product. Nevertheless, research and development costs associated with generic pharmaceuticals are much lower than those of the originator pharmaceuticals, as no preclinical studies or clinical trials on dose finding, safety and efficacy must be performed by the generic company. As a result, generic pharmaceutical products can be offered for sale at prices often much lower than those of products protected by patents and data exclusivity, which must recoup substantial research and development costs through higher prices over the life of the product's patent and data exclusivity period.

While generic pharmaceuticals are follow-on versions of chemically synthesized molecules, biosimilar products contain a version of the active substance of an already approved biological reference medicine. Due to the inherent variability and complexity of biologic products, including batch-to-batch differences and variations following manufacturing changes, the development and the regulatory pathway of biosimilars differ significantly from that of generics.

The development of a biosimilar product is much more technically challenging than the development of a typical generic small molecule pharmaceutical. While generic pharmaceuticals normally do not require clinical studies in patients, regulators worldwide do require such targeted studies for biosimilar products. Biosimilars are engineered to match the reference medicine in quality, safety and efficacy. This is achieved by systematically defining the target range of the reference medicine and then comparing the biosimilar to the reference medicine at various development stages to confirm biosimilarity and to establish that there are no clinically meaningful differences between the proposed biosimilar and the reference biologic. Because the purpose of a biosimilar clinical development program is to confirm biosimilarity and not to establish efficacy and safety de novo, the clinical studies required are less than those required for a reference biologic. Therefore, the cost of development for a biosimilar is usually less than that of a reference biologic.

The Development and Registration staff employed by affiliates of the Sandoz Division are based worldwide, including at facilities in Holzkirchen, Germany; Rudolstadt, Germany; Kundl, Austria; Ljubljana, Slovenia; Melville, New York; and Hicksville, New York. In 2018, the divestment of the Boucherville, Canada, development (and associated manufacturing) facility to Avara Pharmaceutical Services was announced. In 2019, the Superior Court of Quebec granted Sandoz the right to reacquire the site, which had subsequently gone into receivership, in order to maintain stable operations pending a decision about the site's long-term future. Sepa-

rately, in 2019, Sandoz confirmed the opening of a new development center in Hyderabad, India, initially focused on oral solid medicines. In May 2019, we announced the planned closure of the Holzkirchen development and registration site.

Regulation

Generics

The Hatch-Waxman Act in the US (and similar legislation in the EU and in other countries) eliminated the requirement that manufacturers of generic pharmaceuticals repeat the extensive clinical trials required for reference products, so long as the generic version could be shown to be therapeutically equivalent to the reference product.

In the US, the decision on whether a generic pharmaceutical is therapeutically equivalent to the original product is made by the FDA based on an Abbreviated New Drug Application (ANDA) filed by the generic product's manufacturer. The process typically takes nearly two years from the filing of the ANDA until FDA approval. However, delays can occur if issues arise, for example, regarding the interpretation of bioequivalence study data, labeling requirements for the generic product, or qualifying the supply of active ingredients. In addition, the Hatch-Waxman Act requires a generic manufacturer to certify in certain situations that the generic product does not infringe on any current applicable patents on the product held by the holder of the marketing authorization for the reference product, or to certify that such patents are invalid. This certification often results in a patent infringement lawsuit being brought against the generic company. In the event of such a lawsuit, the Hatch-Waxman Act imposes an automatic 30-month delay in the approval of the ANDA to allow the parties to resolve the intellectual property issues. For generic applicants who are the first to file their ANDA containing a certification claiming non-infringement or patent invalidity, the Hatch-Waxman Act generally provides those applicants with 180 days of marketing exclusivity to recoup the expense of challenging the patents on the reference product. However, generic applicants must launch their products within certain timeframes or risk losing the marketing exclusivity that they had gained by being a first-to-file applicant.

In the EU, decisions on the granting of a marketing authorization are made either by the European Commission based on a positive recommendation by the EMA under the centralized procedure, or by a single member state under the national or decentralized procedure. See "—Innovative Medicines—Regulation—European Union." Companies may submit Abridged Applications for approval of a generic medicinal product based upon its "essential similarity" to a medicinal product authorized and marketed in the EU following the expiration of the product's data exclusivity period. In such cases, the generic company is able to submit its Abridged Application based on the data submitted by the innovator company for the reference product, without the need to conduct extensive Phase III clinical trials of its own. For all products that received a marketing authorization in the EU after late 2005, the Abridged Application can be submitted throughout the EU. However, the data submitted by the innovator company in support of its application for a marketing authorization for the reference product will be protected for 10 years after the first grant of marketing authorization in all member states, and can be extended for an additional year if a further innovative indication has been authorized for that product, based on preclinical and clinical trials filed by the innovator company that show a significant clinical benefit in comparison to the existing therapies.

Biosimilars

The regulatory pathways for approval of biosimilar medicines are still being developed and established in many countries of the world. A regulatory framework for the approval of biosimilars has been established in the EU, Japan, Canada and the US, while the World Health Organization (WHO) has issued guidance. Sandoz has successfully registered and launched the first biosimilar (or biosimilar-type) medicine in Europe, the US, Canada, Japan, Taiwan, Australia, and many countries in Latin America and Asia. Sandoz was the first company to secure approval for and launch a biosimilar under the US biosimilar pathway that was established as part of the Biologics Price Competition and Innovation Act (BPCIA).

The approval of biosimilars in Europe follows a process similar to that followed for small molecules. However, biosimilars usually have to be approved through the centralized procedure because they are manufactured using recombinant DNA technology. As part of the approval process in the EU, biosimilars have to demonstrate comparability to the reference medicine in terms of safety, efficacy and quality through an extensive comparability exercise, based on strict guidelines set by the authorities. Regulators will only approve a biosimilar based on data that allows the regulators to conclude that there are no clinically meaningful differences between the reference medicine and the biosimilar.

In the US, under the BPCIA, a biosimilar must be highly similar with no clinically meaningful differences compared to the reference medicine. Approval of a biosimilar in the US requires the submission of an ABLA to the FDA, including an assessment of immunogenicity, and pharmacokinetics or pharmacodynamics. The ABLA for a biosimilar can be submitted as soon as four years after the initial approval of the reference biologic, but can only be approved 12 years after the initial approval of the reference biologic.

Intellectual property

We take all reasonable steps to ensure that our products do not infringe valid intellectual property rights held by others. Nevertheless, competing companies commonly assert patent and other intellectual property rights. As a result, we can become involved in significant litigation regarding our products. If we are unsuccessful in defending these suits, we could be subject to injunctions preventing us from selling our products and to potentially substantial damages.

Wherever possible, our products are protected by our own patents. Among other things, patents may cover the products themselves, including the product's formu-

lation, or the processes for manufacturing a product. However, there can be no assurance that our intellectual property will protect our products or that we will be able to avoid adverse effects from the loss of intellectual property protection in the future.

4.C Organizational structure

Organizational structure

See "Item 4. Information on the Company—Item 4.A History and development of Novartis," and "Item 4. Information on the Company—Item 4.B Business overview—Overview."

Significant subsidiaries

See "Item 18. Financial Statements—Note 32. Principal Group subsidiaries and associated companies."

4.D Property, plants and equipment

Our principal executive offices are located in Basel, Switzerland. Our divisions operate through a number of affiliates that have offices, research and development facilities, and production sites throughout the world.

We generally own our facilities or have entered into long-term lease arrangements for them. Some of our principal facilities are subject to mortgages and other security interests granted to secure indebtedness to certain financial institutions.

NTO manages the production and supply chains of our Innovative Medicines and Sandoz Division products through a network of 60 manufacturing sites, as well as through external suppliers, and warehouse and distribution centers. AAA manages four sites for radioligand therapies production, and certain other small sites for diagnostics and enriched water production. AveXis manages six sites for research and development, production, warehousing, its headquarters and administrative offices. Endocyte manages two sites for research and its headquarters and administrative offices.

The following table sets forth our major headquarters and most significant production, research and development, and administrative facilities. See also "—Item 4.B Business overview—Innovative Medicines—Production" and "—Item 4.B Business overview—Sandoz—Production" for a discussion of our manufacturing processes.

Major facilities

Location	Size of site (in square meters)	Major activity
Basel, Switzerland – St. Johann	589 000	Global Group headquarters; global Innovative Medicines Division headquarters; Global Sandoz Division; research and development; production of drug substances and drug intermediates
Kundl and Schaftenau, Austria	480 000	Production of biotechnological products, drug products and finished products, anti-infectives, active drug substances, product development
East Hanover, New Jersey	391 000	Innovative Medicines Division US headquarters, research and development
Barleben, Germany	340 000	Production of broad range of generics finished dosage forms
Cambridge, Massachusetts	205 000	Research and development
Shanghai, China	106 500	Research and development
Ljubljana, Slovenia	83 000	Production of broad range of finished solid and sterile dosage forms
Hyderabad, India	80 500	General administrative and development global service center
Longmont, Colorado	65 032	Production, warehouse, and administrative offices for AveXis
Stein, Switzerland	64 700	Production of sterile vials, pre-filled syringes and ampoules; inhalation capsules, tablets and transdermals; active pharmaceutical ingredients, and cell and gene therapies
Holzkirchen, Germany	64 200	Global Sandoz Division headquarters, production of oral films, transdermal delivery systems, matrix patches, product development
Menges, Slovenia	62 400	Production of drug substances and drug intermediates
Stryków, Poland	45 000	Production of broad range of bulk oral solid forms and packaging
Huningue, France	35 000	Production of drug substances for clinical and commercial supply
Singapore	35 000	Production for Innovative Medicines solids and biologics
Barbera, Spain	33 000	Production of tablets, capsules and inhalation products
Basel, Switzerland – Schweizerhalle	31 700	Production of drug substances and drug intermediates
Rueil-Malmaison, France	29 500	Administrative offices for Innovative Medicines
Puurs, Belgium	27 500	Production for Innovative Medicines ophthalmic products
Tokyo, Japan	20 000	Administrative offices for Innovative Medicines and Sandoz
Morris Plains, New Jersey	15 600	Production for Innovative Medicines Division cell and gene therapies
Princeton, New Jersey	14 300	Sandoz Division US headquarters
Libertyville, Illinois	9 800	Production, warehouse, and administrative offices for AveXis
Targu Mures, Romania	9 070	Production of solids for Innovative Medicines and Sandoz
Les Ulis, France	5 920	Production for Innovative Medicines Division cell and gene therapies
Millburn, New Jersey	1 400	AAA primary production site for radioligand therapy
Colleretto Giacosa/Ivrea, Italy	1 200	AAA primary production site for radioligand therapy

As our product portfolio evolves, NTO is adapting our manufacturing capacity and capabilities to meet our changing needs, shifting from high-volume products toward lower-volume, customized and personalized medicines. As of December 31, 2019 we have closed, exited or sold, or announced the closure, exit or sale of 19 facilities since 2016. We have also continued to expand our capacity in personalized medicines and complex biologic drugs, such as in Stein, Switzerland, as well as investing in new facilities to provide cell and gene therapies, such as in Les Ulis, France. We are leveraging innovation to increase the reliability and productivity of our manufacturing network, including using data and digital technologies. We continue to seek opportunities to manage our production facilities as efficiently as possible, optimize external spend, and simplify and standardize across our manufacturing network to help us lower costs and help optimize the value of our products. At the same time, we are working to improve our environmental sustainability, for example by reducing energy and water consumption at our sites.

In 2012, we announced the construction of a new state-of-the-art production facility to produce solid dosage form medicines for the Innovative Medicines Division in Stein, Switzerland. In addition, we invested in new technologies and packaging facilities for pharmaceuticals at Stein. Both projects became fully operational in 2019. As of December 31, 2019, the total amount paid and committed to be paid on the Stein projects is equivalent to approximately USD 0.6 billion.

In 2012, we announced the planned construction of a new state-of-the-art biotechnology production site in Singapore. The facility became operational in 2019 and is focused on drug substance manufacturing based on cell culture technology. The facility is co-located with the pharmaceutical production site based in Tuas, Singapore. As of December 31, 2019, the total amount paid and committed to be paid on this project is equivalent to USD 0.8 billion.

In 2018, AveXis initiated construction of a new 15 800-square-meter state-of-the-art gene therapy manufacturing facility in Durham, North Carolina. The new facility is expected to complement the existing AveXis site in Libertyville, Illinois, and allow for production of multiple gene therapy products simultaneously. The site is expected to be operational in 2020. We expect our investment in this facility to exceed USD 0.2 billion. As of December 31, 2019, the total amount paid and com-

mitted to be paid on this project is approximately USD 0.2 billion.

In 2018, we announced our plan to establish a European cell and gene therapy hub in Stein, Switzerland, and the facility was officially opened in November 2019. We expect our investment in this project to exceed USD 0.1 billion. As of December 31, 2019, the total amount paid and committed to be paid on this project is equivalent to USD 0.1 billion.

In 2018, we announced the construction of a new state-of-the-art advanced integrated biologics manufacturing facility in Schaftenau, Austria. We expect our investment in this facility to exceed USD 0.2 billion. We expect phase one of this project to be operational in 2020. As of December 31, 2019, the total amount paid and committed to be paid on this project is equivalent to approximately USD 0.1 billion.

In April 2019, AveXis purchased a former AstraZeneca site in Longmont, Colorado. The new facility is expected to complement the AveXis sites in Libertyville, Illinois, and Durham, North Carolina, and to allow for production of gene therapy products. The site became operational in 2020. We expect our investment in this facility to exceed USD 0.1 billion. As of December 31, 2019, the total amount paid and committed to be paid on this project (excluding the acquisition costs) is approximately USD 0.1 billion.

In November 2019, we began to expand our existing biologics drug substance manufacturing based on cell culture technology in Schaftenau, Austria. We expect our total investment in this project to amount to USD 0.2 billion. We expect this project to be operational in 2022. As of December 31, 2019, the total amount paid and committed to be paid on this project is equivalent to approximately USD 0.1 billion.

Environmental matters

We integrate core values of environmental protection into our business strategy to protect the environment, add value to the business, manage risk and enhance our reputation. For example, our Executive Committee has endorsed targets for environmental sustainability related to our carbon footprint, waste production and water sustainability, and we are party to a virtual power purchase agreement for renewable energy.

We are subject to laws and regulations concerning the environment, safety matters, regulation of chemicals, and product safety in the countries where we manufacture and sell our products or otherwise operate our business. These requirements include regulation of the handling, manufacture, transportation, use and disposal of materials, including the discharge of pollutants into the environment. In the normal course of our business, we are exposed to risks relating to possible releases of hazardous substances into the environment that could cause environmental or property damage or personal injuries, and that could require remediation of contaminated soil and groundwater – in some cases over many years – regardless of whether the contamination was caused by us or by previous occupants of the property.

See “Item 3. Key Information—Item 3.D Risk factors—Environmental, social and governance matters may impact our business and reputation,” “Item 3. Key Information—Item 3.D Risk factors—Environmental liabilities may adversely impact our financial results,” and “Item 3. Key Information—Item 3.D Risk factors—Climate change, extreme weather events, earthquakes and other natural disasters could adversely affect our business.” See also “Item 18. Financial Statements—Note 20. Provisions and other non-current liabilities.”

Item 4A. Unresolved Staff Comments

Not applicable.

Item 5. Operating and Financial Review and Prospects

5.A Operating results

This operating and financial review should be read with the Group's consolidated financial statements in this Annual Report, which have been prepared in accordance with International Financial Reporting Standards (IFRS) as published by the International Accounting Standards Board (see "Item 18. Financial Statements"). "Item 5. Operating and Financial Review and Prospects" with the sections on compounds in development and key development projects of our divisions (see "Item 4. Information on the Company—Item 4.B Business overview") constitute the Operating and Financial Review (*Lagebericht*), as defined by the Swiss Code of Obligations.

Overview

Our purpose is to reimagine medicine to improve and extend people's lives. We use innovative science and technology to address some of society's most challenging healthcare issues. We discover and develop breakthrough treatments and find new ways to deliver them to as many people as possible. We also aim to reward those who invest their money, time and ideas in our company. Our vision is to be a trusted leader in changing the practice of medicine. Our strategy is to build a leading, focused medicines company powered by advanced therapy platforms and data science. As we implement our strategy, we have five priorities to shape our future and help us continue to create value for our company, our shareholders and society: unleash the power of our people; deliver transformative innovation; embrace operational excellence; go big on data and digital; and build trust with society.

The businesses of Novartis are divided operationally on a worldwide basis into two identified reporting segments:

- Innovative Medicines: innovative patent-protected prescription medicines
- Sandoz: generic pharmaceuticals and biosimilars

In addition, we separately report the results of Corporate activities. The financial results of our Corporate activities include the costs of the Group headquarters and those of corporate coordination functions in major countries. Corporate also includes other items of income and expense that are not attributable to specific segments, such as certain revenues from intellectual property rights and certain expenses related to post-employment benefits, environmental remediation liabilities, charitable activities, donations and sponsorships.

Our divisions are supported by the following organizational units: the Novartis Institutes for BioMedical Research, Global Drug Development, Novartis Technical Operations and Novartis Business Services. The financial results of these organizational units are included in the results of the divisions for which their work is performed.

As part of our long-term strategy we announced and/or completed several acquisitions and divestments during 2019:

In April 2019, we completed the spin-off of the Alcon business into a separately-traded standalone company.

In May 2019, we acquired IFM Tre, Inc., a privately held, US-based biopharmaceutical company focused on developing anti-inflammatory medicines targeting the NLRP3 inflammasome.

In May 2019, we entered into an agreement with Takeda to acquire the assets associated with *Xiidra* worldwide. This transaction closed on July 1, 2019.

In November 2019, we entered into a binding agreement for the acquisition of the Japanese business of Aspen Global Incorporated (AGI). We have received all relevant approvals and this transaction is expected to be completed in the first quarter of 2020.

In November 2019, we entered into an agreement and plan of merger with The Medicines Company, a US-based pharmaceutical company headquartered in Parsippany, New Jersey. The transaction closed in January 2020.

For a description of these and other significant transactions, refer to "Item 4. Information on the Company—Item4.A History and development of Novartis— Important corporate developments 2017– January 2020", "Item 18. Financial Statements—Note 2. Significant transactions", "Item 18.Financial Statements—Note 3 Segmentation of key figures 2019, 2018 and 2017," and "Item 18.Financial Statements—Note 30. Discontinued operations."

As a result of the spin-off of the Alcon business, Novartis has separated the Group's reported financial data for the current and prior years into "continuing" and "discontinued" operations, to comply with International Financial Reporting Standards (IFRS). Continuing operations include the businesses of the Innovative Medicines and Sandoz Divisions, and the continuing Corporate activities. Discontinued operations include the Alcon eye care devices business and certain Corporate activities attributable to the Alcon business prior to the spin-off, the gain on distribution of Alcon Inc. to Novartis AG shareholders and certain other expenses related to the spin-off.

In 2019, Novartis achieved net sales from continuing operations of USD 47.4 billion, of which 25%, came from Emerging Growth Markets, and 75%, came from Established Markets. Emerging Growth Markets comprise all markets other than the Established Markets of the US, Canada, Western Europe, Japan, Australia and New Zealand.

Innovative Medicines accounted for USD 37.7 billion, or 79%, of Group net sales, and for USD 9.3 billion, or 94%, of Group operating income (excluding Corporate income and expense, net).

Sandoz accounted for USD 9.7 billion, or 21%, of Group net sales, and for USD 551 million, or 6%, of Group operating income (excluding Corporate income and expense, net).

Opportunity and risk summary

Our financial results are affected to varying degrees by external factors. The healthcare industry is in a phase of significant progress and change. We believe biomedical innovation has the potential to continue to accelerate over the next two decades, – potentially leading to new treatments and treatment modalities for previously untreatable conditions. We see this as an opportunity given our strong internal research capabilities, and we expect to sustain long-term growth in part through our 15 ongoing and upcoming major launches.

The rapid expansion in data science and digital technologies has the potential to transform a wide range of activities in healthcare, from drug research and development, to the ways in which doctors diagnose and treat diseases, and patients' involvement in their own care. These trends could help society address the changing healthcare needs of aging populations and produce better health outcomes for patients.

In addition, drug pricing is an increasingly prominent issue in many countries as healthcare spending continues to rise. This impacts our ability to establish satisfactory rates of reimbursement for our products by governments, insurers and other payers, which could affect our ability to generate returns and invest for the future.

We expect loss of market exclusivity and the introduction of branded and generic competitors to continue to significantly erode sales of our products. Our ability to grow depends on the success of our research and development efforts to replenish our pipeline, as well as on the commercial acceptance of our products.

We may also fail to take advantage of rapid progress in new technologies and in the development of new business models. Third parties may enter the healthcare field, which could increase the competition we face or supplant portions of our business. Our manufacturing processes are technically complex and subject to strict regulatory requirements, which introduce a greater chance for supply disruptions and liabilities.

We have a significant global compliance program in place, but any failure to comply with local laws could lead to substantial liabilities and harm our business and our reputation. We carry a significant amount of goodwill and other intangible assets on our consolidated balance sheet, and may incur significant impairment charges in the future.

Tax authorities around the world have increased their scrutiny of company tax filings. In addition, tax reform initiatives by the Organization for Economic Co-operation and Development (OECD), the EU, Switzerland and the US will require us to continually assess our organizational structure against tax policy trends. This could lead to an increased risk of international tax disputes and an increase in our effective tax rate.

For more details on these trends and how they could impact our results, see "—Factors affecting results of operations" below.

Results of operations

2019 compared to 2018

Key figures[1]

(USD millions unless indicated otherwise)	**Year ended Dec 31, 2019**	Year ended Dec 31, 2018	Change in USD %	Change in constant currencies %[2]
Net sales to third parties from continuing operations	**47 445**	**44 751**	**6**	**9**
Sales to discontinued operations	53	82	– 35	– 31
Net sales from continuing operations	**47 498**	**44 833**	**6**	**9**
Other revenues	1 179	1 266	– 7	– 7
Cost of goods sold	– 14 425	– 14 510	1	– 2
Gross profit from continuing operations	**34 252**	**31 589**	**8**	**12**
Selling, general and administration	– 14 369	– 13 717	– 5	– 8
Research and development	– 9 402	– 8 489	– 11	– 13
Other income	2 031	1 629	25	27
Other expense	– 3 426	– 2 609	– 31	– 33
Operating income from continuing operations	**9 086**	**8 403**	**8**	**14**
Return on net sales (%)	19.2	18.8		
Income from associated companies	659	6 438	nm	nm
Interest expense	– 850	– 932	9	8
Other financial income and expense	45	186	– 76	– 69
Income before taxes from continuing operations	**8 940**	**14 095**	**– 37**	**– 33**
Taxes	– 1 793	– 1 295	– 38	– 46
Net income from continuing operations	**7 147**	**12 800**	**– 44**	**– 41**
Net loss from discontinued operations before gain on distribution of Alcon Inc. to Novartis AG shareholders	– 101	– 186	nm	nm
Gain on distribution of Alcon Inc. to Novartis AG shareholders	4 691			
Net income/(loss) from discontinued operations	**4 590**	**– 186**	nm	nm
Net income	**11 737**	**12 614**	**– 7**	**– 3**
Attributable to:				
Shareholders of Novartis AG	*11 732*	*12 611*	*– 7*	*– 3*
Non-controlling interests	*5*	*3*	*nm*	*nm*
Basic earnings per share from continuing operations (USD)	**3.12**	**5.52**	**– 43**	**– 40**
Basic earnings per share from discontinued operations (USD)	2.00	– 0.08	nm	nm
Total basic earnings per share (USD)	**5.12**	**5.44**	**– 6**	**– 2**
Net cash flows from operating activities from continuing operations	**13 547**	**13 049**	**4**	
Free cash flow from continuing operations[2]	**12 937**	**11 256**	**15**	

[1] Continuing operations include the businesses of the Innovative Medicines and Sandoz divisions and the continuing Corporate activities and discontinued operations include the Alcon eye care devices business and certain Corporate activities attributable to the Alcon business prior to the spin-off, the gain on distribution of Alcon Inc. to Novartis AG shareholders in 2019 and certain other expenses related to the distribution. See "Item 18. Financial Statements—Note 1. Significant accounting principles", "Item 18.Financial Statements—Note 2. Significant transactions—Significant transactions in 2019," and "Item 18.Finanacial Statements—Note 30. Discontinued operations."

[2] For an explanation of non-IFRS measures and reconciliation tables, see "Item 5.A Operating results—Non-IFRS measures as defined by Novartis."

nm = not meaningful

Group overview

In 2019, Novartis delivered strong sales performance, margin expansion and breakthrough innovation launching five new molecular entities.

Net sales to third parties for Novartis continuing operations were USD 47.4 billion, up 6% in reported terms and up 9% measured in constant currencies (cc) to remove the impact of exchange rate movements. Sales growth was driven by volume growth of 12 percentage points, mainly driven by *Cosentyx, Entresto,* and *Zolgensma* for the Novartis Pharmaceuticals business unit and *Promacta/Revolade*, *Kisqali* and *Lutathera* for the Novartis Oncology business unit. The strong volume growth was partly offset by the negative impacts of pricing (2 percentage points) and generic competition (1 percentage point).

By division, Innovative Medicines delivered net sales of USD 37.7 billion (+8%, +11% cc). Sandoz net sales were USD 9.7 billion (–1%, +2% cc), driven by growth in biopharmaceuticals, partly offset by continued industrywide pricing pressures on retail generics, mainly in the US.

In emerging growth markets, which comprise all markets excluding the US, Canada, Western Europe, Japan, Australia and New Zealand, sales from continuing operations were USD 11.8 billion (+4%, +10% cc) driven by China (USD 2.2 billion) growing 13%, (+19% cc).

Operating income from continuing operations was USD 9.1 billion (+8%, +14% cc), mainly driven by higher sales, higher divestments and productivity programs, which were partly offset by growth investments, legal provisions and higher impairments. Operating income margin from continuing operations was 19.2% of net sales, increasing by 0.4 percentage points (+0.9 percentage points cc).

Net income from continuing operations was USD 7.1 billion, compared to USD 12.8 billion in 2018 as the prior year benefited from a USD 5.7 billion net gain recognized from the sale of our stake in the GlaxoSmithKline (GSK) consumer healthcare joint venture. Earnings per share from continuing operations were USD 3.12, compared to USD 5.52 in the prior year, declining less than net income, driven by the lower weighted average number of shares outstanding.

Cash flows from operating activities from continuing operations amounted to USD 13.5 billion (+4%), compared to USD 13.0 billion in the prior year. This increase was driven by higher net income adjusted for non-cash items and other adjustments, including divestment gains. It was partly offset by lower dividends received from associated companies due to the divestment of the GSK consumer healthcare joint venture in the second quarter of 2018, higher taxes paid, provision payments and working capital, which included the receipt of a GSK sales milestone from the divested Vaccines business of USD 0.4 billion in the prior year.

Free cash flow from continuing operations amounted to USD 12.9 billion (+15%), compared to USD 11.3 billion in the prior year. The increase was mainly driven by higher operating income adjusted for non-cash items.

We also present our core results, which exclude the impact of amortization, impairments, disposals, acquisitions, restructurings and other significant items, to help investors understand our underlying performance.

Core operating income from continuing operations was USD 14.1 billion (+12%, +17% cc), mainly driven by higher sales and productivity programs, which were partly offset by growth investments. Core operating income margin was 29.7% of net sales, increasing by 1.6 percentage points (+1.9 percentage points cc).

Core net income from continuing operations was USD 12.1 billion (+11%, +15% cc), driven by growth in core operating income, which was partly offset by the discontinuation of core income from the GSK consumer healthcare joint venture. Core earnings per share from continuing operations were USD 5.28 (+12%, +17% cc), growing faster than core net income driven by the lower weighted average number of shares outstanding.

Discontinued operations net sales were USD 1.8 billion, and operating income amounted to USD 71 million. Net income from discontinued operations was USD 4.6 billion, and included a non-taxable non-cash net gain on distribution of Alcon Inc. to Novartis AG shareholders of USD 4.7 billion.

For the total Group, net income amounted to USD 11.7 billion, and basic earnings per share were USD 5.12. Cash flow from operating activities for the total Group was USD 13.6 billion, and free cash flow was USD 12.9 billion.

Net sales by segment

The following table provides an overview of net sales to third parties by segment:

(USD millions)	**Year ended Dec 31, 2019**	Year ended Dec 31, 2018	Change in USD %	Change in constant currencies %
Innovative Medicines	37 714	34 892	8	11
Sandoz	9 731	9 859	– 1	2
Net sales to third parties from continuing operations	**47 445**	**44 751**	**6**	**9**

Innovative Medicines

The Innovative Medicines Division delivered net sales of USD 37.7 billion in 2019, up 8% in reported terms and 11% in constant currencies (cc). The Novartis Pharmaceuticals Business Unit delivered net sales of USD 23.3 billion in 2019 growing 9% (+12% cc), driven by *Cosentyx* reaching USD 3.6 billion, *Entresto* USD 1.7 billion and *Zolgensma* USD 0.4 billion. The Novartis Oncology Business Unit delivered net sales of USD 14.4 billion growing 7% (+10% cc), driven by *Lutathera* reaching USD 0.4 billion *Promacta/Revolade* reaching USD 1.4 billion and *Kisqali* USD 0.5 billion. Volume contributed 13 percentage points to sales growth. Generic competition had a negative impact of 1 percentage point. Net pricing had a negative impact of 1 percentage point.

Regionally, the US (USD 13.8 billion, +16%) delivered a strong performance driven by *Cosentyx*, *Entresto*, *Lutathera* and *Zolgensma*. Europe sales (USD 12.8 billion, +4%, +10% cc) benefited from the continued strong performance of *Entresto*, *Tafinlar* + *Mekinist*, *Kisqali*, *Kymriah* and *Jakavi*. Japan sales were USD 2.4 billion (+2%, 0% cc). Emerging Growth Markets sales grew (+6%, +12% cc), led by double-digit growth in China, including the launches of *Cosentyx* and *Entresto*.

The following table provides an overview of net sales to third parties by business franchise in the Innovative Medicines Division:

(USD millions)	**Year ended Dec 31, 2019**	Year ended Dec 31, 2018	Change in USD %	Change in constant currencies %
Total Novartis Oncology business unit	**14 370**	**13 428**	**7**	**10**
Total Novartis Pharmaceuticals business unit	**23 344**	**21 464**	**9**	**12**
Ophthalmology	4 776	4 558	5	8
Immunology, Hepatology and Dermatology	4 222	3 392	24	27
Neuroscience	3 773	3 429	10	13
Respiratory	1 825	1 767	3	9
Cardiovascular, Renal and Metabolism	1 750	1 050	67	70
Established Medicines	6 998	7 268	– 4	0
Total Innovative Medicines	**37 714**	**34 892**	**8**	**11**

The following table provides the top 20 Innovative Medicines Division product net sales in 2019:

			US		Rest of world			Total		
Brands	**Business franchise**	**Indication**	USD m	% change USD/cc[2]	USD m	% change USD	% change cc[2]	USD m	% change USD	% change cc[2]
Cosentyx	Immunology, Hepatology and Dermatology	Psoriasis, ankylosing spondylitis and psoriatic arthritis	2 220	33	1 331	14	20	**3 551**	**25**	**28**
Gilenya	Neuroscience	Relapsing multiple sclerosis	1 736	– 2	1 487	– 6	0	**3 223**	**– 4**	**– 1**
Lucentis	Ophthalmology	Age-related macular degeneration			2 086	2	7	**2 086**	**2**	**7**
Tasigna	Oncology	Chronic myeloid leukemia	804	0	1 076	1	5	**1 880**	**0**	**3**
Entresto	Cardiovascular, Renal and Metabolism	Chronic heart failure	925	66	801	70	77	**1 726**	**68**	**71**
Sandostatin	Oncology	Carcinoid tumors and acromegaly	881	8	704	– 9	– 3	**1 585**	**0**	**2**
Afinitor/Votubia	Oncology	Breast cancer/TSC	1 003	8	536	– 15	– 10	**1 539**	**– 1**	**1**
Promacta/Revolade	Oncology	Immune thrombocytopenia (ITP), severe aplastic anemia (SAA)	691	19	725	22	27	**1 416**	**21**	**23**
Tafinlar + Mekinist	Oncology	BRAF V600+ metastatic and adjuvant melanoma; advanced non-small cell lung cancer (NSCLC)	481	5	857	23	30	**1 338**	**16**	**20**
Galvus Group	Established Medicines	Diabetes			1 297	1	5	**1 297**	**1**	**5**
Gleevec/Glivec	Oncology	Chronic myeloid leukemia and GIST	334	– 24	929	– 17	– 14	**1 263**	**– 19**	**– 17**
Xolair[1]	Respiratory	Severe Allergic Asthma (SAA) and Chronic Spontaneous Urticaria (CSU)			1 173	13	19	**1 173**	**13**	**19**
Jakavi	Oncology	Myelofibrosis (MF), polycytomia vera (PV)			1 114	14	20	**1 114**	**14**	**20**
Diovan Group	Established Medicines	Hypertension	86	2	978	4	10	**1 064**	**4**	**9**
Exforge Group	Established Medicines	Hypertension	13	– 32	1 012	3	8	**1 025**	**2**	**7**
Exjade/Jadenu	Oncology	Chronic iron overload	450	– 14	525	– 9	– 6	**975**	**– 11**	**– 9**
Votrient	Oncology	Renal cell carcinoma	332	– 18	423	0	5	**755**	**– 9**	**– 6**
Ilaris	Immunology, Hepatology and Dermatology	Auto-inflammatory (CAPS, TRAPS, HIDS/MKD, FMF, SJIA, AOSD and gout)	304	16	367	26	33	**671**	**21**	**25**
Zortress/Certican	Established Medicines	Transplantation	169	17	316	– 1	4	**485**	**5**	**8**
Kisqali	Oncology	HR+/HER2- metastatic breast cancer	250	45	230	nm	nm	**480**	**104**	**111**
Top 20 products total			**10 679**	**11**	**17 967**	**5**	**11**	**28 646**	**7**	**11**
Rest of portfolio			3 110	39	5 958	– 1	4	**9 068**	**10**	**13**
Total division sales			**13 789**	**16**	**23 925**	**4**	**9**	**37 714**	**8**	**11**

[1] Net sales reflect *Xolair* sales for all indications.

[2] Constant currencies (cc) is a non-IFRS measure. For an explanation of non-IFRS measures, see " —Item 5.A Operating results—Non-IFRS measures as defined by Novartis."

For information about the approved indications for the products described, see "Item 4. Information on the Company—Item 4.B Business overview—Innovative Medicines—Key marketed products."

Novartis Oncology business unit

Tasigna (USD 1.9 billion, 0%, +3% cc) grew across most regions, mainly driven by Emerging Growth Markets including China.

Sandostatin (USD 1.6 billion, 0%, +2% cc) grew mainly driven by the US and Emerging Growth Markets, including China, partly offset by competitive pressure in other regions, including first generic competitors entering the market in Europe and Japan.

Afinitor/Votubia (USD 1.5 billion, –1%, +1% cc) sales were broadly in line with prior year, driven by growth in the US in the TSC indication, offset by generic competition in other regions.

Promacta/Revolade (USD 1.4 billion, +21%, +23% cc) grew at a double-digit rate across all regions driven by increased use in chronic immune thrombocytopenia (ITP) and uptake as first-line treatment for severe aplastic anemia (SAA) in the US and Japan.

Tafinlar + Mekinist (USD 1.3 billion, +16%, +20% cc) saw double-digit growth in metastatic and adjuvant melanoma as well as non-small cell lung cancer (NSCLC),

with ongoing uptake of the adjuvant melanoma indication in the US and Europe.

Gleevec/Glivec (USD 1.3 billion, –19%, –17% cc) declined due to generic competition in most major markets.

Jakavi (USD 1.1 billion, +14%, +20% cc) saw double-digit growth across all regions driven by demand in the myelofibrosis and polycythemia vera indications.

Exjade/Jadenu (USD 975 million, –11%, –9% cc) declined mainly due to pressure from new generic competition in the US and in other regions.

Votrient (USD 755 million, –9%, –6% cc) sales declined mainly due to competitive pressure in the US.

Kisqali (USD 480 million, +104%, +111% cc) showed solid growth in the US driven by use in metastatic breast cancer patients, independent of menopausal status or combination partner, with strong uptake and patient share gain in Europe and other regions, benefitting from the impact of overall survival data from the MONALESSA-7 and MONALEESA-3 trials.

Lutathera (USD 441 million, +164%, +160% cc) continued to grow led by the US, with over 170 centers actively treating patients, and ongoing launches in Europe. Sales from all AAA brands (including *Lutathera* and radiopharmaceutical diagnostic products) were USD 679 million.

Kymriah (USD 278 million) strong demand continued and sales increased primarily driven by ongoing uptake in Europe and the US. There are over 200 qualified treatment centers and more than 20 countries worldwide have coverage for at least one indication, including Japan, making Kymriah the only CAR-T approved in Asia. We have significantly increased our global manufacturing capacity. Three additional facilities in Les Ulis, Stein, and Japan have started manufacturing clinical batches. We have also signed a licensing agreement with Cellular Biomedicine Group (CBMG) in China with plans to expand further.

Piqray (USD 116 million) US launch progressed well. *Piqray* was approved by the FDA as the first and only treatment for patients with a PIK3CA mutation in hormone receptor-positive (HR+)/human epidermal growth factor receptor 2-negative (HER2-) advanced breast cancer.

Novartis Pharmaceuticals business unit

Ophthalmology

Sales in the Ophthalmology franchise were USD 4.8 billion (+5%, +8 cc), mainly driven by the acquisition of *Xiidra* and growth of *Lucentis*, while benefitting from the launch of *Beovu*.

Lucentis (USD 2.1 billion, +2%, +7% cc) grew driven by strong execution of a focused commercial strategy supported by new head-to-head evidence enabling an improved efficacy and durability perception in an overall strongly growing Retina market. *Lucentis* received approval for the treatment of retinopathy of prematurity (ROP) in premature infants in the EU and Japan in the second half of 2019, making *Lucentis* the first licensed pharmacological therapy to treat the condition. *Lucentis* also received approval for the treatment of proliferative diabetic retinopathy (PDR) in the EU in October, becoming the first licensed pharmacological therapy to treat adults with PDR ex-US.

Xiidra (USD 192 million) is the only prescription eye drop solution marketed in the US and Canada to treat the signs and symptoms of dry eye disease. It is dosed twice per day, approximately 12 hours apart, in each eye. *Xiidra* is approved in multiple markets including the US, Canada and Australia. It is under regulatory review in a number of additional markets. Novartis acquired *Xiidra* from Takeda and began recording sales as of July 1st, 2019.

Beovu (USD 35 million, brolucizumab, formerly RTH258) was launched in the US following FDA approval in October, offering patients with wet age-related macular degeneration (AMD) in the US a new treatment option with demonstrated robust vision gains. *Beovu* is the only anti-VEGF in wet AMD approved in the US to maintain eligible patients on up to three month dosing intervals immediately after the loading phase. *Beovu* received a positive CHMP opinion in the EU in December 2019 and a permanent J-code from CMS on January 1, 2020.

Immunology, Hepatology and Dermatology

Sales in the Immunology, Hepatology and Dermatology franchise reached USD 4.2 billion (+24%, +27% cc), of which *Cosentyx* delivered USD 3.6 billion.

Cosentyx (USD 3.6 billion, +25%, +28% cc) continued momentum in the US (+33%) and in the rest of the world (+14%, +20% cc), driven by strong demand across indications and regions and broad first line access in all three indications. In March, *Cosentyx* was the first IL-17A inhibitor to be approved in China for the treatment of psoriasis. In September, Novartis announced positive new data from the Phase III PREVENT trial evaluating the efficacy and safety of *Cosentyx* in patients with non-radiographic axial spondyloarthritis (nr-axSpA). Novartis has submitted the data to EMA and to the FDA. Nr-axSpA would be the fourth indication for *Cosentyx*.

Ilaris (USD 671 million, +21%, +25% cc) sales were driven by strong double-digit volume growth, mostly in Europe.

Xolair sales for all indications are reported in the Respiratory franchise. Dermatology teams help support commercial efforts of Xolair in chronic spontaneous urticaria/chronic idiopathic urticaria.

Neuroscience

Sales in the Neuroscience franchise were USD 3.8 billion (+10%, +13% cc), mainly driven by the launch of *Zolgensma* and sales growth of *Aimovig*, partly offset by sales decline of *Gilenya*.

Gilenya (USD 3.2 billion, –4%, –1% cc) declined mainly due to competitive pressures.

Zolgensma (USD 361 million, formerly AVXS-101) is an adeno-associated virus vector-based gene therapy designed to address the genetic root cause of spinal muscular atrophy (SMA) by providing a functional copy of the human survival motor neuron (SMN) gene to halt disease progression through sustained SMN protein expression. The FDA approved the intravenous formulation of AVXS-101 as *Zolgensma* in May 2019 for the treatment of pediatric patients less than 2 years old who have SMA with biallelic mutations in the SMN1 gene. Regulatory reviews are underway in Europe, with a CHMP opinion anticipated in Q1 2020, and Japan, with a deci-

sion anticipated in 1H 2020. AVXS-101 is in ongoing clinical studies, including the global Phase III STR1VE clinical program (consisting of STR1VE-US, STR1VE-EU and STR1VE-AP) to evaluate the intravenous (IV) formulation of AVXS-101 in patients who have SMA Type 1, and the multinational Phase III SPR1NT trial in presymptomatic patients who have a genetic diagnosis of SMA with two or three copies of the SMN2 gene. Additionally, AVXS-101 intrathecal administration is being studied in a Phase I/II STRONG trial in patients who have SMA Type 2 and three copies of the SMN2 gene. New data from trials were presented at 2019 congresses, including the American Academy of Neurology Annual Meeting.

Aimovig (USD 103 million, ex-US, ex-Japan) is the most prescribed anti-CGRP worldwide, with more than 350,000 patients prescribed worldwide in the post-trial setting. It has now been launched in 38 countries for the preventive treatment of migraine and additional launches are underway. *Aimovig* is co-commercialized with Amgen in the US, where Amgen records sales and Novartis has exclusive rights in all ex-US territories excluding Japan. Amgen issued a termination notice in April 2019, based on an alleged material breach of the collaboration agreements, and this notice, as well as other ancillary matters, are the subject of legal proceedings between Novartis and Amgen. Novartis disputes Amgen's allegations vigorously. The collaboration continues during the litigation between the companies, and will remain in force until and unless a final court decision terminates the agreements.

Mayzent (USD 26 million) launch is progressing and efforts are ongoing to accelerate patient on-boarding and drive urgency to treat. *Mayzent* was approved by the FDA on March 26, 2019 and is indicated for the treatment of relapsing forms of multiple sclerosis (MS), to include clinically isolated syndrome, relapsing-remitting disease, and active secondary progressive MS, in adults. *Mayzent* is the only FDA approved oral therapy for active SPMS based on evidence from a pivotal prospective Phase III clinical trial (EXPAND) in a broad SPMS population. *Mayzent* received EU approval in January 2020 for the treatment of adult patients with secondary progressive multiple sclerosis (SPMS) with active disease.

Respiratory

Sales in the Respiratory franchise were USD 1.8 billion (+3%, +9% cc), of which *Xolair* delivered USD 1.2 billion.

Xolair (USD 1.2 billion, +13%, +19% cc) continued to grow in both indications Severe Allergic Asthma (SAA) and Chronic Spontaneous Urticaria (CSU). Growth for both indications benefited from the recent approval of *Xolair* for home-use in Europe and strong performance in Emerging Growth Markets. We co-promote *Xolair* with Genentech in the US and share a portion of operating income, but we do not record any US sales.

Ultibro Breezhaler (USD 427 million, –6%, –1% cc), an inhaled LABA/LAMA, sales declined mainly due to competition.

Seebri Breezhaler (USD 121 million, –18%, –14% cc) an inhaled LAMA, and *Onbrez Breezhaler* (USD 82 million, –19%, –14% cc) an inhaled LABA, declined mainly due to competition.

Cardiovascular, Renal and Metabolism

Sales in the Cardiovascular, Renal and Metabolism franchise were USD 1.8 billion (+67%, +70% cc).

Entresto (USD 1.7 billion, +68%, +71% cc) continued strong momentum across geographies, fueled by increased demand in both hospital and ambulatory settings. New data presented at American Heart Association (AHA) Scientific Sessions 2019 on reverse cardiac remodeling, in-hospital use and quality of life, further reinforce *Entresto* as an essential, first-choice treatment for heart failure with reduced ejection fraction.

Established Medicines

The Established Medicines franchise had sales of USD 7.0 billion (–4%, 0% cc).

Galvus Group (USD 1.3 billion, +1%, +5% cc) grew, led by solid performance in Emerging Growth Markets, including China.

Diovan Group (USD 1.1 billion, +4%, +9% cc) grew in Europe and Emerging Growth Markets, partially offset by a decline in Japan.

Exforge Group (USD 1.0 billion, +2%, +7% cc) grew in Emerging Growth Markets, offset by a decline in Europe, Japan and the US due to generic competition.

Zortress/Certican (USD 485 million, +5%, +8% cc) continued to grow in most regions.

Neoral/Sandimmun(e) (USD 419 million, –10%, –7% cc) declined due to generic competition and mandatory price reductions.

Voltaren/Cataflam (USD 417 million, –6%, –4% cc) sales declined mainly due to generic competition.

Sandoz

Sandoz net sales in 2019 were USD 9.7 billion (–1%, +2% cc) driven by strong volume growth of 8 percentage points which was partially offset by 6 percentage points of price erosion. Excluding the US, net sales grew strongly (+2%, +7% cc).

Sales in Europe were USD 5.1 billion (+3%, +9% cc), mainly driven by biosimilars. Sales in the US were USD 2.5 billion declining 10%, mainly due to continued industry-wide pricing pressure. Sales in Asia, Africa and Australasia were USD 1.3 billion (–2%, +1% cc). Sales in Canada and Latin America were USD 784 million (+1%, +6% cc).

(USD millions)	**Year ended Dec 31, 2019**	Year ended Dec 31, 2018	Change in USD %	Change in constant currencies %
Retail Generics[1]	7 590	7 880	– 4	0
Biopharmaceuticals	1 607	1 436	12	16
Anti-Infectives (partner label/API)	534	543	– 2	2
Total Sandoz	**9 731**	**9 859**	**– 1**	**2**

[1] Of which USD 784 million (2018: USD 826 million) represents anti-infectives sold under the Sandoz name

Retail Generics

In Retail Generics, Sandoz develops, manufactures and markets active ingredients and finished dosage forms of small molecule pharmaceuticals to third parties across a broad range of therapeutic areas, as well as finished dosage form of anti-infectives sold to third parties. Retail Generics sales in 2019 were USD 7.6 billion (–4%, 0% cc), in line with prior year as first-to-market launches offset the impact of US pricing pressure.

Biopharmaceuticals

In Biopharmaceuticals, Sandoz develops, manufactures and markets protein- or other biotechnology-based products, including biosimilars, and provides biotechnology manufacturing services to other companies. The Biopharmaceuticals business also includes *Glatopa*, a generic version of Copaxone®, which treats relapsing forms of multiple sclerosis and is marketed in the US. Global sales of Biopharmaceuticals grew to USD 1.6 billion (+12%, +16% cc), driven by continued strong double-digit growth in Europe from *Hyrimoz* (adalimumab), *Rixathon* (rituximab) and *Erelzi* (etanercept). Launch rollouts in Asia, Africa and Australasia also contributed to growth.

Anti-Infectives

In Anti-Infectives, Sandoz manufactures and supplies active pharmaceutical ingredients and intermediates, mainly antibiotics, for internal use by Retail Generics and for sale to third-party customers. Sales of anti-infectives sold to third parties under their own name were USD 534 million, down 2% (+2% cc). Total Anti-Infectives franchise sales were USD 1.3 billion (–4%, 0% cc), including USD 784 million finished dosage forms sold under the Sandoz name.

Operating income from continuing operations

The following table provides an overview of operating income from continuing operations by segment:

(USD millions)	**Year ended Dec 31, 2019**	% of net sales	Year ended Dec 31, 2018	% of net sales	Change in USD %	Change in constant currencies %
Innovative Medicines	**9 287**	**24.6**	**7 871**	**22.6**	**18**	**24**
Sandoz	**551**	**5.7**	**1 332**	**13.5**	**– 59**	**– 53**
Corporate	– 752		– 800		6	4
Operating income from continuing operations	**9 086**	**19.2**	**8 403**	**18.8**	**8**	**14**

Operating income from continuing operations was USD 9.1 billion (+8%, +14% cc), mainly driven by higher sales, higher divestments and productivity programs, which were partly offset by growth investments, legal provisions and higher impairments. Operating income margin from continuing operations was 19.2% of net sales, increasing by 0.4 percentage points (+0.9 percentage points cc).

Core operating income from continuing operations key figures[1]

(USD millions unless indicated otherwise)	Year ended Dec 31, 2019	Year ended Dec 31, 2018	Change in USD %	Change in constant currencies %
Core gross profit from continuing operations	**37 392**	**34 886**	**7**	**10**
Selling, general and administration	– 14 319	– 13 690	– 5	– 7
Research and development	– 8 386	– 8 154	– 3	– 5
Other income	495	558	– 11	– 9
Other expense	– 1 070	– 1 043	– 3	– 5
Core operating income from continuing operations	**14 112**	**12 557**	**12**	**17**
As % of net sales	29.7	28.1		

[1] For an explanation of non-IFRS measures and reconciliation tables, see "Item 5.A Operating results—Non-IFRS measures as defined by Novartis."

The adjustments made to operating income from continuing operations to arrive at core operating income from continuing operations amounted to USD 5.0 billion (compared to USD 4.2 billion in the prior year). For details please see "Item 5. – 2019, 2018 and 2017 reconciliation from IFRS results to core results."

Core operating income from continuing operations was USD 14.1 billion (+12%, +17% cc), mainly driven by higher sales and productivity programs, partly offset by growth investments. Core operating income margin was 29.7% of net sales, increasing by 1.6 percentage points (+1.9 percentage points cc).

The following table provides an overview of core operating income by segment:

(USD millions)	Year ended Dec 31, 2019	% of net sales	Year ended Dec 31, 2018	% of net sales	Change in USD %	Change in constant currencies %
Innovative Medicines	**12 650**	**33.5**	**11 151**	**32.0**	**13**	**18**
Sandoz	**2 094**	**21.5**	**2 002**	**20.3**	**5**	**10**
Corporate	– 632		– 596		– 6	– 9
Core operating income from continuing operations	**14 112**	**29.7**	**12 557**	**28.1**	**12**	**17**

Innovative Medicines

Operating income was USD 9.3 billion (+18%, +24% cc), mainly driven by continued strong sales growth and productivity, partly offset by growth investments. Operating income margin was 24.6% of net sales, increasing 2.0 percentage points (+2.5 percentage points cc).

Core adjustments were USD 3.4 billion, mainly due to USD 2.4 billion of amortization. Prior year core adjustments were USD 3.3 billion. Core adjustment were broadly in line with the prior year as higher legal provisions were offset by higher divestment income and lower restructuring.

Core operating income was USD 12.7 billion (+13%, +18% cc), mainly driven by higher sales, partly offset by higher growth investments. Core operating income margin was 33.5% of net sales, increasing 1.5 percentage points (+1.8 percentage points cc).

Core gross margin was broadly in line with prior year as productivity improvements were offset the ramp up of capacity for cell / gene therapies and lower other revenue (-0.8 percentage points cc). Core R&D expenses decreased by 1.2 percentage points (cc), mainly driven by the higher net sales, productivity and portfolio prioritization. Core selling, general and administration (SG&A) expenses declined by 0.7 percentage points (cc), mainly driven by sales leverage and productivity. Core other income and expense did not have a material impact on margin.

Sandoz

Operating income was USD 551 million (–59%, –53% cc), impacted by higher impairments of intangible assets and property, plant and equipment related to the discontinuation of the generic Advair® development program in the US and higher restructuring charges mainly from the ongoing business transformation. Operating income margin was 5.7% of net sales, declining 7.8 percentage points (-7.3 percentage points cc).

Core adjustments were USD 1.5 billion, including USD 314 million of amortization. Prior year core adjustments were USD 670 million. The change in core adjustments compared to prior year was driven mainly by higher impairments of intangible assets and property, plant and equipment, higher restructuring charges mainly from the ongoing transformation, net changes in legal settlements and lower divestment income.

Core operating income was USD 2.1 billion (+5%, +10% cc), as sales growth and continued gross margin improvements were partly offset by price erosion and lower divestment income. Core operating income margin was 21.5% of net sales, increasing 1.2 percentage points (1.5 percentage points cc).

Core gross margin increased by 1.6 percentage points (cc), as favorable product and geographic mix and ongoing productivity improvements, were partly offset by the impact of price erosion. Core R&D expenses were in line with prior year, while core SG&A expenses decreased by 0.6 percentage points (cc). Core other income and expense decreased the margin by 0.7 percentage points (cc), mainly due to lower divestment income.

Corporate income and expense, net

Corporate income and expense, which includes the cost of Group headquarters and coordination functions, amounted to an expense of USD 752 million in 2019 compared to USD 800 million in the prior year, mainly driven by lower impairment charges from the Novartis Venture Fund financial asset, partly offset by higher restructuring costs.

Innovative Medicines Division research and development

The following table provides an overview of the reported and core research and development expense of the Innovative Medicines Division:

(USD millions unless indicated otherwise)	**Year ended Dec 31, 2019**	Year ended Dec 31, 2018	Change in USD %	Change in constant currencies %
Research and exploratory development	– 2 855	– 2 770	– 3	– 4
Confirmatory development	– 5 297	– 4 905	– 8	– 10
Total Innovative Medicines Division research and development expense	**– 8 152**	**– 7 675**	**– 6**	**– 8**
As % of Innovative Medicines net sales to third parties	21.6	22.0		
Core research and exploratory development[1]	– 2 706	– 2 665	– 2	– 2
Core confirmatory development[1]	– 4 879	– 4 675	– 4	– 6
Total core Innovative Medicines Division research and development expense	**– 7 585**	**– 7 340**	**– 3**	**– 5**
As % of Innovative Medicines net sales to third parties	20.1	21.0		

[1] Core excludes impairments, amortization and certain other items. For an explanation of non-IFRS measures and reconciliation tables, see " —Item 5.A Operating results—Non-IFRS measures as defined by Novartis."

Innovative Medicines Division research and exploratory development expense increased by 3% (–4% cc) to USD 2.9 billion, and confirmatory development expense amounted to USD 5.3 billion, increasing by 8% (–10% cc) versus prior year. This was mainly due to higher pipeline investments, including *Zolgensma*, and higher impairments of intangible assets.

Total core research and development expense in the Innovative Medicines Division as a percentage of sales decreased by 0.9 percentage points (1.2 percentage points cc) to 20.1% of net sales, mainly driven by the higher net sales, productivity and portfolio prioritization.

Non-operating income and expense

The term "non-operating income and expense" includes all income and expense items outside operating income. The following table provides an overview of non-operating income and expense from continuing operations:

(USD millions unless indicated otherwise)	**Year ended Dec 31, 2019**	Year ended Dec 31, 2018	Change in USD %	Change in constant currencies %
Operating income from continuing operations	**9 086**	**8 403**	**8**	**14**
Income from associated companies	659	6 438	nm	nm
Interest expense	– 850	– 932	9	8
Other financial income and expense	45	186	– 76	– 69
Income before taxes from continuing operations	**8 940**	**14 095**	**– 37**	**– 33**
Taxes	– 1 793	– 1 295	*– 38*	*– 46*
Net income from continuing operations	**7 147**	**12 800**	**– 44**	**– 41**
Net loss from discontinued operations before gain on distribution of Alcon Inc. to Novartis AG shareholders	– 101	– 186	nm	nm
Gain on distribution of Alcon Inc. to Novartis AG shareholders	4 691			
Net income from discontinued operations	**4 590**	**– 186**	nm	nm
Net income	**11 737**	**12 614**	**– 7**	**– 3**
Attributable to:				
Shareholders of Novartis AG	*11 732*	*12 611*	*– 7*	*– 3*
Non-controlling interests	*5*	*3*	*nm*	*nm*
Basic earnings per share from continuing operations (USD)	**3.12**	**5.52**	**– 43**	**– 40**
Basic earnings per share from discontinued operations (USD)	2.00	– 0.08	nm	nm
Total basic earnings per share (USD)	**5.12**	**5.44**	**– 6**	**– 2**

nm = not meaningful

Income from associated companies

Income from associated companies amounted to USD 659 million in 2019 compared to USD 6.4 billion in prior year. This decrease is mainly due to the pre-tax gain of USD 5.8 billion recognized on the divestment of the 36.5% stake in the GSK consumer healthcare joint venture in 2018.

The share of income from Roche was USD 662 million compared to USD 526 million in the prior year. The estimated income for Roche Holding AG was USD 748 million compared to USD 651 million in the prior year and was partly offset by the negative prior year true up of USD 129 million in the first quarter of 2019, compared to a negative prior year true up of USD 125 million recognized in the first quarter of 2018. In addition, a USD 43 million income from revaluation of deferred tax liability, recognized upon initial accounting of the Roche investment, was recorded in the first quarter of 2019, following a change in the enacted tax rate in February 2019 of the Swiss Canton Basel-Stadt, effective January 1, 2019.

Interest expense and other financial income and expense

Interest expense decreased to USD 850 million from USD 932 million in the prior year, driven by lower outstanding debts partly offset by the additional interest expense on lease liabilities of USD 66 million, following the implementation of IFRS 16 Leases as of January 1, 2019.

Other financial income and expense, net amounted to an income of USD 45 million compared to USD 186 million in the prior year. The decrease is mainly due to lower interest income and higher currency losses.

Taxes

The tax rate from continuing operations in 2019 was 20.1% compared to 9.2% in the prior year. The 2019 tax rate was negatively impacted by a one-time, non-cash deferred tax expense resulting from legal entity reorganizations, a prior year item and an increase to an uncertain tax position, partially offset by the deferred tax credit from Swiss tax reform. The prior year tax rate was positively impacted by the divestment of the 36.5% stake in the GSK consumer healthcare joint venture. Excluding these impacts, the tax rate from continuing operations would have been 15.4% compared to 14.9% in the prior year. The increase compared to prior year is mainly the result of a change in profit mix.

Net income from continuing operations

Net income from continuing operations amounted to USD 7.1 billion, compared to USD 12.8 billion in the prior year, as the prior year benefited from a USD 5.7 billion net gain recognized from the sale of our stake in the GSK consumer healthcare joint venture.

Earnings per share

Basic earnings per share from continuing operations were USD 3.12, compared to USD 5.52 in the prior year, declining less than net income due to the lower weighted average number of shares outstanding.

Core non-operating income and expense from continuing operations[1]

The following table provides an overview of core non-operating income and expense from continuing operations:

(USD millions unless indicated otherwise)	**Year ended Dec 31, 2019**	Year ended Dec 31, 2018	Change in USD %	Change in constant currencies %
Core operating income from continuing operations	**14 112**	**12 557**	**12**	**17**
Core income from associated companies	1 086	1 113	– 2	– 2
Core interest expense	– 850	– 932	9	8
Core other financial income and expense	56	186	– 70	– 63
Core income before taxes from continuing operations	**14 404**	**12 924**	**11**	**16**
Core taxes	– 2 300	– 2 004	– 15	– 19
Core net income from continuing operations	**12 104**	**10 920**	**11**	**15**
Core basic earnings per share from continuing operations (USD)	**5.28**	**4.71**	**12**	**17**

[1] For an explanation of non-IFRS measures and reconciliation tables, see "Item 5.A Operating results—Non-IFRS measures as defined by Novartis."

Core income from associated companies

Core income from associated companies from continuing operations amounted to USD 1.1 billion, in line with the prior year despite the discontinuation of core income from the GSK consumer healthcare joint venture. The core income contribution from Roche Holding AG increased to USD 1.1 billion from USD 970 million in the prior year. The increase is due to a higher estimated core income contribution from Roche for the current period and the recognition of a favorable prior-year core income true-up of USD 32 million, compared to a favorable true-up of USD 8 million in the first quarter of 2018.

Core interest expense and other financial income and expense

Core interest expense from continuing operations was USD 850 million, compared to USD 932 million in the prior year. Core other financial income and expense from continuing operations amounted to a net income of USD 56 million, compared to USD 186 million in the prior year.

Core taxes

The core tax rate from continuing operations (core taxes as a percentage of core income before tax from continuing operations) was 16.0% compared to 15.5% in the prior year mainly as a result of a change in profit mix.

Core net income

Core net income from continuing operations was USD 12.1 billion (+11%, +15 cc), driven by growth in core operating income, partly offset by the discontinuation of core income from the GSK consumer healthcare joint venture.

Core earnings per share

Core earnings per share from continuing operations were USD 5.28 (+12%, +17% cc), growing faster than core net income due to the lower weighted average number of shares outstanding.

Discontinued operations

Discontinued operations in 2019 include the business of Alcon, and certain corporate costs directly attributable to Alcon's business up to the spin-off date. As the Alcon spin-off was completed on April 9, 2019, there were no operating results in the remainder of the year 2019. The prior year includes the results for the full year.

Discontinued operations net sales in 2019 were USD 1.8 billion, compared to USD 7.1 billion in 2018 and operating income amounted to USD 71 million, compared to an operating loss of USD 234 million in 2018.

Net income from discontinued operations in 2019 amounted to USD 4.6 billion, compared to a net loss of USD 186 million in 2018, driven by the non-taxable, non-cash net gain on distribution of Alcon Inc. to Novartis AG shareholders, which amounted to USD 4.7 billion. For further details, see "Item 18.Financial Statements—Note 2. Significant transactions—Completion of the spin-off of the Alcon business through a dividend in kind distribution to Novartis AG shareholders" and "Item 18.Financial Statements—Note 30. Discontinued operations."

Total Group

For the total Group, net income amounted to USD 11.7 billion in 2019, compared to USD 12.6 billion in 2018, and basic earnings per share was USD 5.12 compared to USD 5.44 in prior year. Cash flow from operating activities for the total Group amounted to USD 13.6 billion, and free cash flow amounted to USD 12.9 billion.

2018 compared to 2017

Key figures[1]

(USD millions unless indicated otherwise)	Year ended Dec 31, 2018	Year ended Dec 31, 2017	Change in USD %	Change in constant currencies %[2]
Net sales to third parties from continuing operations	**44 751**	**42 338**	**6**	**5**
Sales to discontinued operations	82	43	91	76
Net sales from continuing operations	**44 833**	**42 381**	**6**	**5**
Other revenues	1 266	1 023	24	24
Cost of goods sold	– 14 510	– 13 633	– 6	– 5
Gross profit from continuing operations	**31 589**	**29 771**	**6**	**6**
Selling, general and administration	– 13 717	– 12 465	– 10	– 9
Research and development	– 8 489	– 8 389	– 1	0
Other income	1 629	1 922	– 15	– 16
Other expense	– 2 609	– 2 137	– 22	– 21
Operating income from continuing operations	**8 403**	**8 702**	**– 3**	**– 3**
Return on net sales (%)	18.8	20.6		
Income from associated companies	6 438	1 108	nm	nm
Interest expense	– 932	– 750	– 24	– 27
Other financial income and expense	186	42	nm	nm
Income before taxes from continuing operations	**14 095**	**9 102**	**55**	**55**
Taxes	– 1 295	– 1 603	19	19
Net income from continuing operations	**12 800**	**7 499**	**71**	**71**
Net (loss)/income from discontinued operations	– 186	204	nm	nm
Net income	**12 614**	**7 703**	**64**	**64**
Attributable to:				
Shareholders of Novartis AG	*12 611*	*7 703*	*64*	*64*
Non-controlling interests	*3*	*0*	*nm*	*nm*
Basic earnings per share from continuing operations (USD)	**5.52**	**3.20**	**73**	**73**
Basic earnings per share from discontinued operations (USD)	– 0.08	0.08	nm	nm
Total basic earnings per share (USD)	**5.44**	**3.28**	**66**	**66**
Net cash flows from operating activities from continuing operations	**13 049**	**11 419**	**14**	
Free cash flow from continuing operations[2]	**11 256**	**9 791**	**15**	

[1] Continuing operations include the businesses of the Innovative Medicines and Sandoz divisions and the continuing Corporate activities and discontinued operations include the Alcon eye care devices business and certain Corporate activities attributable to the Alcon business prior to the spin-off and certain other expenses related to the distribution. See "Item 18. Financial Statements—Note 1. Significant accounting principles", "Item 18.Financial Statements—Note 2. Significant transactions—Significant transactions in 2019," and "Item 18.Finanacial Statements—Note 30. Discontinued operations."

[2] For an explanation of non-IFRS measures and reconciliation tables, see "Item 5.A Operating results—Non-IFRS measures as defined by Novartis."

nm = not meaningful

Group overview

Novartis continuing operations delivered strong performance in 2018 driven by continued sales momentum from our key growth products and the successful acquisition of Advanced Accelerator Applications (AAA).

Net sales to third parties from Novartis continuing operations were USD 44.8 billion, up 6% in reported terms and up 5% measured in constant currencies (cc) to remove the impact of exchange rate movements. This strong sales growth was driven by volume growth of 10 percentage points, mainly driven by *Cosentyx*, AAA and four drugs that reached blockbuster status (*Promacta/Revolade, Tafinlar + Mekinist, Entresto* and *Xolair)*. The strong volume growth was partly offset by the negative impacts of pricing (-3 percentage points) and generic competition (-2 percentage points).

Cosentyx, our treatment for psoriasis and other autoimmune diseases, grew strongly across all indications, with sales rising 37% (+36% cc) to USD 2.8 billion. *Entresto*, our product for heart failure has now more than doubled sales, reaching USD 1.0 billion.

Our treatments for certain cancer and related rare diseases continued to grow, driven by strong demand. *Promacta/Revolade*, a treatment for blood disorders, grew 35% (+35% cc) to USD 1.2 billion. *Tafinlar + Mekinist*, a combination treatment for skin and lung cancers, had sales of USD 1.2 billion, up 32% (+31% cc). *Jakavi*, a treatment for rare blood cancers, grew 26% (+24% cc) to USD 977 million. Sales of the products from AAA, including *Lutathera*, a radioligand therapy for a rare type of cancer in the pancreas or gut, amounted to USD 355 million.

By division, Innovative Medicines sales grew 8% (+8% cc). Sandoz sales declined 2% (–3% cc), mainly due to lower sales of retail generics, which was impacted by continued US industrywide pricing pressures, which were partly offset by growth in Biopharmaceuticals, including the continued uptake of *Rixathon* and *Erelzi* in Europe.

Operating income from continuing operations was USD 8.4 billion (–3%, –3% cc), mainly due to the impacts of M&A transactions, higher restructuring and net impairment charges, and growth investments, which were partly offset by higher sales. Operating income margin from continuing operations decreased by 1.8 percentage points to 18.8% of net sales, driven by a decrease in constant currencies of 1.6 percentage points and a negative currency impact of 0.2 percentage points.

Net income from continuing operations was USD 12.8 billion, compared to USD 7.5 billion in the prior year, mainly benefiting from a USD 5.7 billion net gain from the divestment of our stake in the GSK consumer healthcare joint venture. Earnings per share from continuing operations were USD 5.52, compared to USD 3.20 in the prior year, driven by higher net income and the lower weighted average number of shares outstanding.

Cash flow from operating activities from continuing operations was USD 13.0 billion (+14%), compared to USD 11.4 billion in the prior year.

Free cash flow from continuing operations amounted to USD 11.3 billion (+15%), compared to USD 9.8 billion in the prior year, as higher cash flows from operating activities, including the receipt of a GSK sales milestone from the divested Vaccines business, was partly offset by higher net investments in intangible assets.

We also present our core results, which exclude the impact of amortization, impairments, disposals, acquisitions, restructurings and other significant items, to help investors understand our underlying performance.

Core operating income from continuing operations was USD 12.6 billion (+7%, +7% cc) driven by higher sales and gross margin, which were partly offset by growth investments, including AveXis. Core operating income margin in constant currencies increased by 0.6 percentage points; currency had a negative impact of 0.2 percentage points, resulting in a net increase of 0.4 percentage points to 28.1% of net sales from continuing operations.

Core net income from continuing operations was USD 10.9 billion (+4%, +4% cc), driven by growth in core operating income, which was partly offset by the discontinuation of core income from the GSK consumer healthcare joint venture from April 1, 2018. Core earnings per share were USD 4.71 (+6%, +5% cc), driven by growth in core net income and the lower weighted average number of shares outstanding.

Discontinued operations include the business of Alcon and certain corporate costs directly attributable to Alcon's business. Net sales of discontinued operations were USD 7.1 billion, compared to USD 6.8 billion in the prior year and operating loss from discontinued operations was USD 234 million, compared to an operating loss of USD 73 million in the prior year. Net loss from discontinued operations amounted to USD 186 million, compared to a net income from discontinued operations of USD 204 million in the prior year.

Total Group net income amounted to USD 12.6 billion, compared to USD 7.7 billion in the prior year, and basic earnings per share increased to USD 5.44 from USD 3.28 in the prior year. Cash flow from operating activities amounted to USD 14.3 billion, and free cash flow amounted to USD 11.7 billion.

Net sales by segment

The following table provides an overview of net sales to third parties by segment:

(USD millions)	**Year ended Dec 31, 2018**	Year ended Dec 31, 2017	Change in USD %	Change in constant currencies %
Innovative Medicines	34 892	32 278	8	8
Sandoz	9 859	10 060	– 2	– 3
Net sales to third parties from continuing operations	**44 751**	**42 338**	**6**	**5**

Innovative Medicines

Following the internal reorganization announced on October 24, 2017, and January 24, 2018, which became effective on January 1, 2018, we transferred our over-the-counter ophthalmic products and certain surgical diagnostic products with sales of USD 747 million in 2017 from the Innovative Medicines Division to the Alcon Division. Our prescription ophthalmic medicines business remains with the Innovative Medicines Division. In compliance with IFRS, we updated our segment reporting to reflect this transfer, both for the current and prior years, to aid comparability of year-on-year results. For details on Innovative Medicines net sales by business franchise, see also "Item 18. Financial Statements—Note 3. Segmentation of key figures 2019, 2018 and 2017."

In addition, the former Immunology and Dermatology franchise was reorganized into Immunology, Hepatology and Dermatology, and certain products were transferred to Established Medicines. The Cardio-Metabolic franchise was renamed to Cardiovascular, Renal and Metabolism.

The Innovative Medicines Division delivered net sales of USD 34.9 billion in 2018, up 8% in reported terms and in constant currencies. The Novartis Pharmaceuticals business unit grew 7% (+7% cc), driven by *Cosentyx* reaching USD 2.8 billion and *Entresto* reaching USD 1.0 billion. The Novartis Oncology business unit grew 9% (+9% cc), driven by AAA, including *Lutathera, Promacta/Revolade* and *Tafinlar + Mekinist* which both reached USD 1.2 billion, and *Jakavi* which reached USD 977 million. Volume contributed 11 percentage points to sales growth. Generic competition had a negative impact of 2 percentage points. Pricing had a negative impact of 1 percentage point.

Regionally, in the US (USD 11.9 billion, +9%), the strong performance was driven by *Cosentyx*, *Entresto*, *Promacta/Revolade* and *Lutathera*. Europe sales (USD 12.3 billion, +11%, +8% cc) were driven by *Cosentyx, Entresto* and *Jakavi*. Japan sales (USD 2.4 billion, –2%, –3% cc) declined, mainly due to the biennial price cut and generic competition. Emerging Growth Markets sales increased 7% (+10% cc) to USD 8.6 billion, mainly driven by strong growth in China.

The following table provides an overview of net sales to third parties by business franchise in the Innovative Medicines Division:

(USD millions)	Year ended Dec 31, 2018	Year ended Dec 31, 2017	Change in USD %	Change in constant currencies %
Total Novartis Oncology business unit	**13 428**	**12 274**	**9**	**9**
Total Novartis Pharmaceuticals business unit	**21 464**	**20 004**	**7**	**7**
Ophthalmology	4 558	4 621	– 1	– 2
Neuroscience	3 429	3 287	4	4
Immunology, Hepatology and Dermatology	3 392	2 474	37	37
Respiratory	1 767	1 617	9	8
Cardiovascular, Renal and Metabolism	1 050	524	100	100
Established Medicines	7 268	7 481	– 3	– 3
Total Innovative Medicines	**34 892**	**32 278**	**8**	**8**

The following table provides the top 20 Innovative Medicines Division product net sales in 2018:

			US		Rest of world			Total		
Brands	**Business franchise**	**Indication**	USD m	% change USD/cc[2]	USD m	% change USD	% change cc[2]	USD m	% change USD	% change cc[2]
Gilenya	Neuroscience	Relapsing multiple sclerosis	1 765	3	1 576	7	5	**3 341**	**5**	**4**
Cosentyx	Immunology, Hepatology and Dermatology	Psoriasis, ankylosing spondylitis and psoriatic arthritis	1 674	31	1 163	46	44	**2 837**	**37**	**36**
Lucentis	Ophthalmology	Age-related macular degeneration			2 046	8	7	**2 046**	**8**	**7**
Tasigna	Oncology	Chronic myeloid leukemia	806	0	1 068	4	3	**1 874**	**2**	**1**
Sandostatin	Oncology	Carcinoid tumors and acromegaly	817	– 2	770	– 1	– 1	**1 587**	**– 2**	**– 2**
Gleevec/Glivec	Oncology	Chronic myeloid leukemia and GIST	440	– 30	1 121	– 15	– 16	**1 561**	**– 20**	**– 20**
Afinitor/Votubia	Oncology	Breast cancer/TSC	929	13	627	– 11	– 12	**1 556**	**2**	**2**
Galvus Group	Established Medicines	Diabetes			1 284	4	6	**1 284**	**4**	**6**
Promacta/Revolade	Oncology	Immune thrombocytopenia (ITP), severe aplastic anemia (SAA)	581	30	593	41	40	**1 174**	**35**	**35**
Tafinlar + Mekinist	Oncology	BRAF V600+ metastatic and adjuvant melanoma; advanced non-small cell lung cancer (NSCLC)	457	35	698	31	29	**1 155**	**32**	**31**
Exjade/Jadenu	Oncology	Chronic iron overload	521	1	578	6	5	**1 099**	**4**	**3**
Xolair[1]	Respiratory	Severe Allergic Asthma (SAA) and Chronic Spontaneous Urticaria (CSU)			1 039	13	12	**1 039**	**13**	**12**
Entresto	Cardiovascular, Renal and Metabolism	Chronic heart failure	556	87	472	125	124	**1 028**	**103**	**102**
Diovan Group	Established Medicines	Hypertension	84	– 3	939	8	8	**1 023**	**7**	**7**
Exforge Group	Established Medicines	Hypertension	19	– 32	983	5	5	**1 002**	**4**	**4**
Jakavi	Oncology	Myelofibrosis (MF), polycytomia vera (PV)			977	26	24	**977**	**26**	**24**
Votrient	Oncology	Renal cell carcinoma	404	– 1	424	6	5	**828**	**2**	**2**
Ilaris	Immunology, Hepatology and Dermatology	Auto-inflammatory (CAPS, TRAPS, HIDS/MKD, FMF, SJIA, AOSD and gout)	262	34	292	42	44	**554**	**38**	**39**
Travoprost Group	Ophthalmology	Reduction of elevated intraocular pressure	194	– 10	323	– 13	– 13	**517**	**– 12**	**– 12**
Zortress/Certican	Established Medicines	Transplantation	145	12	319	12	12	**464**	**12**	**12**
Top 20 products total			**9 654**	**11**	**17 292**	**10**	**9**	**26 946**	**10**	**10**
Rest of portfolio			2 210	4	5 736	0	0	**7 946**	**1**	**1**
Total division sales			**11 864**	**9**	**23 028**	**8**	**7**	**34 892**	**8**	**8**

[1] Net sales reflect *Xolair* sales for all indications.

[2] Constant currencies (cc) is a non-IFRS measure. For an explanation of non-IFRS measures, see " —Item 5.A Operating results—Non-IFRS measures as defined by Novartis."

For information about the approved indications for the products described below, see "Item 4. Information on the Company—Item 4.B Business overview—Innovative Medicines—Key marketed products."

Oncology business unit

Oncology sales were USD 13.4 billion (+9%, +9% cc), driven by AAA, including *Lutathera*, *Promacta/Revolade*, *Tafinlar + Mekinist* and *Jakavi*.

Tasigna (USD 1.9 billion, +2%, +1% cc) was broadly in line with the prior year across most regions.

Sandostatin (USD 1.6 billion, –2%, –2% cc) declined slightly, due to competitive pressure across most regions.

Gleevec/Glivec (USD 1.6 billion, –20%, –20% cc) continued to decline due to generic competition in most major markets.

Afinitor/Votubia (USD 1.6 billion, +2%, +2% cc) grew slightly, mainly driven by the tuberous sclerosis complex (TSC) and neuroendocrine tumor (NET) indications in the US.

Promacta/Revolade (USD 1.2 billion, +35%, +35% cc) grew at a strong double-digit rate across all regions.

Tafinlar + Mekinist (USD 1.2 billion, +32%, +31% cc) continued strong double-digit growth due to increased demand in metastatic melanoma and NSCLC across all regions, with strong uptake in the adjuvant melanoma indication also contributing in the US and Europe.

Exjade/Jadenu (USD 1.1 billion, +4% +3% cc) grew, driven by continued uptake in Europe and Japan as well as the film-coated tablets formulation launch in Europe.

Jakavi (USD 977 million, +26%, +24% cc) continued strong double-digit growth across all regions, driven by both the myelofibrosis and polycythemia vera indications.

Votrient (USD 828 million, +2%, +2% cc) sales grew slightly driven by growth in Japan and Emerging Growth Markets partially offset by competitive pressures in the US and Europe.

Kisqali (USD 235 million, +209%, +210% cc) continued to build momentum with growth in the US and launches in several European and Emerging Growth Markets. In July 2018, the FDA approved two new indications for *Kisqali* based on the MONALEESA 3/7 trials, also approved in Europe in December 2018.

Lutathera (USD 167 million) launch in the US is progressing well, with over 100 centers actively treating. Sales from all AAA brands (including *Lutathera* and radiopharmaceutical diagnostic products) were USD 355 million. The FDA approved *Lutathera* in late January 2018, shortly following the acquisition of AAA. In Europe, full reimbursement for *Lutathera* has been achieved in several countries in 2018. European authorities approved *Lutathera* in late September 2017.

Kymriah sales were USD 76 million. In May 2018, the FDA approved *Kymriah* for a second indication: relapsed/refractory (r/r) DLBCL. Approval of *Kymriah* was also granted by the European Commission, Health Canada and Swissmedic for the r/r pediatric and young adult ALL and r/r DLBCL indications.

Pharmaceuticals business unit

Ophthalmology

Sales in the Ophthalmology franchise were USD 4.6 billion (–1%, –2% cc), with increased sales of *Lucentis* partly offsetting the impact of generic competition for glaucoma and anti-infective portfolios (mainly in the US and Europe), as well as price erosion.

Lucentis (USD 2.0 billion, +8%, +7% cc) delivered strong growth, benefitting from the implementation of a focused global campaign as well as strong retina market growth.

Travoprost Group (USD 517 million, –12%, –12% cc) declined, mainly due to generic competition in Europe and increased competition in the US.

Neuroscience

Sales in the Neuroscience franchise were USD 3.4 billion (+4%, +4% cc), mainly driven by *Gilenya*.

Gilenya (USD 3.3 billion, +5%, +4% cc) with approximately 267,000 treated patients worldwide, continued solid growth, driven by increased demand in Europe and the US. *Gilenya* was approved by the FDA in May 2018 and by the European Commission in November 2018 as the first disease-modifying therapy for pediatric relapsing multiple sclerosis addressing the strong unmet clinical need of younger patients.

Aimovig received FDA approval in May 2018 and European Commission approval in July 2018 and is now available in 25 countries as the first novel treatment designed specifically for migraine prevention. *Aimovig* was successfully launched in the US, and ex-US launches are underway, including local reimbursement procedures. Additional regulatory filings are pending with other health authorities worldwide. *Aimovig* is co-commercialized with Amgen in the US, where Amgen records sales, and Novartis has exclusive commercialization rights for all territories, excluding the US and Japan. More than 165,000 patients have been treated with *Aimovig* worldwide since launch.

Immunology, Hepatology and Dermatology

Sales in the Immunology, Hepatology and Dermatology franchise reached USD 3.4 billion (+37%, +37% cc), of which *Cosentyx* delivered USD 2.8 billion.

Cosentyx (USD 2.8 billion, +37%, +36% cc) delivered strong volume growth across all indications in the US and EU. In October 2018, Novartis presented five-year data in psoriatic arthritis and ankylosing spondylitis confirming the efficacy and safety benefits of *Cosentyx*. This added to the results of a Phase III psoriasis study reported in 2017, demonstrating that *Cosentyx* delivers high and long-lasting skin clearance in patients with moderate-to-severe plaque psoriasis, with high response rates essentially maintained from Year One to Year Five. These scientific data are reinforcing *Cosentyx*'s unique position as a long-lasting comprehensive treatment across PsO, PsA and AS.

Ilaris (USD 554 million, +38%, +39% cc) sales were driven by strong double-digit growth across most regions driven by volume.

Xolair sales for all indications are reported in the Respiratory franchise.

Respiratory

Sales in the Respiratory franchise were USD 1.8 billion (+9%, +8% cc). *Xolair* sales amounted to USD 1.0 billion, and our chronic obstructive pulmonary disease (COPD) portfolio, including *Onbrez Breezhaler, Seebri Breezhaler* and *Ultibro Breezhaler*, achieved sales of USD 703 million (+4%, +2% cc).

Xolair (USD 1.0 billion, +13%, +12% cc) continued to grow in both indications, severe allergic asthma (SAA) and in chronic spontaneous urticaria (CSU, also known as CIU), a severe skin disease, driven by increasing disease awareness.

Ultibro Breezhaler (USD 454 million, +10%, +8% cc) continued to grow, driven by positive FLAME and CLAIM study results as well as the GOLD Strategy 2018 Report, and further supported by the published SUNSET study results.

Cardiovascular, Renal and Metabolism

Sales in the Cardiovascular, Renal and Metabolism franchise were USD 1.1 billion (+100%, +100% cc).

Entresto (USD 1.0 billion, +103%, +102% cc) sales doubled year on year, driven by growing adoption by physicians and strong volume in all markets (US +87%, rest of world +125%, +124% cc). New data from the landmark PIONEER-HF trial presented at the A,erican Heart Association's (AHA) Scientific Session 2018 and published in the New England Journal of Medicine (NEJM) reconfirmed the superiority of *Entresto* versus enalapril, as demonstrated in PARADIGM-HF.

Established Medicines

The Established Medicines franchise had sales of USD 7.3 billion (–3%, –3% cc).

Galvus Group (USD 1.3 billion, +4%, +6% cc) continued to grow driven by solid performance in Emerging Growth Markets, including China.

Diovan Group (USD 1.0 billion, +7%, +7% cc) saw increased demand, mainly due to the recall of generic products in many markets.

Exforge Group (USD 1.0 billion, +4%, +4% cc) saw increased sales, mainly in Emerging Growth Markets.

Zortress/Certican (USD 464 million, +12%, +12% cc) sales were driven by strong double-digit growth across all regions.

Neoral/Sandimmun(e) (USD 463 million, –5%, –6% cc) declined due to generic competition and mandatory price reductions.

Voltaren/Cataflam (USD 445 million, –4%, –3% cc) declined due to generic competition.

Sandoz

Sandoz net sales in 2018 were USD 9.9 billion, down 2% in reported terms. In constant currencies, sales declined 3%, as 8 percentage points of price erosion, mainly in the US, were partly offset by volume growth of 5 percentage points. In the US, sales were USD 2.8 billion (–16%), down mainly due to continued industrywide pricing pressure. Sales in Europe were USD 5.0 billion (+7%, +5% cc), with growth in biosimilars mainly in Germany, France, the UK and Italy. Sales in Asia, Africa and Australasia were USD 1.4 billion, down 2% (–2%cc). Sales in Canada and Latin America were USD 779 million (+3%, +8% cc). Excluding the US, net sales grew 5%, (+4% cc).

(USD millions)	Year ended Dec 31, 2018	Year ended Dec 31, 2017	Change in USD %	Change in constant currencies %
Retail Generics[1]	7 880	8 409	– 6	– 7
Biopharmaceuticals	1 436	1 135	27	24
Anti-Infectives (partner label/API)	543	516	5	3
Total Sandoz	**9 859**	**10 060**	**– 2**	**– 3**

[1] Of which USD 826 million (2017: USD 880 million) represents anti-infectives sold under the Sandoz name

Retail Generics

In Retail Generics, Sandoz develops, manufactures and markets active ingredients and finished dosage forms of small molecule pharmaceuticals to third parties across a broad range of therapeutic areas, as well as finished dosage form of anti-infectives sold to third parties. Retail Generics sales in 2018 were USD 7.9 billion (–6%, –7% cc), due to the decline in the US (–22%).

Biopharmaceuticals

In Biopharmaceuticals, Sandoz develops, manufactures and markets protein- or other biotechnology-based products, including biosimilars, and provides biotechnology manufacturing services to other companies. The Biopharmaceuticals business also includes Glatopa, a generic version of Copaxone®, which treats relapsing forms of multiple sclerosis and is marketed in the US. Global sales of Biopharmaceuticals grew 27% (+24% cc) to USD 1.4 billion driven by both Europe and the US. By region, Europe continued double–digit growth, driven by *Rixathon* (rituximab) and *Erelzi* (etanercept). In the US, growth was mainly driven by *Zarxio* (now the leading filgrastim in the US market).

Anti-Infectives

In Anti-Infectives, Sandoz manufactures and supplies active pharmaceutical ingredients and intermediates, mainly antibiotics, for internal use by Retail Generics and for sale to third-party customers. Sales of anti-infectives sold to third parties under their own name were USD 543 million, up 5% (+3% cc). Total Anti-Infectives franchise sales were USD 1.4 billion (–2%,–3% cc), and included USD 826 million in sales of finished dosage forms sold under the Sandoz name.

Operating income from continuing operations

The following table provides an overview of operating income from continuing operations by segment:

(USD millions)	**Year ended Dec 31, 2018**	% of net sales	Year ended Dec 31, 2017	% of net sales	Change in USD %	Change in constant currencies %
Innovative Medicines	**7 871**	**22.6**	**7 595**	**23.5**	**4**	**4**
Sandoz	**1 332**	**13.5**	**1 368**	**13.6**	**– 3**	**– 2**
Corporate	– 800		**– 261**		nm	nm
Operating income from continuing operations	**8 403**	**18.8**	**8 702**	**20.6**	**– 3**	**– 3**

nm = not meaningful

Operating income from continuing operations was USD 8.4 billion (–3%, –3% cc), mainly due to the impacts of M&A transactions, higher restructuring and net impairment charges, and growth investments, which were

partly offset by higher sales. Operating income margin from continuing operations decreased by 1.8 percentage points to 18.8% of net sales, driven by a decrease in constant currencies of 1.6 percentage points and a negative currency impact of 0.2 percentage points.

Core operating income from continuing operations key figures[1]

(USD millions unless indicated otherwise)	**Year ended Dec 31, 2018**	Year ended Dec 31, 2017	Change in USD %	Change in constant currencies %
Core gross profit from continuing operations	**34 886**	**32 374**	**8**	**7**
Selling, general and administration	– 13 690	– 12 468	– 10	– 9
Research and development	– 8 154	– 7 808	– 4	– 4
Other income	558	748	– 25	– 26
Other expense	– 1 043	– 1 132	8	9
Core operating income from continuing operations	**12 557**	**11 714**	**7**	**7**
As % of net sales	28.1	27.7		

[1] For an explanation of non-IFRS measures and reconciliation tables, see "Item 5.A Operating results—Non-IFRS measures as defined by Novartis."

The adjustments made to operating income from continuing operations to arrive at core operating income from continuing operations amounted to USD 4.2 billion (compared to USD 3.0 billion in 2017), increasing mainly due to higher restructuring and net impairment charges.

Core operating income from continuing operations was USD 12.6 billion (+7%, +7% cc) driven by higher sales and gross margin, which were partly offset by growth investments, including AveXis. Core operating income margin in constant currencies increased by 0.6 percentage points; currency had a negative impact of 0.2 percentage points, resulting in a net increase of 0.4 percentage points to 28.1% of net sales.

The following table provides an overview of core operating income from continuing operations by segment:

(USD millions)	**Year ended Dec 31, 2018**	% of net sales	Year ended Dec 31, 2017	% of net sales	Change in USD %	Change in constant currencies %
Innovative Medicines	**11 151**	**32.0**	**10 019**	**31.0**	**11**	**11**
Sandoz	**2 002**	**20.3**	**2 080**	**20.7**	**– 4**	**– 3**
Corporate	– 596		– 385		– 55	– 52
Core operating income from continuing operations	**12 557**	**28.1**	**11 714**	**27.7**	**7**	**7**

Innovative Medicines

Operating income was USD 7.9 billion (+4%, +4% cc) mainly driven by higher sales, which were partly offset by increased growth and launch investments, and higher restructuring and net impairment charges. Operating income margin in constant currencies decreased 0.8 percentage points; currency had a negative impact of 0.1 percentage points, resulting in a net decrease of 0.9 percentage points to 22.6% of net sales.

Core adjustments amounted to USD 3.3 billion, including USD 2.2 billion of amortization of intangible assets. Prior-year core adjustments were USD 2.4 billion. Core adjustments increased compared to prior year mainly due to higher restructuring and net impairment charges. Core operating income was USD 11.2 billion (+11%, +11% cc) mainly driven by strong sales growth and gross margin expansion, which were partly offset by higher growth investments. Core operating income margin in constant currencies increased by 1.0 percentage points; currency had a negligible impact, resulting in a net increase of 1.0 percentage points to 32.0% of net sales.

Core gross margin as a percentage of net sales increased by 0.9 percentage points (cc). Core R&D expenses decreased by 0.8 percentage points (cc). Core SG&A expenses increased by 0.7 percentage points (cc) due to launch investments and the acquisitions of AveXis and AAA. Core other income and expense, net, was in line with the prior year.

Sandoz

Operating income was USD 1.3 billion (–3%, –2% cc), mainly driven by impairment charges related to the Sandoz US dermatology business and the generic US oral solids portfolio and lower sales, which were partly offset by continued gross margin expansion and lower amortization. Operating income margin was broadly in line with the prior year.

Core adjustments amounted to USD 670 million, including USD 363 million of amortization. Prior-year

core adjustments were USD 712 million. Core adjustments declined compared to the prior year, driven by net changes in legal provisions and lower amortization, which were partly offset by impairment charges related to the Sandoz US dermatology business and the generic US oral solids portfolio. Core operating income was USD 2.0 billion (–4%, –3% cc), mainly due to the sales decline, ex-US marketing and sales (M&S) investments, which were partly offset by continued core gross margin expansion. Core operating income margin in constant currencies decreased by 0.1 percentage points, and currency had a negative impact of 0.3 percentage points, resulting in a net decrease of 0.4 percentage points to 20.3% of net sales.

Core gross margin as a percentage of net sales increased by 2.4 percentage points (cc), mainly driven by productivity gains and favorable product and geographic mix. Core R&D expenses increased by 0.4 percentage points (cc). Core SG&A expenses increased by 2.2 percentage points (cc), mainly due to higher M&S investments in key ex-US markets. Core other income and expense increased the margin by 0.1 percentage points (cc).

Corporate income and expense, net

Corporate income and expense, which includes the cost of Group management and central services, amounted to an expense of USD 800 million, compared to USD 261 million in the prior year. The increase in net expense compared to the prior year was mainly due to lower contributions from the Novartis Venture Fund, lower income from retained Vaccines intellectual property, higher Novartis Business Services (NBS) restructuring costs, and an income from a sales milestone in the prior year related to the Vaccines divestment.

Innovative Medicines Division research and development

The following table provides an overview of the reported and core research and development expense of the Innovative Medicines Division:

(USD millions unless indicated otherwise)	**Year ended Dec 31, 2018**	Year ended Dec 31, 2017	Change in USD %	Change in constant currencies %
Research and exploratory development	– 2 770	– 2 729	– 2	– 1
Confirmatory development	– 4 905	– 4 886	0	0
Total Innovative Medicines Division research and development expense	**– 7 675**	**– 7 615**	**– 1**	**0**
As % of Innovative Medicines net sales to third parties	22.0	23.6		
Core research and exploratory development[1]	– 2 665	– 2 603	– 2	– 2
Core confirmatory development[1]	– 4 675	– 4 431	– 6	– 5
Total core Innovative Medicines Division research and development expense	**– 7 340**	**– 7 034**	**– 4**	**– 4**
As % of Innovative Medicines net sales to third parties	21.0	21.8		

[1] Core excludes impairments, amortization and certain other items. For an explanation of non-IFRS measures and reconciliation tables, see " —Item 5.A Operating results—Non-IFRS measures as defined by Novartis."

Innovative Medicines Division research and exploratory development expense increased by 2% (–1% cc) to USD 2.8 billion, and confirmatory development expense amounted to USD 4.9 billion, broadly in line with the prior year. This was mainly due to higher pipeline investments, including AveXis, which were offset by lower net impairment charges (mainly prior-year RLX030) and productivity.

Total core research and development expense in the Innovative Medicines Division as a percentage of sales decreased by 0.8 percentage points in constant currencies mainly driven by continued resource allocation and productivity efforts, and higher net sales. The impact from currency exchange rates was negligible, yielding a net decrease of 0.8 percentage points to 21.0% of net sales.

Non-operating income and expense from continuing operations

The term "Non-operating income and expense" includes all income and expense items outside operating income. The following table provides an overview of non-operating income and expense from continuing operations:

(USD millions unless indicated otherwise)	Year ended Dec 31, 2018	Year ended Dec 31, 2017	Change in USD %	Change in constant currencies %
Operating income from continuing operations	**8 403**	**8 702**	**– 3**	**– 3**
Income from associated companies	6 438	1 108	nm	nm
Interest expense	– 932	– 750	– 24	– 27
Other financial income and expense	186	42	nm	nm
Income before taxes	**14 095**	**9 102**	**55**	**55**
Taxes	– 1 295	– 1 603	19	19
Net income from continuing operations	**12 800**	**7 499**	**71**	**71**
Net (loss)/income from discontinued operations	– 186	204	nm	nm
Net income	**12 614**	**7 703**	**64**	**64**
Attributable to:				
Shareholders of Novartis AG	*12 611*	*7 703*	*64*	*64*
Non-controlling interests	*3*	*0*	*nm*	*nm*
Basic earnings per share from continuing operations (USD)	**5.52**	**3.20**	73	73
Basic earnings per share from discontinued operations (USD)	– 0.08	0.08	nm	nm
Total basic earnings per share (USD)	**5.44**	**3.28**	**66**	**66**

nm = not meaningful

Income from associated companies

Income from associated companies from continuing operations increased to USD 6.4 billion from USD 1.1 billion in the prior year, an increase of USD 5.3 billion. This increase was mainly due to the pre-tax gain of USD 5.8 billion recognized on the divestment of the 36.5% stake in the GSK consumer healthcare joint venture. Excluding this divestment gain, income from associated companies amounted to USD 648 million, compared to USD 1.1 billion in the prior year.

The share of income from Roche was USD 526 million, compared to USD 456 million in the prior year. The higher estimated income for Roche of USD 130 million in 2018, was partly offset by the net impacts from a negative prior-year adjustment of USD 125 million recognized in 2018, compared to a negative prior-year adjustment of USD 67 million recognized in 2017. The share of income from the GSK consumer healthcare joint venture decreased by USD 509 million compared to the prior year, due to the discontinuation of the recognition of income from April 1, 2018 (see "Item 18. Financial Statements—Note 2. Significant transactions").

Interest expense and other financial income and expense

Interest expense from continuing operations was USD 932 million, compared to USD 750 million in the prior year, an increase of USD 182 million due to higher interest expense of USD 136 million relating to the level of outstanding debts, and higher interest expense of USD 46 million on discounting of long-term liabilities.

Other financial income and expense from continuing operations amounted to an income of USD 186 million, compared to an income of USD 42 million in the prior year, mainly due to higher interest income of USD 292 million, compared to USD 110 million in the prior year, which was partly offset by higher currency losses of USD 68 million, compared to currency losses of USD 58 million in the prior year and higher other financial expenses, net of USD 38 million, compared to USD 10 million in the prior year.

Taxes

The tax rate from continuing operations was 9.2%, compared to 17.6% in the prior year, due to the impact in 2018 on taxes of the divestment of the 36.5% stake in the GSK consumer healthcare joint venture and the impact in 2017 on taxes from the US enacted tax reform legislation. Excluding the impact of the divestment, the tax rate would have been 14.9% in 2018 and excluding the impact of US tax reform, 14.2% in 2017. The tax rate increased as the benefit from favorable profit mix was offset by the impact from the discontinuation of the recognition of the income from associated companies related to the GSK consumer healthcare joint venture from April 1, 2018 (see "Item 18. Financial Statements—Note 2. Significant transactions").

Net income from continuing operations

Net income from continuing operations was USD 12.8 billion, compared to USD 7.5 billion in the prior year, mainly benefiting from a USD 5.7 billion net gain from the divestment of our stake in the GSK consumer healthcare joint venture in the second quarter of 2018.

Earnings per share

Basic earnings per share from continuing operations were USD 5.52, compared to USD 3.20 in the prior year, driven by higher net income and lower weighted average number of shares outstanding.

Core non-operating income and expense from continuing operations[1]

The following table provides an overview of core non-operating income and expense from continuing operations:

(USD millions unless indicated otherwise)	**Year ended Dec 31, 2018**	Year ended Dec 31, 2017	Change in USD %	Change in constant currencies %
Core operating income from continuing operations	**12 557**	**11 714**	**7**	**7**
Core income from associated companies	1 113	1 335	– 17	– 17
Core interest expense	– 932	– 750	– 24	– 27
Core other financial income and expense	186	42	nm	nm
Core income before taxes from continuing operations	**12 924**	**12 341**	**5**	**5**
Core taxes	– 2 004	– 1 867	– 7	– 7
Core net income from continuing operations	**10 920**	**10 474**	**4**	**4**
Core basic EPS from continuing operations (USD)	**4.71**	**4.46**	**6**	**5**

[1] For an explanation of non-IFRS measures and reconciliation tables, see "Item 5.A Operating results—Non-IFRS measures as defined by Novartis."
nm = not meaningful

Core income from associated companies

Core income from associated companies from continuing operations amounted to USD 1.1 billion, compared to USD 1.3 billion in the prior year. The core income contribution from Roche amounted to USD 970 million, compared to USD 832 million in the prior year, an increase of USD 138 million, mainly due to the higher estimated contribution from core income. The share of core income from GSK consumer healthcare joint venture decreased by USD 338 million, compared to the prior year, due to the discontinuation of core income from April 1, 2018 (see "Item 18. Financial Statements—Note 2. Significant transactions").

Core interest expense and other financial income and expense

Core interest expense from continuing operations was USD 932 million, compared to USD 750 million in the prior year. Core other financial income and expense from continuing operations amounted to a net income of USD 186 million, compared to USD 42 million in the prior year.

Core taxes

The core tax rate from continuing operations (core taxes as a percentage of core income before tax from continuing operations) increased to 15.5% from 15.1% in the prior year.

Core net income

Core net income from continuing operations was USD 10.9 billion (+4%, +4% cc) driven by growth in core operating income and partly offset by the discontinuation of core income from the GSK consumer healthcare joint venture from April 1, 2018.

Core earnings per share

Core earnings per share from continuing operations were USD 4.71 (+6%, +5% cc), driven by growth in core net income and the lower number of shares outstanding.

Discontinued operations

Discontinued operations net sales were USD 7.1 billion, compared to USD 6.8 billion in the prior year. Operating loss amounted to USD 234 million, compared to an operating loss of USD 73 million in the prior year.

Net loss from discontinued operations amounted to USD 186 million, compared to a net income from discontinued operations of USD 204 million in the prior year.

Total Group

For the total Group, net income amounted to USD 12.6 billion in 2018, compared to USD 7.7 billion in the prior year, and basic earnings per share increased to USD 5.44 from USD 3.28. Cash flow from operating activities for the total Group amounted to USD 14.3 billion, and free cash flow amounted to USD 11.7 billion.

Factors affecting comparability of year-on-year results of operations

Significant transactions in 2019, 2018 and 2017, and significant pending transactions

The comparability of the year-on-year results of our operations for the total Group can be significantly affected by acquisitions and divestments. As part of our long-term strategy to focus Novartis as a leading medicines company, we announced and/or completed several acquisitions and divestments during 2019, 2018 and 2017.

A detailed description of significant transactions in 2019, 2018 and 2017, and significant pending transactions, can be found in "Item 4.Information on the Company—Item 4.A History and development of Novartis—Important corporate developments 2017—2019," and "Item 18. Financial Statements—Note 2. Significant transactions."

Critical accounting policies and estimates

Our significant accounting policies are set out in "Item 18. Financial Statements—Note 1. Significant accounting policies," which are prepared in accordance with International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board (IASB).

Given the uncertainties inherent in our business activities, we must make certain estimates and assumptions that require difficult, subjective and complex judgments. Because of uncertainties inherent in such judgments, actual outcomes and results may differ from our assumptions and estimates, which could materially affect the Group's consolidated financial statements. Application of the following accounting policies requires certain assumptions and estimates that have the potential for the most significant impact on our consolidated financial statements.

New accounting pronouncement

Novartis implemented the new standard IFRS 16 Leases effective as of January 1, 2019. IFRS 16 Leases substantially changed the consolidated financial statements, as the majority of leases for which the company is the lessee became on-balance sheet liabilities with corresponding right-of-use assets also recognized on the balance sheet. The lease liability reflects the net present value of the remaining lease payments, and the right-of-use asset corresponds to the lease liability, adjusted for payments made before the commencement date, lease incentives and other items related to the lease agreement. The standard replaces IAS 17 Leases and related interpretations.

Upon adoption of the new standard, a portion of the annual operating lease costs is recorded as an interest expense. This was previously fully recognized within operating income as a functional expense. In addition, the portion of the lease payments that represents the reduction of the lease liability is recognized in the cash flow statement as an outflow from financing activities. Previously, this was fully recognized as an outflow from operating activities. Given the leases involved, these effects are not significant to the presentation of our consolidated income statement or our consolidated cash flows from operating activities and from financing activities.

The Group implemented the new standard on January 1, 2019, and applied the modified retrospective method, with right-of-use assets measured at an amount equal to the lease liability, adjusted by the amount of the prepaid or accrued lease payments relating to those leases recognized in the balance sheet immediately before the date of initial application and will not restate prior years.

From January 1, 2019, with the adoption of IFRS 16 Leases, the Group adopted new accounting policies for leases and right-of-use assets, which are set forth in "Item 18. Financial Statements—Note 1. Significant accounting policies – Leases and right-of-use assets."

For further information on the impact of adoption and additional disclosures of IFRS 16 Leases, see "Item 18. Financial Statements—Note 1. Significant accounting policies" and "Item 18. Financial Statements—Note 10. Right-of-use assets and lease liabilities."

Non-current assets held for sale or held for distribution to owners

Non-current assets are classified as assets held for sale or related to discontinued operations when their carrying amount is to be recovered principally through a sale transaction or distribution to owners, and a sale or distribution to owners is considered highly probable. They are stated at the lower of carrying amount and fair value less costs to sell with any resulting impairment recognized. Assets related to discontinued operations and assets of disposal group held for sale are not depreciated or amortized. The prior-year consolidated balance sheet is not restated. For more details on the assets and liabilities of disposal group classified as held for sale in the 2019 and 2018 balance sheets, see "Item 18. Financial Statements—Note 2. Significant transactions—Significant pending transactions."

Distribution of Alcon Inc. to Novartis AG shareholders

During the first quarter of 2019, at the Annual General Meeting (AGM) of Novartis AG shareholders, held on February 28, 2019, the Novartis AG shareholders approved a special distribution by way of a dividend in kind to effect the spin-off of Alcon Inc.

The February 28, 2019, shareholder approval for the spin-off required the Alcon Division and selected portions of corporate activities attributable to Alcon's business (the "Alcon business") to be reported as discontinued operations.

The shareholder approval to spin off the Alcon business also required the recognition of a distribution liability at the fair value of the Alcon business. The Group elected to measure the distribution liability at the fair value of the Alcon business net assets taken as a whole. The distribution liability was recognized through a reduction in retained earnings. It was required to be adjusted at each balance sheet date for changes in its estimated fair value, up to the date of the distribution to shareholders through retained earnings. Any resulting impairment of the business assets to be distributed would have been recognized in the consolidated income statements in "Other expense" of discontinued operations, at the date of initial recognition of the distribution liability or at subsequent dates resulting from changes of the distribution liability valuation. At the April 8, 2019 distribution settlement date, the resulting gain, which was measured as the excess amount of the distribution liability over the then-carrying value of the net assets of the business distributed, was recognized on the line "Gain on distribution of Alcon Inc. to Novartis AG shareholders" in the income statement of discontinued operations.

The recognition of the distribution liability required the use of valuation techniques for purposes of impairment testing of the Alcon business' assets to be distributed and for the measurement of the fair value of the distribution liability. These valuations required the use of management assumptions and estimates related to the Alcon business' future cash flows, market multiples to estimate day one market value, and control premiums to apply in estimating the Alcon business fair value. These fair value measurements were classified as "Level 3" in the fair value hierarchy. . "Item 18. Financial Statements—Note 1. Impairment of goodwill and intangible assets" provides additional information on key assumptions that are highly sensitive in the estimation of fair values using valuation techniques.

Transaction costs that were directly attributable to the distribution (spin-off) of Alcon to the Novartis shareholders, and that would otherwise have been avoided, were recorded as a deduction from equity.

For additional disclosures, refer to "Item 18. Financial Statements—Note 2. Significant transactions in 2019—Completion of the Spin-off of the Alcon business through a dividend in kind distribution to Novartis AG shareholders" and "Item 18. Financial Statements—Note 30. Discontinued operations."

Deductions from revenues

As is typical in the pharmaceutical industry, our gross sales are subject to various deductions, which are primarily composed of rebates and discounts to retail customers, government agencies, wholesalers, health insurance companies and managed healthcare organizations. These deductions represent estimates of the related obligations, requiring the use of judgment when estimating the effect of these sales deductions on gross sales for a reporting period. These adjustments are deducted from gross sales to arrive at net sales.

The following summarizes the nature of some of these deductions and how the deduction is estimated. After recording these, net sales represent our best estimate of the cash that we expect to ultimately collect. The US market has the most complex arrangements related to revenue deductions.

United States-specific healthcare plans and program rebates

The United States Medicaid Drug Rebate Program is administered by state governments, using state and federal funds to provide assistance to certain vulnerable and needy individuals and families. Calculating the rebates to be paid related to this program involves interpreting relevant regulations, which are subject to challenge or change in interpretative guidance by government authorities. Provisions for estimating Medicaid rebates are calculated using a combination of historical experience, product and population growth, product pricing, and the mix of contracts and specific terms in the individual state agreements.

The United States Federal Medicare Program, which funds healthcare benefits to individuals aged 65 and older, and to people with certain disabilities, provides prescription drug benefits under the Part D section of the program. This benefit is provided and administered through private prescription drug plans. Provisions for estimating Medicare Part D rebates are calculated based on the terms of individual plan agreements, product sales and population growth, product pricing, and the mix of contracts.

We offer rebates to key managed healthcare and private plans in an effort to sustain and increase the market share of our products, and to ensure patient access to our products. These programs provide a rebate after the plans have demonstrated they have met all terms and conditions set forth in their contract with us.

These rebates are estimated based on the terms of individual agreements, historical experience, product pricing and projected product growth rates, and are recorded as a deduction from revenue at the time the related revenues are recorded.

These provisions are adjusted based on established processes and experiences from filing data with individual states and plans. There is often a time lag of several months between the recording of the revenue deductions and the final accounting for them.

Non-United States-specific healthcare plans and program rebates

In certain countries other than the US, we provide rebates to governments and other entities. These rebates are often mandated by laws or government regulations.

In several countries, we enter into innovative pay-for-performance arrangements (i.e. outcome based arrangements) with certain healthcare providers. Under these agreements, we may be required to make refunds to the healthcare providers or to provide additional medicines free of charge if anticipated treatment outcomes do not meet predefined targets. The impact of potential refunds or the delivery of additional medicines at no cost is estimated and recorded as a deduction from revenue at the time the related revenues are recorded. Estimates are based on historical experience and clinical data. In cases where historical experience and clinical data are not sufficient for a reliable estimation of the outcome, revenue recognition is deferred until such history is available.

In addition, we offer global patient assistance programs.

There is often a time lag of several months between the recording of the revenue deductions and the final accounting for them.

Non-healthcare plans and program rebates, returns and other deductions

We offer rebates to purchasing organizations and other direct and indirect customers to sustain and increase market share and to ensure patient access to our products. Since rebates are contractually agreed upon, the related provisions are estimated based on the terms of the individual agreements, historical experience and projected product sales growth rates.

Chargebacks occur where our subsidiaries have arrangements with indirect customers to sell products at prices that are lower than the price charged to wholesalers. A chargeback represents the difference between the invoice price to the wholesaler and the indirect customer's contract price. We account for vendor chargebacks by reducing revenue by the estimate of chargebacks attributable to a sales transaction. Provisions for estimated chargebacks are calculated using a combination of factors, such as historical experience, product growth rates, product pricing, level of inventory in the distribution channel, and the terms of individual agreements.

When we sell a product providing a customer the right to return it, we record a provision for estimated sales returns based on our sales return policy and historical return rates. Other factors considered include actual product recalls, expected marketplace changes, the remaining shelf life of the product, and the expected entry of generic products. In 2019, sales returns amounted to approximately 1% of gross product sales. If sufficient experience is not available, sales are only recorded based on evidence of product consumption or when the right of return has expired.

We enter into distribution service agreements with major wholesalers, which provide a financial disincentive for the wholesalers to purchase product quantities in excess of current customer demand. Where possible, we adjust shipping patterns for our products to maintain wholesalers' inventory levels consistent with underlying patient demand.

We offer cash discounts to customers to encourage prompt payment. Cash discounts are estimated and accrued at the time of invoicing and are deducted from revenue.

Following a decrease in the price of a product, we generally grant customers a "shelf stock adjustment" for their existing inventory for the relevant product. Provisions for shelf stock adjustments, which are primarily relevant within the Sandoz Division, are determined at the time of the price decline or at the point of sale, if the impact of a price decline on the products sold can be reasonably estimated based on the customer's inventory levels of the relevant product.

Other sales discounts, such as consumer coupons and copay discount cards, are offered in some markets. The estimated amounts of these discounts are recorded at the time of sale or when the coupons are issued, and are estimated utilizing historical experience and the specific terms for each program. If a discount for a probable future transaction is offered as part of a sales transaction, then an appropriate portion of revenue is deferred to cover this estimated obligation.

We adjust provisions for revenue deductions periodically to reflect actual experience. To evaluate the adequacy of provision balances, we use internal and external estimates of the inventory in transit, the level of inventory in the distribution and retail channels, actual claims data received, and the time lag for processing rebate claims. External data sources include reports from wholesalers and third-party market data purchased by Novartis.

For the table showing the worldwide extent of our revenue deductions provisions and related payment experiences for the Group see "Item 18. Financial Statements—Note 22. Provisions and other current liabilities."

Gross-to-net sales reconciliation

The table below shows the gross-to-net sales reconciliation for our Innovative Medicines Division:

(USD millions)	2019	In % of gross sales	2018	In % of gross sales	2017	In % of gross sales
Innovative Medicines gross sales subject to deductions	**52 956**	**100.0**	**47 785**	**100.0**	**43 127**	**100.0**
US-specific healthcare plans and program rebates	– 4 824	– 9.1	– 3 921	– 8.2	– 3 303	– 7.7
Non-US-specific healthcare plans and program rebates	– 3 438	– 6.5	– 3 140	– 6.6	– 2 652	– 6.1
Non-healthcare plans and program-related rebates, returns and other deductions	– 6 980	– 13.2	– 5 832	– 12.2	– 4 894	– 11.4
Total Innovative Medicines gross-to-net sales adjustments	**– 15 242**	**– 28.8**	**– 12 893**	**– 27.0**	**– 10 849**	**– 25.2**
Innovative Medicines net sales	**37 714**	**71.2**	**34 892**	**73.0**	**32 278**	**74.8**

Impairment of goodwill, intangible assets and property, plant and equipment

We review long-lived intangible assets and property, plant and equipment for impairment whenever events or changes in circumstance indicate that the asset's balance sheet carrying amount may not be recoverable. Goodwill and other currently not amortized intangible assets are reviewed for impairment at least annually.

An asset is considered impaired when its balance sheet carrying amount exceeds its estimated recoverable amount, which is defined as the higher of its fair value less costs of disposal and its value in use. Usually, Novartis applies the fair value less costs of disposal method for its impairment assessment. In most cases, no directly observable market inputs are available to measure the fair value less costs of disposal. Therefore, an estimate is derived indirectly and is based on net present value techniques utilizing post-tax cash flows and discount rates. In the limited cases where the value in use method would be applied, net present value techniques would be applied using pre-tax cash flows and discount rates.

Fair value less costs of disposal reflects estimates of assumptions that market participants would be expected to use when pricing the asset or CGUs, and for this purpose, management considers the range of economic conditions that are expected to exist over the remaining useful life of the asset.

The estimates used in calculating the net present values are highly sensitive and depend on assumptions specific to the nature of the Group's activities with regard to:

- Amount and timing of projected future cash flows
- Long-term sales forecasts
- Actions of competitors (launch of competing products, marketing initiatives, etc.)
- Sales erosion rates after the end of patent or other intellectual property rights protection, and timing of the entry of generic competition
- Outcome of research and development activities (compound efficacy, results of clinical trials, etc.)
- Amount and timing of projected costs to develop IPR&D into commercially viable products
- Profit margins
- Probability of obtaining regulatory approval
- Future tax rate
- Appropriate terminal growth rate
- Appropriate discount rate

Due to the above factors, actual cash flows and values could vary significantly from forecasted future cash flows and related values derived using discounting techniques.

The recoverable amount of the grouping of cash-generating units to which goodwill and indefinite life intangible assets are allocated is based on fair value less costs of disposal. The valuations are derived from applying discounted future cash flows based on key assumptions, including the terminal growth rate and discount rate. For additional information, see "Item 18. Financial Statements—Note 1. Significant accounting policies—Impairment of goodwill and intangible assets and Note 11. Goodwill and intangible assets."

In 2019, intangible asset impairment charges in continuing operations of USD 1.2 billion were recognized, of which USD 669 million was recorded in the Innovative Medicines Division and USD 506 million was recorded in the Sandoz Division.

In 2018, intangible asset impairment charges in continuing operations of USD 841 million were recognized, of which USD 592 million was recorded in the Innovative Medicines Division and USD 249 million was recorded in the Sandoz Division.

In 2017, intangible asset impairment charges in continuing operations of USD 652 million were recognized, of which USD 591 million was recorded in the Innovative Medicines Division and USD 61 million was recorded in the Sandoz Division.

In 2019, the reversal of prior year impairment charges amounted to USD 37 million. In 2018 and 2017, there were no reversals of prior-year impairment charges.

Goodwill and other intangible assets represent a significant part of our consolidated balance sheet, primarily due to acquisitions. Although no significant additional impairments are currently anticipated, impairment evaluation could lead to material impairment charges in the future. For more information, see "Item 18. Financial Statements—Note 11. Goodwill and intangible assets."

Additionally, net impairment charges for property, plant and equipment from continuing operations during 2019 amounted to USD 202 million (2018: USD 301 million; 2017: USD 157 million).

Impairment of associated companies accounted for at equity

Novartis considers investments in associated companies for impairment evaluation whenever objective evidence indicates the net investment may be impaired, including when a quoted share price indicates a fair value less than the per-share balance sheet carrying value for the investment.

If the recoverable amount of the investment is estimated to be lower than the balance sheet carrying amount, an impairment charge is recognized for the difference in the consolidated income statement under "Income from associated companies."

Trade receivables

Trade receivables are initially recognized at their invoiced amounts, including any related sales taxes less adjustments for estimated revenue deductions such as rebates, chargebacks and cash discounts.

From January 1, 2018, with the adoption of IFRS 9 Financial Instruments, provisions for doubtful trade receivables are established using an expected credit loss model (ECL). The provisions are based on a forward-looking ECL, which includes possible default events on the trade receivables over the entire holding period of the trade receivable. These provisions represent the difference between the trade receivable's carrying amount in the consolidated balance sheet and the estimated collectible amount. Charges for doubtful trade receivables are recorded as marketing and selling costs recognized in the consolidated income statement within "Selling, General & Administration" expenses.

Trade receivable balances include sales to drug wholesalers, retailers, private health systems, government agencies, managed care providers, pharmacy benefit managers and government-supported healthcare systems. Novartis continues to monitor sovereign debt issues and economic conditions in Argentina, Brazil, Greece, Italy, Portugal, Russia, Saudi Arabia, Spain, Turkey and other countries, and evaluates trade receivables in these countries for potential collection risks. Substantially all of the trade receivables overdue from Argentina, Brazil, Greece, Portugal, Saudi Arabia and Spain are due directly from local governments or from government-funded entities. Deteriorating credit and economic conditions as well as other factors in these countries have resulted in – and may continue to result in – an increase in the average length of time that it takes to collect these trade receivables, and may require the Group to re-evaluate the estimated collectable amount of these trade receivables in future periods.

Contingent consideration

In a business combination or divestment of a business, it is necessary to recognize contingent future amounts due to previous owners representing contractually defined potential amounts as a liability or asset. Usually for Novartis, these are linked to milestone or royalty payments related to certain assets and are recognized as a financial liability or financial asset at their fair value, which is then remeasured at each subsequent reporting date. These estimations typically depend on factors such as technical milestones or market performance, and are adjusted for the probability of their likelihood of payment and, if material, are appropriately discounted to reflect the impact of time.

Changes in the fair value of contingent consideration liabilities in subsequent periods are recognized in the consolidated income statement in "Cost of goods sold" for currently marketed products and in "Research and development" for in-process research and development (IPR&D). Changes in contingent consideration assets are recognized in "Other income" or "Other expense," depending on its nature.

The effect of unwinding the discount over time is recognized for contingent liabilities in "Interest expense" and for contingent assets as interest income recognized in the consolidated income statement within "Other financial income and expense."

Retirement and other post-employment benefit plans

We sponsor pension and other post-employment benefit plans in various forms that cover a significant portion of our current and former associates. For post-employment plans with defined benefit obligations, we are required to make significant assumptions and estimates about future events in calculating the expense and the present value of the liability related to these plans. These include assumptions about the interest rates we apply to estimate future defined benefit obligations and net periodic pension expense, as well as rates of future pension increases. In addition, our actuarial consultants provide our management with historical statistical information, such as withdrawal and mortality rates in connection with these estimates.

Assumptions and estimates used by the Group may differ materially from the actual results we experience due to changing market and economic conditions, higher or lower withdrawal rates, and longer or shorter life spans of participants, among other factors. For example, in 2019, a decrease in the interest rate we apply in determining the present value of the defined benefit obligations of one-quarter of 1% would have increased our year-end defined benefit pension obligation for plans in Switzerland, the United States, the United Kingdom, Germany and Japan, which represent 95% of the Group total defined benefit pension obligation, by approximately USD 0.8 billion. Similarly, if the 2019 interest rate had been one-quarter of 1 percentage point lower than actually assumed, the net periodic pension cost for pension plans in these countries, which represent about 89% of the Group's total net periodic pension cost for pension plans, would have increased by approximately USD 22 million. Depending on events, such differences could have a material effect on our total equity. For more information on obligations under retirement and other post-employment benefit plans and underlying actuarial assumptions, see "Item 18. Financial Statements—Note 25. Post-employment benefits for associates."

Provisions and contingencies

A number of Group companies are involved in various government investigations and legal proceedings (intellectual property, sales and marketing practices, product liability, commercial, employment and wrongful discharge, environmental claims, etc.) arising out of the normal conduct of their businesses. For more information, see "Item 18. Financial Statements—Note 20. Provisions and other non-current liabilities," and "Item 18. Financial Statements—Note 28. Commitments and contingencies."

We record provisions for legal proceedings when it is probable that a liability has been incurred and the amount can be reliably estimated. These provisions are adjusted periodically as assessments change or additional information becomes available. For significant product liability cases, the provision is actuarially determined based on factors such as past experience, amount and number of claims reported, and estimates of claims incurred but not yet reported.

Provisions are recorded for environmental remediation costs when expenditure on remedial work is probable and the cost can be reliably estimated. Remediation costs are provided for under "Non-current liabilities" in the Group's consolidated balance sheet.

Provisions relating to estimated future expenditure for liabilities do not usually reflect any insurance or other claims or recoveries, since these are only recognized as assets when the amount is reasonably estimable and collection is virtually certain.

Research and development

Internal research and development (R&D) costs are fully charged to the consolidated income statement in the period in which they are incurred. We consider that regulatory and other uncertainties inherent in the development of new products preclude the capitalization of internal development expenses as an intangible asset usually until marketing approval from the regulatory authority is obtained in a relevant major market, such as for the United States, the European Union, Switzerland or Japan.

Costs for post-approval studies performed to support the continued registration of a marketed product are recognized as marketing expenses. Costs for activities that are required by regulatory authorities as a condition for obtaining marketing approval are capitalized and recognized as currently marketed products.

Healthcare contributions

In many countries, our subsidiaries are required to make contributions to the country's healthcare costs as part of programs other than the ones mentioned above under deductions from revenues. The amounts to be paid depend on various criteria such as the subsidiary's market share or sales volume compared to certain targets. Considerable judgment is required in estimating these contributions, as not all data is available when the estimates need to be made.

The largest of these healthcare contributions relates to the US Healthcare Reform fee, which was introduced in 2011. This fee is an annual levy to be paid by US pharmaceutical companies, including various Novartis subsidiaries, based on each company's prior-year qualifying sales as a percentage of the prior year's government-funded program sales. This pharmaceutical fee levy is recognized in "Other expense."

Taxes

We prepare and file our tax returns based on an interpretation of tax laws and regulations, and we record estimates based on these judgments and interpretations. Our tax returns are subject to examination by the competent taxing authorities, which may result in an assessment being made, requiring payments of additional tax, interest or penalties. Since Novartis uses its intellectual property globally to deliver goods and services, the transfer prices within the Group as well as arrangements between subsidiaries to finance research and development and other activities may be challenged by the national tax authorities in any of the jurisdictions in which Novartis operates. Therefore, inherent uncertainties exist in our estimates of our tax positions, but we believe that our estimated amounts for current and deferred tax assets or liabilities, including any amounts related to any uncertain tax positions, are appropriate based on currently known facts and circumstances.

Internal control over financial reporting

The Group's management has assessed the effectiveness of internal control over financial reporting. The Group's independent statutory auditor also issued an opinion on the effectiveness of internal control over financial reporting. Both the Group's management and its external auditors concluded that the Group maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019. For more details, see "Item 15. Controls and Procedures."

Factors affecting results of operations

Transformational changes fueling demand

Accelerating biomedical innovation

We believe that biomedical innovation has the potential to accelerate over the next two decades, with a potentially transformative set of therapeutic platforms emerging that could make many intractable, "undruggable" targets accessible to new therapeutics and treatment modalities. Our molecular understanding of biology is steadily deepening to guide drug discovery. Artificial intelligence (AI) and *in silico* drug discovery tools are also maturing, with technology-native life sciences companies starting to develop their own drug pipelines. These developments have the potential to provide us with new tools to help reduce some of the uncertainty in drug discovery, while at the same time helping to enable a new set of potential competitors.

We see this as an opportunity because our strong internal research capabilities should allow us to harness the potential of an increasingly fragmented external innovation environment. For example, we expect to sustain long-term growth in part through our 15 ongoing or upcoming major launches. In order to use this potential to our advantage, first we will need to maintain a leading position in new drug research capabilities that continue to emerge. New methods to generate, analyze and use big data to make predictions have the potential to make biomedical problems more tractable, and new technology platforms have the potential to make previously "undruggable" targets accessible to new treatments. Second, there may be an increasing number of contributors to drug research, with a broader range of possible therapeutic advances. It will therefore be important for us to effectively identify, operationalize, and scale new technologies from a wide range of sources. Third, we will need to continue to attract and retain talent who can harness these new opportunities and continue to build innovation leadership.

Aging populations

While accelerating medical innovation could help control some of the devastating diseases that still plague humanity, other trends in society pose significant challenges. Rapidly aging populations continue to put pressure on governments and payers around the world.

People are living longer and the worldwide elderly population continues to grow at a rapid pace. The number of people in the world aged 65 or over is projected to reach nearly 1.5 billion by 2050, according to projections by the United Nations, up from 700 million today. Aging populations, in addition to rapid urbanization and changing lifestyles in the developing world, are contributing to an increased prevalence of chronic ailments such as heart disease and cancer.

At the same time, many countries are working to expand access to healthcare. For example, China is taking steps to expand reimbursement of new medicines to help ensure broad access to medical innovation for its population. In the coming years, we expect to double the average number of our NDA approvals per year in China compared with 2015-2019.

These factors are driving higher healthcare spending, which is projected by the consultancy firm Deloitte to grow at an annual rate of 5.4% between 2018 and 2022, reaching a total of more than USD 10 trillion worldwide (Deloitte, "2019 Global Healthcare Outlook, Shaping the Future").

To keep costs in check, governments and health insurers are already employing a variety of measures, including increasing the use of generics and biosimilars, imposing price cuts, and limiting access to some innovative therapies. The pharmaceutical industry is also expected to play a role in controlling healthcare spending, including by exploring new pricing models and delivering innovative new treatments that help maximize benefits for patients.

Moving towards value-based care

In the long term, we believe that healthcare systems are more likely to remain sustainable if they are able to reward on the basis of value, instead of volume, and rationally allocate resources to the treatments that lead to the best outcomes for patients. In the US in particular, changes to incentives currently built into the healthcare system—which can encourage delivery of more expensive treatments from manufacturers paying higher rebates over more cost-effective products—may be needed before value-based approaches become more widely implemented. "American Patients First," published by the Trump administration in May 2018, included proposals to remove barriers for value-based arrangements and value-based purchasing, in addition to promoting indication-based pricing projects in federal programs.

In the meantime, cost containment measures are becoming increasingly prevalent. Before eventually shifting to value-based pricing methods, which can sometimes be more difficult and complicated to implement, countries are increasingly pursuing available sources of savings including policies on prescription drug prices. These direct moves are expected to drive our industry to become much more innovative in demonstrating and delivering value to healthcare systems.

We believe that technology and innovation hold great potential to improve patient outcomes and quality of life, while also supporting healthcare systems to improve value for money and access. Novartis expects to continue to play a significant role in bringing new technologies into R&D and into patient support, and to help healthcare systems improve access.

Technology has the potential to help change the way in which healthcare is delivered

The expansion in data science and digital technologies has the potential to impact a number of areas across the healthcare value chain. First, digital technologies may increasingly improve the efficiency and effectiveness of researching and developing potential new therapies. The combination of data and artificial intelligence could enable complex biological simulations that complement

human scientific ingenuity. This technology is anticipated to augment our R&D capabilities. Second, increased volumes of real-world data and the ability to analyze that data with artificial intelligence, may in the future allow more accurate, faster diagnosis of patients and recommendation of appropriate treatments. Real-world evidence will be important to demonstrate the value of our innovation to payers and healthcare providers. Third, we expect that in the future patients may have the opportunity to be much more engaged in managing their own care via clinical-grade digital tools, such as those supporting adherence to instructions from healthcare professionals. Patients are also likely to have greater decision-making power regarding with whom to share their health data, as data ownership is expected to shift from central data aggregators to the patient.

Increasingly challenging business environment

Pricing and reimbursement

Around the world, governments and payers continue to struggle with rising healthcare costs as aging populations contribute to increased prevalence of chronic diseases. There have also been examples of significant controversies about prices for pharmaceuticals that some politicians and members of the public have considered excessive. These factors have intensified the pressures we face regarding the prices we charge for our products, and our ability to establish satisfactory rates of reimbursement for our products by governments, insurers and other payers.

We expect this scrutiny to continue in 2020, and the following years, as governments and insurers around the world strive to reduce healthcare costs through steps such as restricting access to higher-priced new medicines, increasing coinsurance or copays owed by patients for medicines, increasing the use of generics, and imposing price cuts. In this environment, we believe it is more important than ever to demonstrate the value that true innovation brings to the healthcare system.

To manage these pressures, we are investing in real world data and analytics to provide additional evidence of the health benefits of our products, exploring new technologies and patient management services, and working with payers to develop and scale outcomes-based commercial models. For example, we are working with customers on flexible pricing approaches where we are fully compensated only if a drug succeeds in meeting certain performance targets, or where the price for a product administered only once is paid over a period of time. For more information about these pricing approaches, see "Item 4. Information on the Company—Item 4.B Business overview—Innovative Medicines—Marketing and sales."

We take a disciplined and value-based approach to pricing. We strive to price our products commensurate to the value they provide to society, which is primarily in line with external benchmarks. Importantly, our sales growth has been mainly driven by new innovations driving volume growth and not by price increases on existing drugs. The net pricing impact on our sales growth has been negative or negligible for the last few years, and has been more than offset by volume growth from new products. We expect this to continue.

Loss of exclusivity for patented products

Pharmaceutical companies routinely face generic competition when their products lose patent or other intellectual property protection, and Novartis is no exception. Major products of our Innovative Medicines Division, as well as certain products of our Sandoz Division, are protected by patent or other intellectual property rights, allowing us to exclusively market those products. The loss of exclusivity has had, and will continue to have, an adverse effect on our results. In 2019, the total impact of generic competition on our net sales amounted to approximately USD 0.5 billion. The impact of generic competition on sales growth in 2019 was lower than the historical average.

Some of our best selling products face, or are expected to face, considerable competition due to the expiration of patent or other intellectual property protection. For example, our former top-selling product *Gleevec/Glivec* continues to face increasing generic competition in major markets. Patent protection for our *Sandostatin* products has expired and we are facing generic competition for *Sandostatin LAR* in Europe. Patent protection for *Exjade* in the US has expired and generic versions of *Exjade* are available in the US. Looking forward, intellectual property protecting a number of our major products will expire at various times in the coming years, raising the likelihood of further generic competition. Among our products expected to begin losing intellectual property protection in key countries during the coming years are our everolimus products or their remaining dosage strengths (*Afinitor/Votubia* and *Zortress/Certican*), *Sandostatin LAR* in Europe, *Jadenu, Lucentis*, and potentially *Gilenya*.

To counter the impact of intellectual property expirations, we continuously invest in research and development to rejuvenate our portfolio. For example, in 2019, we invested 19.8% of total net sales in R&D. One measure of the output of our efforts is the performance of our growth drivers, including *Cosentyx, Entresto,* and *Kisqali*, and our Sandoz Division biosimilars. We also have a number of late-stage product candidates in our pipeline with the potential to come to market in the next few years. We launched five products with blockbuster potential in 2019: *Zolgensma, Piqray, Mayzent, Beovu,* and *Adakveo*. We expect to launch several potentially major new molecular entities in 2020, including ofatumumab (OMB157) for relapsing multiple sclerosis.

Commercial success of key products

Our ability to maintain and grow our business and to replace revenue and income lost to generic and other competitors depends in part on our commercial success, particularly with respect to our key growth driver products, which we consider to be an indicator of our ability to renew our portfolio. The commercial success of these products could be impacted at any time by a number of factors, including new competitors, changes in doctors' prescribing habits, pricing pressure, manufacturing issues, and loss of intellectual property protection. In

addition, our revenue could be significantly impacted by the timing and rate of commercial acceptance of new products.

All of our businesses face intense competition from new products and scientific advances from competitors. Physicians, patients and payers may choose competitor products instead of ours if they perceive them to be better in terms of efficacy, safety, cost or convenience. The commercial success of our key products and launches in the face of increasing competition and pressures on pricing requires significant attention and focus from members of our key management.

Ability to deliver new products

Our ability to grow depends not only on the commercial success of our marketed products, but also on the success of our R&D activities in identifying and developing new treatments that address unmet medical needs, are accepted by patients and physicians, and are reimbursed by payers.

Developing new healthcare products and bringing them to market is a costly, lengthy and uncertain process. R&D for a new product in our Innovative Medicines Division can take 15 years or more, from discovery to commercial launch. With time limits on intellectual property protections, the longer it takes to develop a product, the less time we may have to recoup our costs. During each stage of development, there is a significant risk that we will encounter obstacles or fail. This may cause a delay or add substantial expense, limit the potential for commercial success, or force us to abandon a development project in which we have invested substantial amounts of time and money.

In addition, as healthcare costs continue to rise, governments and payers around the world are increasingly focused on health outcomes, rewarding new products that represent truly breakthrough innovation versus those that offer an incremental benefit over other products in the same therapeutic class. This has led to requests for more clinical trial data than has been required in the past, the inclusion of significantly higher numbers of patients in clinical trials, and more detailed analyses of the trials. As a result, despite significant efforts by health authorities such as the FDA to accelerate the development of new drugs, the already lengthy and expensive process of obtaining regulatory approvals and reimbursement for pharmaceutical products has become even more challenging.

Our Sandoz Division faces similar challenges, particularly in the development of biosimilars. While Sandoz was a pioneer in introducing biosimilars to the European market in 2006, and was the first company to win approval for a biosimilar under the new regulatory pathway in the United States in 2015, many countries still lack fully developed regulatory frameworks for the development, approval and marketing of biosimilars. Further delays in establishing regulatory frameworks, or any other difficulties that may arise in the development or marketing of biosimilars, could put at risk the significant investments that Sandoz has made, and will continue to make, in this area.

In spite of our significant investments, there can be no guarantee that our R&D activities will produce commercially viable new products that will enable us to grow our business and replace revenue and income lost to competition.

Business practices

There is a continued focus on government investigations and litigation against companies operating in our industry, including in the United States and other countries. We are obligated to comply with the laws of all countries in which we operate, as well as any new requirements that may be imposed upon us. In addition, governments and regulatory authorities worldwide are increasingly challenging practices previously considered to be legal and compliant. Beyond legal requirements, we strive to meet evolving public expectations for ethical behavior. We have a significant global compliance program in place, and we devote substantial time and resources to efforts to ensure that our business is conducted in a legal and publicly acceptable manner. Despite these efforts, any failure to comply with the law could lead to substantial liabilities that may not be covered by insurance and could affect our business and reputation.

Responding to these challenges and new regulations is costly. Investigations and litigation may affect our reputation, create a risk of potential exclusion from government reimbursement programs in the United States and other countries, and potentially lead to large damage payments and agreements intended to regulate company behavior. To help address this, we strive to continually strengthen our Ethics, Risk & Compliance function, which is headed by our Chief Ethics, Risk and Compliance Officer, who reports directly to the CEO of Novartis.

Investors and Novartis are increasingly focused on Environmental, Social and Governance (ESG) issues. We have made progress in transforming our culture and building trust with society in 2019, which are two of the key strategic priorities of our CEO. For all our new medicines, we are systematically integrating access strategies into how we research, develop and launch products globally. We are developing innovative treatments for diseases where there is unmet need, including crizanlizumab (SEG101) in sickle cell disease, which is now approved as *Adakveo* in the US.

Supply continuity

The manufacture of our products relies on technically complex processes and, in some cases, highly specialized raw materials, and is highly regulated. Deviations, difficulties or delays in production, or failure to obtain specialized raw materials, have in the past resulted in some of the following, and may in the future result in, shut-downs, work stoppages, approval delays, voluntary market withdrawals, product recalls, penalties, supply disruptions or shortages, increased costs, product liability or reputational harm. Whether our products and the related raw materials are manufactured at our own dedicated manufacturing facilities or by third parties, we must ensure that all manufacturing processes comply with current Good Manufacturing Practices (cGMP) and other applicable regulations. Any significant failure by us or our third party suppliers to comply with these requirements or health authorities' expectations may cause us to shut down production facilities or production lines, either voluntarily or by order of a government health authority.

Beyond regulatory requirements, many of our products involve technically sophisticated manufacturing processes or require specialized raw materials. For example, we manufacture and sell a number of sterile products, biologic products and products involving advanced therapy platforms, such as CAR-T therapies, gene therapies and radioligand therapies, all of which are particularly complex and involve highly specialized manufacturing technologies. As a result, even slight deviations at any point in their production processes may lead to production failures or recalls. Sales of *Kymriah,* the first approved CAR-T therapy, are currently constrained by production capacity. We continue to optimize our manufacturing process and have expanded our manufacturing capacity significantly in 2019. Our facilities in Stein, Switzerland and Les Ullis, France, have started manufacturing for clinical study patients. Our ultimate goal is to make *Kymriah* available for every patient in need.

Given the complexity of our manufacturing processes, we have worked for several years to adopt a single high quality standard across the company. We believe these efforts are having an impact. Of 177 inspections of our facilities by health authorities around the world in 2019, all but seven were found to be good or acceptable (96%).

Intangible assets and goodwill

We carry a significant amount of goodwill and other intangible assets on our consolidated balance sheet, primarily due to acquisitions, including the acquisition of *Xiidra*, Endocyte, AveXis, AAA, and certain oncology assets acquired from GSK. As a result, we may incur significant impairment charges if the fair value of intangible assets and groupings of cash-generating units containing goodwill are less than their carrying value on the Group's consolidated balance sheet at any point in time.

We regularly review our long-lived intangible and tangible assets for impairment. Impairment testing under IFRS may lead to impairment charges in the future. Any significant impairment charges could have a material adverse effect on our results of operations and financial condition. In 2019, for example, we recorded intangible asset impairment charges of USD 1.1 billion.

Tax

Our multinational operations are taxed under the laws of the countries and other jurisdictions in which we operate. However, the integrated nature of our worldwide operations can produce conflicting claims from revenue authorities in different countries as to the profits to be taxed in the individual countries, including potential disputes relating to the prices our subsidiaries charge one another for intercompany transactions, known as transfer pricing. The majority of the jurisdictions in which we operate have double tax treaties with other foreign jurisdictions, which provide a framework for mitigating the impact of double taxation on our revenues and capital gains. However, mechanisms developed to resolve such conflicting claims are largely untried, and can be expected to be very lengthy.

In recent years, tax authorities around the world, including in the EU, Switzerland and the US, have increased their scrutiny of company tax filings, and have become more rigid in exercising any discretion they may have, and numerous changes in tax laws and rules have been enacted or proposed. The outcome of these efforts remains subject to change and could end up in a materially different form from what is currently proposed, or could be administered or implemented in a manner different from our expectations.

In Switzerland, the Basel-Stadt Cantonal Tax Reform was approved by voters in February 2019, with parts retroactive from January 1, 2019. In May 2019, Swiss voters approved the Swiss Federal Tax Reform. With the enactment of this tax reform, new elements will be introduced into law, for example the abolishment of special taxed regimes, notional interest deduction, and an implementation of a Patent-Box, which provides tax advantages on income generated from intellectual property rights. Some of the new elements as well as the transition rules for the Swiss tax reform might be regarded as not completely aligned with OECD and EU regulations, and might require subsequent amendments, the need for and impact of which are difficult to predict.

As a result, such tax reform efforts, including with respect to tax base or rate, transfer pricing, intercompany dividends, cross border transactions, controlled corporations, and limitations on tax relief allowed on the interest on intercompany debt, will require us to continually assess our organizational structure against tax policy trends, could lead to an increased risk of international tax disputes and an increase in our effective tax rate, and could adversely affect our financial results.

Approach to risk management

See "Item 6. Directors, Senior Management and Employees—Item 6.C Board practices—Corporate governance—Board of Directors—Information and control systems of the Board vis-à-vis management—Risk management" and "Item 18. Financial Statements—Note 29. Financial instruments—additional disclosures."

Non-IFRS measures as defined by Novartis

Novartis uses certain non-IFRS metrics when measuring performance, especially when measuring current-year results against prior periods, including core results, constant currencies, free cash flow and net debt.

Despite the use of these measures by management in setting goals and measuring the Group's performance, these are non-IFRS measures that have no standardized meaning prescribed by IFRS. As a result, such measures have limits in their usefulness to investors.

Because of their non-standardized definitions, the non-IFRS measures (unlike IFRS measures) may not be comparable to the calculation of similar measures of other companies. These non-IFRS measures are presented solely to permit investors to more fully understand how the Group's management assesses underlying performance. These non-IFRS measures are not, and should not be viewed as, a substitute for IFRS measures.

As an internal measure of Group performance, these non-IFRS measures have limitations, and the Group's performance management process is not solely restricted to these metrics.

Core results

The Group's core results – including core operating income, core net income and core earnings per share – exclude fully the amortization and impairment charges of intangible assets, excluding software, net gains and losses on fund investments and equity securities valued at fair value through profit and loss, and certain acquisition- and divestment-related items. The following items that exceed a threshold of USD 25 million are also excluded: integration- and divestment-related income and expenses; divestment gains and losses; restructuring charges/releases and related items; legal-related items; impairments of property, plant and equipment, and financial assets, and income and expense items that management deems exceptional and that are or are expected to accumulate within the year to be over a USD 25 million threshold.

Novartis believes that investor understanding of the Group's performance is enhanced by disclosing core measures of performance because, core measures exclude items that can vary significantly from year to year, they enable better comparison of business performance across years. For this same reason, Novartis uses these core measures in addition to IFRS and other measures as important factors in assessing the Group's performance.

The following are examples of how these core measures are utilized:

- In addition to monthly reports containing financial information prepared under International Financial Reporting Standards (IFRS), senior management receives a monthly analysis incorporating these core measures.
- Annual budgets are prepared for both IFRS and core measures.

Despite the use of these measures by management in setting goals and measuring the Group's performance, these are non-IFRS measures that have no standardized meaning prescribed by IFRS. As a result, such measures have limits in their usefulness to investors.

Because of their non-standardized definitions, the core measures (unlike IFRS measures) may not be comparable to the calculation of similar measures of other companies. These core measures are presented solely to permit investors to more fully understand how the Group's management assesses underlying performance. These core measures are not, and should not be viewed as, a substitute for IFRS measures.

As an internal measure of Group performance, these core measures have limitations, and the Group's performance management process is not solely restricted to these metrics. A limitation of the core measures is that they provide a view of the Group's operations without including all events during a period, such as the effects of an acquisition, divestment, or amortization/impairments of purchased intangible assets and restructurings.

Constant currencies

Changes in the relative values of non-US currencies to the US dollar can affect the Group's financial results and financial position. To provide additional information that may be useful to investors, including changes in sales volume, we present information about our net sales and various values relating to operating and net income that are adjusted for such foreign currency effects.

Constant currency calculations have the goal of eliminating two exchange rate effects so that an estimate can be made of underlying changes in the consolidated income statement excluding the impact of fluctuations in exchanges rates:

- The impact of translating the income statements of consolidated entities from their non-USD functional currencies to USD
- The impact of exchange rate movements on the major transactions of consolidated entities performed in currencies other than their functional currency

We calculate constant currency measures by translating the current year's foreign currency values for sales and other income statement items into USD, using the average exchange rates from the prior year and comparing them to the prior-year values in USD.

We use these constant currency measures in evaluating the Group's performance, since they may assist us in evaluating our ongoing performance from year to year. However, in performing our evaluation, we also consider equivalent measures of performance that are not affected by changes in the relative value of currencies.

Growth rate calculation

For ease of understanding, Novartis uses a sign convention for its growth rates such that a reduction in operating expenses or losses compared to the prior year is shown as a positive growth.

Free cash flow

Free cash flow is not intended to be a substitute measure for net cash flows from operating activities as determined under IFRS. Free cash flow is presented as additional information because management believes it is a useful supplemental indicator of the Group's ability to operate without reliance on additional borrowing or use of existing cash. Free cash flow is a measure of the net cash generated that is available for investment in strategic opportunities, returning to shareholders and for debt repayment. Free cash flow is a non-IFRS measure, which means it should not be interpreted as a measure determined under IFRS.

Novartis defines free cash flow as net cash flows from operating activities and cash flows associated with the purchase or sale of property, plant and equipment, as well as intangible, other non-current and financial assets, excluding marketable securities. Cash flows in connection with the acquisition or divestment of subsidiaries, associated companies and non-controlling interests in subsidiaries are not taken into account to determine free cash flow.

Net debt

Net debt is a non-IFRS measure, which means it should not be interpreted as a measure determined under IFRS. Net debt is presented as additional information because management believes it is a useful supplemental indicator of the Group's ability to pay dividends, to meet financial commitments, and to invest in new strategic opportunities, including strengthening its balance sheet.

Novartis calculates net debt as current financial debts and derivative financial instruments plus non-current financial debt less cash and cash equivalents and marketable securities, commodities, time deposits and derivative financial instruments.

Novartis Cash Value Added

Novartis Cash Value Added (NCVA) is a metric that is based on what the Company assesses to be its cash flow return less a capital charge on gross operating assets. NCVA is used as the primary internal financial measure for determining payouts under the old Long-Term Performance Plan (LTPP) introduced in 2014. The LTTP performance measures were changed effective January 1, 2019, and from the 2019 cycle onward no longer include NCVA as a performance measure. More information on NCVA is presented as part of the Compensation Report; see "Item 6. Directors, Senior Management and Employees—Item 6.B Compensation."

Additional information

EBITDA

Novartis defines earnings before interest, tax, depreciation and amortization (EBITDA) as operating income, excluding depreciation of property, plant and equipment (including any related impairment charges), depreciation of right-of-use assets and amortization of intangible assets (including any related impairment charges). With the adoption of IFRS 16 Leases on January 1, 2019, lease expenses are classified as depreciation on right-of-use assets. For comparative information on prior periods see footnote 1 to the table.

(USD millions)	**2019**	2018	2017
Operating income from continuing operations	**9 086**	**8 403**	**8 702**
Depreciation of property, plant and equipment	1 345	1 482	1 303
Depreciation of the right-of-use-assets [1]	305		
Amortization of intangible assets	2 836	2 587	2 624
Impairments of property, plant and equipment, and intangible assets	1 340	1 142	809
EBITDA from continuing operations [1]	**14 912**	**13 614**	**13 438**
Operating income from discontinued operations	**71**	**– 234**	**– 73**
Depreciation of property, plant and equipment	42	235	217
Depreciation of the right-of-use-assets	9		
Amortization of intangible assets	174	1 052	1 066
Impairments of property, plant and equipment, and intangible assets		394	57
EBITDA from discontinued operations	**296**	**1 447**	**1 267**
EBITDA Total Group [1]	**15 208**	**15 061**	**14 705**

[1] In 2019, EBITDA is positively impacted through the adoption of IFRS 16 Leases on January 1, 2019, as lease expenses are classified as depreciation on right-of-use assets (USD 314 million, thereof USD 305 million continuing operations) and interest expense (USD 66 million). In the prior years, the lease expense was recognized as a functional expense within operating income (lease expense for total group was in 2018 USD 383 million, thereof USD 331 million from continuing operations and in 2017 USD 337 million thereof USD 292 million from continuing operations).

Enterprise value

Enterprise value represents the total amount that shareholders and debt holders have invested in Novartis, less the Group's liquidity.

(USD millions unless indicated otherwise)	**Dec 31, 2019**[1]	Dec 31, 2018	Dec 31, 2017
Market capitalization	214 815	196 950	195 541
Non-controlling interests	77	78	59
Non current financial debts	20 353	22 470	23 224
Current financial debts and derivatives financial instruments	7 031	9 678	5 308
Marketable securities, commodities, time deposits and derivative financial instruments	– 334	– 2 693	– 625
Cash and cash equivalents	– 11 112	– 13 271	– 8 860
Enterprise value	**230 830**	**213 212**	**214 647**

[1] Decrmber 31, 2019 excludes the business of Alcon, which was spun off in April 2019 into a separately traded standalone company. For details see "Item 18. Financial Statements—Note 2. Significant transactions".

2019 and 2018 reconciliation from IFRS results to core results

	Innovative Medicines		Sandoz		Corporate		Group	
(USD millions unless indicated otherwise)	**2019**	2018	**2019**	2018	**2019**	2018	**2019**	2018
IFRS operating income from continuing operations	**9 287**	**7 871**	**551**	**1 332**	**– 752**	**– 800**	**9 086**	**8 403**
Amortization of intangible assets	**2 447**	**2 158**	**314**	**363**			**2 761**	**2 521**
Impairments								
Intangible assets	632	592	503	249			1 135	841
Property, plant and equipment related to the Group-wide rationalization of manufacturing sites	83	170	69	63			152	233
Other property, plant and equipment	10	65	33				43	65
Total impairment charges	**725**	**827**	**605**	**312**			**1 330**	**1 139**
Acquisition or divestment of businesses and related items								
- Income	– 8				– 108	– 21	– 116	– 21
- Expense	87	126			115	29	202	155
Total acquisition or divestment of businesses and related items, net	**79**	**126**			**7**	**8**	**86**	**134**
Other items								
Divestment gains	– 1 091	– 482		– 78	2	– 56	– 1 089	– 616
Financial assets – fair value adjustments	– 18	– 107			– 20	113	– 38	6
Restructuring and related items								
- Income	– 58	– 25	– 7	– 12	– 6	– 2	– 71	– 39
- Expense	509	665	390	179	113	106	1 012	950
Legal-related items								
- Income		– 1	– 32	– 63			– 32	– 64
- Expense	999	36	156	90			1 155	126
Additional income	– 316	– 73	– 4	– 171	– 95	– 19	– 415	– 263
Additional expense	87	156	121	50	119	54	327	260
Total other items	**112**	**169**	**624**	**– 5**	**113**	**196**	**849**	**360**
Total adjustments	**3 363**	**3 280**	**1 543**	**670**	**120**	**204**	**5 026**	**4 154**
Core operating income from continuing operations	**12 650**	**11 151**	**2 094**	**2 002**	**– 632**	**– 596**	**14 112**	**12 557**
as % of net sales	*33.5%*	*32.0%*	*21.5%*	*20.3%*			*29.7%*	*28.1%*
Income from associated companies	1	1	2	5	656	6 432	659	6 438
Core adjustments to income from associated companies, net of tax					427	– 5 325	427	– 5 325
Interest expense							– 850	– 932
Other financial income and expense							45	186
Core adjustments to other financial income and expense							11	
Taxes, adjusted for above items (core taxes)							– 2 300	– 2 004
Core net income from continuing operations							**12 104**	**10 920**
Core net income from discontinued operations [1]							278	1 018
Core net income							**12 382**	**11 938**
Core net income attributable to shareholders of Novartis AG							**12 377**	**11 935**
Core basic EPS from continuing operations (USD) [2]							**5.28**	**4.71**
Core basic EPS from discontinued operations (USD) [2]							0.12	0.44
Core basic EPS (USD) [2]							**5.40**	**5.15**

[1] For details on discontinued operations reconciliation from IFRS to core net income, please refer to page 109.
[2] Earnings per share (EPS) is calculated on the amount of net income attributable to shareholders of Novartis AG.

2018 and 2017 reconciliation from IFRS results to core results

	Innovative Medicines		Sandoz		Corporate		Group	
(USD millions unless indicated otherwise)	2018	2017	2018	2017	2018	2017	2018	2017
IFRS operating income from continuing operations	**7 871**	**7 595**	**1 332**	**1 368**	**– 800**	**– 261**	**8 403**	**8 702**
Amortization of intangible assets	**2 158**	**2 119**	**363**	**454**			**2 521**	**2 573**
Impairments								
Intangible assets	592	591	249	61			841	652
Property, plant and equipment related to the Group-wide rationalization of manufacturing sites	170	7	63	60			233	67
Other property, plant and equipment	65	77		13			65	90
Financial assets [1]						197		197
Total impairment charges	**827**	**675**	**312**	**134**		**197**	**1 139**	**1 006**
Acquisition or divestment of businesses and related items								
- Income		– 2			– 21	– 115	– 21	– 117
- Expense	126	32			29	130	155	162
Total acquisition or divestment of businesses and related items, net	**126**	**30**			**8**	**15**	**134**	**45**
Other items								
Divestment gains	– 482	– 368	– 78		– 56		– 616	– 368
Financial assets – fair value adjustments [1]	– 107				113		6	
Restructuring and related items								
- Income	– 25	– 53	– 12	– 7	– 2	– 1	– 39	– 61
- Expense	665	268	179	134	106	– 9	950	393
Legal-related items								
- Income	– 1	– 21	– 63				– 64	– 21
- Expense	36	35	90				126	35
Additional income	– 73	– 534	– 171	– 3	– 19	– 372	– 263	– 909
Additional expense	156	273	50		54	46	260	319
Total other items	**169**	**– 400**	**– 5**	**124**	**196**	**– 336**	**360**	**– 612**
Total adjustments	**3 280**	**2 424**	**670**	**712**	**204**	**– 124**	**4 154**	**3 012**
Core operating income from continuing operations	**11 151**	**10 019**	**2 002**	**2 080**	**– 596**	**– 385**	**12 557**	**11 714**
as % of net sales	*32.0%*	*31.0%*	*20.3%*	*20.7%*			*28.1%*	*27.7%*
Income from associated companies	1	– 1	5	23	6 432	1 086	6 438	1 108
Core adjustments to income from associated companies, net of tax		1			– 5 325	226	– 5 325	227
Interest expense							– 932	– 750
Other financial income and expense							186	42
Taxes, adjusted for above items (core taxes)							– 2 004	– 1 867
Core net income from continuing operations							**10 920**	**10 474**
Core net income from discontinued operations [2]							1 018	917
Core net income							**11 938**	**11 391**
Core net income attributable to shareholders of Novartis AG							**11 935**	**11 391**
Core basic EPS from continuing operations (USD) [3]							**4.71**	**4.46**
Core basic EPS from discontinued operations (USD) [3]							0.44	0.40
Core basic EPS (USD) [3]							**5.15**	**4.86**

[1] For financial instruments accounted for as fair value through profit and loss, as of January 1, 2018, unrealized gains/losses on financial assets are shown under "Financial assets – fair value adjustments," due to the change in IFRS 9.
[2] For details on discontinued operations reconciliation from IFRS to core net income, please refer to page 110.
[3] Earnings per share (EPS) is calculated on the amount of net income attributable to shareholders of Novartis AG.

2019, 2018 and 2017 reconciliation from IFRS results to core results – Group

2019 (USD millions unless indicated otherwise)	IFRS results	Amortization of intangible assets[1]	Impairments[2]	Acquisition or divestment of businesses and related items[3]	Other items[4]	Core results
Gross profit from continuing operations	**34 252**	**2 711**	**85**	**48**	**296**	**37 392**
Operating income from continuing operations	**9 086**	**2 761**	**1 330**	**86**	**849**	**14 112**
Income before taxes from continuing operations	**8 940**	**3 188**	**1 330**	**86**	**860**	**14 404**
Taxes from continuing operations[5]	– 1 793					– 2 300
Net income from continuing operations	**7 147**					**12 104**
Net income from discontinued operations[6]	4 590					278
Net income	**11 737**					**12 382**
Basic EPS from continuing operations (USD)[7]	**3.12**					**5.28**
Basic EPS from discontined operations (USD)[7]	2.00					0.12
Basic EPS (USD)[7]	**5.12**					**5.40**
The following are adjustments to arrive at core gross profit						
Other revenues	1 179				– 66	1 113
Cost of goods sold	– 14 425	2 711	85	48	362	– 11 219
The following are adjustments to arrive at core operating income						
Selling, general and administration	– 14 369			10	40	– 14 319
Research and development	– 9 402	50	1 078	10	– 122	– 8 386
Other income	2 031		– 2	– 116	– 1 418	495
Other expense	– 3 426		169	134	2 053	– 1 070
The following are adjustments to arrive at core income before taxes						
Income from associated companies	659	427				1 086
Other financial income and expense	45				11	56

[1] Amortization of intangible assets: cost of goods sold includes the amortization of acquired rights to in-market products and other production-related intangible assets; research and development includes the amortization of acquired rights for technologies; income from associated companies includes USD 427 million for the Novartis share of the estimated Roche core items

[2] Impairments: cost of goods sold, and research and development include impairment charges related to intangible assets; research and development also includes the reversal of an impairment charge; cost of goods sold, other income and other expense include net impairment charges related to property, plant and equipment

[3] Acquisition or divestment of businesses and related items, including restructuring and integration charges: cost of goods sold, selling, general and administration, research and development, other income and other expense include net charges related to acquisitions; other income and other expense also include transitional service fee income and expenses related to the portfolio transformation and the Alcon spin-off

[4] Other items: other revenues includes income from an outlicensing agreement, and income related to an amendment of a collaboration agreement; cost of goods sold, other income and other expense include net restructuring and other charges related to the Group-wide rationalization of manufacturing sites; cost of goods sold, research and development, selling, general and administration, other income and other expense include other restructuring income and charges and related items; cost of goods sold, and research and development also include fair value adjustments of contingent consideration liabilties; cost of goods sold also includes inventory write-offs and other provisions; selling, general and administration includes receivable expected credit loss provisions and other provisions; other income and other expense include fair value adjustments and divestment gains and losses on financial assets and legal-related items as well as environmental provisions; other income also includes net gains from the divestment of products and property, plant and equipment, and provision releases; other expense includes a provision for onerous contracts and other provisions; other financial income and expense includes a revaluation impact of a financial liability incurred through the Alcon distribution

[5] Taxes on the adjustments between IFRS and core results take into account, for each individual item included in the adjustment, the tax rate that will finally be applicable to the item based on the jurisdiction where the adjustment will finally have a tax impact. Generally, this results in amortization and impairment of intangible assets and acquisition-related restructuring and integration items having a full tax impact. There is usually a tax impact on other items, although this is not always the case for items arising from legal settlements in certain jurisdictions. Adjustments related to income from associated companies are recorded net of any related tax effect. Due to these factors and the differing effective tax rates in the various jurisdictions, the tax on the total adjustments for continuing operations of USD 5.5 billion to arrive at the core results before tax amounts to USD 507 million. The average tax rate on the adjustments is 9.3%.

[6] For details on discontinued operations reconciliation from IFRS to core net income please refer to page 109.

[7] Earnings per share (EPS) is calculated on the amount of net income, attributable to shareholders of Novartis AG.

2018 (USD millions unless indicated otherwise)	IFRS results	Amortization of intangible assets[1]	Impairments[2]	Acquisition or divestment of businesses and related items[3]	Other items[4]	Core results
Gross profit from continuing operations	**31 589**	**2 342**	**488**	**5**	**462**	**34 886**
Operating income from continuing operations	**8 403**	**2 521**	**1 139**	**134**	**360**	**12 557**
Income before taxes from continuing operations	**14 095**	**2 965**	**1 139**	**– 5 656**	**381**	**12 924**
Taxes from continuing operations[5]	– 1 295					– 2 004
Net income from continuing operations	**12 800**					**10 920**
Net income from discontinued operations[6]	– 186					1 018
Net income	**12 614**					**11 938**
Basic EPS from continuing operations (USD)[7]	**5.52**					**4.71**
Basic EPS from discontined operations (USD)[7]	– 0.08					0.44
Basic EPS (USD)[7]	**5.44**					**5.15**
The following are adjustments to arrive at core gross profit						
Cost of goods sold	– 14 510	2 342	488	5	462	– 11 213
The following are adjustments to arrive at core operating income						
Selling, general and administration	– 13 717			28	– 1	– 13 690
Research and development	– 8 489	179	167	23	– 34	– 8 154
Other income	1 629			– 21	– 1 050	558
Other expense	– 2 609		484	99	983	– 1 043
The following are adjustments to arrive at core income before taxes						
Income from associated companies	6 438	444		– 5 790	21	1 113

[1] Amortization of intangible assets: cost of goods sold includes the amortization of acquired rights to in-market products, and other production-related intangible assets; research and development includes the amortization of acquired rights, including technology platforms; income from associated companies includes USD 444 million for the Novartis share of the estimated Roche core items

[2] Impairments: cost of goods sold, and research and development include impairment charges related to intangible assets; research and development also includes impairment reversals of property, plant and equipment; other expense includes impairment charges related to property, plant and equipment; cost of goods sold and other expense include impairment charges related to a disposal group held for sale for goodwill and currently marketed products

[3] Acquisition or divestment of businesses and related items, including restructuring and integration charges: cost of goods sold, selling, general and administration, research and development and other expense include charges related to acquisitions; other income and other expense include transitional service fee income and expenses, and other items related to the portfolio transformation; income from associated companies includes the pre-tax gain of USD 5.8 billion on the sale of the 36.5% investment in GSK Consumer Healthcare Holdings Ltd.

[4] Other items: cost of goods sold, other income and other expense include net restructuring and other charges related to the Group-wide rationalization of manufacturing sites; cost of goods sold, selling, general and administration, research and development, other income and other expense include other restructuring income and charges and related items; cost of goods sold and other expense include charges related to changes in a contractual agreement; cost of goods sold also includes inventory write-off and other product recall-related costs; selling, general and administration includes a reversal of a provision; research and development includes fair value adjustments of contingent consideration liabilities and a charge for onerous contracts; other income and other expense include fair value adjustments and divestment gains and losses on financial assets; other income also includes product divestment gains, divestment gains on property, plant and equipment, releases of accruals and a legal settlement gain; other expense includes legal-related items and restructuring charges; income from associated companies includes an adjustment of USD 21 million for the Novartis share of the estimated GSK Consumer Healthcare Holdings Ltd. core items

[5] Taxes on the adjustments between IFRS and core results take into account, for each individual item included in the adjustment, the tax rate that will finally be applicable to the item based on the jurisdiction where the adjustment will finally have a tax impact. Generally, this results in amortization and impairment of intangible assets and acquisition-related restructuring and integration items having a full tax impact. There is usually a tax impact on other items, although this is not always the case for items arising from legal settlements in certain jurisdictions. Adjustments related to income from associated companies are recorded net of any related tax effect. Due to these factors and the differing effective tax rates in the various jurisdictions, the tax on the total adjustments of USD 1.2 billion to arrive at the core results before tax amounts to USD 709 million. Excluding the gain on the sale of the 36.5% investment in GSK Cosumer Healthcare Holdings Ltd., the tax on the total adjustments of USD 4.6 billion to arrive at the core results before tax amounts to USD 770 billion. The average tax rate on the adjustments excluding this transaction is 16.7%.

[6] For details on discontinued operations reconciliation from IFRS to core net income please refer to page 110.

[7] Earnings per share (EPS) is calculated on the amount of net income, attributable to shareholders of Novartis AG.

2017 (USD millions unless indicated otherwise)	IFRS results	Amortization of intangible assets[1]	Impairments[2]	Acquisition or divestment of businesses and related items[3]	Other items[4]	Core results
Gross profit	**29 771**	**2 386**	**92**		**125**	**32 374**
Operating income	**8 702**	**2 573**	**1 006**	**45**	**– 612**	**11 714**
Income before taxes	**9 102**	**2 949**	**1 007**	**45**	**– 762**	**12 341**
Taxes[5]	– 1 603					– 1 867
Net income from continuing operations	**7 499**					**10 474**
Net income from discontinued operations[6]	204					917
Net income	**7 703**					**11 391**
Basic EPS from continuing operations (USD)[7]	**3.20**					**4.46**
Basic EPS from discontined operations (USD)[7]	0.08					0.40
Basic EPS (USD)[7]	**3.28**					**4.86**
The following are adjustments to arrive at core gross profit						
Cost of goods sold	– 13 633	2 386	92		125	– 11 030
The following are adjustments to arrive at core operating income						
Selling, general and administration	– 12 465				– 3	– 12 468
Research and development	– 8 389	187	594		– 200	– 7 808
Other income	1 922		– 9	– 117	– 1 048	748
Other expense	– 2 137		329	162	514	– 1 132
The following are adjustments to arrive at core income before taxes						
Income from associated companies	1 108	376	1		– 150	1 335

[1] Amortization of intangible assets: cost of goods sold includes the recurring amortization of acquired rights to in-market products and other production-related intangible assets; research and development includes the recurring amortization of acquired rights for technology platforms; income from associated companies includes USD 376 million for the Novartis share of the estimated Roche core items

[2] Impairments: cost of goods sold, and research and development include impairment charges related to intangible assets; research and development, other income and other expense include reversals and charges related to the impairment of property, plant and equipment; other expense also includes impairment charges related to financial assets

[3] Acquisition or divestment of businesses and related items, including restructuring and integration charges: other income and other expense include transitional service fee income and expenses, and other items related to the portfolio transformation

[4] Other items: cost of goods sold, other income and other expense include net restructuring and other charges related to the Group-wide rationalization of manufacturing sites; cost of goods sold, research and development, selling, general and administration, other income and other expense include other restructuring income and charges and related items; selling, general and administration includes an income from the release of a provision; research and development includes fair value adjustments to contingent consideration liabilities; other income and other expense include legal-related items; other income also includes a gain from a Swiss pension plan amendment, product and financial asset divestment gains, income from a settlement of a contract dispute and a fair value adjustment to contingent consideration sales milestone receivables; other expense also includes a provision for contract termination costs, a charge for onerous contracts, and an amendment to the Swiss pension plan; income from associated companies includes an adjustment of USD 150 million for the Novartis share of the estimated GSK Consumer Healthcare Holdings Ltd. core items

[5] Taxes on the adjustments between IFRS and core results take into account, for each individual item included in the adjustment, the tax rate that will finally be applicable to the item based on the jurisdiction where the adjustment will finally have a tax impact. Generally, this results in amortization and impairment of intangible assets and acquisition-related restructuring and integration items having a full tax impact. There is usually a tax impact on other items, although this is not always the case for items arising from legal settlements in certain jurisdictions. Adjustments related to income from associated companies are recorded net of any related tax effect. Due to these factors and the differing effective tax rates in the various jurisdictions, the tax on the total adjustments of USD 3.2 billion to arrive at the core results before tax amounts to USD 264 million. The average tax rate on the adjustments is 8.2%.

[6] For details on discontinued operations reconciliation from IFRS to core net income please refer to page 110.

[7] Earnings per share (EPS) is calculated on the amount of net income, attributable to shareholders of Novartis AG.

2019, 2018 and 2017 reconciliation from IFRS results to core results – Innovative Medicines

2019 (USD millions)	IFRS results	Amortization of intangible assets[1]	Impairments[2]	Acquisition or divestment of businesses and related items[3]	Other items[4]	Core results
Gross profit	**29 539**	**2 397**		**48**	**116**	**32 100**
Operating income	**9 287**	**2 447**	**725**	**79**	**112**	**12 650**
The following are adjustments to arrive at core gross profit						
Other revenues	1 092				– 66	1 026
Cost of goods sold	– 10 050	2 397		48	182	– 7 423
The following are adjustments to arrive at core operating income						
Selling, general and administration	– 11 617			10	25	– 11 582
Research and development	– 8 152	50	632	10	– 125	– 7 585
Other income	1 586		– 1	– 8	– 1 230	347
Other expense	– 2 069		94	19	1 326	– 630

[1] Amortization of intangible assets: cost of goods sold includes the amortization of acquired rights to in-market products and other production-related intangible assets; research and development includes the amortization of acquired rights for technologies

[2] Impairments: research and development includes impairment charges and a reversal of impairment charges related to intangible assets; other income and other expense include net impairment charges related to property, plant and equipment

[3] Acquisition or divestment of businesses and related items, including restructuring and integration charges: cost of goods sold, selling, general and administration, research and development, other income and other expense include net charges related to acquisitions; other income and other expense also include transitional service-fee income and expenses related to the portfolio transformation and the Alcon spin-off

[4] Other items: other revenues includes a net income from an outlicensing agreement and an income related to an amendment of a collaboration agreement; cost of goods sold, other income and other expense include restructuring and other charges related to the Group-wide rationalization of manufacturing sites; cost of goods sold, research and development, other income and other expense include other restructuring income and charges and related items; cost of goods sold, and research and development also include fair value adjustments of contingent consideration liabilities; selling, general and administration includes other provisions; other income and other expense include fair value adjustments and divestment gains and losses on financial assets; other income also includes net gains from the divestment of products and property, plant and equipment, and provision releases; other expense includes legal-related items

2018 (USD millions)	IFRS results	Amortization of intangible assets[1]	Impairments[2]	Acquisition or divestment of businesses and related items[3]	Other items[4]	Core results
Gross profit	**26 951**	**1 979**	**423**	**5**	**329**	**29 687**
Operating income	**7 871**	**2 158**	**827**	**126**	**169**	**11 151**
The following are adjustments to arrive at core gross profit						
Cost of goods sold	– 9 870	1 979	423	5	329	– 7 134
The following are adjustments to arrive at core operating income						
Selling, general and administration	– 10 907			28	– 11	– 10 890
Research and development	– 7 675	179	167	23	– 34	– 7 340
Other income	977				– 671	306
Other expense	– 1 475		237	70	556	– 612

[1] Amortization of intangible assets: cost of goods sold includes the amortization of acquired rights to in-market products and other production-related intangible assets; research and development includes the amortization of acquired rights, including technology platforms

[2] Impairments: cost of goods sold, and research and development include impairment charges related to intangible assets; research and development also includes impairment reversals of property, plant and equipment; other expense includes impairment charges related to property, plant and equipment

[3] Acquisition or divestment of businesses and related items, including restructuring and integration charges: cost of goods sold, selling, general and administration, research and development and other expense include charges related to acquisitions; other expense also includes items related to the portfolio transformation

[4] Other items: cost of goods sold and other expense include restructuring and other charges related to the Group-wide rationalization of manufacturing sites, and charges related to changes in a contractual agreement; cost of goods sold, research and development, other income and other expense include other restructuring income and charges and related items; cost of goods sold, and research and development also include fair value adjustments of contingent consideration liabilities; cost of goods sold also includes an inventory write-off; selling, general and administration includes a reversal of a provision; research and development includes a charge for onerous contracts; other income and other expense include fair value adjustments on financial assets and legal-related items; other income also includes product divestment gains and releases of accruals

2017 (USD millions)	IFRS results	Amortization of intangible assets[1]	Impairments[2]	Acquisition or divestment of businesses and related items[3]	Other items[4]	Core results
Gross profit	**25 194**	**1 932**	**31**		**56**	**27 213**
Operating income	**7 595**	**2 119**	**675**	**30**	**– 400**	**10 019**
The following are adjustments to arrive at core gross profit						
Cost of goods sold	– 8 650	1 932	31		56	– 6 631
The following are adjustments to arrive at core operating income						
Selling, general and administration	– 9 887				– 3	– 9 890
Research and development	– 7 615	187	594		– 200	– 7 034
Other income	1 027		– 9	– 2	– 665	351
Other expense	– 1 124		59	32	412	– 621

[1] Amortization of intangible assets: cost of goods sold includes the recurring amortization of acquired rights to in-market products and other production-related intangible assets; research and development includes the recurring amortization of acquired rights for technology platforms

[2] Impairments: cost of goods sold, and research and development include impairment charges related to intangible assets; research and development, other income and other expense include reversals and charges related to the impairment of property, plant and equipment

[3] Acquisition or divestment of businesses and related items, including restructuring and integration charges: other income includes transitional service fee income; other expense includes items related to the portfolio transformation and costs related to an acquisition

[4] Other items: cost of goods sold, other income and other expense include net restructuring and other charges related to the Group-wide rationalization of manufacturing sites; costs of goods sold, research and development, selling, general and administration, other income and other expense include other restructuring income and charges and related items; selling, general and administration includes an income from the release of a provision; research and development includes fair value adjustments to contingent consideration liabilities; other income and other expense include legal-related items; other income also includes a gain from a Swiss pension plan amendment, income from a settlement of a contract dispute, as well as product and financial asset divestment gains; other expense also includes a provision for contract termination costs, an amendment to the Swiss pension plan, a charge for onerous contracts, and other charges

2019, 2018 and 2017 reconciliation from IFRS to core results – Sandoz

2019 (USD millions)	IFRS results	Amortization of intangible assets[1]	Impairments[2]	Acquisition or divestment of businesses and related items	Other items[3]	Core results
Gross profit	**4 601**	**314**	**85**		**180**	**5 180**
Operating income	**551**	**314**	**605**		**624**	**2 094**
The following are adjustments to arrive at core gross profit						
Cost of goods sold	– 5 334	314	85		180	– 4 755
The following are adjustments to arrive at core operating income						
Selling, general and administration	– 2 218				15	– 2 203
Research and development	– 1 250		446		3	– 801
Other income	167		– 1		– 39	127
Other expense	– 749		75		465	– 209

[1] Amortization of intangible assets: cost of goods sold includes the amortization of acquired rights to in-market products and other production-related intangible assets

[2] Impairments: cost of goods sold, and research and development include impairment charges related to intangible assets; cost of goods sold, other income and other expense include net impairment charges related to property, plant and equipment

[3] Other items: cost of goods sold and other expense include net restructuring and other charges related to the Group-wide rationalization of manufacturing sites; cost of goods sold, selling, general and administration, other income and other expense include restructuring income and charges and related items; cost of goods sold also includes inventory write-offs and other provisions; selling, general and administration includes receivable expected credit loss provisions and other provisions; other income and other expense also include legal-related items; other expense also includes an environmental provision, a provision for onerous contracts and other provisions

2018 (USD millions)	IFRS results	Amortization of intangible assets[1]	Impairments[2]	Acquisition or divestment of businesses and related items	Other items[3]	Core results
Gross profit	**4 568**	**363**	**65**		**133**	**5 129**
Operating income	**1 332**	**363**	**312**		**– 5**	**2 002**
The following are adjustments to arrive at core gross profit						
Cost of goods sold	– 5 530	363	65		133	– 4 969
The following are adjustments to arrive at core operating income						
Selling, general and administration	– 2 305				10	– 2 295
Other income	505				– 295	210
Other expense	– 622		247		147	– 228

[1] Amortization of intangible assets: cost of goods sold includes the amortization of acquired rights to in-market products and other production-related intangible assets
[2] Impairments: cost of goods sold includes impairment charges related to intangible assets, and impairment charges for currently marketed products related to a disposal group held for sale; other expense includes impairment charges related to property, plant and equipment, and goodwill impairment charges related to a disposal group held for sale
[3] Other items: cost of goods sold, other income and other expense include net restructuring and other charges related to the Group-wide rationalization of manufacturing sites; cost of goods sold also includes inventory write-off and other product recall-related costs; cost of goods sold, selling, general and administration, other income and other expense include other restructuring income and charges and related items; other income also includes product divestment gains, a legal settlement gain, and fair value adjustments of contingent consideration liabilities; other expense includes legal-related items and restructuring charges

2017 (USD millions)	IFRS results	Amortization of intangible assets[1]	Impairments[2]	Acquisition or divestment of businesses and related items	Other items[3]	Core results
Gross profit	**4 415**	**454**	**61**		**69**	**4 999**
Operating income	**1 368**	**454**	**134**		**124**	**2 080**
The following are adjustments to arrive at core gross profit						
Cost of goods sold	– 5 800	454	61		69	– 5 216
The following are adjustments to arrive at core operating income						
Other income	204				– 10	194
Other expense	– 351		73		65	– 213

[1] Amortization of intangible assets: cost of goods sold includes the recurring amortization of acquired rights to in-market products and other production-related intangible assets
[2] Impairments: cost of goods sold includes impairment charges related to intangible assets; other expense includes impairment charges related to property, plant and equipment
[3] Other items: cost of goods sold, other income and other expense include net restructuring and other charges related to the Group-wide rationalization of manufacturing sites, and other restructuring income and charges and related items; other income also includes a gain from a Swiss pension plan amendment

2019, 2018 and 2017 reconciliation from IFRS results to core results – Corporate

2019 (USD millions)	IFRS results	Amortization of intangible assets	Impairments	Acquisition or divestment of businesses and related items[1]	Other items[2]	Core results
Gross profit	**112**					**112**
Operating loss	**– 752**			**7**	**113**	**– 632**
The following are adjustments to arrive at core operating income						
Other income	278			– 108	– 149	21
Other expense	– 608			115	262	– 231

[1] Acquisition or divestment of businesses and related items, including restructuring and integration charges: other income and other expense include transitional service fee income and expenses related to the portfolio transformation and the Alcon spin-off
[2] Other items: other income and other expense include fair value adjustments and divestment gains and losses on financial assets, restructuring income and charges and related items, as well as environmental provisions

2018 (USD millions)	IFRS results	Amortization of intangible assets	Impairments	Acquisition or divestment of businesses and related items[1]	Other items[2]	Core results
Gross profit	**70**					**70**
Operating loss	**– 800**			**8**	**196**	**– 596**
The following are adjustments to arrive at core operating loss						
Other income	147			– 21	– 84	42
Other expense	– 512			29	280	– 203

[1] Acquisition or divestment of businesses and related items, including restructuring and integration charges: other income and other expense include transitional service fee income and expenses, and other items related to the portfolio transformation

[2] Other items: other income and other expense include fair value adjustments and divestment gains and losses on financial assets, as well as restructuring income and charges and related items; other income also includes divestment gains on property, plant and equipment

2017 (USD millions)	IFRS results	Amortization of intangible assets	Impairments[1]	Acquisition or divestment of businesses and related items[2]	Other items[3]	Core results
Gross profit	**162**					**162**
Operating loss	**– 261**		**197**	**15**	**– 336**	**– 385**
The following are adjustments to arrive at core operating loss						
Other income	691			– 115	– 373	203
Other expense	– 662		197	130	37	– 298

[1] Impairments: other expense includes impairment charges related to financial assets

[2] Acquisition or divestment of businesses and related items, including restructuring and integration charges: other income and other expense include transitional service fee income and expenses, and other items related to the portfolio transformation

[3] Other items: other income includes a fair value adjustment to contingent consideration sales milestone receivables, a Swiss pension plan amendment and other items; other income and other expense include restructuring income and charges and related items; other expense also includes an amendment to the Swiss pension plan

2019, 2018 and 2017 reconciliation of IFRS results to core results – discontinued operations

2019 (USD millions)	IFRS results	Amortization of intangible assets[1]	Impairments	Acquisition or divestment of businesses and related items[2]	Other items[3]	Core results
Gross profit	**949**	**165**			**9**	**1 123**
Operating income of discontinued operations	**71**	**167**			**112**	**350**
Income before taxes of discontinued operations	**58**					**337**
Taxes[4]	– 159					– 59
Net loss/income from discontinued operations before gain on distribution of Alcon Inc. to Novartis AG shareholders	**– 101**					**278**
Gain on distribution of Alcon Inc. to Novartis AG shareholders	4 691			– 4 691		
Net income from discontinued operations	**4 590**					**278**
Basic EPS (USD)[5]	**2.00**					**0.12**
The following are adjustments to arrive at core gross profit						
Cost of goods sold	– 860	165			9	– 686
The following are adjustments to arrive at core operating income						
Selling, general and administration	– 638				14	– 624
Research and development	– 142	2			4	– 136
Other income	15				– 3	12
Other expense	– 113				88	– 25

[1] Amortization of intangible assets: cost of goods sold includes the amortization of acquired rights to in-market products and other production-related intangible assets; research and development includes the amortization of acquired rights for technologies

[2] Acquisition or divestment of businesses and related items represents the non-taxable, non-cash gain adjustment related to the distribution of Alcon Inc. (spin-off) to Novartis AG shareholders

[3] Other items: cost of goods sold, selling, general and administration, research and development and other expense include other restructuring charges and related items; research and development also includes amortization of option rights and the fair value adjustment of a contingent consideration liability; other income includes fair value adjustments on a financial asset; other expense also includes legal-related items

[4] Taxes on the adjustments between IFRS and core results take into account, for each individual item included in the adjustment, the tax rate that will finally be applicable to the item based on the jurisdiction where the adjustment will finally have a tax impact. Generally, this results in amortization and impairment of intangible assets and acquisition-related restructuring and integration items having a full tax impact. There is usually a tax impact on other items, although this is not always the case for items arising from legal settlements in certain jurisdictions. Due to these factors and the differing effective tax rates in the various jurisdictions, the tax on the total adjustments, excluding the non-taxable, non-cash gain on the distribution (spin-off) of Alcon Inc. to Novartis AG shareholders of USD 279 million to arrive at the core results before tax amounts to USD 100 million. The 2019 core tax rate, excluding the effect of the gain on the distribution of Alcon Inc. to Novartis AG shareholders, is 17.5%.

[5] Earnings per share (EPS) is calculated on the amount of net income attributable to shareholders of Novartis AG.

2018 (USD millions)	IFRS results	Amortization of intangible assets[1]	Impairments[2]	Acquisition or divestment of businesses and related items	Other items[3]	Core results
Gross profit	**3 170**	**996**	**389**		**– 23**	**4 532**
Operating loss/income of discontinued operations	**– 234**	**1 007**	**391**		**102**	**1 266**
Loss/income before taxes of discontinued operations	**– 260**					**1 240**
Taxes[4]	**74**					**– 222**
Net loss/income from discontinued operations	**– 186**					**1 018**
Basic EPS (USD)[5]	**– 0.08**					**0.44**
The following are adjustments to arrive at core gross profit						
Cost of goods sold	– 3 983	996	389		– 23	– 2 621
The following are adjustments to arrive at core operating income						
Selling, general and administration	– 2 754		2		13	– 2 739
Research and development	– 585	11			47	– 527
Other income	61				– 23	38
Other expense	– 126				88	– 38

[1] Amortization of intangible assets: cost of goods sold includes the amortization of acquired rights to in-market products and other production-related intangible assets; research and development includes the amortization of acquired rights for technology platforms

[2] Impairments: cost of goods sold and selling, general and administration include impairment charges related to intangible assets

[3] Other items: cost of goods sold, selling, general and administration and research and development include charges and reversal of charges related to a product's voluntary market withdrawal; cost of goods sold, selling, general and administration, research and development, other income and other expense also include other restructuring income and charges and related items; research and development also includes amortization of option rights and the fair value adjustment of a contingent consideration liability; other income includes fair value adjustments on a financial asset; other expense includes legal-related items

[4] Taxes on the adjustments between IFRS and core results take into account, for each individual item included in the adjustment, the tax rate that will finally be applicable to the item based on the jurisdiction where the adjustment will finally have a tax impact. Generally, this results in amortization and impairment of intangible assets and acquisition-related restructuring and integration items having a full tax impact. There is usually a tax impact on other items, although this is not always the case for items arising from legal settlements in certain jurisdictions. Due to these factors and the differing effective tax rates in the various jurisdictions, the tax on the total adjustments of USD 1.5 billion to arrive at the core results before tax amounts to USD 296 million. The 2018 core tax rate is 17.9%.

[5] Earnings per share (EPS) is calculated on the amount of net income attributable to shareholders of Novartis AG.

2017 (USD millions)	IFRS results	Amortization of intangible assets[1]	Impairments[2]	Acquisition or divestment of businesses and related items	Other items[3]	Core results
Gross profit	**3 189**	**1 015**				**4 204**
Operating loss/income of discontinued operations	**– 73**	**1 025**	**86**		**98**	**1 136**
Loss/income before taxes of discontinued operations	**– 103**					**1 106**
Taxes[4]	**307**					**– 189**
Net income from discontinued operations	**204**					**917**
Basic EPS (USD)[5]	**0.08**					**0.40**
The following are adjustments to arrive at core gross profit						
Cost of goods sold	– 3 588	1 015				– 2 573
The following are adjustments to arrive at core operating income						
Research and development	– 583	10	86		– 18	– 505
Other income	47				– 17	30
Other expense	– 194				133	– 61

[1] Amortization of intangible assets: cost of goods sold includes the recurring amortization of acquired rights to in-market products and other production-related intangible assets; research and development includes the recurring amortization of acquired rights for technology platforms

[2] Impairments: research and development includes impairment charges related to intangible and financial assets

[3] Other items: research and development includes fair value adjustments to contingent consideration liabilities; other income and other expense include restructuring income and charges and related items; other income also includes a gain from a Swiss pension plan amendment and the partial reversal of a prior-period charge; other expense also includes legal-related items

[4] Taxes on the adjustments between IFRS and core results take into account, for each individual item included in the adjustment, the tax rate that will finally be applicable to the item based on the jurisdiction where the adjustment will finally have a tax impact. Generally, this results in amortization and impairment of intangible assets and acquisition-related restructuring and integration items having a full tax impact. There is usually a tax impact on other items, although this is not always the case for items arising from legal settlements in certain jurisdictions. Due to these factors and the differing effective tax rates in the various jurisdictions, the tax on the total adjustments of USD 1.2 billion to arrive at the core results before tax amounts to USD 496 million. The 2017 core tax rate is 17.1%.

[5] Earnings per share (EPS) is calculated on the amount of net income attributable to shareholders of Novartis AG.

5.B Liquidity and capital resources

The following tables summarize the Group's cash flows and net debt.

(USD millions)	**2019**	2018	2017
Net cash flows from operating activities of continuing operations	13 547	13 049	11 419
Net cash flows from operating activities of discontinued operations	78	1 223	1 202
Net cash flows used in investing activities of continuing operations	– 1 067	– 4 590	– 2 344
Net cash flows used in investing activities from discontinued operations	– 1 159	– 1 001	– 775
Net cash flows used in financing activities of continuing operations	– 16 884	– 4 077	– 7 318
Net cash flows from/used in financing activities of discontinued operations	3 257	– 167	– 415
Effect of exchange rate changes on cash and cash equivalents	69	– 26	84
Net change in cash and cash equivalents	**– 2 159**	**4 411**	**1 853**
Change in marketable securities, commodities, time deposits and derivative financial instruments	– 2 359	2 068	– 145
Change in current and non-current financial debts and derivative financial instruments	4 764	– 3 616	– 4 730
Change in net debt	**246**	**2 863**	**– 3 022**
Net debt at January 1	– 16 184	– 19 047	– 16 025
Net debt at December 31	**– 15 938**	**– 16 184**	**– 19 047**

Cash flow

Financial year 2019 compared to 2018

Net cash flows from operating activities from continuing operations amounted to USD 13.5 billion, compared to USD 13.0 billion in 2018. This increase was driven by higher net income adjusted for non-cash items and other adjustments, including divestment gains. It was partly offset by lower dividends received from associated companies due to the divestment of the GSK consumer healthcare joint venture in the second quarter of 2018, higher taxes paid, provision payments and working capital, which included the receipt of a GSK sales milestone from the divested Vaccines business of USD 0.4 billion in the prior year.

Net cash flows from operating activities from discontinued operations were USD 78 million, compared to USD 1.2 billion in 2018. This reduction was due to the completion of the Alcon spin-off on April 9, 2019.

Net cash flows used in investing activities from continuing operations amounted to USD 1.1 billion, compared to USD 4.6 billion in 2018. The current year mainly includes cash outflows of USD 1.4 billion for the purchase of property, plant and equipment; USD 0.9 billion for the purchase of intangible assets; USD 0.4 billion for the purchase of financial assets and other non-current assets; and USD 3.8 billion for the acquisitions and divestments of businesses, net, including the acquisition of IFM Tre, Inc. (USD 0.3 billion) and the acquisition of *Xiidra* from Takeda Pharmaceutical Company Limited (USD 3.5 billion). These were partly offset by net proceeds of USD 2.3 billion from the sale of marketable securities and commodities; cash inflows of USD 0.9 billion from the sale of property, plant and equipment (including the proceeds from the sale and leaseback of real estate); cash inflows of USD 1.2 billion from the sale of financial assets (including USD 976 million in proceeds from the sale of Alcon Inc. shares); and cash inflows of USD 1.0 billion from the sale of intangible assets.

In 2018, net cash flows used in investing activities from continuing operations were mainly related to the cash inflows of USD 13.0 billion from the divestment of our 36.5% stake in the GSK consumer healthcare joint venture, and of USD 1.1 billion in proceeds from the sale of property, plant and equipment; intangible assets; and financial assets. This was offset by cash outflows of USD 13.7 billion for the acquisitions of businesses, mainly Advanced Accelerator Applications S.A. (USD 3.5 billion, net), AveXis, Inc. (USD 8.3 billion, net) and Endocyte, Inc. (USD 1.8 billion, net); USD 1.3 billion for the purchase of property, plant and equipment; and USD 1.4 billion for the purchase of intangible assets. Net purchases of marketable securities and commodities amounted to USD 2.0 billion.

Net cash flows used in investing activities from discontinued operations amounted to USD 1.2 billion, compared to USD 1.0 billion in 2018. The current year mainly includes the cash outflow of USD 0.3 billion for the acquisition of PowerVision, Inc., and USD 0.6 billion due to the derecognized cash and cash equivalents following the completion of the Alcon spin-off on April 9, 2019.

Net cash flows used in financing activities from continuing operations amounted to USD 16.9 billion, compared to USD 4.1 billion in 2018. The current year mainly includes the cash outflows of USD 6.6 billion for the dividend payment and of USD 5.3 billion for net treasury share transactions (mainly related to the up-to USD 5 billion share buyback), and net cash outflows of USD 3.1 billion for non-current financial debts (mainly driven by the repayment at maturity of a US dollar bond of USD 3.0 billion). The net repayments of current financial debts amounted to USD 1.6 billion. Payments for lease liabilities, net, and other financing cash flows resulted in a net cash outflow of USD 0.2 billion.

In 2018, net cash flows used in financing activities from continuing operations mainly included the cash out-

flows of USD 7.0 billion for the dividend payment and of USD 1.3 billion for net treasury share transactions, partly offset by a net increase of USD 4.2 billion in current and non-current financial debts.

Net cash inflows from financing activities from discontinued operations amounted to USD 3.3 billion, compared to a cash outflow of USD 0.2 billion in 2018. The current-year mainly includes the cash inflows of USD 3.5 billion from Alcon borrowings, partly offset by USD 0.2 billion in payments for transaction costs.

Financial year 2018 compared to 2017

Net cash flows from operating activities from continuing operations amounted to USD 13.0 billion, compared to USD 11.4 billion in 2017. The increase was mainly driven by higher net income adjusted for non-cash items and other adjustments, including divestment gains, as well as favorable hedging results and working capital, which included the receipt of a GSK sales milestone from the divested Vaccines business.

Net cash flows from operating activities from discontinued operations amounted to USD 1.2 billion, which was in line with 2017.

Net cash flows used in investing activities from continuing operations amounted to USD 4.6 billion, compared to USD 2.3 billion in 2017. The 2018 amount includes cash inflows of USD 13.0 billion from the divestment of our 36.5% stake in the GSK consumer healthcare joint venture, and of USD 1.1 billion in proceeds from the sale of property, plant and equipment; intangible assets; and financial assets. This was offset by cash outflows of USD 13.7 billion for the acquisitions of businesses, mainly Advanced Accelerator Applications S.A. (USD 3.5 billion, net; USD 3.9 billion, net of cash acquired USD 0.4 billion), AveXis, Inc. (USD 8.3 billion, net; USD 8.7 billion, net of cash acquired USD 0.4 billion) and Endocyte, Inc. (USD 1.8 billion, net; USD 2.1 billion, net of cash acquired USD 0.3 billion); USD 1.3 billion for the purchase of property, plant and equipment; and USD 1.4 billion for the purchase of intangible assets. Net purchases of marketable securities and commodities amounted to USD 2.0 billion.

In 2017, net cash flows used in investing activities from continuing operations mainly related to cash outflows of USD 1.3 billion for the purchase of property, plant and equipment; USD 1.0 billion for the purchase of intangible assets; USD 0.4 billion for the purchase of financial assets and other non-current assets; and USD 0.7 billion for the acquisitions and divestments of businesses, net, including the acquisitions of Ziarco Group Limited and Encore Vision, Inc. This was partly offset by cash inflows of USD 1.1 billion from the sale of property, plant and equipment; intangible assets; and financial assets.

Net cash flows used in investing activities from discontinued operations amounted to USD 1.0 billion, compared to USD 0.8 billion in 2017. The 2018 amount includes cash outflows of USD 0.2 billion for the acquisitions of businesses, net.

Net cash flows used in financing activities from continuing operations amounted to USD 4.1 billion, compared to USD 7.3 billion in 2017. The 2018 amount mainly includes the cash outflows of USD 7.0 billion for the dividend payment and of USD 1.3 billion for net treasury share transactions, partly offset by a net increase of USD 4.2 billion in current and non-current financial debts. This increase was mainly from the issuance of euro bonds totaling USD 2.8 billion (notional amount EUR 2.25 billion), and the net increase of USD 1.7 billion in current financial debts. It was partly offset by repayments of non-current financial debts of USD 0.4 billion.

In 2017, net cash flows used in financing activities from continuing operations included cash outflows of USD 6.5 billion for the dividend payment and of USD 5.2 billion for net treasury share transactions. The net cash inflows from current and non-current financial debts of USD 4.1 billion were mainly from the issuance of bonds denominated in US dollar and euro for a notional amount of USD 3.0 billion and EUR 1.85 billion (USD 2.0 billion), respectively, partly offset by the repayment of current and non-current financial debts of USD 0.8 billion. Other financing cash inflows amounted to USD 0.3 billion.

Net cash flows used in financing activities from discontinued operations amounted to USD 0.2 billion, compared to USD 0.4 billion in 2017. The 2018 amount includes USD 0.1 billion in payments for transaction costs. The 2017 amount included a cash outflow of USD 0.1 billion due to a net decrease in current financial debts.

Group liquidity, financial debts and net debt

Novartis calculates net debt as current financial debts and derivative financial instruments plus non-current financial debt less cash and cash equivalents and marketable securities, commodities, time deposits and derivative financial instruments. Net debt constitutes a non-IFRS financial measure, which means that it should not be interpreted as a measure determined under International Financial Reporting Standards (IFRS). Net debt is presented as additional information, as it is a useful indicator of the Group's ability to meet financial commitments and to invest in new strategic opportunities, including strengthening its balance sheet.

Group liquidity, financial debts and net debt consists of:

(USD millions)	**2019**	2018	2017
Non-current financial debts	– 20 353	– 22 470	– 23 224
Current financial debts and derivative financial instruments	– 7 031	– 9 678	– 5 308
Total financial debts	**– 27 384**	**– 32 148**	**– 28 532**
Less liquidity			
Cash and cash equivalents	11 112	13 271	8 860
Marketable securities, commodities, time deposits and derivative financial instruments	334	2 693	625
Total liquidity	**11 446**	**15 964**	**9 485**
Net debt at December 31	**– 15 938**	**– 16 184**	**– 19 047**

Financial year 2019

Group net debt at December 31, 2019, decreased to USD 15.9 billion, compared to USD 16.2 billion at December 31, 2018.

Total financial debt decreased by USD 4.8 billion to USD 27.4 billion at December 31, 2019, from USD 32.1 billion at December 31, 2018. Non-current financial debts decreased by USD 2.1 billion to USD 20.4 billion at December 31, 2019, from USD 22.5 billion at December 2018, mainly driven by foreign exchange translation adjustments and the reclassification of two US dollar bonds totaling USD 2.0 billion, which are due in 2020, to current financial debts.

Current financial debts and derivative financial instruments decreased by USD 2.6 billion to USD 7.0 billion at December 31, 2019, from USD 9.7 billion at December 31, 2018, mainly due to the repayment at maturity of a US dollar bond of USD 3.0 billion, partially offset by the reclassification of two US dollar bonds totaling USD 2.0 billion from non-current financial debts, which are due in 2020.

Novartis has two US commercial paper programs under which it can issue up to USD 9.0 billion in the aggregate of unsecured commercial paper notes. Novartis also has a Japanese commercial paper program under which it can issue up to JPY 150 billion (approximately USD 1.4 billion) of unsecured commercial paper notes. Commercial paper notes totaling USD 2.3 billion under these three programs were outstanding as per December 31, 2019 (2018: USD 4.0 billion).

Novartis further has a committed credit facility of USD 6.0 billion, which was renewed in September 2019. This credit facility is provided by a syndicate of banks and is intended to be used as a backstop for the US commercial paper programs. The renewed facility matures in September 2024 and was undrawn as per December 31, 2019, and December 31, 2018.

In December 2019, Novartis entered into a short-term credit facility of USD 7.0 billion, with a maturity date of June 30, 2020 with a syndicate of banks. On January 7, 2020, Novartis borrowed USD 7.0 billion under the facility with interest based on the USD LIBOR.

As of year-end 2019, Moody's Investors Service rated the Company A1 for long-term maturities and P-1 for short-term maturities and S&P Global Ratings rated the company AA- for long-term maturities and A-1+ for short-term maturities.

Financial year 2018

Group net debt at December 31, 2018, decreased to USD 16.2 billion, compared to USD 19.0 billion at December 31, 2017.

Total financial debt increased by USD 3.6 billion to USD 32.1 billion at December 31, 2018, from USD 28.5 billion at December 31, 2017. Non-current financial debt decreased by USD 0.8 billion to USD 22.5 billion at December 31, 2018, from USD 23.2 billion at December 2017, mainly driven by foreign exchange translation adjustments, as the issuance of euro bonds totaling USD 2.8 billion (notional amount EUR 2.25 billion) was offset by the reclassification of a US dollar bond of USD 3.0 billion, which became due in 2019, to current financial debt.

Current financial debts and derivative financial instruments increased by USD 4.4 billion to USD 9.7 billion at December 31, 2018, from USD 5.3 billion at December 31, 2017, mainly due to higher net short-term borrowings and the reclassification of a US dollar bond of USD 3.0 billion from non-current liabilities, which became due in 2019.

Novartis has two US commercial paper programs under which it can issue up to USD 9.0 billion in the aggregate of unsecured commercial paper notes. Novartis also has a Japanese commercial paper program under which it can issue up to JPY 150 billion (approximately USD 1.4 billion) of unsecured commercial paper notes. Commercial paper notes totaling USD 4.0 billion under these three programs were outstanding as per December 31, 2018 (2017: USD 2.3 billion).

As of year-end 2018, Moody's Investors Service rated the Company A1 for long-term maturities and P-1 for short-term maturities and S&P Global Ratings rated the company AA- for long-term maturities and A-1+ for short-term maturities.

The maturity schedule of our current financial assets, current and non-current financial debts and net debt is as follows:

	2019					
(USD millions)	Due within one month	Due later than one month but less than three months	Due later than three months but less than one year	Due later than one year but less than five years	Due after five years	Total
Current assets						
Marketable securities, time deposits and short-term investments with original maturity more than 90 days	20	26	16	3	57	122
Commodities					110	110
Derivative financial instruments and accrued interest	14	79	3	3	3	102
Cash and cash equivalents	9 712	1 400				11 112
Total current financial assets	**9 746**	**1 505**	**19**	**6**	**170**	**11 446**
Non-current liabilities						
Financial debt				– 9 110	– 11 243	– 20 353
Financial debt – undiscounted				*– 9 150*	*– 11 355*	*– 20 505*
Total non-current financial debt				**– 9 110**	**– 11 243**	**– 20 353**
Current liabilities						
Financial debt	– 4 243	– 1 373	– 1 230			– 6 846
Financial debt – undiscounted	*– 4 243*	*– 1 373*	*– 1 230*			*– 6 846*
Derivative financial instruments	– 130	– 29	– 26			– 185
Total current financial debt	**– 4 373**	**– 1 402**	**– 1 256**			**– 7 031**
Net debt	**5 373**	**103**	**– 1 237**	**– 9 104**	**– 11 073**	**– 15 938**

	2018					
(USD millions)	Due within one month	Due later than one month but less than three months	Due later than three months but less than one year	Due later than one year but less than five years	Due after five years	Total
Current assets						
Marketable securities, time deposits and short-term investments with original maturity more than 90 days	39	56	2 091	198	63	2 447
Commodities					104	104
Derivative financial instruments and accrued interest	40	75	27			142
Cash and cash equivalents	3 571	9 700				13 271
Total current financial assets	**3 650**	**9 831**	**2 118**	**198**	**167**	**15 964**
Non-current liabilities						
Financial debt				– 8 980	– 13 490	– 22 470
Financial debt – undiscounted				*– 9 025*	*– 13 623*	*– 22 648*
Total non-current financial debt				**– 8 980**	**– 13 490**	**– 22 470**
Current liabilities						
Financial debt	– 5 217	– 4 084	– 319			– 9 620
Financial debt – undiscounted	*– 5 217*	*– 4 084*	*– 319*			*– 9 620*
Derivative financial instruments	– 16	– 34	– 8			– 58
Total current financial debt	**– 5 233**	**– 4 118**	**– 327**			**– 9 678**
Net debt	**– 1 583**	**5 713**	**1 791**	**– 8 782**	**– 13 323**	**– 16 184**

For a description of risks and restrictions on the ability of subsidiaries to transfer funds to the company via cash dividends, loan or advances please see "Item 5.B – Effects of currency fluctuations" and "Item 18. Financial Statements—Note 29. Financial instruments—Nature and extent of risks arising from financial instruments."

Information regarding the company's material commitments for capital expenditures as of the end of 2019 and 2018 and an indication of the general purpose of such commitments and the anticipated sources of funds needed to fulfill such commitments are provided in "Item 5.F Tabular disclosure of contractual obligations."

The following table provides a breakdown of liquidity and financial debt by currency as of December 31:

Liquidity and financial debt by currency

	Liquidity in % 2019[1]	Liquidity in % 2018[1]	Liquidity in % 2017[1]	**Financial debt in % 2019**[2]	Financial debt in % 2018[2]	Financial debt in % 2017[2]
USD	72	83	77	53	60	63
CHF	14	7	5	12	10	11
EUR	7	6	8	29	25	20
JPY	1		1	3	3	4
Other	6	4	9	3	2	2
	100	100	100	100	100	100

[1] Liquidity includes cash and cash equivalents, marketable securities, commodities and time deposits.
[2] Financial debt includes non-current and current financial debt.

Effects of currency fluctuations

We transact our business in many currencies other than the US dollar, our reporting currency.

The following provides an overview of net sales and operating expenses for our continuing operations based on IFRS values for 2019, 2018 and 2017, for currencies most important to the Group:

	2019		2018		2017	
Currency	Net sales %	Operating expenses %[1]	Net sales %	Operating expenses %[1]	Net sales %	Operating expenses %[1]
US dollar (USD)	37	36	35	31	36	37
Euro (EUR)	28	26	29	27	28	24
Swiss franc (CHF)	2	16	2	20	2	17
Japanese yen (JPY)	6	3	6	3	6	5
Chinese yuan (CNY)	5	4	4	3	4	3
Canadian dollar (CAD)	3	2	3	2	3	1
British pound (GBP)	2	2	2	2	2	2
Brazilian real (BRL)	2	1	2	1	2	1
Russian ruble (RUB)	2	1	2	1	2	1
Australian dollar (AUD)	1	1	1	1	2	1
Other currencies	12	8	14	9	13	8

[1] Operating expenses include cost of goods sold; selling, general and administration; research and development; other income and other expense.

We prepare our consolidated financial statements in US dollars. As a result, fluctuations in the exchange rates between the US dollar and other currencies can have a significant effect on both the Group's results of operations as well as the reported value of our assets, liabilities and cash flows. This in turn may significantly affect reported earnings (both positively and negatively) and the comparability of period-to-period results of operations.

For purposes of our consolidated balance sheets, we translate assets and liabilities denominated in other currencies into US dollars at the prevailing market exchange rates as of the relevant balance sheet date. For purposes of the Group's consolidated income and cash flow statements, revenue, expense and cash flow items in local currencies are translated into US dollars at average exchange rates prevailing during the relevant period. As a result, even if the amounts or values of these items remain unchanged in the respective local currency, changes in exchange rates have an impact on the amounts or values of these items in our consolidated financial statements.

Because our expenditures in Swiss francs are significantly higher than our revenues in Swiss francs, volatility in the value of the Swiss franc can have a significant impact on the reported value of our earnings, assets and liabilities, and the timing and extent of such volatility can be difficult to predict.

There is also a risk that certain countries could devalue their currency. If this occurs, it could impact the effective prices we would be able to charge for our products and also have an adverse impact on both our consolidated income statement and balance sheet.

Certain countries have legal or economic restrictions on the ability of subsidiaries to transfer funds to the Group in the form of cash dividends, loans or advances, but these restrictions do not have an impact on the ability of the Group to meet its cash obligations.

The most significant countries in this respect are Argentina and Venezuela, where the governments have implemented capital controls. The net outstanding intercompany payable balance of Argentina and Venezuela subsidiaries were not material for the Group at December 31, 2019, and at December 31, 2018.

Subsidiaries whose functional currencies have experienced a cumulative inflation rate of more than 100% over the past three years apply the rules of IAS 29 "Financial Reporting in Hyperinflationary Economies." Gains and losses incurred upon adjusting the carrying amounts of non-monetary assets and liabilities for inflation are recognized in the income statement. The hyperinflationary economies in which Novartis operates are Argentina and Venezuela. Venezuela was hyperinflationary for all years presented, and Argentina became hyperinflationary effective July 1, 2018, requiring retroactive implementation of hyperinflation accounting as of January 1, 2018. The impacts from applying IAS 29 are not significant.

The Group manages its global currency exposure by engaging in hedging transactions where management deems appropriate, after taking into account the natural hedging afforded by our global business activity. For 2019, we entered into various contracts that change in value with movements in foreign exchange rates to preserve the value of assets, commitments and expected transactions. We use forward contracts and foreign currency options to hedge. For more information on how these transactions affect our consolidated financial statements and on how foreign exchange rate exposure is managed, see "Item 18. Financial Statements—Note 1. Significant accounting policies," "Item 18. Financial Statements—Note 5. Interest expense and other financial income and expense," "Item 18. Financial Statements—Note 15. Trade receivables," "Item 18. Financial Statements—Note 28. Commitments and contingencies" and "Item 18. Financial Statements—Note 29. Financial instruments – additional disclosures."

The following table sets forth the foreign exchange rates of the US dollar against key currencies used for foreign currency translation when preparing the Group's consolidated financial statements:

	Average for year			Year-end		
USD per unit	**2019**	2018	Change in %	**2019**	2018	Change in %
Australian dollar (AUD)	0.695	0.748	– 7	0.701	0.707	– 1
Brazilian real (BRL)	0.254	0.275	– 8	0.249	0.258	– 3
Canadian dollar (CAD)	0.754	0.772	– 2	0.767	0.735	4
Swiss franc (CHF)	1.006	1.023	– 2	1.032	1.014	2
Chinese yuan (CNY)	0.145	0.151	– 4	0.144	0.145	– 1
Euro (EUR)	1.120	1.181	– 5	1.121	1.144	– 2
British pound (GBP)	1.277	1.336	– 4	1.313	1.274	3
Japanese yen (JPY (100))	0.918	0.906	1	0.920	0.907	1
Russian ruble (RUB (100))	1.546	1.600	– 3	1.613	1.437	12

	Average for year			Year-end		
USD per unit	**2018**	2017	Change in %	**2018**	2017	Change in %
Australian dollar (AUD)	0.748	0.766	– 2	0.707	0.779	– 9
Brazilian real (BRL)	0.275	0.313	– 12	0.258	0.302	– 15
Canadian dollar (CAD)	0.772	0.771	0	0.735	0.797	– 8
Swiss franc (CHF)	1.023	1.016	1	1.014	1.024	– 1
Chinese yuan (CNY)	0.151	0.148	2	0.145	0.154	– 6
Euro (EUR)	1.181	1.129	5	1.144	1.195	– 4
British pound (GBP)	1.336	1.288	4	1.274	1.347	– 5
Japanese yen (JPY (100))	0.906	0.892	2	0.907	0.888	2
Russian ruble (RUB (100))	1.600	1.715	– 7	1.437	1.734	– 17

The following table provides a summary of the currency impact on key Group figures due to their conversion into US dollars, the Group's reporting currency, of the financial data from entities reporting in non-US dollars. Constant currency (cc) calculations apply the exchange rates of the prior year to the current-year financial data for entities reporting in non-US dollars.

Currency impact on key figures

	Change in USD % 2019	Change in constant currencies % 2019	Percentage point currency impact 2019	Change in USD % 2018	Change in constant currencies % 2018	Percentage point currency impact 2018
Total Group						
Net sales to third parties from continuing operations	6	9	– 3	6	5	1
Operating income from continuing operations	8	14	– 6	– 3	– 3	0
Net income from continuing operations	– 44	– 41	– 3	71	71	0
Basic earnings per share from continuing operations (USD)	– 43	– 40	– 3	73	73	0
Core operating income from continuing operations	12	17	– 5	7	7	0
Core net income from continuing operations	11	15	– 4	4	4	0
Core basic earnings per share from continuing operations (USD)	12	17	– 5	6	5	1
Innovative Medicines						
Net sales to third parties	8	11	– 3	8	8	0
Operating income	18	24	– 6	4	4	0
Core operating income	13	18	– 5	11	11	0
Sandoz						
Net sales to third parties	– 1	2	– 3	– 2	– 3	1
Operating income	– 59	– 53	– 6	– 3	– 2	– 1
Core operating income	5	10	– 5	– 4	– 3	– 1
Corporate						
Operating loss	6	4	2	nm	nm	nm
Core operating loss	– 6	– 9	3	– 55	– 52	– 3

nm = not meaningful

For additional information on the effects of currency fluctuations, see "Item 18. Financial Statements—Note 29. Financial instruments – additional disclosures."

Free cash flow

Novartis defines free cash flow as net cash flows from operating activities and cash flows associated with the purchase or sale of property, plant and equipment, as well as intangible, other non-current and financial assets, excluding marketable securities. Cash flows in connection with the acquisition or divestment of subsidiaries, associated companies and non-controlling interests in subsidiaries are not taken into account to determine free cash flow. For further information about the free cash flow measure, which is a non-IFRS measure, see "Item 5. Operating and Financial Review and Prospects—Item 5.A Operating results—Non-IFRS measures as defined by Novartis—Free cash flow" above. The following is a summary of the free cash flow:

(USD millions)	**2019**	2018	2017
Operating income from continuing operations	**9 086**	**8 403**	**8 702**
Adjustments for non-cash items			
Depreciation, amortization and impairments	5 788	5 217	4 963
Change in provisions and other non-current liabilities	1 871	895	86
Other	– 476	– 229	– 465
Operating income adjusted for non-cash items	**16 269**	**14 286**	**13 286**
Dividends received from associated companies and others	463	719	987
Interest and other financial receipts	242	459	97
Interest and other financial payments	– 826	– 847	– 967
Taxes paid	– 1 876	– 1 506	– 1 487
Payments out of provisions and other net cash movements in non-current liabilities	– 924	– 638	– 829
Change in inventory and trade receivables less trade payables	– 809	– 679	– 776
Change in other net current assets and other operating cash flow items	1 008	1 255	1 108
Net cash flows from operating activities from continuing operations	**13 547**	**13 049**	**11 419**
Purchase of property, plant and equipment	– 1 379	– 1 254	– 1 325
Proceeds from sales of property, plant and equipment	857	102	91
Purchase of intangible assets	– 878	– 1 394	– 969
Proceeds from sales of intangible assets	973	823	640
Purchase of financial assets	– 302	– 205	– 354
Proceeds from sales of financial assets [1]	176	165	328
Purchase of other non-current assets	– 60	– 39	– 40
Proceeds from sales of other non-current assets	3	9	1
Free cash flow from continuing operations	**12 937**	**11 256**	**9 791**
Free cash flow from discontinued operations [2]	– 62	461	637
Total free cash flow	**12 875**	**11 717**	**10 428**

[1] For the free cash flow, proceeds from the sales of financial assets exclude the cash inflows from the sale of a portion of the Alcon Inc. shares received by certain consolidated foundations through the Alcon spin-off, which amounted to USD 976 million. See "Item 18. Financial Statements – Note 2 Significant transactions in 2019."

[2] In 2019, the free cash flow from discontinued operations was a cash outflow of USD 62 million (2018: USD 461 million cash inflow, 2017: USD 637 million cash inflow) consisting of USD 78 million net cash inflows from operating activities from discontinued operations (2018 and 2017: USD 1.2 billion), USD 1.2 billion net cash flows used in investing activities from discontinued operations (2018: USD 1.0 billion, 2017: USD 775 million) adjusted by USD 362 million of net cash outflows for acquisition and divestments of businesses (2018: USD 239 million, 2017: USD 210 million) and by USD 657 million for cash outflows attributable to the spin-off of the Alcon business (2018 and 2017: nil).

Financial year 2019 compared to 2018

Free cash flow from continuing operations amounted to USD 12.9 billion (+15%) compared to USD 11.3 billion in 2018. The increase was mainly driven by higher operating income adjusted for non-cash items, higher real estate divestment proceeds and lower investments in intangible assets, partly offset by higher taxes paid, provision payments and working capital, which in the prior year included the receipt of a GSK sales milestone from the divested Vaccines business of USD 0.4 billion, as well as lower dividends received from associated companies, as prior year included the GSK consumer healthcare joint venture that was divested in the second quarter of 2018.

Financial year 2018 compared to 2017

Free cash flow from continuing operations in 2018 amounted to USD 11.3 billion (+15%), compared to USD 9.8 billion in 2017, as higher cash flows from operating activities, which includes the receipt of a GSK sales milestone from the divested Vaccines business, were partly offset by higher net investments in intangible assets.

Condensed consolidated balance sheets

(USD millions)	Dec 31, 2019	Dec 31, 2018	Change
Assets			
Property, plant and equipment	12 069	15 696	– 3 627
Right-of-use assets	1 677		1 677
Goodwill	26 524	35 294	– 8 770
Intangible assets other than goodwill	28 787	38 719	– 9 932
Financial and other non-current assets	19 809	20 291	– 482
Total non-current assets	**88 866**	**110 000**	**– 21 134**
Inventories	5 982	6 956	– 974
Trade receivables	8 301	8 727	– 426
Other current assets and income tax receivable	2 934	3 109	– 175
Cash, marketable securities, commodities, time deposits and derivative financial instruments	11 446	15 964	– 4 518
Assets of disposal group held for sale	841	807	34
Total current assets	**29 504**	**35 563**	**– 6 059**
Total assets	**118 370**	**145 563**	**– 27 193**
Equity and liabilities			
Total equity	**55 551**	**78 692**	**– 23 141**
Financial debts	20 353	22 470	– 2 117
Lease liabilities	1 703		1 703
Deferred tax liabilities	5 867	7 475	– 1 608
Provisions and other non-current liabilities	6 632	7 319	– 687
Total non-current liabilities	**34 555**	**37 264**	**– 2 709**
Trade payables	5 424	5 556	– 132
Financial debts and derivative financial instruments	7 031	9 678	– 2 647
Lease liabilities	246		246
Provisions and other current liabilities and current income tax liabities	15 532	14 322	1 210
Liabilities of disposal group held for sale	31	51	– 20
Total current liabilities	**28 264**	**29 607**	**– 1 343**
Total liabilities	**62 819**	**66 871**	**– 4 052**
Total equity and liabilities	**118 370**	**145 563**	**– 27 193**

There has been a significant change in the consolidated balance sheet resulting from the spin-off of the Alcon business through the dividend in kind distribution to Novartis AG shareholders completed on April 9, 2019. For further details see "Item 18. Financial Statements—Note 1. Significant accounting policies—Distribution of Alcon Inc. to Novartis AG shareholders" and "Item 18. Financial Statements—Note 2. Significant transactions—Completion of the spin-off of the Alcon business through a dividend in kind distribution to Novartis AG shareholders."

The December 31, 2018, consolidated balance sheet includes the assets and liabilities of the Alcon business. The December 31, 2019, consolidated balance sheet excludes the assets and liabilities of the Alcon business, due to the derecognition of the Alcon business at the date of the spin-off. The consolidated balance sheet discussion and analysis that follows excludes the impacts of the derecognition of the Alcon business at the date of the spin-off. For details on the net assets derecognized at April 9, 2019, the completion date of the spin-off, see "Item 18. Financial Statements—Note 30. Discontinued operations—Net assets derecognized."

Total non-current assets of USD 88.9 billion at December 31, 2019, increased by USD 2.5 billion compared to December 31, 2018, excluding the impact of the derecognition of the Alcon business non-current assets as a result of the spin-off. This increase was mainly driven by the recognition of right-of-use assets resulting from the implementation of IFRS 16 Leases on January 1, 2019, amounting to USD 1.7 billion; an increase in intangible assets other than goodwill of USD 0.7 billion, mainly due to the impact of acquiring *Xiidra* from Takeda Pharmaceutical Company Limited, net of amortizations; an increase in financial assets of USD 0.6 billion, primarily from the financial investments in Alcon Inc. shares recognized by certain consolidated foundations through the Alcon spin-off, and an increase in investments in associated companies of USD 0.3 billion. This was partly offset by a decrease in property, plant and equipment of USD 0.7 billion, mainly due to depreciation in excess of net additions and a decrease in deferred tax assets of USD 0.1 billion. Goodwill and other non-current assets were broadly in line compared to December 31, 2018.

Total current assets of USD 29.5 billion at December 31, 2019, decreased by USD 2.7 billion compared to December 31, 2018, excluding the impact of the derecog-

nition of the Alcon business current assets as a result of the spin-off. This decrease was mainly driven by the reduction in marketable securities, commodities, time deposits and derivative financial instruments of USD 2.4 billion and in cash and cash equivalents of USD 1.9 billion mainly due to the repayment of financial debts and the dividend payment. This was partly offset by an increase in trade receivables by USD 0.8 billion, in inventories by USD 0.5 billion, and in other current assets by USD 0.2 billion. Income tax receivable and assets of disposal group held for sale remained broadly in line compared to December 31, 2018.

Net assets of disposal group held for sale of USD 0.8 billion include net assets and liabilities related to the pending divestment of the Sandoz US dermatology business and generic US oral solids portfolio to Aurobindo Pharma USA Inc., as announced on September 6, 2018 (see "Item 18. Financial Statements – Note 2. Significant pending transactions").

We consider our provisions for doubtful trade receivables to be adequate. We continue to monitor the level of trade receivables, particularly in Argentina, Brazil, Greece, Italy, Portugal, Russia, Saudi Arabia, Spain and Turkey. Should there be a substantial deterioration in our economic exposure with respect to those countries, we may change the terms of trade on which we operate. The gross trade receivables from these countries at December 31, 2019, amounted to USD 1.6 billion (2018: USD 1.7 billion), of which USD 61 million is past due for more than one year (2018: USD 97 million), and for which provisions of USD 24 million have been recorded (2018: USD 44 million). At December 31, 2019, amounts past due for more than one year are not significant in any of these countries on a standalone basis. The majority of the outstanding trade receivables from Portugal, Saudi Arabia and Spain (in 2018, in addition Greece) are due directly from local governments or government-funded entities.

The following table provides an overview of the aging analysis of total trade receivables and the total amount of the provision for doubtful trade receivables as of December 31, 2019 and 2018:

(USD millions)	**2019**	2018
Not overdue	7 763	7 916
Past due for not more than one month	161	296
Past due for more than one month but less than three months	123	194
Past due for more than three months but less than six months	103	136
Past due for more than six months but less than one year	96	98
Past due for more than one year	150	213
Provisions for doubtful trade receivables	– 95	– 126
Total trade receivables, net	**8 301**	**8 727**

There is also a risk that certain countries could devalue their currency. Currency exposures are described in more detail in "—Effects of currency fluctuations" above.

Total non-current liabilities of USD 34.6 billion decreased by USD 0.2 billion compared to December 31, 2018, excluding the impact of the derecognition of the Alcon business non-current liabilities as a result of the spin-off. This decrease was mainly driven the USD 2.0 billion decrease in long-term financial debts, mainly driven by the reclassification from non-current to current financial debt of USD 2.0 billion US dollar bonds due in 2020. This was partly offset by the recognition of lease liabilities resulting from the implementation of IFRS 16 Leases on January 1, 2019, amounting to USD 1.7 billion, and the USD 0.2 billion increase in provisions and other non-current liabilities, mainly due to higher pension plan liabilities due to the decrease in discount rates used to calculate the actuarial defined benefit obligations. Deferred tax liabilities were broadly in line compared to December 31, 2018.

Novartis believes that its total provisions are adequate based upon currently available information. However, given the inherent difficulties in estimating liabilities in this area, Novartis may incur additional costs beyond the amounts provided. Management believes that such additional amounts, if any, would not be material to the Group's financial condition but could be material to the results of operations or cash flows in a given period.

Total current liabilities of USD 28.3 billion increased by USD 0.5 billion compared to December 31, 2018, excluding the impacts of the derecognition of the Alcon business current liabilities as a result of the spin-off. This was mainly driven by an increase in provisions and other current liabilities of USD 2.0 billion, primarily from higher legal and revenue deduction provisions, increases of USD 0.5 billion in trade payables, USD 0.3 billion in current income tax liabilities and USD 0.2 billion in lease liabilities, resulting from the implementation of IFRS 16 Leases on January 1, 2019. This was partially offset by a USD 2.6 billion decrease in financial debts and derivative financial instruments, mainly due to the repayment of USD 3.0 billion of bonds issued in February 2009.

In our key countries, Switzerland and the United States, assessments have been agreed by the tax authorities up to 2015 in Switzerland and 2014 in the United States, respectively, with the exception of one open United States position related to the 2007 tax filing. In addition, a subsidiary in France, acquired with the AAA acquisition, has an open position related to the tax years 2014 and 2015.

The Group's equity decreased by USD 23.1 billion to USD 55.6 billion at December 31, 2019, compared to USD 78.7 billion at December 31, 2018. This decrease was mainly due to the dividend in kind to effect the spin-off of Alcon Inc. of USD 23.4 billion (for further details, see "Item 5.A Operating results – Critical accounting policies and estimates", "Item 18. Financial Statements – Note 2. Significant transactions" and "Item 18. Financial Statements – Note 30. – Discontinued operations"), the cash-dividend payment of USD 6.6 billion, the purchase of treasury shares of USD 5.5 billion, net actuarial losses of USD 0.5 billion, transaction costs attributable to the Alcon spin-off of USD 0.3 billion, and taxes on treasury shares of USD 0.2 billion. This was partially offset by net income of USD 11.7 billion, the net effect of exercise of options and employee transactions of USD 1.0 billion, favorable currency translation differences of USD 0.4 billion and a decrease in the treasury share repurchase obligation under a share buyback trading plan of USD 0.3 billion.

The Group's liquidity amounted to USD 11.4 billion at December 31, 2019, compared to USD 16.0 billion at

December 31, 2018. Total non-current and current financial debts, including derivatives, amounted to USD 27.4 billion at December 31, 2019, compared to USD 32.1 billion at December 31, 2018. The debt/equity ratio increased to 0.49:1 at December 31, 2019, compared to 0.41:1 at December 31, 2018.

The net debt decreased to USD 15.9 billion at December 31, 2019, compared to USD 16.2 billion at December 31, 2018.

Summary of equity movements attributable to Novartis AG shareholders

	Number of outstanding shares (in millions)			Issued share capital and reserves attributable to Novartis AG shareholders		
	2019	2018	Change	**2019 USD millions**	2018 USD millions	Change USD millions
Balance at beginning of year	**2 311.2**	**2 317.5**	**– 6.3**	**78 614**	**74 168**	**4 446**
Impact of change in accounting policy [1]				3	60	– 57
Restated equity at January 1				**78 617**	**74 228**	**4 389**
Shares acquired to be canceled	– 60.3	– 23.3	– 37.0	– 5 351	– 1 859	– 3 492
Other share purchases	– 1.7	– 1.2	– 0.5	– 160	– 114	– 46
Exercise of options and employee transactions	5.5	7.8	– 2.3	210	434	– 224
Other share sales		3.0	– 3.0		263	– 263
Equity-based compensation	9.4	7.4	2.0	833	756	77
Shares delivered to Alcon employees as a result of the Alcon spin-off	0.9		0.9	18		18
Taxes on treasury share transactions [2]				– 189		– 189
Decrease/(increase) of treasury share repurchase obligation under a share buyback trading plan				284	– 284	568
Transaction costs, net of taxes [3]				– 253	– 79	– 174
Dividends				– 6 645	– 6 966	321
Dividend in kind to effect the spin-off of Alcon Inc. [4]				– 23 434		– 23 434
Net income of the year attributable to shareholders of Novartis AG				11 732	12 611	– 879
Impact of change in ownership of consolidated entities				– 3	– 13	10
Other comprehensive income attributable to shareholders of Novartis AG				– 207	– 401	194
Other movements [5]				22	38	– 16
Balance at end of year	**2 265.0**	**2 311.2**	**– 46.2**	**55 474**	**78 614**	**– 23 140**

[1] In 2019, the impact of change in accounting policy includes USD 3 million related to the implementation of IFRS 16 Leases (see "Item 18. Financial Statements—Note 1. Significant accounting policies"). In 2018, the impact of change in accounting policy includes USD 60 million related to the implementation of IFRS 15, and USD 177 million related to the implementation of IFRS 9.

[2] Included in 2019 is a USD 69 million impact related to the revaluation of deferred tax liability on treasury shares. This revaluation resulted from the Swiss federal tax reform enacted in May 2019 (see "Item 18. Financial Statements—Note 12. Deferred tax assets and liabilities").

[3] Transaction costs, net of tax of USD 36 million (2018: USD 20 milion), directly attributable to the potential distribution (spin-off) of Alcon to Novartis shareholders (see "Item 18. Financial Statements—Note 1. Significant accounting policies").

[4] Fair value of the dividend in kind of Alcon Inc. shares to Novartis AG shareholders and ADR (American Depositary Receipt) holders approved at the 2019 Annual General Meeting held on February 28, 2019. Distribution was effected on April 8, 2019, whereby each Novartis AG shareholder and ADR holder received one Alcon Inc. share for every five Novartis AG shares/ADRs they held on April 8, 2019, close of business (see "Item 18. Financial Statements—Note 1. Significant accounting policies").

[5] Impact of hyperinflationary economies (see "Item 18. Financial Statements—Note 1. Significant accounting policies").

In 2019, the up to USD 5 billion share buyback announced in June 2018 was completed with a total of 55.8 million shares for USD 5.0 billion repurchased since the announcement.

During 2019, Novartis repurchased a total of 60.3 million shares for USD 5.4 billion on the SIX Swiss Exchange second trading line, including 46.5 million shares (USD 4.2 billion) bought back under the up-to USD 5 billion share buyback announced in June 2018, and 13.8 million shares (USD 1.1 billion) to mitigate dilution related to participation plans of associates.

In addition, 1.7 million shares (USD 0.2 billion) were repurchased from associates. In the same period, 15.8 million shares (for an equity value of USD 1.1 billion) were delivered as a result of options exercised and share deliveries related to participation plans of associates. Consequently, the total number of shares outstanding decreased by 46.2 million versus December 31, 2018. These treasury share transactions resulted in a decrease in equity of USD 4.5 billion and a net cash outflow of USD 5.3 billion.

In 2018, Novartis repurchased a total of 23.3 million shares for USD 1.9 billion on the SIX Swiss Exchange second trading line under the CHF 10 billion share buyback authority approved at the 2016 Annual General Meeting. This included 9.3 million shares (USD 0.8 billion) under the new up-to USD 5 billion share buyback announced in June 2018, and 14.0 million shares (USD 1.1 billion) to offset the dilutive impact from equity-based participation plans of associates.

In addition, 1.2 million shares for USD 0.1 billion were acquired from employees, which were previously granted

to them under the respective programs. In 2018, 15.2 million treasury shares for USD 1.2 billion were delivered as a result of options being exercised and physical share deliveries related to equity-based participation plans. Other share sales for USD 0.3 billion resulted in an increase of 3.0 million shares outstanding.

With these transactions, the total number of shares outstanding decreased by 6.3 million shares in 2018 versus December 31, 2017. These treasury share transactions resulted in an equity decrease of USD 0.5 billion and a net cash outflow of USD 1.3 billion in 2018.

Treasury shares

At December 31, 2019, our holding of treasury shares amounted to 262.4 million shares, or approximately 10% of the total number of issued shares. Approximately 118 million treasury shares were held in entities that limit their availability for use.

At December 31, 2018, our holding of treasury shares amounted to 239.5 million shares, or approximately 10% of the total number of issued shares. Approximately 122 million treasury shares were held in entities that limit their availability for use.

At December 31, 2017, our holding of treasury shares amounted to 299.4 million shares, or approximately 10% of the total number of issued shares. Approximately 131 million treasury shares were held in entities that limit their availability for use.

Bonds

In February 2019, a 10-year USD bond of USD 3.0 billion with a coupon of 5.125% was repaid at maturity.

In February 2018, three euro bonds totaling EUR 2.25 billion were issued: a 5.5-year bond of EUR 750 million with a coupon of 0.5%, a 12.5-year bond of EUR 750 million with a coupon of 1.375%, and a 20.5-year bond of EUR 750 million with a coupon of 1.7%.

In February 2017, three US dollar bonds totaling USD 3.0 billion were issued: a three-year bond of USD 1.0 billion with a coupon of 1.80%, a five-year bond of USD 1.0 billion with a coupon of 2.40%, and a 10-year bond of USD 1.0 billion with a coupon of 3.10%.

In March 2017, two EUR bonds totaling EUR 1.85 billion were issued: a four-year bond of EUR 1.25 billion with a coupon of 0%, and a 10-year bond of EUR 0.6 billion with a coupon of 1.125%.

Liquidity/short-term funding

We continuously track our liquidity position and asset/liability profile. This involves modeling cash flow maturity profiles based on both historical experiences and contractual expectations to project our liquidity requirements. We seek to preserve prudent liquidity and funding capabilities.

We are not aware of any significant demands to change the level of liquidity needed to support our normal business activities. We make use of various borrowing facilities provided by several financial institutions. We also successfully issued various bonds in previous years (including 2017 and 2018), and raised funds through our commercial paper programs.

The maturity schedule of our net debt can be found in "Item 18. Financial Statements—Note 29. Financial instruments – additional disclosures."

5.C Research and development, patents and licenses

Our R&D spending from continuing operations totaled USD 9.4 billion, USD 8.5 billion and USD 8.4 billion (Core R&D USD 8.4 billion, USD 8.2 billion and USD 7.8 billion) for the years 2019, 2018 and 2017, respectively.

Each of our divisions has its own R&D and patent policies. Our divisions have numerous products in various stages of development. For further information on these policies and these products in development, see "Item 4. Information on the Company—Item 4.B Business overview."

As described in the risk factors section and elsewhere in this Annual Report, our drug development efforts are subject to the risks and uncertainties inherent in any new drug development program. Due to the risks and uncertainties involved in progressing through preclinical development and clinical trials, and the time and cost involved in obtaining regulatory approvals, among other factors, we cannot reasonably estimate the timing, completion dates and costs, or range of costs, of our drug development program, or of the development of any particular development compound (see "Item 3. Key Information—Item 3.D Risk factors"). In addition, for a description of the research and development process for the development of new drugs and our other products, and the regulatory process for their approval, see "Item 4. Information on the Company—Item 4.B Business overview."

5.D Trend information

Please see "—Item 5.A Operating results—Factors affecting results of operations" and "Item 4. Information on the Company—Item 4.B Business overview" for trend information.

5.E Off-balance sheet arrangements

We have no unconsolidated special purpose financing or partnership entities or other off-balance sheet arrangements that have or are reasonably likely to have a current or future effect on our financial condition, changes in financial condition, revenues or expenses, results of operations, liquidity, capital expenditures or capital resources, that is material to investors. See also "Item 18. Financial Statements—Note 28. Commitments and contingencies," and matters described in "— Item 5.F Tabular disclosure of contractual obligations."

5.F Tabular disclosure of contractual obligations

The following table summarizes the Group's contractual obligations and other commercial commitments, as well as the effect these obligations and commitments are expected to have on the Group's liquidity and cash flow in future periods:

	Payments due by period				
(USD millions)	Total	Less than 1 year	2–3 years	4–5 years	After 5 years
Non-current financial debt, including current portion	**22 355**	2 002	4 650	4 460	11 243
Interest on non-current financial debt, including current portion	**5 434**	464	845	686	3 439
Lease liabilities, non-current and current portion	**1 949**	246	365	257	1 081
Interest on lease liabilities, non-current and current portion	**1 536**	49	83	66	1 338
Unfunded pensions and other post-employment benefit plans	**1 748**	101	201	208	1 238
Research and development potential milestone commitments	**4 404**	809	761	891	1 943
Contingent consideration liabilities	**1 036**	71	352	230	383
Property, plant and equipment purchase commitments	**220**	177	43		
Acquisition of business commitments [1]	**10 164**	10 130	34		
Total contractual cash obligations	**48 846**	**14 049**	**7 334**	**6 798**	**20 665**

[1] For acquisition of business commitments, please refer to "Item 18. Financial Statements – Note 2 Significant transactions – significant pending transactions".

The Group intends to fund the research and development; property, plant and equipment; intangible asset purchase commitments with internally generated resources, and the acquisition of business commitment through available cash and short- and long-term borrowings.

The acquisition of business commitments relate to the acquisition of The Medicines Company (see "Item 18. Financial Statements—Note 2. Significant transactions —Significant Transactions entered into in 2019 and closed in January 2020") and to the pending acquisition of the Japanese business of Aspen Global Incorporated (see "Item 18. Financial Statements—Note 2. Significant transactions — Significant pending transactions").

In December 2019, Novartis entered into a short-term credit facility of USD 7.0 billion, with a maturity date of June 30, 2020 with a syndicate of banks. On January 7, 2020, Novartis borrowed USD 7.0 billion under the facility with interest based on the USD LIBOR.

For other contingencies, see "Item 4. Information on the Company—Item 4.D Property, plants and equipment—Environmental matters," "Item 8. Financial Information—Item 8.A Consolidated statements and other financial information," "Item 18. Financial Statements — Note 10. Right-of-use assets and lease liabilities," "Item 18. Financial Statements—Note 20. Provisions and other non-current liabilities," and "Item 18. Financial Statements—Note 28. Commitments and contingencies."

Item 6. Directors, Senior Management and Employees

6.A Directors and senior management

The information set forth under “Item 6.C Board practices—Corporate governance—Board of Directors” and “Item 6.C Board practices—Corporate governance—Executive Committee” is incorporated by reference.

6.B Compensation

Dear shareholder,

As Chairman of the Compensation Committee of the Board of Directors, I am pleased to share with you the 2019 Compensation Report of Novartis AG. It follows a similar structure to the previous year's report, which was supported by over 94% of shareholders.

At the 2019 Annual General Meeting (AGM), we welcomed new Board member Patrice Bula to the Compensation Committee.

During 2019, the committee continued to engage with shareholders and proxy advisors to gather feedback on the compensation system for the Executive Committee and our disclosures. In response to this feedback, and to better align with the interests of shareholders, we have introduced a mandatory holding period of two years beyond the vesting date for all Long-Term Incentive (LTI) awards (after applicable taxes) to the CEO and CFO granted from 2020 onward.

Reflecting our commitment to shareholders regarding transparency in executive compensation, we would like to also draw attention to the following changes and enhanced disclosures:

- Increased disclosure on the balanced scorecard for the CEO's Annual Incentive, in particular, on targets related to environmental, social and governance (ESG) metrics
- Increased transparency on innovation metrics for the 2019-2021 Long-Term Performance Plan (LTPP) by taking them from the published Novartis selected development projects in Innovative Medicines
- Added an interim update of how performance is tracking against targets for all metrics relating to the ongoing LTPP performance cycles to provide an upfront indication of ongoing performance
- Provided explanations of pension benefits for members of the Executive Committee, which are fully aligned with the pensions of all other associates at Novartis

2019 Company performance

Financial performance significantly exceeded targets set at the beginning of the year, which enabled the company to raise its guidance to shareholders every quarter. Net sales to third parties for Novartis continuing operations grew 6% in reported terms and 9% measured in constant currencies (cc) to remove the impact of exchange rate movements, core operating income grew by 12% (+17% cc) and free cash flow amounted to USD 12.9 billion (+15%) mainly driven by higher operating income. Growth brands contributed to strong sales growth, as *Cosentyx* sales reached USD 3.6 billion, *Entresto* sales reached USD 1.7 billion and *Promacta/Revolade* sales reached USD 1.4 billion. Recently launched products, including *Zolgensma*, *Piqray* and *Beovu*, also contributed to our growth.

In addition to delivering a strong financial year, there were significant achievements across all our strategic pillars:

- Delivered transformative innovation in 2019, with 18 new approvals (of which 5 were new molecular entities), and 17 major submissions
- Continued to improve our operational excellence by transforming our manufacturing operations and business services which, together with increased research and development productivity, led to an overall core operating income margin improvement of 1.6% (+1.9% cc)
- Advanced our digital ecosystem, investing in data architecture and analytics, and forming external strategic partnerships
- Made good progress on our cultural journey, with significant investment in leadership development, external recognition of our approach to learning, and an improvement in our key diversity metrics
- Took significant actions to address areas of "building trust with society" as put in our ESG initiatives, including access to healthcare as we launched our sub-Saharan Africa strategy to drive access for patients across all income levels

On April 9, 2019, Novartis successfully spun off the Alcon eye care devices business, generating significant shareholder value. This was, at the time, the largest-ever spin-off in Europe. Our recent transactions in M&A are strengthening our innovation programs and further supporting our strategy to become a leading, focused medicines company.

More details on the performance of our strategic priorities can be found in "—2019 CEO balanced scorecard."

Overall, shareholders benefited from a total shareholder return (TSR) in 2019 of 22.3%. Between 2017 and 2019, they benefited from a three-year TSR of 63.4%.

2019 realized compensation

The Board of Directors assessed the performance of the CEO in his second year and determined that he will be awarded a 2019 Annual Incentive of CHF 4 017 639, which is 160% of target, within the payout range of 0% to 200%.

The 2017-2019 Long-Term Performance Plan (LTPP) delivered strong results with Cash Value Added (CVA) and innovation at above target, reflecting the underlying performance of our business over the three-year cycle. Overall, the Board of Directors awarded the CEO a payout of CHF 3 510 963, corresponding to a 164% payout against a maximum of 200%.

The 2017-2019 Long-Term Relative Performance Plan (LTRPP) award was based on three-year relative TSR in USD compared to the global healthcare peer group. Novartis ranked No. 6 out of a total of 16 companies (including Novartis), reflecting continued positive momentum in our business. The Board of Directors evaluated the overall context and assigned the CEO a payout of CHF 1 107 806, which is 138% of target and within the payout of 0–200%.

These incentive performance outcomes, combined with base salary and other benefits, pension, share price movement and dividend equivalents, resulted in 2019 total realized compensation for the CEO of **CHF 10 615 740**.

The strong performance of the 2017-2019 LTI awards, coupled with the 30% increase of the share price between grant and vesting of these awards, contributed to a significantly higher total realized compensation for the CEO compared to 2018 (CHF 6 680 288).

The 2019 total realized compensation for the Executive Committee members (comprising the CEO, the other 12 active Executive Committee members, and the two former Executive Committee members who stepped down during the financial year) was CHF 66 491 488, which is broadly in line with the prior year. Strong Company performance drove higher payouts of the Annual Incentive and both LTI grants contributing to a slightly higher total realized payout compared to 2018; partly offset by the fact that there were several Executive Committee members in their first year and fewer Executive Committee members to be reported overall in 2019.

2020 AGM

In line with our Articles of Incorporation, at the 2020 AGM, shareholders will be asked to approve, in a binding vote, the maximum aggregate amount of compensation for the Board of Directors from the 2020 AGM to the 2021 AGM, and the maximum aggregate amount of compensation for the Executive Committee for financial year 2021. For the Board of Directors, the amount considers the nomination of two new Board members for election to the Board at the next AGM, and a reallocation of Board Committee memberships. For the Executive Committee, the requested maximum aggregate amount of compensation remains broadly unchanged compared to the prior year. Shareholders will also be asked to endorse this Compensation Report in an advisory vote.

On behalf of Novartis and the Compensation Committee, I would like to thank you for your continued support and feedback, which we consider extremely valuable in driving improvements in our compensation systems and practices.

I invite you to send your comments to the following email address: investor.relations@novartis.com.

Respectfully,

Enrico Vanni, Ph.D.
Chairman of the Compensation Committee

Compensation at a glance

Executive Committee compensation system

	2019 fixed pay and benefits		Performance-related variable pay		
	Annual base salary	**Pension and other benefits**	**2019 Annual Incentive**	**Long-Term Incentive awards cycle 2017-2019**	
				LTPP[1]	**LTRPP[2]**
Purpose	Reflects responsibilities, experience and skill sets	Provides retirement and risk insurances (tailored to local market practices/regulations)	Rewards for performance against short-term financial and strategic objectives, and Values and Behaviors	Rewards long-term shareholder value creation and innovation in line with our strategy	
Form of payment	Cash	Country/individual-specific and aligned with other employees	50% cash 50% equity[3] deferred for three years	Equity, vesting following a three-year performance period	
Performance measures	–	–	Balanced scorecard comprising: • Financial measures (60%) • Strategic objectives[4] (40%)	• Novartis Cash Value Added (75%) • Innovation milestones (25%)	• Relative TSR versus global sector peers (100%)[5]

[1] LTPP = Long-Term Performance Plan
[2] LTRPP = Long-Term Relative Performance Plan
[3] Executive Committee members may elect to receive more of their Annual Incentive in equity instead of cash.
[4] Strategic objectives are aligned with the five strategic pillars: innovation, operational excellence, data and digital, people and culture, and building trust with society.
[5] For the 2017-2019 performance cycle, the peer group comprises 16 global healthcare companies, including Novartis, as listed in "—Approach to benchmarking."

Target incentive opportunity levels for the CEO are 150% and 325% of base salary for the Annual Incentive and LTI, respectively. Based on Novartis compensation guidelines, the other members of the Executive Committee have Annual Incentive and LTI target opportunity levels that range from 80% to 120%, and 160% to 270% of base salary, respectively. The payout range remains at 0% to 200% of target opportunity based on achievement against performance.

As disclosed in the 2018 Compensation Report, from cycle 2019-2021, the LTRPP plan is discontinued, and the LTPP metrics are transformed into four equally weighted measures: net sales compound annual growth rate, core operating income compound annual growth rate, innovation and relative TSR.

Compensation governance at a glance

A summary of the compensation decision authorization levels within the parameters set by the AGM is shown below, along with an overview of the risk management principles.

DECISION ON	DECISION-MAKING AUTHORITY
Compensation of Chairman and other Board members	Board of Directors
Compensation of CEO	Board of Directors
Compensation of other Executive Committee members	Compensation Committee

EXECUTIVE COMMITTEE COMPENSATION RISK MANAGEMENT PRINCIPLES

- Rigorous performance management process
- Balanced mix of short-term and long-term variable compensation elements
- Performance evaluation under the Annual Incentive includes an individual balanced scorecard
- Performance-based LTI, with three-year cycles
- All variable compensation is capped at 200% of target
- Contractual notice period of 12 months
- Post-contractual non-compete period limited to a maximum of 12 months from the end of employment. Resulting compensation is limited to the annual base salary plus the prior-year Annual Incentive as per contract, if applicable
- Good and bad leaver provisions apply to the variable compensation of leavers
- No severance payments or change-of-control clauses
- Clawback and malus principles apply to all elements of variable compensation
- Share ownership requirements; no hedging or pledging of Novartis share ownership position

2019 CEO pay for performance – outcomes

Measure	Target[1]	Achievement versus target
2019 ANNUAL INCENTIVE (SEE "—2019 ANNUAL INCENTIVE")		
Financial measures – 60% of total Annual Incentive, comprising:		
Group net sales (cc) (30%)	USD 45 384 million	Significantly above
Group operating income (cc) (30%)	USD 8 129 million	Significantly above
Group free cash flow as a % of sales (cc) (20%)	24.8%	Significantly above
Share of peers for Novartis Group (USD) (20%)	7.9%	Above
Overall assessment of Group financial targets in constant currencies		**Significantly above**

[1] For performance evaluation purposes, Target as well as Actual financial KPIs excluded the results of the Sandoz US dermatology business and generic US oral solids portfolio, which was expected to be divested to Aurobindo. The transaction is now expected to close in the first quarter of 2020 pending regulatory approval.

Strategic objectives – 40% of total Annual Incentive, comprising:	
Innovation (20%)	Significantly above
Operational excellence (20%)	Significantly above
Data and digital (20%)	Above
People and culture (including Values and Behaviors) (20%)	Above
Building trust with society (including access to healthcare and reputation and other ESG topics) (20%)	Met
Overall assessment of strategic objectives	**Above**
Overall assessment of CEO balanced scorecard	**Outstanding**
TOTAL Annual Incentive:	**160% of target (payout range 0% – 200%)**
2017-2019 LONG-TERM INCENTIVES (SEE "— LONG-TERM INCENTIVE PLANS, 2017-2019 CYCLE")	
Long-Term Performance Plan (LTPP)	
Novartis Cash Value Added (cc) (75%)	Significantly above
Key innovation milestones (25%)	Above
TOTAL LTPP:	**164% of target (payout range 0% – 200%)**
Long-Term Relative Performance Plan (LTRPP)	
Relative TSR against a global healthcare peer group (USD)	Above threshold
TOTAL LTRPP:	**138% of target (payout range 0% – 200%)**

2019 total realized compensation for the CEO

The 2019 total realized compensation for the CEO was **CHF 10 615 740**. It includes payouts of the Annual Incentive, LTPP and LTRPP based on actual performance assessed for cycles concluding in 2019. More information on the overall assessment of the CEO by the Board of Directors can be found in "—2019 CEO balanced scorecard."

	Fixed pay and benefits		Variable pay – performance-related			
CHF	Annual base salary	Pension and other benefits	2019 Annual Incentive	LTPP 2017-2019 cycle[1]	LTRPP 2017-2019 cycle[1]	Total realized compensation
Vasant Narasimhan (CEO)	1 653 333	325 999	4 017 639	3 510 963	1 107 806	**10 615 740**

[1] The shown amounts represent the underlying share value of the total number of shares vested (including dividend equivalents) to the CEO for the LTPP and LTRPP performance cycle 2017-2019, which were granted before Vasant Narasimhan was appointed CEO.

2019 Board compensation system

The compensation system applicable to the Board of Directors is shown below, and remains unchanged since prior year. All fees to the Board members are delivered at least 50% in equity and the remainder in cash.

CHF 000s	AGM 2019-2020 annual fee
Chairman of the Board	3 800
Board membership	280
Vice Chairman	50
Chair of the Audit and Compliance Committee	130
Chair of the Compensation Committee	90
Chair of the following committees: • Governance, Nomination and Corporate Responsibilities Committee • Research & Development Committee • Risk Committee	70
Membership of the Audit and Compliance Committee	70
Membership of the following committees: • Compensation Committee • Governance, Nomination and Corporate Responsibilities Committee • Research & Development Committee • Risk Committee	40

2019 Board compensation

Total actual compensation earned by Board members in the 2019 financial year is shown in the table below.

CHF 000s	2019 total compensation[1]
Chairman of the Board	3 804
Other 12 members of the Board	4 387
Total	**8 191**

[1] Includes an amount of CHF 21 002 for mandatory employer contributions for all Board members paid by Novartis to governmental social security systems. This amount is out of total employer contributions of CHF 413 985 , and provides a right to the maximum future insured government pension benefit for the Board member.

Executive Committee compensation philosophy and principles

Novartis compensation philosophy

Our compensation philosophy aims to ensure that Executive Committee members are rewarded according to their success in implementing the Company strategy, and their contribution to Company performance and long-term value creation.

Pay for performance	• Variable compensation is tied directly to the achievement of strategic Company targets
Shareholder alignment	• Our incentives are significantly weighted toward long-term equity-based plans • Measures under the Long-Term Incentive plans are calibrated to promote the creation of shareholder value • Executive Committee members are expected to build and maintain substantial shareholdings
Balanced rewards	• Balanced set of measures to create sustainable value • Mix of targets based on financial metrics, strategic objectives, and performance versus our competitors
Business ethics	• The Novartis Values and Behaviors are an integral part of our compensation system • They underpin the assessment of overall performance for the Annual Incentive
Competitive compensation	• Total compensation must be sufficient to attract and retain key global talent • Overarching emphasis on pay for performance

Alignment with Company strategy

Our strategy is to become a leading, focused medicines company powered by advanced therapy platforms and data science. We foster a company culture that is inspired, curious and unbossed. We believe these elements drive continued innovation and will support the creation of value over the long term for our Company, society and shareholders.

To align the compensation system with this strategy and to ensure that Novartis is a high-performing organization, the Company operates both a short-term Annual Incentive and an LTI plan with a balanced set of measures and targets. The Board of Directors determines specific, measurable and time-bound performance measures for the Annual Incentive and LTI plan. The Compensation Committee has reviewed the existing compensation system and determined that it continues to support our new strategy.

Approach to market benchmarking

There remains significant competition for top executive talent with deep expertise, competencies and proven performance within the pharmaceutical and biotechnology industries. As such, external peer compensation data is one of a number of key reference points considered by the Board of Directors and the Compensation Committee when making decisions on executive pay, helping to ensure that the compensation system and compensation levels at Novartis remain competitive. Novartis makes the commitment to shareholders to confirm benchmarking practices, including the peer group, each year.

The Compensation Committee believes in a rigorous approach to peer group construction and maintenance. The Compensation Committee also believes that using a consistent set of peers that are similar in size and scope enables shareholders to evaluate the compensation year on year and make pay-for-performance comparisons. As such, following a review of the benchmarking peer group, the Compensation Committee decided to maintain the same primary peer group of 15 global healthcare companies until the end of 2019, which will be updated from 2020 to consider the acquisition of Celgene, as presented below.

GLOBAL HEALTHCARE PEER GROUP

AbbVie	Amgen	AstraZeneca
Biogen	Bristol-Myers Squibb	Celgene[1]
Eli Lilly & Co.	Gilead Sciences	GlaxoSmithKline
Johnson & Johnson	Merck & Co.	Novo Nordisk
Pfizer	Roche	Sanofi

[1] Celgene will be removed from the 2020 peer group as a result of the acquisition by Bristol-Myers Squibb

The companies in this peer group reflect our industry and are similar to Novartis in terms of both size and scope of operations. Target compensation is generally positioned around the market median benchmark for comparable roles within this group.

Although Novartis is headquartered in Switzerland, more than a third of sales come from the US market, and the US remains a significant talent pool for the recruitment of executives by the Company. All current Executive Committee members have either worked in or have extensive experience with the US market. It is therefore critical that Novartis is able to attract and retain key talent globally, especially from the US.

For consideration of European and local practices, the Compensation Committee also references a cross-industry peer group of Europe-headquartered multinational companies, selected on the basis of comparability in size, scale, global scope of operations, and economic influence to Novartis. Five of these companies focus exclusively on healthcare: AstraZeneca, GlaxoSmithKline, Novo Nordisk, Roche and Sanofi. Ten companies are selected from the STOXX® All Europe 100 Index representing multiple sectors: Anheuser-Busch InBev, Bayer, BMW, Daimler, Danone, Heineken, L'Oréal, Merck KgaA, Nestlé and Unilever.

Executive Committee appointments compensation policy

ELEMENT OF COMPENSATION	POLICY
Level	The overall package should be market-competitive to enable the recruitment of global executive talent with deep expertise and competencies.
Annual base salary	The Compensation Committee may appoint individuals who are new to a role on an annual base salary that is below the market level, with a view to increasing this toward a market level over a period of three to four years as an individual develops in the role. This prudent approach ensures pay levels are merit-based, with increases dependent on strong performance and proven ability in the role over a sustained period.
Incentives	The ongoing compensation package will normally include the key compensation elements and incentive opportunities in line with those offered to current Executive Committee members. In exceptional circumstances, higher Long-Term Incentive opportunities than those offered to current Executive Committee members may be provided, at the Compensation Committee's discretion. Performance measures may include business-specific measures tailored to the specific role.
Pension and other benefits	Newly appointed Executive Committee members are eligible for a local market pension and other benefits in line with the wider employee group.
Buyouts	The Compensation Committee seeks to balance the need to offer competitive compensation opportunities to acquire the talent required by the business with the principle of maintaining a strong focus on pay for performance. As such, when an individual forfeits variable compensation as a result of an appointment at Novartis, the Compensation Committee may offer replacement awards in such form as the Compensation Committee considers appropriate, taking into account relevant factors. Relevant factors include the replacement vehicle (i.e., cash, restricted share units, restricted shares or performance share units), whether the award is contingent on meeting performance conditions or not, the expected value of the forfeited award, the timing of forfeiture (i.e., Novartis mirrors the blocking or vesting period of the forfeited award) and the leaver conditions, in case the recruited individual leaves Novartis prior to the end of the blocking or vesting period. The Compensation Committee will seek to pay no more than is required to match the commercial value or fair value of payments and awards forfeited by the individual.
International mobility	If individuals are required to relocate or be assigned away from their home location to take up their position, relocation support may be provided in line with our global mobility policies (i.e., relocation support, tax equalization).

Treatment of variable compensation for Executive Committee leavers

ELEMENT OF COMPENSATION	POLICY
Annual Incentive – cash element	**Retirement, termination by the Company (for reasons other than performance or conduct), change of control, disability, death** Pro-rata Annual Incentive is paid to reflect the portion of the year the individual was employed. **Any other reason** No Annual Incentive.
Annual Incentive – mandatory deferral into restricted shares/ RSUs	If a participant leaves employment due to voluntary resignation or misconduct, unvested restricted shares and restricted share units (RSUs) are forfeited. If a participant leaves involuntarily, restricted shares and RSUs are released on the original blocking end date. All awards are subject to non-compete terms until the end of the three-year blocking date, starting from the date of grant.
Annual Incentive – voluntary restricted shares/RSUs/ADRs (US associates only)	Awards are not subject to forfeiture during the deferral period.
Long-Term Incentives (LTPP/LTRPP)	**Voluntary resignation or termination by the Company for misconduct** All of the award will be forfeited. **Termination by the Company for reasons other than performance or conduct, and change in control due to divestment (including retirement)** Awards vest on the regular vesting date, subject to performance, on a pro-rata basis for time spent with the Company during the performance cycle. There is no accelerated vesting. **Death or long-term disability** Accelerated vesting at target will be applied. **Non-compete agreement** All awards are subject to non-compete terms against the healthcare peer group until the vesting date.

Malus and clawback

Any incentive compensation paid to Executive Committee members is subject to malus and clawback rules. This means that the Board of Directors for the CEO, and the Compensation Committee for the other Executive Committee members, may decide – subject to applicable law – to retain any unpaid or unvested incentive compensation (malus), or to recover incentive compensation that has been paid or has vested in the past (clawback). This applies in cases where the payout violates laws or conflicts with internal management standards, including Company and accounting policies.

This principle applies to both the short-term Annual Incentive and LTI plans.

Executive Committee performance management process

To foster a high-performance culture, the Company applies a uniform performance management process worldwide, based on quantitative and qualitative criteria, including our Values and Behaviors. All Novartis associates, including the CEO and other Executive Committee members, are subject to a formal three-step process: objective setting, performance evaluation and compensation determination. This process is explained below.

Performance targets are generally set before the start of the relevant performance cycle. There is a rigorous framework in place for establishing targets to ensure they are suitably robust and challenging, and align with the strategic priorities of the Group. The key factors taken into account when setting targets include:

- Novartis strategic priorities
- Internal and external market expectations
- Regulatory factors (e.g., new launches, patent expiries)
- Investment in capital expenditure
- Values and Behaviors

The targets are challenged at multiple stages before they are ultimately approved by the Board of Directors. In line with good governance practices, the Compensation Committee works to set targets that are ambitious and challenging but that do not encourage undue risk-taking.

Following the end of the performance cycle, the Board of Directors and the Compensation Committee consider performance against the targets originally set. The CEO and Executive Committee members are not present while the Board of Directors and the Compensation Committee discuss their individual performance evaluations. Prior to determining the final outcome, related factors such as performance relative to peers, wider market conditions, general industry trends and good practice are used to inform the overall performance assessment.

Objective setting

- The CEO proposes his targets with the Chairman of the Board; they are then reviewed and approved by the Board of Directors, based on input from the Compensation Committee.
- For other Executive Committee members, targets for their division or unit are initially discussed with the CEO and subsequently approved by the Board of Directors and Compensation Committee.

Performance evaluation

- The CEO's performance against the individual balanced scorecard is assessed by the Board of Directors.
- For Executive Committee members, the CEO discusses with the Chairman each member's performance (assessed against his or her individual balanced scorecard) before making recommendations to the Board of Directors.
- Periodic assessments, including at the mid-year stage, ensure progress is suitably tracked.

Compensation determination

- A recommendation for the CEO's variable pay is made by the Compensation Committee to the Board of Directors for final determination.
- For the Long-Term Incentive financial measures payout schedules, a formulaic approach applies and the Compensation Committee can also exercise judgment to ensure there is appropriate alignment between payout levels and overall performance achieved. The same principle of discretion applies to the relative TSR and innovation performance measures.
- The CEO's recommendations for other Executive Committee members are considered and approved by the Compensation Committee, after which the Board of Directors is notified of the outcomes.

2019 Executive Committee compensation

Performance outcomes

Annual base salary

Overview	• The annual base salary is reviewed each year, taking into account the individual's role, performance and experience, business performance and the external environment, increases across the Group and market movements.
2019 annual base salaries	The 2019 annual base salaries were as follows: • **CEO** (effective March 1, 2019): CHF 1 674 000 (CEO base salary may increase as he develops in the role) • **OTHER EXECUTIVE COMMITTEE MEMBERS** (effective March 1, 2019): All other members of the Executive Committee were awarded increases in line with the average of all Novartis employees, with the exception of three individuals as disclosed in Item 6.B of the 2018 Annual Report. These members were appointed to their roles with base salaries below external market median level and have demonstrated excellent performance during their tenure.

Pension and other benefits

Overview	• Pension and other benefits do not constitute a significant proportion of total compensation and are provided to the Executive Committee on the same terms as all other associates based on local country practices and regulations. • The CEO and all other Swiss-based members of the Executive Committee are members of the Novartis Swiss pension funds, which provide Company contributions on the base salary and Annual Incentive up to the legal cap on the insured salary of CHF 853 200. No supplementary pension plans or savings plans are provided. The CEO's employer pension contributions represent 10.01% of his base salary. • Globally the Company operates both defined benefit and defined contribution pension plans (see also Note 25 to the Group's consolidated financial statements). • Novartis may provide other benefits according to local market practice. These include Company car provision, tax and financial planning, and insurance benefits. • Executive Committee members who are required to relocate internationally may also receive additional benefits (including tax equalization), in line with the Company's global mobility policies.

2019 Annual Incentive

PLAN OVERVIEW

Target Annual Incentive

Annual base salary **x** Target incentive (% of base salary) **=** Target Annual Incentive

On-target opportunities

- CEO: 150% of annual base salary
- Other Executive Committee members: 80% to 120% of annual base salary

Performance measures

- A simplified Annual Incentive balanced scorecard containing:
  - Financial performance measures related to Group, division or business unit, where relevant (60% weighting)
  - Five key strategic objectives in the areas of innovation, operational excellence, data and digital, people and culture, and building trust with society (40% weighting)
- The 2019 balanced scorecard targets and achievements of the CEO are detailed on the next page.
- The 2019 balanced scorecards for other Executive Committee members include Group financial targets as well as financial or other quantitative targets that relate to their division or business unit, if applicable.
- Values and Behaviors are a key component of the Annual Incentive and are embedded in our culture. As such, members of the Executive Committee are expected to demonstrate these to the highest standards.

Target setting

- Financial targets are set at the beginning of each financial year and align with the strategic plan proposed by management to the Board of Directors for approval.
- The strategic objectives are aligned with the most important priorities in any performance year.

Payout ranges

- The payout schedule for the Annual Incentive incorporates performance against financial and strategic objectives. The payout range is 0% to 200% of on-target opportunity based on performance, as shown below:

PERFORMANCE	PAYOUT (% of on-target)
Outstanding	170% – 200%
Exceeds expectations	130% – 160%
Meets expectations	80% – 120%
Partially meets expectations	40% – 70%
Below expectations[1]	0% – 30%

[1] From the 2020 performance cycle, a performance deemed "below expectations" will provide for a payout of 0% only.

Payout formula

Annual base salary **x** Target incentive (% of base salary) **x** Payout factor (% of target: 0%–200%) **=** Realized Annual Incentive

Payout vehicle

- At the end of the performance period, 50% is paid in cash, and the remaining 50% is delivered in Novartis restricted shares or RSUs, deferred for three years (see "—Treatment of variable compensation for Executive Committee leavers").
- Executives may choose to receive all or part of the cash portion of their Annual Incentive in Novartis shares or American Depositary Receipts (ADRs; US only) that will not be subject to forfeiture conditions. In the US, awards may also be delivered in cash under the US-deferred compensation plan.
- Clawback and malus provisions apply to all Annual Incentive awards.

Dividend rights, voting rights and settlement

- Novartis restricted shares carry voting rights and dividends during the vesting period. RSUs are of equivalent value but do not carry voting rights and dividends during the vesting period.
- Following the vesting period, settlement of RSUs is made in unrestricted Novartis shares or ADRs.

2019 CEO BALANCED SCORECARD

This section presents the balanced scorecard for the CEO. Balanced scorecard performance is measured in constant currencies to reflect operational performance that can be influenced. The Board of Directors uses a stringent process to set ambitious financial targets to incentivize superior performance.

CEO achievements – 2019	Target[1]	Achievement versus target
Financial measures – 60% of total Annual Incentive, comprising:		
Group net sales (cc) (30%)	45 384 million	Significantly above
Group operating income (cc) (30%)	8 129 million	Significantly above
Group free cash flow as a % of sales (cc) (20%)	24.8%	Significantly above
Share of peers for Novartis Group (USD) (20%)	7.9%	Above
Overall assessment of Group financial targets in constant currencies		**Significantly above**

[1] For performance evaluation purposes, Target as well as Actual financial KPIs excluded the results of the Sandoz US dermatology business and generic US oral solids portfolio, which was expected to be divested to Aurobindo. The transaction is now expected to close in the first quarter of 2020 pending regulatory approval.

Strategic objectives – 40% of total Annual Incentive, comprising:	
Innovation (20%) Novartis achieved 18 key approvals. Five of these key approvals were for new molecular entities–*Adakveo*, *Beovu*, *Mayzent*, *Piqray* and *Zolgensma* – which were all approved and launched in the US. Additional highlights include approvals for new indications for *Lucentis* in Europe, and for *Kymriah*, *Afinitor* and *Xolair* in Japan. The Company also achieved 22 submissions. Seventeen of these submissions were major submissions, including *Entresto* HF-rEF, submitted for approval in Japan; *Cosentyx* non-radiographic axial SA in Europe; SEG101 (crizanlizumab) for sickle cell disease in the US and Europe; and LCI699 (osilodrostat) for Cushing's syndrome in the US. Novartis also achieved 7 Phase IIb transitions, which was on target, and 15 proof of concepts/proof of mechanisms, slightly above the target of 14. Additionally, the CEO achieved his targets in the buildup of advanced therapy platforms. In the CAR-T platform, the clinical portfolio was expanded, with four new CAR-T programs having achieved "first patient first visit" (FPFV). In gene therapy, the platform was strengthened, with progress on new programs and manufacturing capacity expanded for *Zolgensma*. Finally, the protein degradation platform also advanced, with DKY709 achieving FPFV.	**Significantly above**
Operational excellence (20%) In key operational financial metrics, continuing operations Core Operating Income was USD 14 112 million, which is a 12% increase compared to prior year (+17% cc). Continuing operations Core Operating Margin was 29.7%, growing by 1.6 percentage points from prior year (+1.9% percentage points cc). The Alcon eye care business was successfully spun off on April 9, 2019, with immediate and significant value creation to shareholders. The timeline was in line with the target set at the beginning of the year, and value creation was ahead of expectations. Progress was made on the Sandoz transformation, including strategy definition and execution in major markets. On-target merger and acquisition efforts were realized, including the Aspen Japan deal. However, the Sandoz-Aurobindo deal was delayed until 2020, pending Federal Trade Commission approval. The transformation of Novartis Business Services (NBS) is ahead of plan, aiming to deliver USD 300 million of recurrent savings by the end of 2019, significantly ahead of the USD 250 million savings target. Novartis Technical Operations (NTO) is well ahead of its productivity target and on track to deliver over USD 1 billion in savings by 2020, through manufacturing site consolidations.	**Significantly above**
Data and digital (20%) All 12 priority lighthouses, aimed at embedding data science and digital technology across the enterprise, are currently either achieved or underway. Highlights include ACTalya, the virtual assistant for our sales reps that is now live with over 5 000 sales reps on priority brands in 11 markets, and the use of artificial intelligence (AI)-based marketing to optimize spend on Oncology brands in eight markets. We also launched the GenS platform for sickle cell patients in the US, which reached more than 25% of the total patient population and attracted more than 15 000 registrations. In the Novartis Institutes for BioMedical Research (NIBR) and Global Drug Development (GDD), the SENSE platform is now using AI to monitor all trials globally at Novartis. The Data42 project to ingest over 95% of clinical trial data from over 20 years of study was above the target (80%). In NTO, three key digital implementations progressed on target (Buying Engine, "spot on" cockpit, and Asset Management). In NBS, several projects were achieved, including rollout of an AI-based financial planning system and the single client engagement layer OneNovartis Services. Novartis made strong progress on expanding our capabilities in data science and AI by building up dedicated teams. More than 2 000 Novartis leaders participated in our Digital Immersion for Leaders program. The digital collaboration platform One Digital was launched, hosting over 260 projects in over 40 countries, and the Digital Awareness Hub has attracted more than 30% of the Novartis population. Partnerships were established with Microsoft and Amazon Web Services to collaborate on AI exploration and empowerment across the value chain. In China, Novartis signed a partnership with Tencent in heart failure to develop a novel patient solution that was tested by 90 patients and that gained buy-in from key opinion leaders.	**Above**

2019 CEO BALANCED SCORECARD – CONTINUED

People and culture (20%) The culture continues to develop positively toward an inspired, curious and unbossed organization supporting stronger innovation, performance and ethics. Investment has been made in leadership upskilling so that leaders can role model the culture attributes. We are reimagining our performance management based on three elements: (i) ensuring that goals are meaningful and link to the Company's purpose; (ii) ensuring that associates receive frequent and quality feedback that helps them develop; and (iii) ensuring that associates are recognized in a timely manner and rewarded for their contributions. Our new global recognition program was implemented and is currently reaching 66% of employees. Equal global parental leave was also launched in the first wave of countries. The learning strategy was implemented and encouraged all associates to spend 5% of their time on digital learning through courses available on Coursera, Learnlight and LinkedIn Learning. Further learning, including certificates at universities via Coursera, is also now freely available to all associates. Altogether, learning hours per associate increased 30% compared to the prior year. Associate engagement of our sales force is 78%, and 74% when considering all associates, which is notably above the 72% benchmark. Novartis progressed in line with its aspiration toward its UN commitments under the EPIC pledge to achieve gender balance in management by 2023. In 2019, female representation increased at all senior levels – the Executive Committee (25%), top executive positions (31%) and the management level (44%) – and it remains above external benchmarks. Our median gender pay gap of 2.4% is also well below the Bloomberg benchmark of 9% (10 000 companies).	**Above**
Building trust with society (including access to healthcare and reputation and other ESG topics) (20%) Novartis conducted an environmental, social and governance (ESG) materiality assessment, and then set a mix of qualitative and quantitative targets in each of the following four identified areas. Additional information can be found in our Novartis in Society, ESG 2019 report. ETHICAL STANDARDS Novartis strengthened representation on ethical matters by establishing a Risk & Resilience function, which was operational as of April 1, 2019. A newly integrated enterprise risk management strategy and process (the Novartis Risk Compass) was designed to support this and was fully executed in 2019. A new Code of Ethics is also on track for implementation, and a digital engagement app called iEthics has launched in 33 countries. PRICING AND ACCESS We reduced our launch time lag between approval of new medicines in developed markets and availability in lower-middle-income countries (LMICs) and lower-income countries (LICs). The five-month time lag for *Kisqali* was best in class. Our goal is a maximum of one year, which is extremely ambitious versus the industry benchmark. Overall, Novartis was able to achieve the targeted price reductions through manufacturing efficiencies and local brands for all LMICs/LICs to ensure affordability. Access plans were established for six of our biggest innovative brands for 2019 (including *Entresto*, *Cosentyx*, *Kisqali* and *Adakveo*), and more will follow in 2020. GLOBAL HEALTH Novartis put in place a new structure for the Global Health & Corporate Responsibility function. All flagship programs delivered against target. Novartis is the only big pharmaceutical company to be innovating in malaria, developing new programs KAF156 and KAE609. We pledged to reach an additional 1.3 million patients by 2020 in leprosy. Novartis was admitted to the Global Chagas Disease Coalition, and our Phase IIIb study is ongoing for advancing Chagas chronic cardiomyopathy. In sickle cell disease, a partnership was signed with the government of Ghana and the Sickle Cell Foundation of Ghana. RESPONSIBLE CITIZENSHIP Novartis successfully reduced the number of product recalls to below historical levels. The target was –10%, and actual achievement was –36%. Novartis achieved –3% in energy consumption, versus a target of –5%; –8% in water consumption, against a target of –5%; and –7% in waste sent for disposal, which was on target. The Company made progress in dealing with legacy litigation and integrity issues. Disappointingly, only 96% of health authority inspections were deemed acceptable, below the target of >99% set at the beginning of the year. While important progress was made in this area, given the reputational impact of the Zolgensma data integrity issue, the CEO has requested that he not receive an incentive payout for his 'building trust with society' objective. The Board of Directors agreed with this request.	**Met**
Overall assessment of strategic objectives	**Above**
Overall assessment of CEO balanced scorecard	**Outstanding**

ANNUAL INCENTIVE PAYOUT

Payout	**Based on the overall assessment, the Board of Directors decided on an adjusted Annual Incentive resulting in a payout for the CEO amounting to CHF 4 017 639, which is 160% of target, within the range of 0–200%.**

Long-Term Incentive plans, 2017-2019 cycle

- The Long-Term Performance Plan (LTPP) is the first of two LTI plans operated over the 2017-2019 cycle and rewards creation of long-term value and innovation.
- The Long-Term Relative Performance Plan (LTRPP) is the second of two LTI plans operated over the 2017-2019 cycle and rewards competitive shareholder return relative to the global healthcare peer group.

The structure of the two plans is summarized below.

OVERVIEW OF LONG-TERM INCENTIVE PLANS

Grant formula	At the start of the performance cycle, performance share units (PSUs) are granted under each of the Long-Term Incentive plans, as follows: **Step 1**: Annual base salary **x** Target incentive % **=** Grant value **Step 2**: Grant value **/** Share price **=** Target number of PSUs
On-target opportunity and payout range	**LTPP:** • CEO: 200% of annual base salary • Other Executive Committee members: between 130% and 190% of annual base salary **LTRPP:** • CEO: 125% of annual base salary • Other Executive Committee members: between 30% and 80% of annual base salary
Payout range	• From 0% to 200% of the on-target amount based on performance
Award vehicle	PSUs granted at the beginning of the cycle vest at the end of the three-year performance cycle and are converted into Novartis shares. PSUs carry dividend equivalents that are paid in shares at the end of the cycle to the extent that performance conditions have been met. **Payout formula:** Target number of PSUs **x** Performance factor **+** Dividend equivalents **=** Realized PSUs Policy information in "—Treatment of variable compensation for Executive Committee leavers" provides details on the treatment of Long-Term Incentive awards for leavers.

LTPP performance outcomes

NOVARTIS CASH VALUE ADDED (NCVA) (75% OF LTPP)

Description

NCVA incentivizes sales growth and margin improvement as well as asset efficiency. It is calculated as follows:

Operating income + Amortization, impairments, and adjusting for gains/losses from non-operating assets – Taxes	–	Capital charge (based on WACC[1]) on gross operational assets	=	NCVA[2]

[1] WACC = weighted average cost of capital
[2] NCVA = (cash flow return on investment % – WACC) x gross operational assets in constant currencies

The NCVA performance factor is based on a 1:3 payout curve, whereby a 1% deviation in realization versus target leads to a 3% change in payout (for example, a realization of 105% leads to a payout factor of 115%).

Accordingly, if performance over the three-year vesting period falls below 67% of target, no payout is made for this portion of the LTPP. Conversely, if performance over the three-year vesting period is above 133% of target, payout for this portion of the LTPP is capped at 200% of target.

Group performance outcome for the 2017-2019 cycle

During the 2017-2019 cycle, Novartis delivered an NCVA of USD 7.8 billion, 28% ahead of a target of USD 6.1 billion in constant currencies.

When setting the target for the 2017-2019 cycle, the Compensation Committee took into account the following:

- An expected increase in operational performance
- Key business transformation investments and restructuring costs, particularly in the manufacturing and business services organizations
- Higher capital cost driven by a growing capital base due to key M&A investments in line with our strategy to become a streamlined medicines company

The 2017-2019 NCVA performance was mainly driven by the following:

- Out-performance of sales targets over the three-year cycle by Pharmaceuticals (+USD 2.3 billion, mainly driven by Cosentyx, Entresto, Ophtha and valsartan) as well as by Oncology (+USD 1.0 billion, mainly driven by Promacta/Revolade, Tafinlar + Mekinist, and Afinitor). The return of Alcon to growth also played a key role.
- Overachievement of productivity targets, mainly in manufacturing (COGS), as well as further increased R&D and NBS productivity (–1% point of service cost over sales) allowed for targeted launch investments while increasing core operating income margin in constant currencies.

Following the application of the agreed payout curve, the 128% achievement versus target generates a performance factor of 184% of target for this part of the LTPP.

For LTPP cycles starting from 2019, Novartis replaced NCVA as the financial metric with a combination of a three-year net sales compound annual growth rate (CAGR) and core operating income CAGR.

INNOVATION (25% OF LTPP)

Description

Innovation is a key value driver for shareholders and is critical to our future. At the beginning of the cycle, the Research & Development Committee determines the most important target milestones, considering the following:

- The expected future potential revenue
- The potential qualitative impact of research and development on science and medicine
- The potential impact of research and development on the treatment or care of patients

For the cycle 2017-2019, innovation is specific to the respective head of the division or unit, and is a weighted average of the divisions or units for the CEO and Group function heads.

At the end of the cycle, the Compensation Committee determines the payout factor based on the performance assessment made by the Research & Development Committee. In the healthcare industry, achievement of 60% to 80% of pipeline targets set at the beginning of a three-year cycle is considered good performance. The payout range 0% to 150% of target is based on the achievement of the target milestones, and payout above 150% of target is only delivered for truly exceptional performance.

Group performance outcome for the 2017-2019 cycle

In the 2017-2019 period, Novartis achieved outstanding innovation performance against target. In this three-year period, Novartis received approval for eleven new molecular entities, of which five were approved in 2019 alone. Key achievements for the Innovative Medicines Division include the approvals of Adakveo for sickle cell disease and Zolgensma for spinal muscular atrophy, and the submission of OMB157 (ofatumumab) for multiple sclerosis as well as BYL719 (alpelisib) for HR+ mBC. However, some targets were missed, including the approval of RLX030 (serelaxin) for acute heart failure (due to the failure of the Phase III study for this program), and the approval of ACZ885 (canakinumab) for cardiovascular risk reduction (due to the withdrawal of the file). On the other hand, our overachievements included the rapid approval of Kisqali for HR+/HER2- advanced or metastatic breast cancer, and the approval of Kymriah for diffuse large B-cell lymphoma, which was ahead of schedule.

Sandoz delivered important goals, such as the submissions of pirfenidone, apixaban, amantadine hydrochloride and tazarotene cream, but also missed some goals, including the filing of two biosimilar programs, and one low molecular weight generic goal. NIBR made significant progress in applying novel technologies to therapeutic problems, including expanding the use of digital tools for measuring clinical endpoints, and the use of protein degradation to drug difficult targets, and a substantial expansion of the translational capabilities in oncology. NIBR also made substantial progress in the early-stage pipeline, progressing several agents in areas such as immuno-oncology, bispecifics and neuroscience.

Following input from the Research & Development Committee, the Board of Directors approved an innovation performance factor for the CEO and Group function heads of 105% of target.

LTPP PAYOUT

Payout

Overall, the Board of Directors approved an LTPP payout for the CEO amounting to CHF 3 510 963, which is 164% of target, within the range of 0–200%. This amount includes CHF 262 600 of dividend equivalents accrued, and CHF 814 147 in share price evolution over the performance cycle.

LTRPP performance outcomes

RELATIVE TOTAL SHAREHOLDER RETURN (TSR) (100% OF LTRPP)

Description

Performance is based on our TSR relative to a global healthcare peer group. Outperformance of this peer group is a key indicator that Novartis is delivering long-term value to its shareholders.

The peer group and payout matrix for the 2017-2019 performance cycle are as follows:

2017-2019 peer group (15 companies, excluding Novartis)		
AbbVie	Amgen	AstraZeneca
Biogen	Bristol-Myers Squibb	Celgene[1]
Eli Lilly & Co.	Gilead Sciences	GlaxoSmithKline
Johnson & Johnson	Merck & Co.	Novo Nordisk
Pfizer	Roche	Sanofi

Novartis position in the peer group	Payout range (% of target)
Position 1 – 4	160% – 200%
Position 5 – 8	100% – 150%
Position 9 – 12	20% – 80%
Position 13 – 16	0%

There will be no vesting for below-median performance for the 2018-2020 performance cycle onward as communicated in Item 6B. of the 2018 Annual Report.

[1] Celgene will be removed from the 2020 peer group as a result of the acquisition by Bristol-Myers Squibb.

The payout matrix includes a significant reduction (including scope to reduce to nil) when Novartis does not outperform the majority of the companies in the group. At the end of the performance cycle, all companies are ranked in order of highest to lowest TSR in USD.

The Compensation Committee uses its discretion to determine the payout factor within the ranges shown above, and takes into consideration factors such as absolute TSR, overall economic conditions, currency fluctuations and other unforeseeable economic situations.

Group performance outcome for the 2017-2019 cycle

Novartis TSR over the three-year period (2017-2019) was 63.4%. When compared to the global healthcare peer group, Novartis TSR ranked No. 6 out of 16 companies.

LTRPP PAYOUT FOR THE 2017-2019 CYCLE

Payout

Based on the ranking, the Board of Directors approved an LTRPP payout of 138% of target for the CEO, resulting in CHF 1 107 806. This amount includes CHF 82 858 of dividend equivalents accrued, and CHF 256 886 in share price evolution over the performance cycle.

Executive Committee membership changes in 2019

2019 Executive Committee member external appointments and buyout awards

The table below provides an overview of the Executive Committee external hires made during 2019. When an individual forfeits variable compensation as a result of an appointment at Novartis, the Compensation Committee may offer replacement awards, for example performance share units (PSUs), restricted share units (RSUs) or cash, on a like-for-like basis to mirror the forfeited compensation, based on evidence. Further details on our policy approach can be found in "—Executive Committee appointments compensation policy."

During 2019, one external newly appointed Executive Committee member was granted buyout awards in place of forfeited compensation at his former company in agreement with our aforementioned policy. These are described in the table below. Buyout awards are of equivalent economic value and are subject to the same vesting or performance period, payable no earlier than the compensation forfeited upon joining Novartis. Further details on the vesting of the awards below will be provided in relevant future compensation reports.

Name	Date of appointment	Cash payments (CHF)	Equity awards	Total value at grant
Richard Saynor	July 15, 2019	157 087	1 034 803	1 191 890
CEO, Sandoz			equal to 4 172 PSUs and 7 280 RSUs, vesting over the period 2020-2022	

2019 Executive Committee member departures

In determining the compensation arrangements for departing Executive Committee members, the Compensation Committee ensures that contractual entitlements are respected and that all payments are in line with our plan rules and the Swiss Ordinance against Excessive Compensation in Listed Companies.

All Executive Committee members have a 12-month notice period during which they are entitled to their contractual base salary, pension, Annual Incentive and other benefits. During the notice period, no new grants of LTPP/LTRPP awards are made.

The plan rules require that any equity vesting will occur on the normal vesting date (i.e., there is no accelerated vesting), and malus and clawback as well as non-compete restrictions will continue to apply. No severance or non-compete payments are made to departing Executive Committee members. Further details on the policy treatment of variable compensation for departing Executive Committee members can be found in "—Treatment of variable compensation for Executive Committee leavers."

The CEO of Novartis Pharmaceuticals, Paul Hudson, resigned from his position on June 7, 2019. The Board of Directors agreed to shorten his 12-month notice period and decided on a cool-off period until August 31, 2019, during which he had no access to any confidential information concerning the Company. Strictly in line with the Novartis incentive plan rules, his Annual Incentive for the 2019 performance year; unvested LTI for cycles 2017-2019, 2018-2020 and 2019-2021; unvested Deferred Share Bonus Plan (DSBP) awarded in 2017, 2018 and 2019; and unvested equity buyouts (5 993 PSUs) made at the point of his recruitment on July 1, 2016, to replace lost equity at his former employer were all forfeited in full.

The CEO of Sandoz, Richard Francis, stepped down from the Executive Committee on March 31, 2019, and will fulfill the required 12-month notice period until the end of March 2020. Outstanding LTI grants will vest at the end of the relevant performance cycles on a pro-rata basis per his contractual agreement and in line with the plan rules.

Realized compensation

To aid shareholders' understanding of the link between pay and performance, the Compensation Committee discloses the realized compensation for the CEO individually, and for the other members of the Executive Committee on an aggregated basis. Disclosing realized compensation means that the Annual Incentive and the LTI are disclosed at the end of their respective performance cycles, reflecting actual payouts based on performance.

The total actual payout may vary year on year depending on multiple factors, including the composition of the Executive Committee and the tenure of its members (as new members may not have vested LTI), compensation increases, payout of variable compensation based on actual performance, share price fluctuations of the LTI, and dividend equivalents.

2019 realized compensation for the CEO and other Executive Committee members

The table below reports fixed and other compensation for the year, including the Annual Incentive for the 2019 performance year, the realized LTI for the 2017-2019 performance cycle, and any buyouts vesting in 2019. The portion of the Annual Incentive paid in shares for the year 2019 is disclosed using the underlying value of Novartis shares at the date of grant, while the realized values of any other equity awards (including dividend equivalents) are calculated using the share price on the date of vesting.

		2019 annual base salary	2019 pension benefits[1]	2019 Annual Incentive		Long-Term Incentives		Other 2019 compensation	
						LTPP 2017-2019 cycle	LTRPP 2017-2019 cycle		
	Currency	Cash (amount)	Amount	Cash	Equity[2]	Equity (value at vesting date)[3]	Equity (value at vesting date)[3]	Amount[2,4,5]	Total realized compensation (incl. share price movement)[6]
Executive Committee members									
Vasant Narasimhan (CEO)	CHF	1 653 333	165 547	2 008 800	2 008 839	3 510 963	1 107 806	160 452	10 615 740
Aggregate realized compensation of the other 14 Executive Committee members, including the two members who stepped down during financial year 2019[7,8]	CHF	9 370 547	2 131 905	5 809 455	7 013 842	17 932 704	6 383 700	7 233 594	55 875 748
Total	**CHF**	**11 023 880**	**2 297 452**	**7 818 255**	**9 022 682**	**21 443 667**	**7 491 506**	**7 394 046**	**66 491 488**

See "—2018 realized compensation for the CEO and other Executive Committee members" for 2018 comparative figures.

[1] Includes mandatory employer contributions of CHF 4 373 for the CEO and CHF 63 461 for the other Executive Committee members paid by Novartis to governmental social security systems. This amount is out of total employer contributions of CHF 3 923 070 paid in 2019 for all Executive Committee members, and provides a right to the maximum future insured government pension benefit for the Executive Committee member.

[2] The portion of the Annual Incentive delivered in equity is rounded up to the nearest share, based on the closing share price on the grant date (January 21, 2020) of CHF 92.89 per Novartis share and USD 95.19 per ADR.

[3] The amounts represent the underlying share value of the 232 425 LTPP PSUs and 77 904 LTRPP PSUs vesting on January 17, 2020, to the CEO and other Executive Committee members for the performance cycle 2017-2019, inclusive of earned dividend equivalents for the three-year cycle (details in "—2017-2019 performance cycle LTPP and 2017-2019 performance cycle LTRPP").The taxable value is determined using the closing share price on the day the Novartis Board of Directors approved the final LTPP and LTRPP performance factors (i.e., January 21, 2020) of 92.89 per Novartis share and USD 95.19 per ADR. Shannon Thyme Klinger, Stefan Lang, Susanne Schaffert and Marie-France Tschudin were promoted to the Executive Committee during the course of the performance period 2017-2019, and as such, the information disclosed reflects their pro-rata LTPP & LTRPP 2017-2019 payouts attributable to the period they were a member of the Executive Committee. Bertrand Bodson, Klaus Moosmayer, John Tsai, Robert Weltevreden and Richard Saynor joined Novartis post the 2017 LTI awards being made and hence did not receive LTPP & LTRPP awards for the 2017-2019 performance period.

[4] Includes any other perquisites, benefits in kind, international assignment benefits as per the global mobility policy (e.g., housing, international health insurance, children's school fees, tax equalization) as well as vested shares under LTPP & LTRPP after the step down date.

[5] Includes 5 430 vested RSUs (CHF 502 003) on July 28, 2019, to John Tsai, in lieu of the LTI that he forfeited when leaving his previous employer and 1 323 vested RSUs (CHF 123 092) and 14 470 vested PSUs (CHF 1 346 289) on March 24, 2019, to Paul Hudson in lieu of the LTI that he forfeited when leaving his previous employer. The PSUs had the same performance measures as the LTPP for the 2016-2018 performance cycle (NCVA and long-term innovation).

[6] All amounts are before deduction of the social security contribution and income tax due by the Executive Committee member.

[7] Comprises the compensation of Richard Francis, the former CEO of Sandoz including the vesting of his Long-Term Incentives for performance cycle 2017-2019, as per the plan rules. Unvested shares for Paul Hudson were forfeited upon his departure from the Company. See "—Executive Committee member departures" for details.

[8] Amounts for Executive Committee members paid in USD were converted at a rate of USD 1.00 = CHF 0.9938, which is the same average exchange rate used in the Group's 2019 consolidated financial statements.

The table and information below provide additional details on awards granted as part of the 2017-2019 LTPP and LTRPP performance cycle, including the number of shares awarded and delivered, following the application of the payout factor and the addition of dividend equivalent shares.

2017-2019 LTPP performance cycle

	PSUs at grant			Shares delivered at vesting				
	PSUs (target number)	PSUs (target value at grant date) (CHF)[2]	Payout factor for LTPP (% of target)	Performance shares delivered at vesting (number)	Performance shares delivered at vesting (value at vesting date) (CHF)[3]	Dividend equivalent shares delivered at vesting (number)[4]	Dividend equivalent shares delivered at vesting (value at vesting date) (CHF)	Total shares delivered at vesting (value at vesting date) (CHF)
Executive Committee members[1]								
Vasant Narasimhan	21 323	1 980 693	164%	34 970	3 248 363	2 827	262 600	3 510 963
Other 14 Executive Committee members, including the two members who stepped down during financial year 2019[5]	109 616	10 247 244	164%	178 984	16 735 046	13 151	1 227 397	17 932 704
Total	**130 939**	**12 227 938**		**213 954**	**19 983 409**	**15 978**	**1 489 997**	**21 443 667**

[1] Shannon Thyme Klinger, Stefan Lang, Susanne Schaffert and Marie-France Tschudin joined the Executive Committee during the course of the performance period 2017-2019. As such, the information disclosed reflects their pro-rata LTPP 2017-2019 payout attributable to the period they were a member of the Executive Committee. Bertrand Bodson, Klaus Moosmayer, John Tsai, Robert Weltevreden and Richard Saynor joined Novartis post the 2017 LTPP awards being made and hence did not receive an LTPP award for the 2017-2019 performance period.

[2] The shown amounts represent the underlying share value of the target number of PSUs granted to each Executive Committee member for the performance period 2017-2019, based on the closing share price on the grant date (January 17, 2017) of CHF 71.35 per Novartis share and USD 71.99 per ADR.

[3] The shown amounts represent the underlying share value of the target number of PSUs vested for the performance period 2017-2019, based on the last closing share price on the day the Novartis Board of Directors approved the final LTPP and LTRPP performance payout factors (i.e., January 21, 2020) of CHF 92.89 per Novartis share and USD 95.19 per ADR.

[4] Dividend equivalent shares are calculated on the dividend each member of the Executive Committee would have received, based on the actual number of shares delivered at the end of the performance period 2017-2019. At vesting, the dividend equivalents are credited in shares or ADRs.

[5] Includes the LTPP vesting for Richard Francis, the former CEO, Sandoz for performance cycle 2017-2019, as per the plan rules. The LTPP vesting for the former CEO, Novartis Pharmaceuticals, Paul Hudson were forfeited on August 31, 2019, at his departure from the Company. See "—LTPP perfomance outcomes" for further details.

2017-2019 LTRPP performance cycle

	PSUs at grant			Shares delivered at vesting				
	PSUs (target number)	PSUs (target value at grant date) (CHF)[2]	Payout factor for LTRPP (% of target)	Performance shares delivered at vesting (number)	Performance shares delivered at vesting (value at vesting date) (CHF)[3]	Dividend equivalent shares delivered at vesting (number)[4]	Dividend equivalent shares delivered at vesting (value at vesting date) (CHF)	Total shares delivered at vesting (value at vesting date) (CHF)
Executive Committee members[1]								
Vasant Narasimhan	7 996	742 748	138%	11 034	1 024 948	892	82 858	1 107 806
Other 14 Executive Committee members, including the two members who stepped down during financial year 2019[5]	45 858	4 290 344	138%	63 283	5 920 579	5 077	474 933	6 383 700
Total	**53 854**	**5 033 093**		**74 317**	**6 945 527**	**5 969**	**557 791**	**7 491 506**

[1] Shannon Thyme Klinger, Stefan Lang, Susanne Schaffert and Marie-France Tschudin joined the Executive Committee during the course of the performance period 2017-2019. As such, the information disclosed reflects their pro-rata LTRPP 2017-2019 payout attributable to the period they were a member of the Executive Committee. Bertrand Bodson, Klaus Moosmayer, John Tsai, Robert Weltevreden and Richard Saynor joined Novartis post the 2017 LTRPP awards being made and hence did not receive an LTRPP award for the 2017-2019 performance period.

[2] The shown amounts represent the underlying share value of the target number of PSUs granted to each Executive Committee member for the performance period 2017-2019, based on the closing share price on the grant date (January 17, 2017) of CHF 71.35 per Novartis share and USD 71.99 per ADR.

[3] The shown amounts represent the underlying share value of the target number of PSUs vested for the performance period 2017-2019, based on the last closing share price on the day the Novartis Board of Directors approved the final LTPP and LTRPP performance payout factors (i.e., January 21, 2020) of CHF 92.89 per Novartis share and USD 95.19 per ADR.

[4] Dividend equivalent shares are calculated on the dividend each member of the Executive Committee would have received, based on the actual number of shares delivered at the end of the performance period 2017-2019. At vesting, the dividend equivalents are credited in shares or ADRs.

[5] Includes the LTRPP vesting for the CEO of Sandoz for performance cycle 2017-2019, as per the plan rules. The LTRPP vesting for Paul Hudson were forfeited on August 31, 2019, at his departure from the Company. See "—LTRPP perfomance outcomes" for further details.

The table and information below provide details on the 2018 realized compensation for the CEO and other Executive Committee members, for comparative purposes.

2018 realized compensation for the CEO and other Executive Committee members

		2018 annual base salary	2018 pension benefits[1]	2018 Annual Incentive		Long-Term Incentives		Other 2018 compensation	
						LTPP 2016-2018 cycle	LTRPP 2016-2018 cycle		
	Currency	Cash (amount)	Amount	Cash	Equity[2]	Equity (value at vesting date)[3]	Equity (value at vesting date)	Amount[2,4]	Total realized compensation (incl. share price movement)[5]
Executive Committee members									
Vasant Narasimhan (CEO from February 1, 2018)	CHF	1 491 667	168 233	1 594 801	1 594 805	1 796 381	0	34 401	6 680 288
Aggregate realized compensation of the other 16 Executive Committee members, including the four members who stepped down during financial year 2018[6,7]	CHF	9 297 021	1 874 671	5 727 765	5 532 316	24 079 974	0	13 131 653	59 643 400
Total	**CHF**	**10 788 688**	**2 042 904**[1]	**7 322 566**	**7 127 121**	**25 876 355**	**0**	**13 166 054**	**66 323 688**

[1] Includes mandatory employer contributions of CHF 4 336 for the CEO and CHF 78 403 for the other Executive Committee members paid by Novartis to governmental social security systems. This amount is out of total employer contributions of CHF 2 847 422 paid in 2018 for all Executive Committee members, and provides a right to the maximum future insured government pension benefit for the Executive Committee member.
[2] The portion of the Annual Incentive delivered in equity is rounded up to the nearest share, based on the closing share price on the grant date (January 22, 2019) of CHF 88.14 per Novartis share and USD 88.32 per ADR.
[3] The amounts represent the underlying share value of the 294 971 PSUs vesting on January 22, 2019, to the CEO and other Executive Committee members for the performance cycle 2016-2018, inclusive of earned dividend equivalents for the three-year cycle. The taxable value is determined using the closing share price on the day the Novartis Board approved the final LTPP and LTRPP performance factors (i.e., January 22, 2019) of CHF 88.14 per Novartis share and USD 88.32 per ADR. Vasant Narasimhan, Shannon Thyme Klinger, Stefan Lang and André Wyss joined the Executive Committee during the course of the performance period 2016-2018, and as such, the information disclosed reflects their pro-rata LTPP 2016-2018 payout attributable to the period they were a member of the Executive Committee. Elizabeth Barrett, Bertrand Bodson, Paul Hudson, Klaus Moosmayer, John Tsai and Robert Weltevreden joined post the 2016 LTPP awards being made and hence did not receive an LTPP award for the 2016-2018 performance period.
[4] Includes any other perquisites, benefits in kind, international assignment benefits as per the global mobility policy (e.g., housing, international health insurance, children's school fees, tax equalization) as well as vested shares under LTPP after the step down date.
[5] All amounts are before deduction of the social security contribution and income tax due by the Executive Committee member.
[6] Comprises the compensation of the outgoing CEO, General Counsel, CEO of Alcon, and President of Novartis Operations and Country President Switzerland, including the vesting of their Long-Term Incentives for performance cycle 2016-2018, as per the plan rules.
[7] Amounts for Executive Committee members paid in USD were converted at a rate of UDS 1.00 = CHF 0.978, which is the same average exchange rate used in the Group's 2018 consolidated financial statements.

Realized compensation for the Executive Committee for 2019 compared to 2018

In his second, and first full year in the role, and following a strong performance year for the Company, the 2019 total realized compensation for the CEO was **CHF 10 615 740**, and includes the payouts of the Annual Incentive, LTPP and LTRPP based on actual performance assessed for the three-year cycle concluding in 2019. This increase, compared to 2018, can be further explained by the following:

- The CEO's annual base salary was increased by 8% from March 31, 2019 in line with our "—Executive Committee appointments compensation policy" as communicated in Item 6.B of the 2018 Annual Report.
- The 2017-2019 LTPP and LTRPP (his first LTI granted as a member of the Executive Committee prior to his CEO role) vested at 164% and 138%, respectively (compared to the 2018 payouts of 136% and 0%).
- The Novartis share price increased by 30.2% between the grant and vest date of the LTPP and LTRPP.

Overall, the 2019 total realized compensation for the Executive Committee, including the CEO, was CHF 66.5 million, which is broadly in line with the 2018 total realized compensation of CHF 66.3 million. The lower turnover of Executive Committee members (four members stepped down in 2018 versus two members in 2019) was partly offset by the higher performance payouts of the variable pay elements (both the Annual Incentive and the LTI) due to the strong Company performance. In addition, 2019 was also the first full year for a number of other members of the Executive Committee.

Compensation at grant value

In accordance with the Swiss Ordinance against Excessive Compensation in Listed Companies, Novartis continues to disclose total compensation at grant value for the CEO and other Executive Committee members. The following tables disclose for the CEO and other Executive Committee members:

- Fixed 2019 compensation (base salary and benefits)
- The actual cash portion and the deferred portion granted in equity of the 2019 Annual Incentive
- 2019-2021 LTPP performance cycle awards, which are reported at target value at grant date under the assumption that the awards will vest at 100% achievement, excluding any share price movement and dividend equivalents that may be accrued over the performance cycle. The future payout will be determined only after the performance cycle concludes in three years (i.e., the end of 2021), with a payout range of 0% to 200% of the target value.
- Other compensation for 2019, which includes other benefits and the full amount of compensation for lost entitlements from former employers (buyouts), and compensation during the notice period (between the date of stepping down from the Executive Committee and either December 31 or the end of the contractual notice), either paid in cash or granted in equity in the year

To assess CEO actual pay for performance in 2019, including the Annual Incentive payout for the 2019 performance year and the LTI payouts for the 2017-2019 performance cycle, shareholders should refer to the 2019 realized compensation table in "—2019 realized compensation for the CEO and other Executive Committee members."

2019 compensation at grant value for the CEO and other Executive Committee members

		Fixed compensation and pension benefits		Variable compensation				
		Actual compensation paid or granted for 2019				Long-Term Incentive 2019-2021 cycle grants at target		
		2019 annual base salary	2019 pension benefits	2019 Annual Incentive (performance achieved)		LTPP 2019-2021 cycle	Other 2019 compensation	Total compensation paid, promised or granted 2019
	Currency	Cash (amount)	Amount [1]	Cash (amount)	Equity (value at grant date) [2]	PSUs (target value at grant date) [3]	Amount [4]	Amount [5]
Executive Committee members active on December 31, 2019								
Vasant Narasimhan	CHF	1 653 333	165 547	2 008 800	2 008 839	5 440 530	160 452	11 437 501
Steven Baert	CHF	789 750	161 454	633 360	633 417	1 662 585	124 979	4 005 545
Bertrand Bodson	CHF	607 500	170 178	341 040	341 092	974 476	137 826	2 572 111
James Bradner [6]	USD	1 126 781	359 961	951 720	951 805	2 832 511	85 498	6 308 275
Harry Kirsch	CHF	1 053 000	164 467	1 045 044	1 045 105	2 744 591	27 658	6 079 865
Shannon Thyme Klinger	CHF	783 333	188 990	468 000	468 073	1 600 005	111 375	3 619 776
Steffen Lang	CHF	745 000	167 815	408 000	612 145	1 200 026	9 810	3 142 796
Klaus Moosmayer	CHF	500 000	125 483	260 000	260 092	800 047	171 749	2 117 371
Richard Saynor (from July 15, 2019) [7]	CHF	356 021	87 118	179 315	179 371	–	1 950 908	2 752 732
Susanne Schaffert [7]	CHF	850 000	167 096	459 000	1 071 115	1 870 066	160 252	4 577 528
John Tsai	CHF	858 333	181 048	602 000	602 020	2 064 063	377 544	4 685 007
Marie-France Tschudin (from June 7, 2019) [7]	CHF	481 667	92 090	290 630	290 653	968 249	–	2 123 289
Robert Weltevreden	CHF	607 500	157 423	158 340	475 132	974 476	4 860	2 377 731
Subtotal		**10 405 223**	**2 186 434**	**7 799 341**	**8 932 950**	**23 114 040**	**3 322 378**	**55 760 366**
Executive Committee members who stepped down during 2019								
Richard Francis (until March 19, 2019) [8, 9]	CHF	179 315	36 025	18 914	37 435	720 460	3 808 445	4 800 594
Paul Hudson (until June 7, 2019) [9, 10]	CHF	439 342	74 994	–	–	270 451	2 885 164	3 669 950
Subtotal		**618 657**	**111 018**	**18 914**	**37 435**	**990 910**	**6 693 609**	**8 470 543**
Total		**11 023 880**	**2 297 452**	**7 818 255**	**8 970 384**	**24 104 951**	**10 015 988**	**64 230 910**

Based on assumption of 100% payout at target. Actual payout (0–200% of target) will be known at the end of the three-year cycle in January 2022.

See next page for 2018 comparative figures.

[1] Includes mandatory employer contributions of CHF 4 373 for the CEO and CHF 63 461 for the other Executive Committee members paid by Novartis to governmental social security systems. This amount is out of total employer contributions of CHF 3 923 070 paid in 2019 for all Executive Committee members, and provides a right to the maximum future insured government pension benefit for the Executive Committee member.

[2] The portion of the Annual Incentive delivered in equity is rounded up to the nearest share, based on the closing share price on the grant date (January 21, 2020) of CHF 92.89 per Novartis share and USD 95.19 per ADR.

[3] The amounts represent the underlying share value of the target number of PSUs granted to Executive Committee members for the performance cycle 2019-2021, based on the closing share price on the grant date (January 22, 2019) of CHF 88.14 per Novartis share and USD 88.32 per ADR for all members except for Mr. Richard Saynor, who was not part of the Company at the annual grant date and hence did not receive an LTPP award.

[4] Includes any other perquisites, benefits in kind, and international assignment benefits as per the global mobility policy (e.g., housing, international health insurance, children's school fees, tax equalization)

[5] All amounts are before deduction of the social security contribution and income tax due by the Executive Committee member.

[6] Amounts in USD for James Bradner were converted at a rate of CHF 1.00 = USD 1.006 , which is the average rate used in the Group's 2019 consolidated financial statements.

[7] For those members who joined the Executive Committee in 2019, the information under the columns "Actual compensation paid or granted for 2019" and "Long-Term Incentive 2019-2021 cycle grants at target" includes their pro-rata compensation from the date they joined the Executive Committee to December 31, 2019 or to the end of the performance cycle in the case of the "Long-Term Incentive 2019-2021 cycle grants at target".

[8] Richard Francis stepped down as CEO, Sandoz on March 19, 2019 and will leave the company on 31 March, 2020 in line with his contractual notice period. Until the end of the notice period, he will receive further contractual compensation that includes the base salary, Annual Incentive and pension benefits. In accordance with the plan rules, the LTPP 2019-2021 cycle grant (21 217 PSUs), included in full in the above table, will vest on the normal vesting date pro-rata based on the number of months of Novartis employment during the performance cycle. The vesting of this grant is subject to performance conditions assessed at the end of the period.

[9] For those members leaving the Executive Committee, the columns under "Actual compensation paid or granted for 2019" and "Long-Term Incentive 2019-2021 cycle grants at target" reflect the pro-rata compensation for their period as Executive Committee member. The column "Other 2019 compensation" includes inter alia their pro-rata compensation from the date they left the Executive Committee to December 31, 2019 or to the end of the performance cycle in the case of the "Long-Term Incentive 2019-2021 cycle grants at target". See "—2019 Executive Committee member departures" for details.

[10] Paul Hudson stepped down as CEO, Novartis Pharmaceuticals on June 7, 2019 and left the company on August 31, 2019 in line with his reduced contractual notice period (see for more details "—2019 Executive Committee member departures"). The Annual Incentive and LTPP 2019-2021 cycle grant (31 553 PSUs) included in the table above, were forfeited in full upon his departure.

2018 compensation at grant value for the CEO and other Executive Committee members

For comparative purposes, the table below provides the compensation at grant value for 2018.

		Fixed compensation and pension benefits		Variable compensation					
		Actual compensation paid or granted for 2018				Long-Term Incentive 2018-2020 cycle grants at target			
		2018 annual base salary	2018 pension benefits	2018 Annual Incentive (performance achieved)		LTPP 2018-2020 cycle	LTRPP 2018-2020 cycle	Other 2018 compensation	Total compensation paid, promised or granted 2018
	Currency	Cash (amount)	Amount [1]	Cash (amount)	Equity (value at grant date) [2]	PSUs (target value at grant date) [3]	PSUs (target value at grant date) [3]	Amount [4]	Amount [5]
Executive Committee members active on December 31, 2018									
Vasant Narasimhan (CEO from February 1, 2018) [6]	CHF	1 491 667	168 233	1 594 801	1 594 805	3 100 046	1 937 539	34 401	9 921 491
Steven Baert	CHF	780 000	152 914	585 000	585 073	1 170 051	468 053	77 550	3 818 642
Elizabeth Barrett (from February 1, 2018, to December 31, 2018) [7]	CHF	779 167	174 274	0	0	1 360 040	510 057	2 747 859	5 571 397
Bertrand Bodson (from April 1, 2018) [8]	CHF	450 000	97 666	216 986	217 001	440 614	110 174	146 478	1 678 918
James Bradner [9]	USD	1 094 462	257 018	924 000	924 004	1 870 085	880 086	63 313	6 012 967
Richard Francis	CHF	850 000	176 368	382 500	382 528	1 360 057	510 001	1 790 428	5 451 882
Paul Hudson	CHF	985 000	180 771	1 007 325	1 007 352	1 683 036	792 027	94 355	5 749 866
Harry Kirsch	CHF	1 040 000	173 499	858 000	858 043	1 768 008	832 067	58 814	5 588 431
Shannon Thyme Klinger (from April 1, 2018) [8]	CHF	520 833	103 448	275 770	275 790	619 595	185 862	37 118	2 018 416
Steffen Lang (from April 1, 2018) [8]	CHF	540 000	99 535	260 384	260 454	596 631	179 064	8 595	1 944 663
Klaus Moosmayer (from December 1, 2018)	CHF	41 667	9 704	16 986	17 011	0	0	808 821	894 189
John Tsai (from May 1, 2018)	CHF	566 667	126 845	313 801	313 867	0	0	4 590 950	5 912 129
Robert Weltevreden (from June 1, 2018)	CHF	350 000	70 950	77 392	232 337	671 702	155 003	3 715	1 561 099
Subtotal		**9 464 855**	**1 785 446**	**6 492 171**	**6 647 490**	**14 597 819**	**6 540 145**	**10 460 974**	**55 988 900**
Executive Committee members who stepped down during 2018 [10]									
Joseph Jimenez (CEO until January 31, 2018)	CHF	178 601	19 146	133 767	0	0	0	2 357 371	2 688 885
F. Michael Ball (until June 30, 2018) [9]	USD	555 397	126 594	333 238	333 231	888 640	388 845	2 970 642	5 596 587
Felix R. Ehrat (until May 31, 2018)	CHF	384 740	68 918	153 896	153 892	654 081	230 877	2 346 072	3 992 477
André Wyss (until March 31, 2018) [11]	CHF	217 582	45 646	216 986	0	116 060	43 523	1 375 802	2 015 599
Subtotal		**1 323 833**	**257 458**	**830 395**	**479 632**	**1 638 802**	**654 503**	**8 983 098**	**14 167 721**
Total		**10 788 688**	**2 042 904**	**7 322 566**	**7 127 122**	**16 236 621**	**7 194 648**	**19 444 072**	**70 156 621**

Based on assumption of 100% payout at target. Actual payout (0–200% of target) will be known at the end of the three-year cycle in January 2021.

[1] Includes mandatory employer contributions of CHF 4 336 for the CEO and CHF 78 403 for the other Executive Committee members paid by Novartis to governmental social security systems. This amount is out of total employer contributions of CHF 2 847 422 paid in 2018 for all Executive Committee members, and provides a right to the maximum future insured government pension benefit for the Executive Committee member.

[2] The portion of the Annual Incentive delivered in equity is rounded up to the nearest share, based on the closing share price on the grant date (January 22, 2019) of CHF 88.14 per Novartis share and USD 88.32 per ADR.

[3] The amounts represent the underlying share value of the target number of PSUs granted to Executive Committee members for the performance cycle 2018-2020, based on the closing share price on the grant date (January 18, 2018) of CHF 82.90 per Novartis share and USD 86.41 per ADR for all members except Elizabeth Barrett and Robert Weltevreden. For Ms. Barrett and Mr. Weltevreden, the closing share price on the grant date was respectively CHF 83.52 on February 1, 2018, and CHF 74.70 on June 1, 2018, per Novartis share.

[4] Includes any other perquisites, benefits in kind, and international assignment benefits as per the global mobility policy (e.g., housing, international health insurance, children's school fees, tax equalization)

[5] All amounts are before deduction of the social security contribution and income tax due by the Executive Committee member.

[6] The figures include Vasant Narasimhan's compensation of January 2018 as Head of Global Drug Development.

[7] Elizabeth Barrett stepped down from the role of CEO, Novartis Oncology and from the Executive Committee as at the end of the 2018 business year. The LTPP and LTRPP grants (16 284 and 6 107 PSUs, respectively) for the 2018-2020 performance cycle, and the 2018 buyout award of 21 267 performance shares, reflected in other compensation, both included in the table above, were forfeited in full upon her departure on December 31, 2018.

[8] For those members who joined the Executive Committee in 2018, the information under the columns "2018 annual base salary," "2018 pension benefits," "2018 Annual Incentive," "LTPP" and "LTRPP" includes their pro-rata compensation from the date they joined the Executive Committee to December 31, 2018.

[9] Amounts in USD for F. Michael Ball and James Bradner were converted at a rate of CHF 1.00 = USD 0.978, which is the same average exchange rate used in the Group's 2018 consolidated financial statements.

[10] For those members who left the Executive Committee in 2018, the information under the columns "2018 annual base salary," "2018 pension benefits," "2018 Annual Incentive," "LTPP" and "LTRPP" reflects the pro-rata compensation for the period they were an Executive Committee member in 2018. The information under the column "Other 2018 compensation" also includes, inter alia, their pro-rata compensation from the date they stepped down from the Executive Committee to December 31, 2018.

[11] The full number of PSUs under LTPP and LTRPP 2018-2020 granted to André Wyss were 16 985 and 6 370, respectively. The amounts included under LTPP and LTRPP in the table above are disclosed on a pro-rata basis to the end of his notice period (i.e., September 30, 2018), per his contractual agreement and subject to the plan rules.

Compensation at grant value for the Executive Committee for 2019 compared to 2018
Grant compensation delivered to the CEO increased by CHF 1.5 million from 2018 to 2019, largely due to the payout of the 2019 Annual Incentive, and an 8% increase in annual base salary from March 31, 2019 as reported in Item 6.B of the 2018 Annual Report.

Overall, there is a notable decrease when comparing the 2019 Executive Committee total compensation at grant value of CHF 64.2 million to the 2018 grant value of CHF 70.2 million. The difference is primarily due to:

- The reduced overlap of members (in total, 17 Executive Committee members were granted compensation in 2018 compared to 15 members in 2019).
- The CEO of Alcon, who stepped down in 2018 and was not replaced following the decision to spin off Alcon.
- Buyout awards (in cash and/or in equity) granted to one onboarding external member in 2019 versus three joining in 2018 (see Item 6.B in the 2018 Annual Report).

Additional disclosures for the CEO and other Executive Committee members

This section provides additional disclosures, including information about the shareholdings of the CEO and the other Executive Committee members.

Malus and clawback
Per our "—Executive Committee compensation philosophy and principles," in 2019, there was no legal or factual basis on which to exercise malus or clawback for current or former Executive Committee members.

Number of equity instruments granted to the CEO and other Executive Committee members for financial year 2019

	Variable compensation[1]		
	2019 Annual Incentive (performance achieved)	LTPP 2019-2021 cycle	Other
	Equity (number)[2]	PSUs (target number)[3]	Equity/PSUs (number)
Executive Committee members active on December 31, 2019			
Vasant Narasimhan	21 626	61 726	0
Steven Baert	6 819	18 863	0
Bertrand Bodson	3 672	11 056	0
James Bradner	9 999	32 071	0
Harry Kirsch	11 251	31 139	0
Shannon Thyme Klinger	5 039	18 153	0
Steffen Lang	6 590	13 615	0
Klaus Moosmayer	2 800	9 077	0
Richard Saynor (from July 15, 2019)[4]	1 931	0	11 452
Susanne Schaffert	11 531	21 217	0
John Tsai	6 481	23 418	0
Marie-France Tschudin (from June 7, 2019)[4]	3 129	11 085	0
Robert Weltevreden	5 115	11 056	0
Subtotal	**95 983**	**262 476**	**11 452**
Executive Committee members who stepped down during 2019			
Richard Francis (until March 19, 2019)[5, 6]	403	8 841	0
Paul Hudson (until June 7, 2019)[5, 7]	0	4 525	0
Subtotal	**403**	**13 366**	**0**
Total	**96 386**	**275 842**	**11 452**

See next page for 2018 comparative figures.

[1] The values of the awards are reported in the table "2019 compensation at grant value for the CEO and other Executive Committee members" in "—2019 compensation at grant value for the CEO and other Executive Committee members."

[2] Vested shares, restricted shares and/or RSUs granted under the Annual Incentive for performance period 2019

[3] Target number of PSUs granted under the LTPP as applicable for the performance cycle 2019-2021

[4] For those members who joined the Executive Committee in 2019, the information under the column "Variable compensation" includes their pro-rata number of equity instruments from the date they joined the Executive Committee to December 31, 2019 or to the end of the performance cycle in case of the "LTPP 2019-2021 cycle".

[5] For those members leaving the Executive Committee, the column under "Variable compensation" reflects the pro-rata number of equity instruments for their period as Executive Committee member. The column "Other" includes their pro-rata compensation from the date they left the Executive Committee to December 31, 2019 or to the end of the performance cycle in the case of the "LTPP 2019-2021 cycle". See "—2019 Executive Committee member departures" for details.

[6] Richard Francis stepped down as CEO, Sandoz on March 19, 2019 and will leave the company on 31 March, 2020 in line with his contractual notice period. In accordance with the plan rules, the LTPP 2019-2021 cycle grant (21 217 PSUs), included in full in the above table, will vest on the normal vesting date pro-rata based on the number of months of Novartis employment during the performance cycle. The vesting of this grant is subject to performance conditions assessed at the end of the period.

[7] Paul Hudson stepped down as CEO, Novartis Pharmaceuticals on June 7, 2019 and left the company on August 31, 2019 in line with his reduced contractual notice period (see for more details "—2019 Executive Committee member departures"). The 2019 Annual Incentive and LTPP 2019-2021 cycle grant (31 553 PSUs) included in the table above, were forfeited in full upon his departure.

Number of equity instruments granted to the CEO and other Executive Committee members for financial year 2018 (comparative information)

	Variable compensation[1]			
	2018 Annual Incentive (performance achieved)	LTPP 2018-2020 cycle	LTRPP 2018-2020 cycle	Other
	Equity (number)[2]	PSUs (target number)[3]	PSUs (target number)[3]	Equity/PSUs (number)
Executive Committee members active on December 31, 2018				
Vasant Narasimhan (CEO from February 1, 2018)	18 094	37 395	23 372	0
Steven Baert	6 638	14 114	5 646	0
Elizabeth Barrett (from February 1, 2018, to December 31, 2018)[4]	0	16 284	6 107	21 267
Bertrand Bodson (from April 1, 2018)	2 462	5 315	1 329	0
James Bradner	10 462	21 642	10 185	0
Richard Francis	4 340	16 406	6 152	0
Paul Hudson	11 429	20 302	9 554	0
Harry Kirsch	9 735	21 327	10 037	0
Shannon Thyme Klinger (from April 1, 2018)	3 129	7 474	2 242	0
Steffen Lang (from April 1, 2018)	2 955	7 197	2 160	0
Klaus Moosmayer (from December 1, 2018)	193	0	0	8 857
John Tsai (from May 1, 2018)	3 561	0	0	27 381
Robert Weltevreden (from June 1, 2018)	2 636	8 992	2 075	0
Subtotal	**75 634**	**176 448**	**78 859**	**57 505**
Executive Committee members who stepped down during 2018				
Joseph Jimenez (CEO until January 31, 2018)[5]	0	0	0	0
F. Michael Ball (until June 30, 2018)	7 609	10 284	4 500	18 865
Felix R. Ehrat (until May 31, 2018)	4 221	7 890	2 785	17 603
André Wyss (until March 31, 2018)[6]	0	1 400	525	3 915
Subtotal	**11 830**	**19 574**	**7 810**	**40 383**
Total	**87 464**	**196 022**	**86 669**	**97 888**

[1] The values of the awards are reported in the table "2018 compensation at grant value for the CEO and other Executive Committee members" in "—2018 compensation at grant value for the CEO and Executive Committee members."

[2] Vested shares, restricted shares and/or RSUs granted under the Annual Incentive for performance period 2018

[3] Target number of PSUs granted under the LTPP and LTRPP as applicable for the performance cycle 2018-2020

[4] Elizabeth Barrett stepped down from the role of CEO, Novartis Oncology and from the Executive Committee as at the end of the 2018 business year. The LTPP and LTRPP grants (16 284 and 6 107 PSUs, respectively) for the 2018-2020 performance cycle, and the 2018 buyout award of 21 267 performance shares, reflected in other compensation, both included in the table above, were forfeited in full upon her departure on December 31, 2018.

[5] Joseph Jimenez received his 2018 Annual Incentive 100% in cash and was not granted LTPP and LTRPP awards for the performance cycle 2018-2020.

[6] André Wyss stepped down from the Executive Committee on March 31, 2018, and ended his notice period on September, 30 2018. He received his 2018 Annual Incentive 100% in cash on a pro-rata basis, and the LTPP and LTRPP grants for the 2018-2020 performance cycle, included in the table above, will vest at the end of the performance cycle on a pro-rata basis per his contractual agreement and subject to the plan rules.

Share ownership requirements for the CEO and other Executive Committee members

Executive Committee members are required to own at least a minimum multiple of their annual base salary in Novartis shares or RSUs within five years of hire or promotion, as set out in the table below. In the event of a substantial rise or drop in the share price, the Board of Directors may, at its discretion, amend that time period accordingly.

FUNCTION	OWNERSHIP LEVEL
CEO	5 x base compensation
Other Executive Committee members	3 x base compensation

The determination of equity amounts against the share ownership requirements is defined to include vested and unvested Novartis shares or American Depositary Receipts (ADRs), and RSUs acquired under the Company's compensation plans. However, unvested matching shares granted under former matching programs, such as the Leveraged Share Savings Plan (LSSP), and any unvested PSUs are excluded. The determination also includes other shares and vested options of Novartis shares or ADRs that are owned directly or indirectly by "persons closely linked" to an Executive Committee member. The Compensation Committee reviews compliance with the share ownership guideline on an annual basis.

Shares, ADRs and other equity rights owned by Executive Committee members at December 31, 2019[1]

The following table shows, in alphabetical order after the CEO, the total number of shares, ADRs and other equity rights owned by the CEO and the other Executive Committee members and "persons closely linked" to them as of December 31, 2019. As of December 31, 2019, no members of the Executive Committee, either individually or together with "persons closely linked" to them, owned 1% or more of the outstanding shares or ADRs of Novartis. As of December 31, 2019, all members who have served at least five years on the Executive Committee have met or exceeded their personal Novartis share ownership requirements.

	Vested shares and ADRs[1]	Unvested shares and other equity rights[2]	Equity ownership level as a multiple of annual base salary[3]	Unvested target PSUs (e.g., LTPP/LTRPP)[4]	Matching shares under the LSSP[5]	**Total at December 31, 2019**
Vasant Narasimhan	59 983	89 381	8x	115 896	4 657	269 917
Steven Baert	39 785	31 890	8x	64 538	0	136 213
Bertrand Bodson	4 600	11 492	2x	15 037	0	31 129
James Bradner	21 794	46 531	5x	104 379	0	172 704
Harry Kirsch	108 193	40 968	12x	102 484	0	251 645
Shannon Thyme Klinger	12 193	22 028	3x	35 117	1 488	70 826
Steffen Lang	56 063	20 248	9x	26 782	4 535	107 628
Klaus Moosmayer	0	3 016	0x	12 034	0	15 050
Richard Saynor (from July 15, 2019)	0	9 211	1x	1 790	0	11 001
Susanne Schaffert	43 770	26 123	7x	36 224	1 735	107 852
John Tsai	11 859	29 570	4x	12 487	0	53 916
Marie-France Tschudin (from June 7, 2019)	5 500	24 715	3x	45 078	0	75 293
Robert Weltevreden	150	7 751	1x	11 386	0	19 287
Total[6]	**363 890**	**362 924**		**583 232**	**12 415**	**1 322 461**

[1] Includes holdings of "persons closely linked" to Executive Committee members (see definition "—Persons closely linked.")

[2] Includes unvested shares and ADRs as well as other equity rights applicable for the determination of equity amounts for the share ownership requirements, as per the definition above. Also includes unvested keep-whole shares received in connection to the Alcon spin-off.

[3] The multiple is calculated based on the full-year annual base salary and the closing share price as at the end of the 2019 financial year. The share price on the final trading day of 2019 was CHF 91.90 / USD 94.69 as at December 31, 2019.

[4] The target number of PSUs is disclosed pro-rata to December 31, 2019, unless the award qualified for full vesting under the relevant plan rules.

[5] Matching shares under the Leveraged Share Savings Plan (LSSP) are disclosed pro-rata to December 31, 2019, unless the award qualified for full vesting under the plan rules. LSSP participation for Executive Committee members ceased in 2014 although some current members received later grants under this plan prior to becoming members of the Executive Committee. Outstanding awards will vest five years from the grant date, subject to the LSSP plan rules.

[6] Paul Hudson and Richard Francis stepped down from the Executive Committee in 2019. At the time they stepped down from the Executive Committee, Mr. Hudson owned zero vested shares, and 140 121 unvested shares and other equity rights and Mr. Francis owned 50 615 vested shares and 86 740 unvested shares and other equity rights.

Fixed and variable compensation

The CEO and other Executive Committee members' annual base salary and variable compensation mix at grant value for financial year 2019:

	Annual base salary[1]	Variable compensation[2]
Vasant Narasimhan	14.7%	85.3%
Steven Baert	20.5%	79.5%
Bertrand Bodson	25.3%	74.7%
James Bradner	18.9%	81.1%
Harry Kirsch	17.8%	82.2%
Shannon Thyme Klinger	22.8%	77.2%
Steffen Lang	25.0%	75.0%
Klaus Moosmayer	25.1%	74.9%
Richard Saynor	13.4%	86.6%
Susanne Schaffert	19.3%	80.7%
John Tsai	19.1%	80.9%
Marie-France Tschudin	23.7%	76.3%
Robert Weltevreden	27.4%	72.6%
Total[3]	**19.4%**	**80.6%**

[1] Excludes pension and other benefits

[2] See table "2019 compensation at grant value for the CEO and other Executive Committee members" with regard to the disclosure principles of variable compensation.

[3] Excludes Richard Francis, who stepped down from the Executive Committee during 2019 and Paul Hudson, who resigned.

Other payments to Executive Committee members

During 2019, no other payments or waivers of claims other than those set out in the tables (including their footnotes) contained in this Compensation Report were made to Executive Committee members or to "persons closely linked" to them.

Payments to former Executive Committee members

Under the former Executive Committee members' contracts and in line with the Company's LTI plan rules, payments were made to eight former members. Of this, CHF 34 312 111 relates to the vesting of the LTPP and LTRPP for the 2017-2019 performance cycle, based on actual performance outcomes plus dividend equivalents, and CHF 4 130 033 (USD 4 451 756) relates to the vesting of the one-off award to the Alcon CEO (see "—Former Alcon CEO one-off performance award"). In addition, contractual amounts totaling 2 050 096 were made (comprising of base salary, Annual Incentive and other benefits), and two individuals received CHF 516 957 in tax equalization on incentive compensation granted during an international assignment.

No other payments (or waivers of claims) were made to former Executive Committee members or to "persons closely linked" to them during 2019.

Loans to Executive Committee members

Our policy does not allow loans to be granted to current or former members of the Executive Committee or to "persons closely linked" to them. Therefore, no loans were granted in 2019, and none were outstanding as of December 31, 2019.

Persons closely linked

"Persons closely linked" are (i) their spouse, (ii) their children below age 18, (iii) any legal entities that they own or otherwise control, and (iv) any legal or natural person who is acting as their fiduciary.

Note 27 to the Group's audited consolidated financial statements

The total expense for the year for compensation awarded to Executive Committee and Board members, using International Financial Reporting Standards (IFRS) measurement rules, is presented in Note 27 to the Group's audited consolidated financial statements.

Award and delivery of equity to Novartis associates

During 2019, 17.7 million unvested restricted shares (or ADRs), RSUs and target PSUs were granted, and 13.4 million Novartis vested shares (or ADRs) were delivered to Novartis associates under various equity-based participation plans. Current unvested equity instruments (restricted shares, RSUs and target PSUs) and outstanding equity options held by associates represent 1.53% of issued shares. Novartis delivers treasury shares to associates to fulfill these obligations, and aims to offset the dilutive impact from its equity-based participation plans.

Additional disclosures – Alcon spin-off and CEO one-off performance award

Former Alcon CEO one-off performance award

As disclosed in the 2016 Compensation Report, the Alcon CEO, F. Michael Ball, received a one-off award of 50 000 Performance Share Units (the payout range was 0–200% of target) on February 1, 2016, when he joined Novartis, subject to the achievement of targets linked to the turnaround of Alcon during the 2016-2018 performance cycle.

Mr. Ball gave notice to retire from the Executive Committee on July 1, 2018, following the announcement of the spin-off of Alcon but continued to work in a full-time capacity for Alcon.

To provide transparency to shareholders, the Board of Directors of Novartis decided to communicate the outcome of the Alcon CEO's one-off performance award.

The performance metrics of the award were based on financial and non-financial targets, including sales growth ahead of peers, core operating income growth ahead of sales growth, core operating income margin at least in line with the average of peers, and successful developments and launches of new products. Performance was monitored regularly across the three-year performance cycle and assessed against the targets supported by the Compensation Committee at the end of each financial year.

After a significant gap in performance versus the targets in the first year, Alcon partially closed the gap in the next two years. Overall, the turnaround of the business resulted in a very successful spin-off, creating significant value for shareholders. Core operating income grew ahead of sales, and target launches of new products like *PanOptix*, and *Dailies Total1* were well executed. However, the final payout was below target, as overall sales grew slower than peers, core operating income margin was below the average of peers and other launches were below target.

This one-off award vested on March 18, 2019, at 85% of target based on performance outcomes versus the targets. The total value of the award at vesting, including dividend equivalents, was USD 4 451 756 (comprising 42 651 shares out of the target of 50 000 after the performance adjustment, plus 5 130 dividend equivalent shares). This figure is included in payments made to former members of the Executive Committee in "—2019 realized compensation for the CEO and other Executive Committee members."

Alcon spin-off equity restoration plan

As disclosed in the 2018 Compensation Report and in line with communications delivered ahead of the spin-off, Novartis shareholders received a dividend in kind in Alcon shares at the spin-off date. PSUs and RSUs held by Novartis employees, including members and former members of the Executive Committee, are not entitled to dividends and therefore did not receive the dividend in kind distribution.

To ensure equal treatment of PSU and RSU holders relative to Novartis shareholders, Novartis granted equity awards (called Keep Whole Awards) to its employees, including the Executive Committee members, following the spin-off. The Keep Whole Awards restored the PSUs and RSUs to their pre-spin values. This was done in accordance with the Alcon spin-off equity restoration plan as follows:

- The Keep Whole Awards had a value similar to the estimated value of the dividend in kind resulting from the spin-off that each award would have received had it been a Novartis share.
- The Keep Whole Awards were granted in the same equity instrument (i.e., PSUs or RSUs) with the same vesting terms and performance conditions (if applicable) as the underlying award.
- The Keep Whole Awards aimed to ensure that Novartis employees who had been granted PSUs or RSUs, including members of the Executive Committee, were not disadvantaged by the spin-off relative to Novartis shareholders.

The total value of Keep Whole Awards granted to the current members of the Executive Committee was USD 8.5 million. The sums are equivalent to the estimated reduction in value of the dividend in kind as a result of the spin-off, and as such are not considered by the Compensation Committee to be additional compensation.

Interim update regarding ongoing LTI performance cycles

Following feedback from our shareholders and in line with our commitment made in the 2018 Compensation Report, below we report how performance is tracking against target for our ongoing LTI performance cycles.

2018-2020 LTPP and LTRPP

After the second year of these LTI performance cycles, both are currently tracking ahead of target. Financial performance continues to advance as we continue to make improvements to our operational efficiencies. All Innovative Medicines targets to be completed by 2019 were achieved, and our NIBR objectives were equally successful. Forecasts at the end of December place the Novartis TSR sixth out of 15 among our global healthcare peer group.

PERFORMANCE MEASURES	TRACKING
LTPP NCVA (75%)	Ahead of target
LTPP innovation (25%)	Ahead of target
LTRPP relative TSR (100%)	Ahead of peer group median

2019-2021 LTPP

As disclosed in the 2018 Compensation Report, the two LTI plans, LTPP and LTRPP, were combined into a single LTPP plan for performance cycles beginning in 2019. The new LTPP plan has four equally weighted metrics. After the first year of the three-year performance cycle, net sales growth is tracking ahead of target. This is largely due to strong sales execution, particularly for Cosentyx and Entresto. Core operating income is tracking ahead of target, mainly driven by higher sales. Innovation is tracking at target, with a number of read-outs, submissions and approvals achieved in our Innovative Medicines programs, and all NIBR milestones on track for completion by the end of the cycle. Relative TSR is tracking ahead of the peer group median.

2020 Executive Committee compensation system

The Compensation Committee has evaluated the Executive Committee compensation system based on feedback received from shareholders; the Compensation Committee believes that the compensation system is largely operating as intended, supports the Company's strategy, and is aligned with market and best practices. The following enhancements to the Annual Incentive and LTI systems should however be acknowledged.

Annual Incentive payout matrix

The payout matrix of the Annual Incentive will be updated such that a performance that is determined to be "below expectations" will receive a 0% payout (previously this provided for a 0–30% payout).

LTPP innovation metric

At the beginning of 2019, the Research & Development Committee and the Compensation Committee jointly approved to change the LTPP innovation metric for cycle 2019-2021 onward. The committees decided that GDD and NIBR targets would be weighted 70% and 30% of the innovation metric, respectively.

The GDD targets are transparent to shareholders given that they are taken directly from the first three years of the published filing chart in the Novartis Annual Report (for 2019, see "—Item 4.B Business overview—Innovative Medicines—Selected development projects") for the start of the performance cycle. Performance is assessed using a scoring mechanism based on the number of successful targeted filings and the time of their completion against target. NIBR milestones are set at the beginning of the cycle, and these will be assessed according to the number of milestones achieved against target. Overall performance will then be calculated based on the actual outcome for GDD and NIBR versus the overall target outcome. The payout schedule is identical to that used for the Annual Incentive (see "—2019 Annual Incentive").

LTPP holding period

As of grants made from 2020, the CEO and CFO will be required to hold any equity vesting under the LTPP plan (after the applicable tax and/or social security) for a minimum of two years after the vesting date. Taking into consideration the three-year vesting period, this means that they will not be permitted to sell or trade the resulting shares before the fifth anniversary of the grant date. This holding period will be additional to the existing share ownership requirements.

LTPP TSR peer group

There will also be a change to the structure of the TSR peer group as a result of the recent acquisition of Celgene by Bristol-Myers Squibb, both of which are companies in our TSR peer group. The Compensation Committee decided that Celgene will therefore be removed from the peer group for the 2018-2020 LTI cycle, thereby reducing the total number of peers, from 15 to 14. Given the anticipated timing of the acquisition, the Compensation Committee decided to keep Celgene in the peer group for the 2017-2019 performance cycle.

LTPP TSR share price evaluation

The Compensation Committee reported last year the decision to combine the two LTI plans, LTPP and LTRPP, into a single LTPP plan for performance cycles beginning in 2019 onward. Both prior and current LTI systems consider the TSR performance measure for the LTI payout and, under former rules, a one-day closing price method was used to determine the share price at the start and end of performance cycles.

The Compensation Committee decided that going forward, a three-month averaging method will be implemented. This means that for the ongoing 2018-2020 and 2019-2021 LTI cycles, a one-day pricing approach will be kept for the start of the performance cycles, and the three-month averaging method will then be used to determine the corresponding share price at the end of the cycles.

The three-month averaging method will be used at the beginning and end of the cycles from 2020-2022. This approach was chosen to be more consistent with market practice and to provide a more stable view of longer-term performance. The Compensation Committee does not believe that this change makes the performance targets any easier or more difficult to achieve.

2020 Executive Committee compensation

As outlined in our "—Executive Committee appointments compensation policy," some members, including the CEO, were appointed with total target compensation below external market median level. Each year, we collaborate with our advisors to benchmark the compensation levels of the members of the Executive Committee. Taking this into consideration and to ensure our competitiveness in the market, the total target compensation for these members has been assessed, and increases have been made for 2020 in line with their demonstrated performance and ability in their respective roles in 2019.

Vasant Narasimhan, CEO (in role since February 1, 2018)
In his second year as CEO, Vasant Narasimhan delivered a strong financial and outstanding innovation year for Novartis in 2019, and made good progress toward our digital and culture transformation, and building trust with society. Further detail on his achievements is provided in "—2019 CEO balanced scorecard." Owing to this performance, Dr. Narasimhan will receive a 5% annual base salary increase effective March 1, 2020 (from CHF 1 674 000 to CHF 1 757 700), bringing him closer to the external market median level, while leaving room to progress further, in line with proven performance in the coming years. There will be no change to his target Annual Incentive and his target Long-Term Incentive (325% of base salary in total).

All other Executive Committee members were awarded annual base salary increases in line with the annual compensation review applicable to all associates in Switzerland and the US, with the exception of the members listed below, who joined the Executive Committee in the last two years.

Bertrand Bodson, Chief Digital Officer (in role since April 1, 2018)
Bertrand Bodson led the substantial scaling of our digital initiatives in 2019, increased the momentum in data science across the Company, and put in place key partnerships with Microsoft, AWS and Tencent. Mr. Bodson will receive an annual base salary increase of 5% as from March 1, 2020, and his target Long-Term Incentive will be increased by 20% of annual base salary as from 2020. There will be no change to his Annual Incentive target.

Shannon Thyme Klinger, Group General Counsel (in role since April 1, 2018)
Shannon Thyme Klinger helped transform our legal function in 2019, becoming one function globally, and leveraging technology to improve efficiency. Ms. Klinger supported the spin-off of our eye-care division, Alcon, creating large value to shareholders. To continue to be competitive in the market, Ms. Klinger will receive an annual salary increase of 9% as from March 1, 2020, and in addition an increase in her current target Annual Incentive and target Long-Term Incentive of 10% and 20%, respectively as a percentage of annual base salary.

Klaus Moosmayer, Chief Ethics, Risk and Compliance Officer (in role since December 1, 2018)
Klaus Moosmayer revamped the Novartis Risk approach in 2019, finalized the strategic integration of Risk and Compliance in the business, and upgraded talent in his department, thereby strengthening our compliance across the global organization. Mr. Moosmayer will receive an annual base salary increase of 5% as from March 1, 2020. There will be no change to his Annual Incentive and his Long-Term Incentive targets.

Robert Weltevreden, Head of Novartis Business Services (in role since June 1, 2018)
Robert Weltevreden made great progress in our NBS transformation; set to over-deliver with recurring savings of over USD 300m in 2019, by increasing the footprint of our Global Service Center, securing international real estate and facility service contracts, and consolidating our IT services. In 2020, Mr. Weltevreden will receive an annual base salary increase of 5% and a target Long-Term Incentive, as a percentage of annual base salary, increase of 20%.

To bring their compensation further toward the external market median for their roles, and within policy guidelines, Steffen Lang, Susanne Schaffert, John Tsai, and Marie-France Tschudin will also receive a 10–20% increase of their target 2020-2022 Long-Term Incentive (LTI). The LTI is subject to three-year performance conditions and provides for an overall payout between 0% and 200%.

2019 Board compensation

Philosophy and benchmarking

Aligned with market practice in Switzerland, the Board of Directors sets compensation for its members at a level that allows for the attraction of high-caliber individuals, including both Swiss and international members, who have global experience.

Board members do not receive variable compensation, in line with their focus on corporate strategy, supervision and governance. Each year at the AGM, shareholders are requested to approve, in a binding vote, the total compensation of the Board of Directors until the following AGM.

The Board of Directors sets the level of compensation for its Chairman and the other members to be in line with relevant benchmark companies, which include other large Switzerland-based multinational companies: ABB, Credit Suisse, Lafarge Holcim, Nestlé, Roche and UBS. This peer group was chosen for Board compensation due to the comparability of Swiss legal requirements, including broad personal and individual liabilities under Swiss law (and new criminal liability under Swiss rules regarding board and executive committee compensation related to the Ordinance against Excessive Compensation in Listed Companies), and under US law (due to the Company's secondary listing on the New York Stock Exchange). The Board of Directors reviews the compensation of its members, including the Chairman, each year based on a proposal by the Compensation Committee and on advice from its independent advisor, including relevant benchmarking information. The peer group used for the Board of Directors is different than that used for the Executive Committee to ensure independence of decision-making.

The contract of the Chairman and the Board of Directors compensation policy do not provide for any termination-related payments.

Chairman of the Board

As Chairman, Joerg Reinhardt receives total annual compensation valued at CHF 3.8 million. The total compensation is comprised equally of cash and shares, as follows:

- Cash compensation: CHF 1.9 million per year
- Share compensation: annual value equal to CHF 1.9 million of unrestricted Novartis shares

For 2019, the Chairman voluntarily waived the increase in compensation to which he is contractually entitled, which is an amount not lower than the average annual compensation increase awarded to associates based in Switzerland (1.2% for 2019).

Other Board members

The annual fee rates for Board membership and additional functions are included in the table below. These were approved by the Board of Directors with effect from the 2019 AGM. Aggregate Board compensation is aligned with other large Swiss companies.

CHF 000s	AGM 2019-2020 annual fee
Chairman of the Board	3 800
Board membership	280
Vice Chairman	50
Chair of the Audit and Compliance Committee	130
Chair of the Compensation Committee	90
Chair of the following committees: • Governance, Nomination and Corporate Responsibilities Committee • Research & Development Committee • Risk Committee	70
Membership of the Audit and Compliance Committee	70
Membership of the following committees: • Compensation Committee • Governance, Nomination and Corporate Responsibilities Committee • Research & Development Committee • Risk Committee	40

In addition, the following policies apply regarding Board compensation:

- 50% of compensation is delivered in cash, paid on a quarterly basis in arrears. Board members may choose to receive more of their compensation in shares instead of cash.
- At least 50% of compensation is delivered in shares in two installments: one six months after the AGM, and one 12 months after the AGM.

Board members bear the full cost of their employee social security contributions, if any, and do not receive share options or pension benefits.

2020 Board compensation

The Board of Directors compensation system and fee levels will remain unchanged in 2020.

Board member total compensation earned for the financial year 2019

	Board membership	Audit and Compliance Committee	Compensation Committee	Governance, Nomination and Corporate Responsibilities Committee	Research & Development Committee	Risk Committee	Shares (number) [1]	Cash (CHF) (A)	Shares (CHF) (B)	Other (CHF) (C) [2]	Total (CHF) (A)+(B)+(C) [3]
Board members active on December 31, 2019											
Joerg Reinhardt [4]	Chair				Chair		21 498	1 900 000	1 900 000	4 373	3 804 373
Enrico Vanni	Vice Chair	•	Chair	•			4 494	220 833	309 166	3 512	533 511
Nancy Andrews	•				•	•	2 035	180 000	180 000	–	360 000
Ton Buechner	•	•					2 967	145 833	204 166	4 373	354 372
Patrice Bula [5]	•		•				1 813	–	266 667	4 373	271 040
Srikant Datar	•	•	•			Chair	2 602	230 000	230 000	–	460 000
Elizabeth Doherty	•	Chair				•	2 544	225 000	225 000	–	450 000
Ann Fudge	•		•	•		•	2 262	200 000	200 000	–	400 000
Frans van Houten	•				•		2 716	26 667	293 334	–	320 001
Andreas von Planta	•	•		Chair		•	2 602	230 000	230 000	4 373	464 373
Charles L. Sawyers	•			•	•		2 035	180 000	180 000	–	360 000
William T. Winters	•		•	•[5]			3 620	–	353 333	–	353 333
Subtotal							**51 188**	**3 538 333**	**4 571 666**	**21 002**	**8 131 001**
Board members who stepped down at the 2019 AGM											
Dimitri Azar [6]	•			•	•		1 016	30 000	30 000	–	60 000
Subtotal							**1 016**	**30 000**	**30 000**	**–**	**60 000**
Total							**52 204**	**3 568 333**	**4 601 666**	**21 002**	**8 191 001**

See next page for 2018 comparative figures.

[1] The shown amounts represent the gross number of shares delivered to each Board member in 2019 for the respective Board member's service period. The number of shares reported in this column represent: (i) the second and final equity installment delivered in February 2019 for the services from the 2018 AGM to the 2019 AGM, and (ii) the first of two equity installments delivered in August 2019 for the services from the 2019 AGM to the 2020 AGM. The second and final equity installment for the services from the 2019 AGM to the 2020 AGM will take place in February 2020.

[2] Includes an amount of CHF 21 002 for mandatory employer contributions for all Board members paid by Novartis to governmental social security systems. This amount is out of total employer contributions of CHF 413 985 , and provides a right to the maximum future insured government pension benefit for the Board member.

[3] All amounts are before deduction of the social security contribution and income tax due by the Board member.

[4] No additional committee fees for chairing the Research & Development Committee were delivered to Joerg Reinhardt.

[5] From February 28, 2019

[6] Until February 28, 2019

Board member total compensation earned for the financial year 2018

	Board membership	Audit and Compliance Committee	Compensation Committee	Governance, Nomination and Corporate Responsibilities Committee	Research & Development Committee	Risk Committee	Shares (number) [1]	Cash (CHF) (A)	Shares (CHF) (B)	Other (CHF) (C) [2]	Total (CHF) (A)+(B)+(C) [3]
Board members active on December 31, 2018											
Joerg Reinhardt [4]	Chair				Chair		23 889	1 900 000	1 900 000	4 336	3 804 336
Enrico Vanni	Vice Chair	•	Chair	•			4 854	41 667	483 334	3 475	528 476
Nancy Andrews	•				•	•	2 262	180 000	180 000	–	360 000
Dimitri Azar	•			• [5]	•		2 359	182 500	182 500	–	365 000
Ton Buechner	•	• [5]				• [6]	4 270	–	346 667	4 336	351 003
Srikant Datar	•	•	•			Chair	2 859	229 167	229 167	–	458 334
Elizabeth Doherty	•	Chair				•	2 828	225 000	225 000	–	450 000
Ann Fudge	•		•	•		•	2 481	199 167	199 167	–	398 334
Frans van Houten	•				• [5]		2 334	148 333	168 333	–	316 666
Andreas von Planta	•	•		Chair		•	2 859	229 167	229 167	4 336	462 670
Charles L. Sawyers	•			•	•		2 262	180 000	180 000	–	360 000
William T. Winters	•		•				4 087	–	321 667	–	321 667
Subtotal							**57 344**	**3 515 001**	**4 645 002**	**16 483**	**8 176 486**
Board members who stepped down at the 2018 AGM											
Pierre Landolt (until March 2, 2018) [7]	•			• [6]			2 131	–	55 000	3 475	58 475
Subtotal							**2 131**	**–**	**55 000**	**3 475**	**58 475**
Total							**59 475**	**3 515 001**	**4 700 002**	**19 958**	**8 234 961**

[1] The shown amounts represent the gross number of shares delivered to each Board member in 2018 for the respective Board member's service period. The number of shares reported in this column represent: (i) the second and final equity installment delivered in February 2018 for the services from the 2017 AGM to the 2018 AGM, and (ii) the first of two equity installments delivered in August 2018 for the services from the 2018 AGM to the 2019 AGM. The second and final equity installment for the services from the 2018 AGM to the 2019 AGM will take place in February 2019.
[2] Includes an amount of CHF 19 958 for mandatory employer contributions for all Board members paid by Novartis to governmental social security systems. This amount is out of total employer contributions of CHF 383 864, and provides a right to the maximum future insured government pension benefit for the Board member.
[3] All amounts are before deduction of the social security contribution and income tax due by the Board member.
[4] No additional committee fees for chairing the Research & Development Committee were delivered to Joerg Reinhardt.
[5] From March 2, 2018
[6] Until March 2, 2018
[7] According to Pierre Landolt, the Sandoz Family Foundation is the economic beneficiary of the compensation.

Additional disclosures

Share ownership requirements for Board members

The Chairman is required to own a minimum of 30 000 Novartis shares, and other members of the Board of Directors are required to own at least 5 000 Novartis shares within five years after joining the Board of Directors, to ensure their interests are aligned with those of shareholders.

Board members are prohibited from hedging or pledging their ownership positions in Novartis shares that are part of their guideline share ownership requirement, and are required to hold these shares for 12 months after retiring from the Board of Directors. As of December 31, 2019, all current and former members of the Board of Directors who were required to meet the minimum share ownership requirements did so.

Shares, ADRs and share options owned by Board members

The total number of vested Novartis shares and ADRs owned by members of the Board of Directors and "persons closely linked" to them as of December 31, 2019, is shown in the table below. As of December 31, 2019, no members of the Board, either individually or together with "persons closely linked" to them, owned 1% or more of the outstanding shares (or ADRs) of Novartis. As of the same date, no members of the Board of Directors held any share options to purchase Novartis shares.

	Number of shares at December 31, 2019[1,2]
Joerg Reinhardt	563 697
Enrico Vanni	26 645
Nancy Andrews	7 265
Ton Buechner	10 950
Patrice Bula	1 946
Srikant Datar	41 334
Elizabeth Doherty	6 765
Ann Fudge	14 114
Frans van Houten	4 764
Andreas von Planta	161 035
Charles L. Sawyers	10 986
William T. Winters	18 170
Total[3]	**867 671**

[1] Includes holdings of "persons closely linked" to Board members (see definition "—Persons closely linked")

[2] Each share provides entitlement to one vote.

[3] Dimitri Azar stepped down from the Board of Directors on February 28, 2019. On February 28, 2019, Mr. Azar owned 18 750 shares. His shares are not included in the total.

Loans to Board members

Our policy does not allow loans to be granted to current or former members of the Board of Directors or to "persons closely linked" to them. Therefore, no loans were granted in 2019, and none were outstanding as of December 31, 2019.

Other payments to Board members

During 2019, no payments (or waivers of claims) other than those set out in the Board member compensation table (including its footnotes) in "—Board member total compensation earned for the financial year 2019" were made to current members of the Board or to "persons closely linked" to them.

Payments to former Board members

During 2019, no payments (or waivers of claims) were made to former Board members or to "persons closely linked" to them, except for the payments reported in Note 27 to the Group's audited consolidated financial statements.

Compensation governance

Legal framework

The Swiss Code of Obligations and the Corporate Governance Guidelines of the SIX Swiss Exchange require listed companies to disclose certain information about the compensation of Board of Directors and Executive Committee members, their equity participation in the Group, and loans made to them. This Annual Report fulfills that requirement. In addition, the Annual Report is in line with the principles of the Swiss Code of Best Practice for Corporate Governance of the Swiss Business Federation (economiesuisse).

Risk management principles

The Compensation Committee, with support from its independent advisor, reviews market trends in compensation, and changes in corporate governance rules and best practices. Together with the Risk Committee, it also reviews the Novartis compensation systems to ensure that they do not encourage inappropriate or excessive risk-taking, and instead encourage behaviors that support sustainable value creation. A summary of the risk management principles is outlined below.

RISK MANAGEMENT PRINCIPLES

- Rigorous performance management process, with approval of targets and evaluation of performance for the CEO by the Board of Directors
- Balanced mix of short-term and long-term variable compensation elements
- Values and Behaviors are a key component of the Annual Incentive and are embedded in our culture
- Clawback and malus principles apply to all elements of the variable compensation
- Performance-vesting Long-Term Incentives only, with three-year cycles
- All variable compensation is capped at 200% of target
- Contractual notice period of 12 months
- Post-contractual non-compete period limited to a maximum of 12 months from the end of employment. Resulting compensation is limited to the annual base salary plus the prior-year Annual Incentive as per contract, if applicable
- Good and bad leaver provisions apply to variable compensation of leavers
- No severance payments or change-of-control clauses
- Share ownership requirements; no hedging or pledging of Novartis share ownership

Executive Committee employment contracts provide for a notice period of up to 12 months and contain no change-of-control clauses or severance provisions (for example, agreements concerning special notice periods, longer-term contracts, "golden parachutes," waiver of lock-up periods for equities and bonds, shorter vesting periods, and additional contributions to occupational pension schemes). For share ownership requirements, please refer to "—Share ownership requirements for the CEO and other Executive Committee members."

Compensation decision-making authorities

Authority for decisions related to compensation is governed by the Articles of Incorporation, Board Regulations and the Compensation Committee Charter, which are all published on the Company website: www.novartis.com/investors/company-overview/corporate-governance. The Compensation Committee serves as the supervisory and governing body for compensation policies and plans within Novartis, and has overall responsibility for determining, reviewing and proposing compensation policies and plans for approval by the Board of Directors in line with the Compensation Committee Charter. A summary of discussions and conclusions of each committee meeting is delivered to the full Board of Directors. A summary of the compensation decision-making authorities is set out below.

Compensation authorization levels within the parameters set by the shareholders' meeting

DECISION ON	DECISION-MAKING AUTHORITY
Compensation of Chairman and other Board members	Board of Directors
Compensation of CEO	Board of Directors
Compensation of other Executive Committee members	Compensation Committee

Committee member independence

The Compensation Committee is composed exclusively of members of the Board of Directors who meet the independence criteria set forth in the Board Regulations. From the 2019 AGM, the Compensation Committee had the following five members: Patrice Bula, Ann Fudge, Srikant Datar, Enrico Vanni and William Winters. Mr. Vanni has served as a member since 2011 and as Chair since 2012.

Role of the Compensation Committee's independent advisor

The Compensation Committee retained Mercer Limited during the financial year 2019 as its independent external compensation advisor to support the Committee in determining the design and implementation of compensation and benefits. The advisor was hired directly by the Compensation Committee in 2017, and the Compensation Committee has been fully satisfied with the performance and independence of the advisor since its engagement. In determining whether to renew the engagement with the advisor, the Compensation Committee evaluates, at least annually, the quality of the consulting service, the independence of the advisor, and the benefits of rotating advisors. Mercer Limited also provides services related to management development at the mid- and frontline leader level and in respect of corporate pensions. The individual Mercer Limited consultants that advise and support the Committee are not responsible or rewarded for work beyond support to the Compensation Committee and P&O on senior compensation.

Compensation Committee meetings held in 2019

In 2019, the Compensation Committee held six formal meetings, one additional joint meeting with the Governance, Nomination and Corporate Responsibilities Committee, and two additional joint meetings with the Research & Development Committee to review and endorse for approval by the Board of Directors the innovation targets and achievements of the LTPP and Annual Incentive. The Compensation Committee conducted a self-evaluation in 2019.

Report of the statutory auditor on the Compensation Report of Novartis AG

To the General Meeting of Novartis AG, Basel

We have audited the 2019 CEO and other Executive Committee members' realized compensation on pages 142-144, the 2019 CEO and other Executive Committee members' compensation at grant value on pages 145-147 and the additional disclosures on pages 149-152, as well as the 2019 Board compensation on pages 157-159 and the additional disclosures on page 160 of the accompanying Compensation Report of Novartis AG for the year ended December 31, 2019 (hereinafter referred to as "disclosures made on the pages defined as subject to audit").

Board of Directors' responsibility
The Board of Directors is responsible for the preparation and overall fair presentation of the Compensation Report in accordance with Swiss law and the Ordinance against Excessive Compensation in Stock Exchange Listed Companies (Ordinance). The Board of Directors is also responsible for designing the remuneration system and defining individual remuneration packages.

Auditor's responsibility
Our responsibility is to express an opinion on the accompanying disclosures made on the pages defined as subject to audit. We conducted our audit in accordance with Swiss Auditing Standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the disclosures made on the pages defined as subject to audit comply with Swiss law and articles 14–16 of the Ordinance.

An audit involves performing procedures to obtain audit evidence on the disclosures made on the pages defined as subject to audit with regard to compensation, loans and credits in accordance with articles 14–16 of the Ordinance. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatements in disclosures made on the pages defined as subject to audit, whether due to fraud or error. This audit also includes evaluating the reasonableness of the methods applied to value components of remuneration, as well as assessing the overall presentation of the disclosures made on the pages defined as subject to audit. We believe that the audit evidence we have obtained is enough and appropriate to provide a basis for our opinion.

Opinion
In our opinion, the disclosures made on the pages defined as subject to audit of the accompanying Compensation Report of Novartis AG for the year ended December 31, 2019, comply with Swiss law and articles 14–16 of the Ordinance.

PricewaterhouseCoopers AG

Martin Kennard
Audit expert
Auditor in charge

Kris Muller
Global relationship partner

Basel, January 28, 2020

6.C Board practices

Corporate governance

Framework

Novartis is committed to effective corporate governance, and our corporate governance framework is intended to support sustainable financial performance and long-term value creation for our shareholders, patients, employees and other stakeholders based on our Values and Behaviors.

The Novartis corporate governance principles are further elaborated in key governance documents, in particular in our Articles of Incorporation and the Regulations of the Board, the Board Committees and the Executive Committee (Board Regulations) (www.novartis.com/investors/company-overview/corporate-governance). The Governance, Nomination and Corporate Responsibilities Committee (GNCRC) regularly reviews both the corporate governance principles and the key governance documents against evolving best practice standards and new developments in line with our commitment to maintaining the highest standards.

Governance bodies

GENERAL MEETING OF SHAREHOLDERS

Approves operating and financial review, Novartis Group consolidated financial statements and financial statements of Novartis AG; decides appropriation of available earnings and dividend; approves compensation of Board and Executive Committee; elects Board members, Chairman, Compensation Committee members, Independent Proxy and external auditor; adopts and modifies Articles of Incorporation

BOARD OF DIRECTORS

AUDIT AND COMPLIANCE COMMITTEE

COMPENSATION COMMITTEE

GOVERNANCE, NOMINATION AND CORPORATE RESPONSIBILITIES COMMITTEE

RESEARCH & DEVELOPMENT COMMITTEE

RISK COMMITTEE

Sets strategic direction of Novartis, appoints and oversees key executives, approves major transactions and investments

EXECUTIVE COMMITTEE

Responsible for operational management of Novartis

EXTERNAL AUDITOR

Provides opinion on compliance of Novartis Group consolidated financial statements and the financial statements of Novartis AG with applicable standards and Swiss law, on compliance of the Compensation Report with applicable law, on effectiveness of internal controls over financial reporting, and on the corporate responsibility reporting of Novartis

Group structure and shareholders

Group structure

Novartis AG and Group companies

Novartis AG, the Group's holding company, is a corporation organized under Swiss law with issued registered shares and registered office at Lichtstrasse 35, CH-4056 Basel, Switzerland.

The principal subsidiaries and associated companies of the Novartis Group are shown in "Item 18. Financial Statements—Note 32. Principal Group subsidiaries and associated companies."

Divisions

Novartis has two focused, customer-facing divisions: Innovative Medicines, which includes the Novartis Pharmaceuticals and Novartis Oncology business units; and Sandoz, the generics and biosimilars division. The divisions are supported by the Novartis Institutes for BioMedical Research (NIBR), Global Drug Development (GDD), Novartis Technical Operations (NTO), Novartis Business Services (NBS), and corporate functions. A detailed review of the 2019 business results can be found in "Item 18. Financial Statements—Note 3. Segmentation of key figures 2019, 2018 and 2017." In April 2019, Novartis completed the spin-off of its former eye care division, Alcon, into a separately traded standalone company.

Shareholdings

Majority holdings in publicly traded Group companies

The Novartis Group owns 70.7% of Novartis India Ltd., with registered office in Mumbai, India, and listing on the Bombay Stock Exchange (ISIN INE234A01025, symbol: HCBA). The total market value of the 29.3% free float of Novartis India Ltd. was USD 67.8 million on December 31, 2019, using the quoted market share price at year-end. Applying this share price to all the shares of the company, the market capitalization of the whole company was USD 231.2 million, and that of the shares owned by Novartis was USD 163.4 million.

Significant minority shareholding owned by the Group

The Novartis Group owns 33.3% of the bearer shares of Roche Holding AG, with registered office in Basel, Switzerland, and listing on the SIX Swiss Exchange (ISIN CH0012032113, symbol: RO). The market value of the Group's interest in Roche Holding AG, as of December 31, 2019, was USD 16.9 billion. The total market value of Roche Holding AG was USD 278.4 billion. Novartis does not exercise control over Roche Holding AG, which is independently governed, managed and operated.

Shareholders

Significant shareholders

According to the Share Register, as of December 31, 2019, the following registered shareholders (including nominees and the ADS depositary) held more than 2% of the total share capital, with the right to vote all their shares based on an exemption granted by the Board (see "—Item 6.C Board practices—Shareholder participation—Voting rights, restrictions and representation—Registration restrictions"):[1]

	% holding of share capital Dec 31, 2019
Shareholders registered for their own account:	
Emasan AG, Basel	3.5
Novartis Foundation for Employee Participation, Basel	2.1
UBS Fund Management (Switzerland) AG, Basel	2.1

	% holding of share capital Dec 31, 2019
Shareholders registered as nominees:	
Chase Nominees Ltd., London	10.4
The Bank of New York Mellon, New York	3.8
Through The Bank of New York Mellon, Everett	*2.0*
Through The Bank of New York Mellon, New York	*1.2*
Through The Bank of New York Mellon, SA/NV, Brussels	*0.6*
Nortrust Nominees Ltd., London	3.9
Shareholder acting as American Depositary Share (ADS) depositary:	
JPMorgan Chase Bank, N.A., New York	12.5

[1] Excluding 5.7% of the share capital held as treasury shares by Novartis AG or its fully owned subsidiaries

According to a disclosure notification filed with Novartis AG, Norges Bank (Central Bank of Norway), Oslo, held 2.1% of the share capital but was not registered in the Share Register as of December 31, 2019.

According to disclosure notifications filed with Novartis AG and the SIX Swiss Exchange, each of the following shareholders held between 3% and 5%, but was not registered, or registered with less than 2% of the share capital as of December 31, 2019:

- BlackRock Inc., New York
- The Capital Group Companies Inc., Los Angeles

Disclosure notifications pertaining to shareholdings filed with Novartis AG and the SIX Swiss Exchange are published on the latter's electronic publication platform: www.six-exchange-regulation.com/en/home/publications/significant-shareholders.html.

Duty to make an offer

According to the Swiss Federal Act on Financial Infrastructures, anyone who – directly, indirectly or acting in concert with third parties – acquires equity securities exceeding 33 1/3% of the voting rights of a company (whether or not such rights are exercisable) is required to make an offer to acquire all listed equity securities of that company. A company may raise this threshold up to 49% of the voting rights ("opting up") or may, under certain circumstances, waive the threshold ("opting out"). Novartis AG has not adopted any such measures.

Cross shareholdings

Novartis AG has no cross shareholdings in excess of 5% of capital, or voting rights with any other company.

Overview on shareholder structure

The following tables relate only to registered shareholders and cannot be assumed to represent the entire investor base because nominees and JPMorgan Chase Bank, N.A., as ADS depositary, are registered as shareholders for a large number of beneficial owners.

As of December 31, 2019, Novartis AG had approximately 161 000 registered shareholders.

Number of shares held

As of December 31, 2019 [1]	Number of registered shareholders	% of registered share capital
1–100	25 442	0.06
101–1 000	97 161	1.59
1 001–10 000	34 884	3.84
10 001–100 000	3 080	3.16
100 001–1 000 000	451	5.45
1 000 001–5 000 000	64	4.96
5 000 001 or more [2]	29	50.66
Total registered shareholders/shares	161 111	69.72
Unregistered shares		30.28
Total		**100.00**

[1] At the record date of the Annual General Meeting (AGM) 2019, unregistered shares amounted to 15%
[2] Including significant registered shareholders as listed above

Registered shareholders by type

As of December 31, 2019	Shareholders in %	Shares in %
Individual shareholders	96.43	12.99
Legal entities [1]	3.52	32.77
Nominees, fiduciaries and ADS depositary	0.05	54.24
Total	**100.00**	**100.00**

[1] Excluding 5.7% of the share capital held as treasury shares by Novartis AG or its fully owned subsidiaries

Registered shareholders by country[1]

As of December 31, 2019	Shareholders in %	Shares in %
Belgium	0.13	1.13
France	2.06	0.29
Germany	5.66	1.64
Japan	0.21	0.70
Luxembourg	0.05	0.42
Switzerland [2]	87.68	42.38
United Kingdom	0.56	26.15
United States	0.32	25.41
Other countries	3.33	1.88
Total	**100.00**	**100.00**

[1] Registered shares held by nominees are shown in the country where the company/affiliate entered in the Share Register as shareholder has its registered seat.
[2] Excluding 5.7% of the share capital held as treasury shares by Novartis AG or its fully owned subsidiaries

Capital structure

Share capital

As of December 31, 2019, the share capital amounted to CHF 1 263 687 410 fully paid-in and divided into 2 527 374 820 registered shares with a nominal value of CHF 0.50 each.

Shares are listed on the SIX Swiss Exchange (ISIN CH0012005267, symbol: NOVN) and on the New York Stock Exchange (NYSE) in the form of American Depositary Receipts (ADRs) representing American Depositary Shares (ADSs) (ISIN US66987V1098, symbol: NVS).

No authorized and conditional capital exists as of December 31, 2019.

Shares, participation certificates, non-voting equity securities, profit-sharing certificates

Shares are issued as uncertificated securities (in the sense of the Swiss Code of Obligations) and as book entry securities (in terms of the Swiss Act on Intermediated Securities). All shares have equal voting rights and carry equal entitlements to dividends. No participation certificates, non-voting equity securities (Genussscheine) or profit-sharing certificates have been issued.

Convertible securities and options

Novartis AG has not issued convertible or exchangeable bonds, warrants, options or other securities granting rights to shares, other than options (or similar instruments such as stock appreciation rights) granted under or in connection with equity-based participation plans of associates. Novartis AG does not grant any new stock options under these plans.

Limitation on transferability

No transferability restrictions are imposed on shares (for registration restrictions, see "—Item 6.C Board practices—Shareholder participation—Voting rights, restrictions and representation—Registration restrictions"). The registration of shareholders in the Share Register or in the ADR register kept by JPMorgan Chase Bank, N.A., does not affect the tradability of shares or ADRs.

Changes to share capital

AGM	Shareholder decision	Shares cancelled	Average repurchase share price (CHF)[1]
2017	• Capital reduction by CHF 5.1 million (from CHF 1 313 557 410 to CHF 1 308 422 410)	10 270 000	74.67
2018	• Capital reduction by CHF 33.11 million (from CHF 1 308 422 410 to CHF 1 275 312 410)	66 220 000	78.34
2019	• Capital reduction by CHF 11.63 million (from CHF 1 275 312 410 to CHF 1 263 687 410) • Authorization of the Board to repurchase shares up to a maximum of CHF 10 billion until the AGM 2022 under an eighth share repurchase program	23 250 000	79.08

AGM	Proposal to the shareholders	Shares to be cancelled	Average repurchase share price (CHF)[1]
2020	• Capital reduction by CHF 30.16 million (from CHF 1 263 687 410 to CHF 1 233 530 460)	60 313 900	88.18

[1] All shares were repurchased on the SIX Swiss Exchange second trading line.

Key Novartis share data

	2019	2018	2017
Issued shares	**2 527 374 820**	**2 550 624 820**	**2 616 844 820**
Treasury shares [1]	262 366 332	239 453 391	299 388 321
Outstanding shares at December 31	**2 265 008 488**	**2 311 171 429**	**2 317 456 499**
Weighted average number of shares outstanding	**2 290 792 782**	**2 319 322 369**	**2 345 783 843**

[1] Approximately 118 million treasury shares (2018: 122 million; 2017: 131 million) are held in Novartis entities that restrict their availability for use.

Per-share information[1]

	2019	2018	2017
Basic earnings per share from continuing operations (USD)	3.12	5.52	3.20
Basic earnings per share from discontinued operations (USD)	2.00	– 0.08	0.08
Total basic earnings per share (USD)	**5.12**	**5.44**	**3.28**
Diluted earnings per share from continuing operations (USD)	3.08	5.46	3.17
Diluted earnings per share from discontinued operations (USD)	1.98	– 0.08	0.08
Total diluted earnings per share (USD)	**5.06**	**5.38**	**3.25**
Net cash flow from operating activities of continuing operations (USD)	5.91	5.63	4.87
Year-end equity for Novartis AG shareholders (USD)	24.49	34.01	32.00
Dividend (CHF)[2]	2.95	2.85	2.80

[1] Calculated on the weighted average number of shares outstanding, except year-end equity
[2] 2019: proposal to shareholders for approval at the AGM on February 28, 2020

Key ratios – December 31

	2019	2018	2017
Price/earnings ratio[1]	18.5	15.7	25.7
Price/earnings ratio from continuing operations[1]	30.4	15.4	25.7
Dividend yield (%)[1]	3.2	3.4	3.4

[1] Based on the Novartis share price at December 31 of each year

Key data on ADRs issued in the US

	2019[1]	2018	2017
Year-end ADR price (USD)	94.69	85.81	83.96
High[2]	96.14	93.91	86.65
Low[2]	75.40	72.44	70.03
Number of ADRs outstanding[3]	315 073 094	338 641 387	320 833 039

[1] 2019 excludes the business of Alcon, which was spun off in April 2019 into a separately traded standalone company.
[2] Based on the daily closing prices
[3] The depositary, JPMorgan Chase Bank, N.A., holds one Novartis AG share for every ADR issued.

Share price (CHF)

	2019[1]	2018	2017
Year-end share price	91.90	84.04	82.40
High[2]	96.04	91.84	85.15
Low[2]	77.03	72.42	69.55
Year-end market capitalization (USD billions)[3]	**214.8**	**197.0**	**195.5**
Year-end market capitalization (CHF billions)[3]	**208.2**	**194.2**	**191.0**

[1] 2019 excludes the business of Alcon, which was spun off in April 2019 into a separately traded standalone company.
[2] Based on the daily closing prices
[3] Market capitalization is calculated based on the number of shares outstanding (excluding treasury shares). Market capitalization in USD is based on the market capitalization in CHF converted at the year-end CHF/USD exchange rate.

Shareholder participation

Shareholder engagement

Shareholder engagement is fundamental to our commitment to governance and transparency, and the feedback we receive during these engagements helps us create long-term and sustainable value.

We concentrate our outreach efforts on our largest 100 shareholders – portfolio managers, buy-side professionals, stewardship teams and environmental, social and governance (ESG) analysts – who represent 60% of our ownership. While the Chairman, CEO and CFO together with Investor Relations are accountable for ensuring effective shareholder engagement, other senior managers from within and outside the Executive Committee also participate in the meetings. We conduct regular outreach to investors throughout the year.

TYPES OF ENGAGEMENTS (SELECT EXAMPLES):

- Quarterly results conference calls for analysts and investors
- Bank conferences
- Management roadshows
- Reverse roadshows at Novartis sites
- Capital markets event (meet Novartis management)
- R&D Day
- AGM
- Governance and compensation roadshow
- Governance teleconferences
- Chairman's dinner in Zurich, London, US East and West Coast
- ESG roadshow
- ESG investor day

TOPICS DISCUSSED WITH SHAREHOLDERS DURING 2019:

INNOVATION:
- Progress
- Milestones
- Data of pipeline projects (e.g., *Zolgensma* intrathecal, ofatumumab, fevipiprant, *Entresto* in heart failure with preserved ejection fraction)
- Launches (e.g., *Zolgensma, Piqray, Mayzent, Beovu*)

OPERATIONAL EXECUTION:
- Progress on financial, strategic and operational performance
- Long-term sustainability of financial performance
- Capital allocation strategy
- Policy and pricing environment
- Lifecycle management

DATA AND DIGITAL:
- New initiatives and progress

BUILDING TRUST WITH SOCIETY AND CULTURE (ESG):
- Clear duties regarding disclosures and ESG integration
- Progress on culture and metrics
- Updates on alleged controversies in relation to Greece, the Southern District of New York, and *Zolgensma*
- Board accountability to ESG topics
- Granularity on how ESG is embedded in the compensation system
- Pricing and access programs
- Environmental targets

COMPENSATION AND GOVERNANCE:
- Diversity of the Board, the Executive Committee and the Company overall
- Board refreshment and succession planning
- Board evaluation process
- Link of compensation system to key strategic priorities
- Risk oversight
- Independence of the Audit Committee
- Overboarding

We appreciate the growing importance shareholders attach to ESG matters and recognize that good outcomes on ESG performance can be an indicator of overall good long-term performance of the Company. We are committed to continuing our efforts to integrate ESG into our overall strategy. In the last two years, we have more than doubled the number of investor engagements on ESG matters, and in 2019, we held our first in-person ESG Day in London, led by our CEO, and our first ESG roadshow in the Netherlands.

Voting rights, restrictions and representation

REGISTRATION

Shareholders have the right to vote and to execute all other rights as granted under Swiss law and the Articles of Incorporation (see, in particular, articles 17 and 18 of the Articles of Incorporation: www.novartis.com/investors/company-overview/corporate-governance).

Each share registered with the right to vote by the third business day before the General Meeting entitles the holder to one vote at General Meetings. To be registered with voting rights, a shareholder must declare that he or she acquired the shares in his or her own name and for his or her own account. According to article 5, paragraph 3 of the Articles of Incorporation (www.novartis.com/investors/company-overview/corporate-governance), the Board may register nominees with the right to vote. The Share Register is an internal, non-public register subject to statutory confidentiality and data-privacy.

REGISTRATION RESTRICTIONS

Article 5, paragraph 2 of the Articles of Incorporation (www.novartis.com/investors/company-overview/corporate-governance) provides that no shareholder shall be registered with the right to vote for more than 2% of the registered share capital. Given that shareholder representation at General Meetings traditionally has been rather low in Switzerland, Novartis AG considers registration restrictions necessary to prevent a minority shareholder from dominating a General Meeting. The Board may, upon request, grant an exemption from this restriction. Considerations include whether the shareholder supports the Novartis goal of creating sustainable value and has a long-term investment horizon. Exemptions are in force for the registered significant shareholders listed in "—Item 6.C Board practices—Group structure and shareholders—Shareholders—Significant shareholders," and for Norges Bank (Central Bank of Norway), Oslo, which as of December 31, 2019, was not registered in the Share Register but according to a disclosure notification filed with Novartis AG, held 2.1% of the share capital. No further exemptions were requested in 2019. The same restrictions indirectly apply to ADR holders.

Article 5, paragraph 3 of the Articles of Incorporation provides that no nominee shall be registered with the right to vote for up to 0.5% of the registered share capital. The Board may, upon request, grant an exemption from this restriction if the nominee discloses the names, addresses and number of shares of the individuals for whose account it holds 0.5% or more of the registered share capital. Exemptions are in force for the nominees listed in "—Item 6.C Board practices—Group structure and shareholders—Shareholders—Significant shareholders," and for the nominee Citibank, London, which in 2015 requested an exemption, but as of December 31, 2019, was not registered in the Share Register. The same restrictions indirectly apply to ADR holders.

Shareholders, ADR holders, or nominees who are linked to each other or who act in concert to circumvent registration restrictions are treated as one person or nominee for the purposes of the restrictions on registration.

REPRESENTATION AND SHERPANY PLATFORM

Shareholders can vote their shares by themselves or appoint another shareholder or the Independent Proxy to vote on their behalf. In 2019, we reconsidered the Independent Proxy set-up and it was concluded that the processing of voting instructions to the Independent Proxy should be without any involvement of Novartis. All shareholders (who are not yet registered on the online platform) receive a General Meeting invitation letter with a form for the appointment of the Independent Proxy. On this form, shareholders can instruct the Independent Proxy to vote on alternative or additional motions related to the agenda items either (i) following the recommendations of the Board for such alternative or additional motions, or (ii) against such alternative or additional motions. They can also abstain from voting.

Shareholders can use an online platform (the Sherpany Platform) to receive invitations to future General Meetings exclusively by email. They can then use Sherpany to order their admission ticket, appoint a proxy, and give voting instructions. Not-yet-registered shareholders can sign up with the account opening document that will be sent to them with the invitation to the AGM 2020 or by ordering the document from the Share Register. Shareholders can deactivate their online account at any time and again receive invitations in paper form.

ADR HOLDERS

ADR holders have the rights enumerated in the deposit agreement (such as the right to give voting instructions and to receive dividends). The ADS depositary of Novartis AG – JPMorgan Chase Bank, N.A., New York – holds the shares underlying the ADRs and is registered as a shareholder in the Share Register. An ADR is not a share, and an ADR holder is not a Novartis AG shareholder. Each ADR represents one share. ADR holders exercise their voting rights by instructing the depositary to exercise their voting rights. JPMorgan Chase Bank, N.A., exercises the voting rights for registered shares underlying ADRs for which no voting instructions have been given by providing a discretionary proxy to an uninstructed independent designee. Such designee has to be a Novartis shareholder.

General Meeting

CONVENING

The AGM must be held within six months after the close of the financial year (December 31), and normally takes place in late February/early March. Extraordinary General Meetings may be requested by the Board, the external auditor, or shareholders representing at least 10% of the share capital.

AGENDA

Shareholders representing shares with an aggregate nominal value of at least CHF 1 million may request that an item be included in a General Meeting agenda. Such requests must be made in writing at least 45 days before the meeting, specifying the requested item and proposal.

POWERS

The following powers are vested exclusively in the General Meeting:

- Adoption and amendment of the Articles of Incorporation
- Election and removal of the Board Chairman, the Board and Compensation Committee members, the Independent Proxy and the external auditor
- Approval of the management report (if required) and of the consolidated financial statements
- Approval of the financial statements of Novartis AG, and decision on the appropriation of available earnings shown on the balance sheet, including dividends
- Approval of the maximum aggregate Board compensation (from an AGM until the next AGM) and of the Executive Committee (for the financial year following the AGM). If the maximum aggregate amount of compensation already approved by the AGM is not sufficient to cover the compensation of newly appointed or promoted Executive Committee members, Novartis may use up to 40% of the amount last approved for the newly appointed or promoted Executive Committee members.
- Discharge of Board and Executive Committee members
- Decision on other matters that are reserved by law or by the Articles of Incorporation (e.g., advisory vote on the Compensation Report) to the General Meeting

STATUTORY QUORUMS

The General Meeting passes resolutions and elections with the absolute majority of the votes represented at the meeting. However, under article 18 of the Articles of Incorporation (www.novartis.com/investors/company-overview/corporate-governance), the approval of two-thirds of the votes represented at the meeting is required for:

- Alteration of the purpose of Novartis AG
- Creation of shares with increased voting powers
- Implementation of restrictions on the transfer of registered shares, and the removal of such restrictions
- Authorized or conditional increase of the share capital
- Increase of the share capital out of equity, by contribution in kind, for the purpose of an acquisition of property or the grant of special rights
- Restriction or suspension of rights or options to subscribe
- Change of location of the registered office of Novartis AG
- Dissolution of Novartis AG

In addition, the law provides for a qualified majority for other resolutions, such as a merger or demerger.

Board of Directors

Composition (as per December 31, 2019)[1]

CHAIRMAN: J. Reinhardt
VICE CHAIRMAN: E. Vanni

N. Andrews
T. Buechner
P. Bula
S. Datar
E. Doherty
A. Fudge
F. van Houten
A. von Planta
C. Sawyers
W. Winters

AUDIT AND COMPLIANCE COMMITTEE	COMPENSATION COMMITTEE	GOVERNANCE, NOMINATION AND CORPORATE RESPONSIBILITIES COMMITTEE	RESEARCH & DEVELOPMENT COMMITTEE	RISK COMMITTEE
E. Doherty (Chair)	E. Vanni (Chair)	A. von Planta (Chair)	J. Reinhardt (Chair)	S. Datar (Chair)
T. Buechner	P. Bula	A. Fudge	N. Andrews	N. Andrews
S. Datar	S. Datar	C. Sawyers	F. van Houten	E. Doherty
A. von Planta	A. Fudge	E. Vanni	C. Sawyers	A. Fudge
E. Vanni	W. Winters	W. Winters		A. von Planta

[1] Dimitri Azar's term as a Board member ended at the 2019 AGM following his decision not to stand for re-election. His CV is included in the 2018 Annual Report (page 188, available at www.novartis.com/annualreport2018).

Election and term of office

Board members (including the Chairman) and Compensation Committee members are individually elected by the AGM for one year until the end of the next AGM.

There is no mandatory term limit for Board members. However, Board members must retire after reaching age 70. Under special circumstances, shareholders may grant an exemption and re-elect a Board member for additional terms of office.

Board succession planning

The Chairman, supported by the GNCRC, ensures effective succession plans for the Board, the CEO and the Executive Committee. These plans are discussed by the Board in private meetings without management. A search for a new Board member is launched – normally with the support of a professional executive search company – with individual selection criteria defined based on the evolving governance needs of the Company and a continuing focus on diversity. Candidates are interviewed by the Chairman, members of the GNCRC, other Board members, and members of the Executive Committee. The GNCRC then makes a recommendation to the full Board, and the Board ultimately decides who should be proposed to shareholders for election at the upcoming AGM.

Independence of Board members

All Board members – including the Chairman – are non-executive and independent, pursuant to applicable corporate governance rules and Novartis independence criteria, which reflect international best practice and are outlined in Appendix II to the Board Regulations (www.novartis.com/investors/company-overview/corporate-governance). In particular, no Board member is or was a member of the management of Novartis AG or of any other Novartis Group company in the last three financial years up to December 31, 2019, or has a significant business relationship with Novartis AG or with any other Novartis Group company.

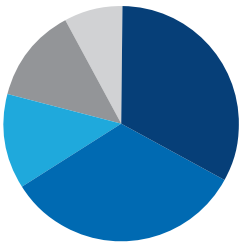
The independence is assessed on an annual basis. We consider tenure – along with many other factors – when determining a Board member's independence in the assessment to ensure that the average tenure is not excessively high while balancing continuity of knowledge and experience with refreshment. We do not believe that an individual automatically becomes "non-independent" after a given period. This has enabled Novartis to benefit from the insight and knowledge of long-standing Board members, which has been particularly important during the last years of Board refreshment. In the past four years, Novartis has added four new Board members, and two additions will be proposed to the shareholders for the AGM 2020.

Board profile

Diversity is a key factor to success and Board effectiveness, and an important criterion for the GNCRC when identifying new Board member candidates. A diverse Board ensures that the appropriate balance of skills, expertise and experience is represented to discharge responsibilities to shareholders, and helps create long-term value. The Board composition aligns with our status as a listed company as well as our business portfolio, geographic reach and culture. To ensure appropriate strategic oversight, the Board members have a diverse set of skills and experience, as highlighted in the Board members' biographies (see "—Item 6.C Board practices—Board of Directors—Members of the Board of Directors"). We are continuously looking for opportunities to improve our Board diversity, and in particular aspire to find female candidates for two of the next three nominations.

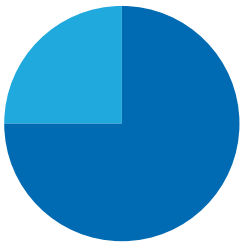
Diversity

Nationality[1]



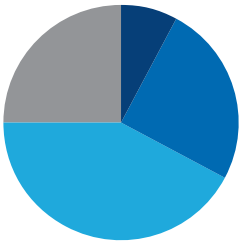
Swiss	33%
American	33%
British	13%
Dutch	13%
German	8%

Gender



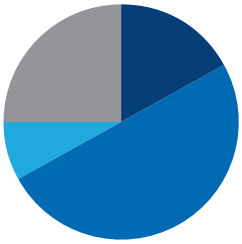
Male	75%
Female	25%

Age



<55	8%
55–60	25%
61–65	42%
>65	25%

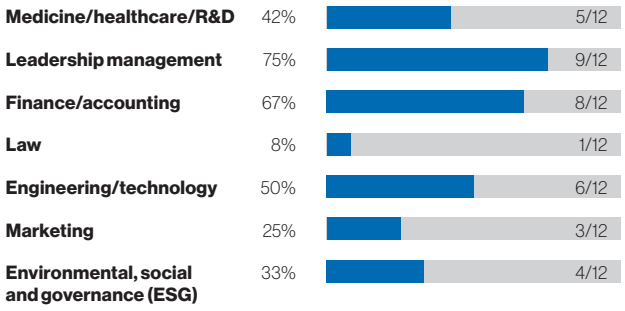
Tenure



<3 y	17%
3–6 y	50%
7–9 y	8%
>9 y	25%

[1] Please note that three Board members have two nationalities. Each of these nationalities were taken into account by a factor of 0.5 in the above chart.

Background/experience



Medicine/healthcare/R&D	42%	5/12
Leadership management	75%	9/12
Finance/accounting	67%	8/12
Law	8%	1/12
Engineering/technology	50%	6/12
Marketing	25%	3/12
Environmental, social and governance (ESG)	33%	4/12

Members of the Board of Directors

Joerg Reinhardt, Ph.D.

Chairman of the Board of Directors since 2013 | Nationality: German | Year of birth: 1956

Professional experience
- Chairman of the board of management and the executive committee, Bayer HealthCare AG, Germany (2010–2013)
- Chief Operating Officer, Novartis AG, Switzerland (2008–2010)
- Head of the Vaccines and Diagnostics Division, Novartis AG, Switzerland (2006–2008)
- Various managerial positions at Sandoz Pharma Ltd. and Novartis AG, Switzerland (1982–2006)

Mandates
- Chairman of the board of trustees, Institute of Molecular and Clinical Ophthalmology Basel (IOB), Switzerland
- Chairman of the board of trustees, Novartis Foundation, Switzerland
- Board member, Swiss Re AG, Switzerland
- Member of the European Advisory Panel, Temasek Holdings Private Ltd., Singapore
- Board member, Lonza Group AG, Switzerland (2012–2013)
- Chairman, Genomics Institute of the Novartis Research Foundation, US (2000–2010)

Education
- Doctorate in pharmaceutical sciences, Saarland University, Germany

Key skills
Medicine/healthcare/R&D Leadership management

Enrico Vanni, Ph.D.

Vice Chairman of the Board of Directors since 2011 | Nationality: Swiss | Year of birth: 1951

Professional experience
- Independent consultant, supporting leaders of pharmaceutical and biotechnology companies (2008–2015)
- Director, consulting in pharmaceutical, consumer and financial sectors, McKinsey & Co., Switzerland (1994–2007)
- Head of the Geneva Office, McKinsey & Co., Switzerland (1988–2004)

Mandates
- Board member, Advanced Oncotherapy PLC, UK
- Board member, Lombard Odier & Cie SA, Switzerland
- Board member, Banque Privée BCP (Suisse) SA, Switzerland
- Board member, Eclosion2 SA, Switzerland (2009–2017)
- Board member, Alcon Inc., Switzerland (2010–2011)
- Board member, Actavis PLC, Ireland (2010)

Education
- Master of Business Administration, INSEAD, France
- Doctorate in physical chemistry, University of Lausanne, Switzerland
- Engineering degree in chemistry, Federal Polytechnic School of Lausanne, Switzerland

Key skills
Medicine/healthcare/R&D Finance/accounting Engineering/technology

Nancy C. Andrews, M.D., Ph.D.

Member of the Board of Directors since 2015 | Nationality: American/Swiss | Year of birth: 1958

Professional experience
- Dean emerita, Duke University School of Medicine, and vice chancellor emerita for academic affairs, Duke University, US (2017–present)
- Dean, Duke University School of Medicine, and vice chancellor for academic affairs, Duke University, US (2007–2017)
- Professor of pediatrics, pharmacology & cancer biology, Duke University, US (2007–present)
- Dean of basic sciences and graduate studies, Harvard Medical School, US (2003–2007)
- Director, Harvard/MIT M.D.-Ph.D. Program, US (1999–2003)
- Biomedical research investigator, Howard Hughes Medical Institute, US (1993–2006)

Mandates
- Member of the executive committee of the corporation, Massachusetts Institute of Technology, US
- Chair, American Academy of Arts and Sciences, US
- Member of the Scientific Advisory Board, Dyne Therapeutics, US
- Board member and former chair, Burroughs Wellcome Fund, US (2011–2019)
- Member of the Scientific Management Review Board, National Institutes of Health, US (2014–2019)

Education
- Doctor of medicine, Harvard Medical School, US
- Doctorate in biology, Massachusetts Institute of Technology, US
- Master and Bachelor of Science in molecular biophysics and biochemistry, Yale University, US

Key skills
Medicine/healthcare/R&D Leadership management

Ton Buechner

Member of the Board of Directors since 2016 | Nationality: Dutch/Swiss | Year of birth: 1965

Professional experience
- Chairman and CEO of the executive board, AkzoNobel NV, Netherlands (2012–2017)
- CEO, Sulzer AG, Switzerland (2007–2011)
- Various managerial positions at Sulzer AG, Switzerland (1994–2007)

Mandates
- Member of the presidential and shareholder committees, Voith GmbH & Co. KGaA, Germany
- Member of the supervisory board, Voith GmbH & Co. KGaA, Germany (2014–2018)

Education
- Master of Business Administration, IMD business school, Switzerland
- Master of Science in civil engineering, Delft University of Technology, Netherlands

Key skills
Leadership management · Finance/accounting · Environmental, social and governance (ESG) · Engineering/technology

Patrice Bula

Member of the Board of Directors since February 28, 2019 | Nationality: Swiss | Year of birth: 1956

Professional experience
- Executive vice president and head of strategic business units, marketing, sales and Nespresso, Nestlé SA, Switzerland (2011–present)
- Market head of the Greater China region, Nestlé SA, Switzerland (2007–2011)
- Market head of Germany, Nestlé SA, Switzerland (2003–2007)
- Head of the confectionery and biscuits strategic business unit, Nestlé SA, Switzerland (2000–2003)
- Various managerial positions at Nestlé SA, Switzerland (1980–2000)

Mandates
- Board member, Schindler AG, Switzerland
- Board member, Cereal Partners Worldwide SA, Switzerland *(Nestlé representative)*
- Board member, Froneri Ltd., UK *(Nestlé representative)*
- Board member, Bobst Group SA, Switzerland (2017–2019)
- Chairman, Blue Bottle Coffee Inc., US *(Nestlé representative)* (2017–2019)
- Chairman, Nestlé Nespresso SA, Switzerland *(Nestlé representative)* (2011–2019)
- Board member, Hsu Fu Chi Food Companies, China (*Nestlé representative*) (2011–2019)

Education
- Program for Executive Development, IMD business school, Switzerland
- Master's degree in economic sciences, HEC Lausanne, Switzerland

Key skills
Leadership management · Marketing · Finance/accounting · Engineering/technology

Srikant Datar, Ph.D.

Member of the Board of Directors since 2003 | Nationality: American | Year of birth: 1953 |
Audit Committee Financial Expert

Professional experience
- Faculty chair, Harvard Innovation Lab, and senior associate dean for university affairs, Harvard Business School, US (2015–present)
- Professor of business administration, Harvard Business School, US (1996–present)
- Professor of accounting and management, Stanford Graduate School of Business, US (1989–1996)
- Professor of industrial administration, Carnegie Mellon University (1986–1988)

Mandates
- Board member, ICF International Inc., US
- Board member, Stryker Corp., US
- Board member, T-Mobile US Inc., US
- Board member, HCL Technologies Ltd., India (2012–2014)
- Board member, KPIT Cummins Infosystems Ltd., India (2007–2012)

Education
- Doctorate in business (accounting), Stanford University, US
- Master of Arts in economics, Stanford University, US
- Master of Science in statistics, Stanford University, US
- Postgraduate diploma in business management, Indian Institute of Management, India
- Bachelor of Science in mathematics and economics, Bombay University, India

Key skills
Finance/accounting

Elizabeth (Liz) Doherty

Member of the Board of Directors since 2016 | Nationality: British | Year of birth: 1957 |
Audit Committee Financial Expert

Professional experience
- CFO (interim), Cognita Schools Ltd., UK (2014–2015)
- CFO and Board member, Reckitt Benckiser Group PLC, UK (2011–2013)
- CFO (interim), City Inn, UK (2010)
- CFO, Brambles Ltd., Australia (2007–2009)
- Group international finance director, Tesco PLC, UK (2001–2007)
- Various managerial positions at Unilever PLC, UK (1981–2001)

Mandates
- Board member, Corbion NV, Netherlands
- Board member, Royal Philips NV, Netherlands
- Advisor, Affinity Petcare SA and GB Foods, Spain
- Board member, Dunelm Group PLC, UK (2013–2019)
- Board member, HM Courts & Tribunals Service, UK (2015–2019)
- Board member, Ministry of Justice, UK (2015–2019)
- Board member, Delhaize Group, Belgium (2013–2016)
- Board member, Nokia Corp., Finland (2013–2016)
- Board member, Brambles Ltd., Australia (2007–2009)
- Board member, SABMiller PLC, UK (2004–2010)

Education
- Fellow, Chartered Institute of Management Accountants, UK
- Bachelor's degree in liberal studies in science (physics), University of Manchester, UK

Key skills
Leadership management · Marketing · Finance/accounting · Engineering/technology

Ann Fudge

Member of the Board of Directors since 2008 | Nationality: American | Year of birth: 1951

Professional experience
- Chairman and CEO, Young & Rubicam Brands, US (2003–2007)
- President of the Beverages, Desserts and Post Division brands, Kraft Foods Inc., US (2000–2001)
- Various managerial positions at Kraft Foods Inc., US (1986–2000)

Mandates
- Board member, Northrop Grumman Corporation, US
- Chair, WGBH Public Media, US
- Chair of the United States Program Advisory Panel, Bill & Melinda Gates Foundation, US (2007–2019)
- Member of the visiting committee, Harvard Business School, US (2014–2019)
- Board member and former vice chair, Unilever PLC and NV, UK and Netherlands (2009–2018)
- Board member, General Electric Co., US (1999–2015)

Education
- Master of Business Administration, Harvard Business School, US
- Bachelor's degree in management, Simmons College, US

Key skills
Leadership management · Marketing · Environmental, social and governance (ESG)

Frans van Houten

Member of the Board of Directors since 2017 | Nationality: Dutch | Year of birth: 1960

Professional experience
- CEO and chairman of the executive committee and the board of management, Royal Philips NV, Netherlands (2011–present)
- Interim management, ING Group NV, Netherlands (2009–2010)
- CEO and chairman of the management board, NXP Semiconductors NV (formerly Philips Semiconductors NV), Netherlands (2004–2009)
- Various managerial positions at Royal Philips Electronics NV, Netherlands (1986–2004)

Mandates
- Vice chairman and member of the supervisory board, Philips Lighting, Netherlands (2016–2017)

Education
- Master of Science in economics and business management, Erasmus University Rotterdam, Netherlands
- Bachelor of Science in economics, Erasmus University Rotterdam, Netherlands

Key skills
Medicine/healthcare/R&D · Leadership management · Finance/accounting · Engineering/technology

Andreas von Planta, Ph.D.

Member of the Board of Directors since 2006 | Nationality: Swiss | Year of birth: 1955

Professional experience
- Senior counsel, Lenz & Staehelin, Switzerland (2017–present)
- Partner, Lenz & Staehelin, Switzerland (1988–2017)

Mandates
- Board member, Helvetia Holding AG, Switzerland
- Board member, A.P. Moller Finance SA, Switzerland
- Board member, Helvetia Schweizerische Lebensversicherungsgesellschaft AG, Switzerland
- Board member, Helvetia Schweizerische Versicherungsgesellschaft AG, Switzerland
- Chairman, HSBC Private Bank (Suisse) SA, Switzerland
- Chairman, HSBC Private Banking Holdings (Suisse) SA, Switzerland
- Board member, Socotab Frana SA, Switzerland
- Chairman of the regulatory board, SIX Swiss Exchange AG, Switzerland
- Board member, Burberry (Suisse) SA, Switzerland
- Chairman of the audit committee, International Road Transport Union, Switzerland
- Board member, Raymond Weil SA, Switzerland (2007–2018)
- Board member and former chairman, Clinique Générale-Beaulieu SA, Switzerland (2008–2016)
- Board member and former chairman, Schweizerische National Versicherungs AG, Switzerland (1997–2015)
- Board member, Holcim AG, Switzerland (2003–2014)

Education
- Master of Laws, Columbia Law School, US
- Bar examination, Switzerland
- Doctorate in law, University of Basel, Switzerland
- Licentiatus iuris, University of Basel, Switzerland

Key skills
Finance/accounting · Law · Environmental, social and governance (ESG)

Charles L. Sawyers, M.D.

Member of the Board of Directors since 2013 | Nationality: American | Year of birth: 1959

Professional experience
- Chair of the Human Oncology and Pathogenesis Program, Memorial Sloan Kettering Cancer Center, US (2006–present)
- Professor of medicine (2008–present), and professor of cell and developmental biology (2011–present), Weill Cornell Graduate School of Medical Sciences, US
- Investigator, Howard Hughes Medical Institute, US (2002–2006 and 2008–present)
- Associate chief, Division of Hematology-Oncology, University of California, Los Angeles, US (1996–2006)

Mandates
- Member, National Cancer Advisory Board, US
- Investigator, Howard Hughes Medical Institute, US
- Science advisor for the following US companies: Agios Pharmaceuticals Inc.; BeiGene Ltd.; Blueprint Medicines Corp.; Foghorn Therapeutics Inc.; Housey Pharmaceutical Research Laboratories; KSQ Therapeutics Inc.; Nextech Invest Ltd.; ORIC Pharmaceuticals Inc.; PMV Pharmaceuticals Inc.; The Column Group
- President, American Association for Cancer Research, US (2013–2014)

Education
- Doctor of medicine, Johns Hopkins University School of Medicine, US
- Bachelor of Arts, Princeton University, US

Key skills
Medicine/healthcare/R&D · Leadership management · Environmental, social and governance (ESG)

William T. Winters

Member of the Board of Directors since 2013 | Nationality: British/American | Year of birth: 1961

Professional experience
- CEO, Standard Chartered PLC, UK (2015–present)
- Chairman and CEO, Renshaw Bay LLP, UK (2011–2015)
- Co-CEO of the Investment Bank, JPMorgan Chase & Co., UK (2004–2010)
- Various managerial positions at JPMorgan Chase & Co., UK and US (1983–2004)

Mandates
- Board member, Standard Chartered Bank PLC, UK
- Board member, International Rescue Committee, UK
- Board member, The Coronet Theatre, UK
- Commissioner, Independent Commission on Banking, UK (2010–2011)

Education
- Master of Business Administration, Wharton School of the University of Pennsylvania, US
- Bachelor's degree in international relations, Colgate University, US

Key skills
Leadership management · Finance/accounting · Engineering/technology

Corporate Secretary

Charlotte Pamer-Wieser, Ph.D.

Board self-assessment

The Board and its committees conduct a self-assessment once a year, covering topics including Board composition, purpose, scope and responsibilities; Board processes and governance; Board meetings and pre-reading material; team effectiveness; and Chairman evaluation and peer evaluation. Periodically, this process is conducted by an independent consultant (this last happened in 2017 and is planned again for 2020).

Anonymous survey

- Each Board member fills out an anonymous survey.
- A report identifying key strengths and challenges is produced for the Board and its committees.

Qualitative review

- Based on the results, the Chairman and the committee chairs each lead a qualitative review with their colleagues and then with the entire Board.
- In addition, the Board, without its Chairman, discusses the Chairman's performance, and then provides him with feedback.

Outcome

- The last self-assessment of January 2019 determined that the Board and its committees were functioning effectively and efficiently.
- The feedback confirmed that the Board has an open, transparent and critical boardroom culture.
- The results also served as a source for potential improvements, touching upon the scope of information and the Board's desire to receive additional/or more detailed information on particular topics, including more insights into external views on the Company and its competitors, and the Company's cost-saving efforts.

Role of the Board and its committees

The Board is responsible for the overall direction and oversight of management, and holds the ultimate decision-making authority, with the exception of decisions reserved for shareholders.

The Board has delegated certain of its duties and responsibilities to its five committees led by a Board-elected Chairman, as set out in the Board Regulations (www.novartis.com/investors/company-overview/corporate-governance). In some cases, these responsibilities are of an advisory or preparatory nature (A/P). In other cases, the committee has decision-making power that is subject to final Board approval (FBA), or the responsibilities have been fully delegated to the committee (FD). All committees have the authority to retain external consultants.

Any Board member may request a Board or committee meeting and the inclusion of an agenda item. Before meetings, Board members receive materials to help them prepare the discussions and decision-making.

Board of Directors

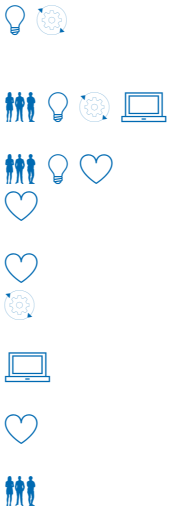
Primary responsibilities

- Group strategy: deciding on the ultimate direction of the Group's business (including portfolio, markets, acquisitions and divestments)
- Group structure and organization: determining and reviewing major changes in the Group's organization and governance
- Group culture: overseeing the strategy and implementation of the corporate culture
- Group risk management system: overseeing the most significant risks and how these are managed
- Group finance: determining the Group's accounting system, financial controls and financial planning; reviewing and approving the Annual Report (including the Compensation Report)
- People & organization: nominating or appointing, removing, and determining duties and responsibilities of key executives, and succession planning

Key activities in 2019

- Oversaw the corporate strategy, including reviewing and approving the required steps for the Alcon spin-off, our investments in breakthrough technologies (e.g., the acquisition of *Xiidra* and The Medicines Company), and the divestments in oncology (e.g., Signifor®)
- Focused on accelerating our push into the data and digital healthcare space, aligning with the general trend of investing in artificial intelligence
- Oversaw the shaping of a corporate culture of empowerment and responsibility to help drive innovation, performance and reputation
- Reviewed ESG developments and oversaw our activities and priorities
- Reviewed the *Zolgensma* data integrity issue, lessons learned and additional management actions to further strengthen the governance of newly acquired companies
- Reviewed cost productivity programs
- Engaged external experts to provide strategic guidance on the Company's cybersecurity efforts
- Discussed longer-term Board succession planning, assessing which profiles are required in the upcoming years
- Topics addressed during private sessions included the Board self-evaluation and the performance assessment of the Executive Committee members, as well as their succession planning

Strategic priorities[3]



Meetings

Number of meetings held	8
Number of members	12
Approximate average duration (hours)	7:48
Meeting attendance	98%

Subject to additional special meetings, the Board and Board committee meetings take place in January, April, June, August, October and December. Typically, these meetings last two days, with the first day allocated to Board committee meetings, and the second day allocated to the meeting of the full Board.

Joerg Reinhardt[1]	8
Enrico Vanni	8
Nancy C. Andrews	8
Ton Buechner	8
Patrice Bula[2]	6
Srikant Datar	8
Elizabeth Doherty	7
Ann Fudge	8
Frans van Houten	8
Andreas von Planta	8
Charles L. Sawyers	7
William T. Winters	8

Documents

- Articles of Incorporation of Novartis AG
- Board Regulations

www.novartis.com/investors/company-overview/corporate-governance

[1] Chair
[2] Mr. Bula was elected at the AGM 2019 and has attended all Board meetings since his election.
[3] Strategic priorities:

Unleash the power of our people | **Deliver transformative innovation** | **Embrace operational excellence** | **Go big on data and digital** | **Build trust with society**

Audit and Compliance Committee

Primary responsibilities

- Supervising the external auditor (FD),** and selecting and nominating the external auditor for election by the shareholders (FBA)***
- Overseeing Internal Audit (FD)**
- Overseeing accounting policies, financial controls, and compliance with accounting and internal control standards (FD)**
- Approving quarterly financial statements and financial results releases (FBA)***
- Overseeing internal control and compliance processes and procedures (FD)**
- Overseeing compliance with laws, and external and internal regulations (FD)**

Key activities in 2019

- Focused on acquisitions as well as divestments
- Reviewed the accounting and financial reporting
- Reviewed the potential impact and implications of the *Zolgensma* data integrity issue together with external advisors
- Received reports and updates from Internal Audit; Quality; Ethics, Risk & Compliance; the SpeakUp Office; Health, Safety and Environment (HSE); Tax; and Legal
- Evaluated the performance and discussed the rotation of the external auditor

Strategic priorities[3]

Meetings

Number of meetings held	9
Number of members	5
Approximate average duration (hours)	2:15
Meeting attendance	96%

Elizabeth Doherty[1,2]	8
Ton Buechner	8
Srikant Datar[2]	9
Andreas von Planta	9
Enrico Vanni	9

Documents

- Board Committees Charter, Appendix I to the Board Regulations

www.novartis.com/investors/company-overview/corporate-governance

[1] Chair
[2] Audit Committee Financial Expert
[*] A/P = advisory or preparatory task
[**] FD = fully delegated task
[***] FBA = task subject to final Board approval
[3] Strategic priorities:

Unleash the power of our people | **Deliver transformative innovation** | **Embrace operational excellence** | **Go big on data and digital** | **Build trust with society**

Compensation Committee

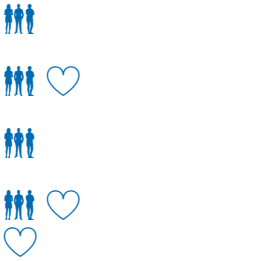
Primary responsibilities

- Designing, reviewing and recommending to the Board the compensation policies and programs (FBA)***
- Advising the Board on the compensation of Board members and of the CEO (A/P)*
- Deciding on the compensation of Executive Committee members (FD)**
- Preparing the Compensation Report and submitting it to the Board for approval (FBA)***

Key activities in 2019

- Made decisions relating to Executive Committee compensation during the year
- Reviewed the Long-Term Incentive, including the relative total shareholder return financial and innovation metrics, for Executive Committee members and other Novartis executives
- Discussed compensation governance matters and made compensation decisions for executives transferred with the Alcon spin-off, which took place in April 2019
- Reviewed shareholder feedback related to Novartis compensation practices and disclosures
- Considered additional disclosures in the 2019 Compensation Report

Strategic priorities[3]



Meetings

Number of meetings held	7
Number of members	5
Approximate average duration (hours)	1:55
Meeting attendance	100%

Enrico Vanni[1]	7
Patrice Bula[2]	6
Srikant Datar	7
Ann Fudge	7
William T. Winters	7

Documents

- Board Committees Charter, Appendix I to the Board Regulations

www.novartis.com/investors/company-overview/corporate-governance

[1] Chair
[2] Mr. Bula was elected at the AGM 2019 and has attended all Compensation Committee meetings since his election.
[*] A/P = advisory or preparatory task
[**] FD = fully delegated task
[***] FBA = task subject to final Board approval
[3] Strategic priorities:

 **Unleash the power of our people**

 **Deliver transformative innovation**

 **Embrace operational excellence**

 **Go big on data and digital**

 **Build trust with society**

Governance, Nomination and Corporate Responsibilities Committee

Primary responsibilities

- Designing, reviewing and recommending to the Board corporate governance principles (FBA)***
- Identifying candidates for election as Board members (FBA)***
- Assessing existing Board members and recommending to the Board whether they should stand for re-election (FBA)***
- Preparing and reviewing the succession plan for the CEO (FBA)***
- Developing and reviewing an onboarding program for new Board members, and an ongoing education plan for existing Board members (FD)**
- Reviewing regularly the Articles of Incorporation, with a view to reinforcing shareholder rights (FD)**
- Reviewing regularly the composition and size of the Board and its committees (FBA)***
- Reviewing annually the independence status of each Board member (FBA)***
- Reviewing directorships and agreements of Board members for conflicts of interest, and dealing with conflicts of interest (FD)**
- Overseeing the Company's strategy and governance on corporate responsibility (FBA)***

Key activities in 2019

- Discussed the succession of Board and committee members, considering anticipated vacancies due to the mandatory retirement age, and the need to increase diversity
- Revised Board Regulations
- Evaluated AGM and proxy advisor trends
- Discussed important corporate governance developments (e.g., diversity, climate change, cybersecurity risks) relevant for Novartis, including changes to Swiss and international laws and regulations
- Decided on a renewed approach to providing patient access in sub-Saharan Africa in order to move beyond profitability ratios and profit optimization
- Reviewed emerging trends and best practices in responsible and sustainable business
- Discussed ESG targets
- Decided to pledge to the United Nations' Equal Pay International Coalition (EPIC) to achieve gender balance and pay equity by 2023

Strategic priorities[3]

Meetings

Number of meetings held	4
Number of members	5
Approximate average duration (hours)	2:07
Meeting attendance	100%

Andreas von Planta[1]	4
Ann Fudge	4
Charles L. Sawyers	4
Enrico Vanni	4
William T. Winters	4

Documents

- Board Committees Charter, Appendix I to the Board Regulations

www.novartis.com/investors/company-overview/corporate-governance

[1] Chair
[*] A/P = advisory or preparatory task
[**] FD = fully delegated task
[***] FBA = task subject to final Board approval
[3] Strategic priorities:

Unleash the power of our people | Deliver transformative innovation | Embrace operational excellence | Go big on data and digital | Build trust with society

Research & Development Committee

Primary responsibilities

- Monitoring research and development, and bringing recommendations to the Board (FBA)***
- Assisting the Board with oversight and evaluation related to research and development (FD)**
- Informing the Board on a periodic basis about the research and development strategy, the effectiveness and competitiveness of the research and development function, emerging scientific trends and activities critical to the success of research and development, and the pipeline (A/P)*
- Advising the Board on scientific, technological, and research and development matters (A/P)*
- Providing counsel and know-how to management in the area of research and development (A/P)*
- Reviewing such other matters in relation to the Company's research and development as the committee may, in its own discretion, deem desirable in connection with its responsibilities (A/P)*

Key activities in 2019

- Discussed science and innovation in China
- Discussed the gene therapy portfolio
- Reviewed an external assessment of the portfolio and productivity of Novartis research and development
- Discussed the radioligand therapeutics portfolio
- Discussed a potential new direction for the Research & Development Committee to broaden its remit to cover science and technology matters, including digital innovation and data science

Strategic priorities[3]

Meetings

Number of meetings held	3
Number of members	4
Approximate average duration (hours)	8:10
Meeting attendance	92%

Joerg Reinhardt[1]	3
Nancy C. Andrews	3
Frans van Houten	3
Charles L. Sawyers	2

Documents

- Board Committees Charter, Appendix I to the Board Regulations

www.novartis.com/investors/company-overview/corporate-governance

[1] Chair
[*] A/P = advisory or preparatory task
[**] FD = fully delegated task
[***] FBA = task subject to final Board approval
[3] Strategic priorities:

 **Unleash the power of our people**

 **Deliver transformative innovation**

 **Embrace operational excellence**

 **Go big on data and digital**

 **Build trust with society**

Risk Committee

Primary responsibilities

- Overseeing the risk management system and processes (FBA)***
- Reviewing, together with management, the prioritization and management of risks, the risk portfolio, and the actions implemented by management (FBA)***
- Performing deep dives into key risk areas and fostering a culture of smart risk-taking (FBA)***
- Approving guidelines and reviewing policies and processes (FBA)***

Key activities in 2019

- Approved a new approach to achieve integrated assurance
- Analyzed pricing in various markets
- Reviewed the anti-counterfeiting activities status and outlook
- With input from the Novartis team and an independent panel of experts, reviewed the status of cybersecurity, including evolving vulnerabilities, threats and measures to address security and recovery
- Evaluated risks and opportunities associated with the digital status and strategy, and the Novartis Business Services transformation
- Reviewed the Company's third-party risk management
- Reviewed the Enterprise Risk Management Report

Strategic priorities[3]

Meetings

Number of meetings held	4
Number of members	5
Approximate average duration (hours)	2:10
Meeting attendance	95%

Srikant Datar[1]	4
Nancy C. Andrews	4
Elizabeth Doherty	3
Ann Fudge	4
Andreas von Planta	4

Documents

- Board Committees Charter, Appendix I to the Board Regulations

www.novartis.com/investors/company-overview/corporate-governance

[1] Chair
* A/P = advisory or preparatory task
** FD = fully delegated task
*** FBA = task subject to final Board approval
[3] Strategic priorities:

Unleash the power of our people | **Deliver transformative innovation** | **Embrace operational excellence** | **Go big on data and digital** | **Build trust with society**

Chairman

The Chairman leads the Board to represent the interests of all stakeholders, and ensures an appropriate balance of power between the Board and the Executive Committee. In this role, he:

- Provides leadership to the Board
- Supports and mentors the CEO
- Ensures that the Board and its committees work effectively
- Sets the agenda, style and tone of Board discussions, promoting constructive dialogue and effective decision-making
- Ensures onboarding programs for new Board members, and continuing education and specialization for all Board members
- Ensures that the Board's performance is annually evaluated
- Promotes effective relationships and communication between Board and Executive Committee members
- Ensures effective communication with the Company's shareholders

Vice Chairman

The Vice Chairman:

- Leads the Board in case and as long as the Chairman is incapacitated
- Chairs the sessions of independent Board members, and leads independent Board members if and as long as the Chairman is not independent
- Leads the yearly session of the Board members to evaluate the performance of the Chairman, during which the Chairman is not present

No separate meetings of the independent Board members were held in 2019.

Honorary Chairmen

Dr. Alex Krauer and Dr. Daniel Vasella have been appointed Honorary Chairmen in recognition of their significant achievements on behalf of Novartis. They are not provided with Board documents and do not attend Board meetings.

Mandates outside the Novartis Group

According to article 34, paragraph 1 of the Articles of Incorporation (www.novartis.com/investors/company-overview/corporate-governance), the following limitations on mandates apply:

	Maximum number of mandates
Mandates	10
Other listed companies[1]	4

[1] Chairmanship of the board of directors in other listed companies counts as two mandates.

According to article 34, paragraph 3 of the Articles of Incorporation (www.novartis.com/investors/company-overview/corporate-governance), the following mandates are not subject to the above-mentioned limitations:

	Maximum number of mandates
Mandates in companies that are controlled by Novartis AG	No limit
Mandates held at the request of Novartis AG or companies controlled by it	5
Mandates in associations, charitable organizations, foundations, trusts and employee welfare foundations	10

"Mandates" means those in the supreme governing body of a legal entity that is required to be registered in the commercial register or a comparable foreign register. Mandates in different legal entities that are under joint control are deemed one mandate.

In 2019, some investors asked questions regarding the election of Patrice Bula for reasons of deemed overboarding. The nomination was based on a thorough assessment of Mr. Bula's capability to not only attend meetings but also to invest an appropriate amount of time in providing strategic oversight as a Novartis Board member, in particular also in case of any urgent matter. We are satisfied that any concerns related to overboarding are outweighed by the significant long-standing Swiss and global business experience Mr. Bula will bring to the Board, including his experience in challenging markets like China. Mr. Bula has attended all Novartis Board and Compensation Committee meetings since his election. As of 1 January 2020, Mr. Bula will no longer be responsible at Nestlé for the unit elaborating Portfolio Strategy and Business Intelligence and, he will step down from his roles as chairman of Blue Bottle Coffee Inc. and Nestlé Nespresso SA, and as board member of Hsu Fu Chi Food Companies.

Information and control systems of the Board vis-à-vis management

Information from senior management

The Board ensures that it receives sufficient information from the Executive Committee through:

- Monthly CEO reporting (including detailed written updates from each division and business unit head), regular CEO information on current developments, and a yearly presentation
- Executive Committee meeting minutes
- Regular meetings/teleconferences by the Board and/or Board committees with the CEO and/or other members of the Executive Committee (e.g., the CFO, Group General Counsel, Chief Ethics, Risk & Compliance Officer) and occasional meetings/teleconferences with senior management (e.g., the Global Head of Novartis Business Assurance & Advisory/Internal Audit)
- Information from Executive Committee members or other Novartis associates, and visits to Novartis sites

To get an outside view, the Board and/or Board committees occasionally invite external advisors (e.g., the independent advisor of the Compensation Committee, the external auditor) to attend a meeting and/or represent a specific topic.

Regular reports to the Board

Novartis produces comprehensive, consolidated (unaudited) financial statements on a monthly basis for the Group and its operating divisions. These are typically available within 10 days after the end of the month, and include the following:

- Consolidated income statement of the month and year to date, in accordance with International Financial Reporting Standards (IFRS), as well as adjustments to arrive at core results, as defined by Novartis (see "Item 5. Operating and Financial Review and Prospects—Item 5.A Operating results—Non-IFRS measures as defined by Novartis"). The IFRS and core figures are compared to the prior-year period and targets in both USD and on a constant currency basis.
- Supplementary data on a monthly and year-to-date basis, such as free cash flow and earnings per share on a USD basis

Management information related to the consolidated income statements and free cash flow is made available to Board members through the monthly CEO Report, including an analysis of key deviations from the prior year or target.

Prior to the release of each quarter's results, the Board receives the actual consolidated financial statement information and an outlook of the full-year results in accordance with IFRS and core results (as defined by Novartis), together with related commentary.

Annually, in the middle of the year, the Board approves the Company's strategic plan for the next three years. In the fourth quarter of the year, the Board approves the operating targets for the following year as well as the financial targets for the following three-year period, including a projected consolidated income statement in USD prepared in accordance with IFRS and non-IFRS measures as defined by Novartis (core results).

The Board does not have direct access to the Novartis financial and management reporting systems but can, at any time, request more detailed information.

Risk management

Ultimate oversight of the Board of Directors

The Board is supported by:

RISK COMMITTEE	• Oversees the risk management system and processes • Reviews, together with management, the priorization and management of risks, the risk portfolio and actions implemented by management • Performs deep dives into key risk areas and fosters a culture of smart risk-taking • Approves guidelines and reviews policies and processes • Receives regular presentations from the Chief Ethics, Risk & Compliance Officer and the Head of Risk & Resilience as well as designated risk owners
COMPENSATION COMMITTEE	• Works closely with the Risk Committee to ensure that the compensation system does not lead to excessive risk-taking by management (for details, see "Item 6.B Compensation—Compensation governance—Risk management principles")
AUDIT AND COMPLIANCE COMMITTEE	• Ensures that Internal Audit plans are aligned with key risks and that the function provides independent assurance and insights around those • Receives bi-annually a presentation from the Chief Ethics, Risk & Compliance Officer, who is free to also request a closed session with the ACC and/or its Chair as needed • Pays particular attention to financial risk
EXECUTIVE COMMITTEE	• Regularly assesses risks and fosters a culture of risk awareness, in line with the Novartis Values and Behaviors
ETHICS, RISK & COMPLIANCE (ERC)	• Provides an integrated Enterprise Risk Management (ERM) framework to gather a holistic view and drive a culture of smart risk-taking • Our integrated framework was further strengthened by launching the Novartis Risk & Resilience organization as an ERC subfunction, bringing together the Group Risk Office, Risk Assessment & Monitoring (RAM), Business Continuity Management (BCM), and Novartis Emergency Management (NEM)
SENIOR LEADERS OF DIVISIONS, ORGANIZATIONAL UNITS AND GROUP FUNCTIONS, AT ALL LEVELS	• Provide appropriate risk management within their area of responsibility • Establish adequate risk prevention and mitigation strategies when risk exposure is identified, involving periodic meetings to track progress and review of the resources for mitigation • Assess emerging risks, trends and overall exposure

Coverage of the ERM framework in general

The ERM process covers, but is not limited to covering, the risks associated with:

- Research, development, manufacturing, marketing and sales of products
- Finance; taxes; intellectual property; compliance with law and regulations; security; product safety; human resources; and health, safety and environmental protection
- Business objectives and strategies, including mergers and acquisitions
- External factors such as the social, political and economic environment

2019 ERM activities

Under the ERC, the ERM process has evolved to further adapt to the Company's changing needs. As part of the ERC, the ERM performed risk workshops, and in close collaboration with all risk assurance functions gathered an integrated view of the risks across the Company. Each Novartis unit had at its leadership team level a focused risk workshop, usually in the context of the strategic planning process. In parallel, the ERC piloted integrated risk workshops in a selected group of countries. This informed the creation of a risk portfolio (the Novartis Risk Compass) with a mitigation action plan per local unit, followed by a "one risk discussion" with the country leadership team, which helped identify and prioritize key risks at the country level.

Internal Audit

Independent assurance, advice and insights

The function supports Novartis in achieving its objectives; identifying and managing major risks; and complying with policies, laws and regulations in the following ways:

- Internal Audit executes the risk-based annual audit plan approved by the ACC at Group and entity level, and reports the results to the audited units, the Executive Committee (including a root cause analysis), and the ACC (in the form of formal quarterly presentations and audit report executive summaries).
- (Potential) material irregularities are escalated to the SpeakUp Office for triage and potential investigation, and to the ACC. Action plans are developed together with the audited units.
- Internal Audit conducts desktop follow-up for high-risk findings prior to the due date of the remediation actions. In case of "needs major improvement" audit opinion, a follow-up audit will take place in the following year.
- Audit findings and action plans are stored and monitored in a single application to enable efficient follow-up.
- Internal Audit also proactively shares insights, best practices and recurring findings with the business to foster continuous learning.

The Global Head of Novartis Business Assurance & Advisory/Internal Audit reports administratively to the CEO, and functionally to the Chair of the ACC, and meets with the latter and the Chairman of the Board at least quarterly.

2019 Internal Audit activities and observations

Compared to previous years, Internal Audit broadened the coverage by applying an end-to-end approach and conducting advisory engagements to assess and strengthen governance, risk management and controls (for example, in ongoing strategic projects, newly set-up processes or acquired companies). In 2019, Internal Audit performed:

44	20	14
Audits	Advisories	Site visits

Coverage extended to engagements in commercial entities, as well as multiple corporate functions and projects, such as various digital initiatives and the transformations of NTO and NBS. Recurring observations identified across functions and business units relate to:

- Improving project governance
- End-to-end processes
- The sustainability and impact of business transformations
- Principles-based decision-making
- Data governance
- System interface management and system security
- Third-party management

Internal Audit and the ERC functions have initiated a multiyear integrated assurance project to further optimize coverage and minimize blind spots and duplications. In 2019, a self-assessment framework was implemented to determine and potentially improve the maturity of monitoring functions. Internal Audit also advised on the execution of joint monitoring visits piloted by ERC, Financial Control and Compliance (FC&C), and BCM.

Executive Committee

Composition (as per December 31, 2019)

Vasant Narasimhan
Chief Executive Officer

Steven Baert
Chief People & Organization Officer

Bertrand Bodson
Chief Digital Officer

James Bradner
President of the Novartis Institutes for BioMedical Research (NIBR)

Harry Kirsch
Chief Financial Officer

Shannon Thyme Klinger
Group General Counsel

Steffen Lang
Global Head of Novartis Technical Operations (NTO)

Klaus Moosmayer
Chief Ethics, Risk & Compliance Officer

Richard Saynor
Chief Executive Officer of Sandoz

Susanne Schaffert
President of Novartis Oncology

John Tsai
Head of Global Drug Development and Chief Medical Officer

Marie-France Tschudin
President of Novartis Pharmaceuticals

Robert Weltevreden
Head of Novartis Business Services (NBS)

Changes to the Executive Committee

Susanne Schaffert became President of Novartis Oncology and a member of the Executive Committee effective January 1, 2019. Marie-France Tschudin became President of Novartis Pharmaceuticals and a member of the Executive Committee effective June 7, 2019. She replaced Paul Hudson, who stepped down as of the same date. His CV can be found in the 2018 Annual Report (page 194). Richard Saynor became CEO of Sandoz and a member of the Executive Committee effective July 15, 2019. Richard Francis served as CEO of Sandoz until March 31, 2019. His CV can be found in the 2018 Annual Report (page 194). The 2018 Annual Report is available at www.novartis.com/annualreport2018.

Role of the Executive Committee

The Board has appointed the Executive Committee members and delegated to them the overall responsibility for and oversight of the operational management of Novartis, including:

- Recruiting, appointing and promoting senior management
- Ensuring the efficient operation of the Group and the achievement of optimal results
- Promoting an active internal and external communications policy
- Developing policies and strategic plans for Board approval, and implementing those approved
- Submitting the following to the Board for approval: investments, divestments, transactions, contracts and litigations with a value exceeding USD 500 million, important capital market and other financing transactions, as well as all other matters of fundamental significance to the Novartis Group
- Preparing and submitting quarterly and annual reports to the Board and its committees
- Informing the Board of all matters of fundamental significance to the businesses
- Dealing with any other matters delegated by the Board

There are no contracts between Novartis and third parties whereby Novartis would delegate any business management tasks to such third parties.

CEO

With the support of the Executive Committee, the CEO is responsible for the operational management of Novartis. This includes effectively implementing the Company strategy, delivering financial results, and shaping a corporate culture of empowerment and responsibility to help drive innovation, performance and reputation.

In addition to other Board-assigned duties, the CEO leads the Executive Committee, building and maintaining an effective executive team. With the support of the Executive Committee, the CEO is responsible for:

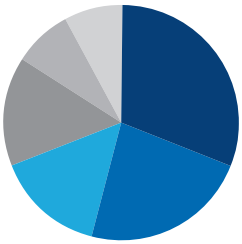
- Ensuring Novartis has the capabilities to achieve its long-term strategic objectives
- Developing robust management succession and development plans for presentation to the Board
- Promoting effective communication with shareholders and other stakeholders
- Ensuring Novartis conducts its business in a legal and ethical manner
- Developing an effective risk control framework for all business activities
- Ensuring the flow of information to the Board is accurate, timely and clear

Executive Committee profile

The composition as of December 31, 2019, in terms of length of tenure, gender and nationality, is shown in the following charts:

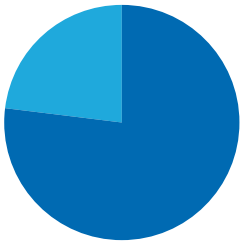
Diversity

Nationality[1]



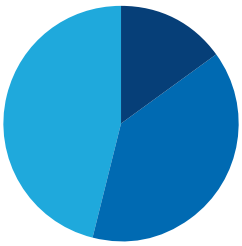
- American 31%
- German 23%
- Swiss 15%
- Belgian 15%
- Dutch 8%
- British 8%

Gender



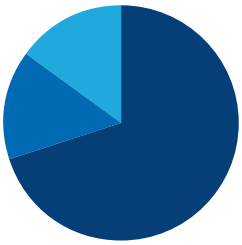
- Male 77%
- Female 23%

Age



- <45 15%
- 45–50 39%
- >50 46%

Tenure



- <2 y 70%
- 2–4 y 15%
- >4 y 15%

[1]Please note that two Executive Committee members have two nationalities. Each of these nationalities were taken into account by a factor of 0.5 in the above chart.

Mandates outside the Novartis Group

According to article 34, paragraph 2 of the Articles of Incorporation (www.novartis.com/investors/company-overview/corporate-governance), the following limitations on mandates apply:

	Maximum number of mandates
Mandates	6
Other listed companies[1]	2

[1] Chairmanship of the board of directors in other listed companies is not allowed.

According to article 34, paragraph 3 of the Articles of Incorporation (www.novartis.com/investors/company-overview/corporate-governance), the following mandates are not subject to above-mentioned limitations:

	Maximum number of mandates
Mandates in companies that are controlled by Novartis AG	No limit
Mandates held at the request of Novartis AG or companies controlled by it	5
Mandates in associations, charitable organizations, foundations, trusts and employee welfare foundations	10

"Mandates" means those in the supreme governing body of a legal entity that is required to be registered in the commercial register or a comparable foreign register. Mandates in different legal entities that are under joint control are deemed one mandate.

Members of the Executive Committee

Vasant (Vas) Narasimhan, M.D.

Chief Executive Officer of Novartis since 2018 | Nationality: American | Year of birth: 1976

Professional experience
- Global Head of Drug Development and Chief Medical Officer, Novartis AG, Switzerland (2016–2018)
- Global Head of Development, Novartis Pharmaceuticals, Switzerland (2014–2016)
- Global Head of Biopharmaceuticals and Oncology Injectables, Sandoz International, Germany (2014)
- Global Head of Development, Novartis Vaccines, US (2012–2014)
- North America Region Head, Novartis Vaccines, and US Country President, Novartis Vaccines and Diagnostics, US (2008–2012)
- Joined Novartis in 2005

Mandates
- Committee member, Biopharmaceutical CEOs Roundtable (BCR), International Federation of Pharmaceutical Manufacturers & Associations (IFPMA), Switzerland
- Member of the board of fellows, Harvard Medical School, US
- Board member, Pharmaceutical Research and Manufacturers of America (PhRMA), US

Education
- Doctor of medicine, Harvard Medical School, US
- Master's degree in public policy, John F. Kennedy School of Government, Harvard University, US
- Bachelor's degree in biological sciences, University of Chicago, US

Steven Baert

Chief People & Organization Officer of Novartis since 2014 | Nationality: Belgian | Year of birth: 1974

Professional experience
- Global Head of Human Resources, Novartis Oncology, Switzerland (2012–2014)
- Head of Human Resources for the US and Canada, Novartis Pharmaceuticals, US (2009–2012)
- Head of Human Resources for Emerging Growth Markets, Novartis Pharmaceuticals, Switzerland (2008–2009)
- Head of Human Resources Global Functions, Novartis Pharmaceuticals, Switzerland (2006–2008)

Mandates
- Board member, WeSeeHope charity, US
- Represented Novartis on the board of GlaxoSmithKline Consumer Healthcare Holdings Ltd. (2015–2018)

Education
- Master of Business Administration, Vlerick Business School, Belgium
- Master of Laws, Katholieke Universiteit Leuven, Belgium
- Bachelor of Laws, Katholieke Universiteit Brussels, Belgium

Bertrand Bodson

Chief Digital Officer of Novartis since 2018 | Nationality: Belgian | Year of birth: 1975

Professional experience
- Chief digital and marketing officer, Sainsbury's Argos, UK (2013–2017)
- Executive vice president of the global digital business, EMI Music, UK (2010–2013)
- Co-founder and CEO, Bragster.com, UK (2006–2010)
- Senior group product manager, Amazon Inc., US and UK (2003–2006)

Mandates
- Board member, Electrocomponents PLC, UK
- Member of the supervisory board, Wolters Kluwer NV, Netherlands

Education
- Master of Business Administration, Harvard Business School, US
- Master's degree in commercial engineering, Solvay Business School, Belgium/McGill University, Canada

James (Jay) Bradner, M.D.

President of the Novartis Institutes for BioMedical Research (NIBR) since 2016 | Nationality: American | Year of birth: 1972

Professional experience
- Associate professor, Department of Medicine, Harvard Medical School, US (2014–2016)
- Assistant professor, Department of Medicine, Harvard Medical School, US (2010–2014)
- Attending physician, Department of Medical Oncology, Dana-Farber Cancer Institute, US (2005–2015)
- Co-founder of five biotechnology companies
- Co-author of more than 200 scientific publications and 30 US patent applications

Mandates
- Member, Alpha Omega Alpha Honor Medical Society, US
- Member, American Society for Clinical Investigation, US
- Chairman, Genomics Institute of the Novartis Research Foundation, US

Education
- Doctor of medicine, University of Chicago Pritzker School of Medicine, US
- Bachelor's degree in biochemistry, Harvard University, US
- Postdoctoral training in chemistry and chemical biology, Harvard University, US
- Fellowship in medical oncology and hematology, Dana-Farber Cancer Institute, US
- Residency in medicine, Brigham and Women's Hospital, US

Harry Kirsch

Chief Financial Officer of Novartis since 2013 | Nationality: German/Swiss | Year of birth: 1965

Professional experience
- Chief Financial Officer of the Pharmaceuticals Division (now known as the Innovative Medicines Division), Novartis Pharmaceuticals, Switzerland (2010-2013)
- Chief Financial Officer of Pharma Europe, Novartis Pharmaceuticals, Switzerland (2008–2010)
- Head of Business Planning & Analysis for the Pharmaceuticals Division, Novartis Pharmaceuticals, Switzerland (2005–2008)
- Joined Novartis in 2003 as Head Finance Global Primary Care, and over the years held positions of increasing responsibility within Finance

Mandates
- Represented Novartis on the board of GlaxoSmithKline Consumer Healthcare Holdings Ltd. (2015–2018)

Education
- Diploma degree in industrial engineering and economics, University of Karlsruhe, Germany

Shannon Thyme Klinger

Group General Counsel of Novartis since 2018 | Nationality: American | Year of birth: 1971

Professional experience
- Chief Ethics, Risk and Compliance Officer, Novartis AG, Switzerland (April–May 2018)
- Chief Ethics and Compliance Officer and Global Head of Litigation, Novartis AG, Switzerland (2016–2018)
- General Counsel and Global Head of Legal, Sandoz International, Germany (2012–2016)
- General Counsel for North America, Sandoz Inc., US (2011–2012)
- Partner, Mayer Brown LLP, US (2010–2011)
- General counsel and senior vice president, Solvay Pharmaceuticals Inc., US (2008–2010)

Mandates
- Board member, SIX Group, Switzerland

Education
- Bar memberships: State of Georgia, District of Columbia, US
- Juris doctor with honors, University of North Carolina at Chapel Hill, US
- Bachelor's degree in psychology, University of Notre Dame, US

Steffen Lang, Ph.D.

Global Head of Novartis Technical Operations (NTO) since 2017 | Nationality: German/Swiss | Year of birth: 1967

Professional experience
- Global Head of Biologics Technical Development and Manufacturing, Novartis Technical Operations, Switzerland (2015–2017)
- Global Head of Technical Research and Development, Novartis Pharmaceuticals, Switzerland (2009–2015)
- Joined Novartis in 1994 as Head of Laboratory in Research, and over the years held positions of increasing responsibility within Pharmaceuticals Development

Education
- Doctorate in pharmaceutical technology, Swiss Federal Institute of Technology, Switzerland
- Master's degree in pharmaceutical sciences, University of Heidelberg, Germany

Klaus Moosmayer, Ph.D.

Chief Ethics, Risk & Compliance Officer of Novartis since 2018 | Nationality: German | Year of birth: 1968

Professional experience
- Chief compliance officer, Siemens AG, Germany (2014–2018)
- Chief counsel compliance, Siemens AG, Germany (2009–2013)
- Compliance operating officer, Siemens AG, Germany (2007–2009)

Mandates
- Chair of the Anti-Corruption Committee of the Business and Industry Advisory Committee, Organization for Economic Co-operation and Development (OECD), Paris
- Co-founder and chair, European Chief Compliance and Integrity Officers' Forum
- Co-chair, B20 Integrity & Compliance Task Force under the G20 presidency of Saudi Arabia
- Co-chair, B20 Integrity & Compliance Task Force under the G20 presidency of Argentina (2018)
- Chair, B20 Integrity & Compliance Task Force under the G20 presidency of Germany (2017)

Education
- First and second state examination in law, Germany
- Doctor of jurisprudence, University of Freiburg, Germany

Richard Saynor

Chief Executive Officer of Sandoz since July 15, 2019 | Nationality: British | Year of birth: 1967

Professional experience
- Senior vice president of classic and established products, and commercial and digital platforms, GlaxoSmithKline (GSK) Pte. Ltd., UK (March–June 2019)
- Senior vice president and global head of classic and established products, GSK, UK (2014–2019)
- Senior vice president and global head of established products, GSK, UK (2013–2014)
- Senior vice president of classic brands and generics for Europe, Japan, and the emerging markets and Asia-Pacific (EMAP) region, GSK, Singapore (2010–2013)
- Region Head of Asian Markets, Sandoz International, Singapore (2008–2010)
- Region Head of Asia-Pacific, Latin America, Canada and Turkey, Sandoz International, Germany (2005–2008)

Mandates
- Member, Royal Pharmaceutical Society, UK
- Board member, GSK India, India (2018–2019)

Education
- Bachelor of Pharmacy, University of Bradford, UK

Susanne Schaffert, Ph.D.

President of Novartis Oncology since January 1, 2019 | Nationality: German | Year of birth: 1967

Professional experience
- Chairperson and President, Advanced Accelerator Applications, Switzerland (2018–2019)
- General Manager of Europe, Novartis Oncology, Italy (2012–2018)
- Global Head of Investor Relations, Novartis AG, Switzerland (2010–2012)
- Global Franchise Head for Immunology and Infectious Diseases, Novartis AG, Switzerland (2009–2010)
- General Manager of Northern and Central Europe, Novartis Oncology, Italy (2007–2009)
- General Manager of Germany, Novartis Oncology, Germany (2004–2007)

Mandates
- Board member, Novartis AG, Germany
- Board member, European Federation of Pharmaceutical Industries and Associations (EFPIA), Belgium
- Represented Novartis on the board of GlaxoSmithKline Consumer Healthcare Holdings Ltd. (2015–2018)

Education
- Doctorate in organic chemistry, University of Erlangen, Germany

John Tsai, M.D.

Head of Global Drug Development and Chief Medical Officer for Novartis since 2018 | Nationality: American | Year of birth: 1967

Professional experience
- Chief medical officer and senior vice president of Global Medical, Amgen Inc., US (2017–2018)
- Global head of clinical development for marketed products, Bristol-Meyers Squibb Co. (BMS), US (2016–2017)
- Full development team leader in oncology, BMS, US (2015–2016)
- Head of Worldwide Medical, BMS, US (2014–2015)
- Chief medical officer for Europe, BMS, France (2012–2014)
- Vice president of US Medical, BMS, US (2010–2012)
- Vice president of Cardiovascular Medical, BMS, US (2006–2010)

Education
- Doctor of medicine, University of Louisville School of Medicine, US
- Bachelor of Science in electrical engineering, Washington University in St. Louis, US

Marie-France Tschudin

President of Novartis Pharmaceuticals since June 7, 2019 | Nationality: Swiss | Year of birth: 1971

Professional experience
- President, Advanced Accelerator Applications, France (March–June 2019)
- Europe Region Head, Novartis Pharmaceuticals, Switzerland (2017–2019)
- Corporate vice president of hematology and oncology for Europe, the Middle East and Africa, Celgene International, Switzerland (2014–2016)
- Regional vice president of northern Europe, Celgene International, Switzerland (2012–2014)
- General manager of Austria, Switzerland, the Czech Republic, Poland, Slovenia and Slovakia, Celgene International, Switzerland (2009–2011)
- Country manager of Switzerland, Celgene International, Switzerland (2008–2009)

Education
- Master of Business Administration, IMD business school, Switzerland
- Bachelor of Science, Georgetown University, US

Robert Weltevreden

Head of Novartis Business Services (NBS) since 2018 | Nationality: Dutch | Year of birth: 1969

Professional experience
- Head of business services, Syngenta AG, Switzerland (2015–2017)
- Head of business process management, Syngenta AG, Switzerland (2014)
- Head of finance services, Syngenta AG, Switzerland, (2009–2014)
- Chief financial officer of the Asia-Pacific region, Syngenta Crop Protection AG, Singapore (2007–2009)

Education
- Master's degree in international finance, economics and business administration, Erasmus University Rotterdam, Netherlands
- Master of Business Administration in financial management, Vlerick Business School, Belgium

Auditors

Duration of the mandate and terms of office of the external auditor

Based on a recommendation by the ACC, the Board nominates an independent auditor for election at the AGM. PricewaterhouseCoopers AG (PwC) assumed its existing auditing mandate for Novartis in 1996. Luc Schulthess, auditor in charge, began serving in his role in 2018, and Kris Muller, global relationship partner, began serving in her role in 2019. The ACC together with PwC ensure that these partners are rotated at least every five years.

Auditing fees and additional fees

The ACC monitors and preapproves the fees paid to the external auditor for all audit and non-audit services. It has developed and approved a policy with clear guidelines on the engagement of the independent auditor firm. This policy is designed to help ensure that the independence of the external auditor is maintained. It limits the scope of services that the external auditor may provide to the Group, stipulating certain permissible types of audit-related and non-audit services, including tax services and other services that have been preapproved by the ACC. The ACC preapproves all other services on a case-by-case basis.

The external auditor is required to report periodically to the ACC about the scope of the services it has provided to the Group and the fees for the services it has performed to date. PwC fees for professional services related to the 12-month periods ended December 31, 2019, and December 31, 2018, are as follows:

	2019 USD million	2018 USD million
Audit services	21.2	25.6
Audit-related services	1.0	13.4
Tax services	0.7	0.7
Other services	1.4	2.4
Total	**24.3**	**42.1**

Audit services include work performed to issue opinions on consolidated financial statements and parent company financial statements of Novartis AG, to issue opinions related to the effectiveness of the Group's internal control over financial reporting, and to issue reports on local statutory financial statements. Also included are audit services that generally can only be provided by the statutory auditor, such as the audit of the Compensation Report, audits of the adoption of new accounting policies, audits of information systems and the related control environment, as well as reviews of quarterly financial results.

Audit-related services include other assurance services provided by the independent auditor but not restricted to those that can only be provided by the statutory auditor. They include services such as audits of pension and other employee benefit plans; audits in connection with non-recurring transactions, including audit services related to the Alcon strategic review; contract audits of third-party arrangements; corporate responsibility assurance; and other audit-related services.
Tax services represent tax compliance, assistance with historical tax matters, and other tax-related services.

Other services include procedures related to corporate integrity agreements, training in the finance area, benchmarking studies, and license fees for use of accounting and other reporting guidance databases.

Information to the Board and the ACC

The ACC, acting on behalf of the Board, is responsible for overseeing the activities of PwC. In 2019, this committee held nine meetings. PwC was invited to six of these meetings to attend the discussions on auditing matters and any other matters relevant to its audit.

The ACC recommended to the Board to approve the audited consolidated financial statements and the separate parent company financial statements of Novartis AG for the year ended December 31, 2019. The Board proposed the acceptance of these financial statements for approval by the shareholders at the next AGM.

The ACC regularly evaluates the performance of PwC and, based on this, once a year determines whether PwC should be proposed to the shareholders for election. To assess the performance of PwC, the ACC holds private meetings with the CFO and the Global Head of Novartis Business Assurance & Advisory/Internal Audit and, if necessary, obtains an independent external assessment. Criteria applied for the performance assessment of PwC include an evaluation of its technical and operational competence; its independence and objectivity; the sufficiency of the resources it has employed; its focus on areas of significant risk to Novartis; its willingness to probe and challenge; its ability to provide effective, practical recommendations; and the openness and effectiveness of its communications and coordination with the ACC, the Internal Audit function and management.

Once a year, the auditor in charge and the global relationship partner report to the Board on PwC's activities during the current year and on the audit plan for the coming year.

On an annual basis, PwC provides the ACC with written disclosures required by the US Public Company Accounting Oversight Board, and the committee and PwC discuss PwC's independence from Novartis.

Information policy

Novartis is committed to open and transparent communication with shareholders, investors, financial analysts, customers, suppliers and other stakeholders. Novartis disseminates information about material developments in its businesses in a broad and timely manner that complies with the rules of the SIX Swiss Exchange and the NYSE.

Communications

Novartis publishes this Annual Report to provide information on the Group's results and operations. Novartis discloses financial results in accordance with IFRS on a quarterly basis, and issues press releases from time to time regarding business developments.

Novartis furnishes press releases related to financial results and material events to the SEC via Form 6-K. An archive containing annual reports, US Securities and Exchange Commission Form 20-F, quarterly results releases, and all related materials – including presentations and conference call webcasts – is available at www.novartis.com/investors.

Novartis also publishes a Novartis in Society ESG Report, available at www.novartis.com/nisreport2019, which details progress and demonstrates the Company's commitment in global health and corporate responsibility. This report has been prepared in accordance with the Global Reporting Initiative, GRI Standards: Core option, and fulfills the Company's reporting requirement as a signatory of the UN Global Compact.

The information on Board and Executive Committee compensation is outlined in the Compensation Report (see "Item 6.B Compensation" in general, and for certain compensation information with respect to our Board that is responsive to Item 6.C.2 of Form 20-F, see "Item 6.B Compensation—2019 Board compensation—Philosophy and benchmarking"). Please also refer to articles 29-35 of the Articles of Incorporation (www.novartis.com/investors/company-overview/corporate-governance). There are no change-of-control and "golden parachute" clauses benefiting Board members, Executive Committee members, or other members of senior management. Employment contracts with Executive Committee members are either for a fixed term not exceeding one year or for an indefinite period with a notice period not exceeding 12 months, and do not contain commissions for the acquisition or transfer of enterprises or severance payments. No loans or credits are granted to Board and Executive Committee members.

Information contained in reports and releases issued by Novartis is only correct and accurate at the time of release. Novartis does not update past releases to reflect subsequent events, and advises against relying on them for current information.

Investor Relations

Investor Relations manages the Group's interactions with the international financial community. Several events are held each year to provide institutional investors and analysts with various opportunities to learn more about Novartis. Investor Relations is based at the Group's headquarters in Basel. Part of the team is located in the US to coordinate interaction with US investors. More information is available at www.novartis.com/investors.

Website information

Topic	Information
Share capital	Articles of Incorporation of Novartis AG www.novartis.com/investors/company-overview/corporate-governance Novartis key share data www.novartis.com/key-share-data
Shareholder rights	Articles of Incorporation of Novartis AG www.novartis.com/investors/company-overview/corporate-governance
Annual General Meeting of Shareholders	Annual General Meeting of Shareholders www.novartis.com/investors/shareholder-information/annual-general-meeting
Board Regulations	Board Regulations www.novartis.com/investors/company-overview/corporate-governance
Novartis code for senior financial officers	Novartis Code of Ethical Conduct for CEO and Senior Financial Officers www.novartis.com/investors/company-overview/corporate-governance
Novartis in Society ESG Report	Novartis in Society ESG Report www.novartis.com/nisreport2019
Novartis financial data	Novartis financial data www.novartis.com/investors/financial-data
Press releases	Press releases www.novartis.com/news/news-archive?type=press_release Free email service www.novartis.com/news/stay-up-to-date
Additional information (including Novartis investors event calendar, registered office, contact and email addresses, phone numbers, etc.)	Novartis Investor Relations www.novartis.com/investors

6.D Employees

The table below sets forth the breakdown of the total year-end number of our full-time equivalent employees by main category of activity and geographic area for the past three years.

For the year ended December 31, 2019 (full-time equivalents)	Marketing and sales	Production and supply	Research and development	NBS[1]	General and administration	Total
USA	5 360	2 830	5 412	614	763	14 979
Canada and Latin America	3 396	838	480	864	397	5 975
Europe	16 395	19 386	9 988	4 352	2 666	52 787
Asia/Africa/Australasia	17 455	3 163	4 296	4 233	1 026	30 173
Total	**42 606**	**26 217**	**20 176**	**10 063**	**4 852**	**103 914**

For the year ended December 31, 2018 (full-time equivalents)	Marketing and sales	Production and supply	Research and development	NBS[1]	General and administration	Total
USA	6 825	7 524	6 700	1 467	911	23 427
Canada and Latin America	4 584	960	508	899	490	7 441
Europe	19 608	21 397	10 049	4 845	2 780	58 679
Asia/Africa/Australasia	20 099	6 636	3 977	3 613	1 289	35 614
Total	**51 116**	**36 517**	**21 234**	**10 824**	**5 470**	**125 161**
Thereof continuing operations[2]	*43 954*	*25 862*	*19 803*	*10 824*	*4 337*	*104 780*
Thereof discontinued operations[2]	*7 162*	*10 655*	*1 431*	*0*	*1 133*	*20 381*

For the year ended December 31, 2017 (full-time equivalents)	Marketing and sales	Production and supply	Research and development	NBS[1]	General and administration	Total
USA	6 563	7 095	6 803	1 680	726	22 867
Canada and Latin America	4 477	1 305	557	900	471	7 710
Europe	18 665	20 412	10 173	4 903	2 469	56 622
Asia/Africa/Australasia	19 005	6 970	3 883	3 386	1 154	34 398
Total	**48 710**	**35 782**	**21 416**	**10 869**	**4 820**	**121 597**
Thereof continuing operations[2]	*42 115*	*25 564*	*20 060*	*10 869*	*3 859*	*102 467*
Thereof discontinued operations[2]	*6 595*	*10 218*	*1 356*	*0*	*961*	*19 130*

[1] NBS relates to full-time equivalent employees from our Novartis Business Services organizational unit.
[2] Continuing operations include the businesses of the Innovative Medicines and Sandoz Divisions and the continuing Corporate activities, and discontinued operations include the Alcon eye care devices business and certain corporate activities attributable to Alcon prior to the spin-off. See "Item 18.Financial Statements—Note 2. Significant transactions—Significant transactions in 2019."

As of December 31, 2019, the number of our full-time equivalent employees decreased by 21 247 compared to December 31, 2018, mainly due to the April 2019 completion of the Alcon spin-off. For more information on this transaction, please see "Item 18. Financial Statements—Note 2. Significant transactions in 2019."

A significant number of our associates are represented by unions or works councils. We have not experienced any material work stoppages in recent years, and we consider our employee relations to be good.

6.E Share ownership

The information set forth under "Item 6. Directors, Senior Management and Employees—Item 6.B Compensation—2019 Executive Committee compensation—Additional disclosures for the CEO and other Executive Committee members—Shares, ADRs and other equity rights owned by Executive Committee members at December 31, 2019" and under "Item 6. Directors, Senior Management and Employees—Item 6.B Compensation—2019 Board compensation—Additional disclosures—Shares, ADRs and share options owned by Board members," is incorporated by reference. For more information on our equity-based participation plans, see the information set forth under "Item 18. Financial Statements—Note 26. Equity-based participation plans for associates," which is incorporated by reference.

Item 7. Major Shareholders and Related Party Transactions

7.A Major shareholders

Novartis shares are widely held. As of December 31, 2019, Novartis had approximately 161 000 shareholders listed in the Novartis AG Share Register, representing approximately 69.7% of issued shares. Based on the Novartis AG Share Register and excluding treasury shares, approximately 42.4% of the shares registered by name were held in Switzerland, and approximately 25.4% were held in the US. Approximately 13% of the shares registered in our share register were held by individual investors, while approximately 32.8% were held by legal entities (excluding 5.7% of our share capital held as treasury shares by Novartis AG or its fully owned subsidiaries), and 54.2% by nominees, fiduciaries and the ADS depositary.

Based on our share register, we believe that we are not directly or indirectly owned or controlled by another corporation or government, or by any other natural or legal persons. There are no arrangements that may result in a change of control.

The tables below set forth information with respect to our major shareholders according to our share register as of December 31, 2019, excluding 5.7% of our share capital held as treasury shares by Novartis AG or its fully owned subsidiaries. The following registered shareholders (including nominees and the ADS depositary) held more than 2% of the total share capital of Novartis with the right to vote all their Novartis shares based on an exemption granted by the Board of Directors:

		% of respective share capital beneficially owned as of:		
	Ordinary shares beneficially owned as of Dec 31, 2019	Dec 31, 2019	Dec 31, 2018	Dec 31, 2017
Shareholders registered for their own account:				
Emasan AG, Basel, Switzerland	89 193 765	3.5	3.5	3.4
Novartis Foundation for Employee Participation, Basel, Switzerland [1]	53 983 628	2.1	2.3	2.5
UBS Fund Management (Switzerland) AG, Basel, Switzerland	52 845 411	2.1	2.2	2.0

[1] The Novartis Foundation for Employee Participation (the "Employee Foundation") is a special purpose entity that was founded by, but is independent from, Novartis.

		% of respective share capital held as of:		
	Ordinary shares held as of Dec 31, 2019	Dec 31, 2019	Dec 31, 2018	Dec 31, 2017
Shareholders registered as nominees:				
Chase Nominees Ltd., London, England	264 073 363	10.4	9.8	7.8
The Bank of New York Mellon, New York, NY	95 456 296	3.8	4.1	4.3
Through The Bank of New York Mellon, Everett, MA	*50 207 591*	*2.0*	*2.1*	*2.0*
Through The Bank of New York Mellon, New York, NY	*29 356 938*	*1.2*	*1.3*	–
Through The Bank of New York Mellon, SA/NV, Brussels, Belgium	*15 891 767*	*0.6*	*0.7*	*2.3*
Nortrust Nominees Ltd., London, England	98 354 215	3.9	3.6	3.8
Shareholder acting as American Depositary Share (ADS) depositary:				
JPMorgan Chase Bank, N.A., New York, NY	314 717 099	12.5	13.3	12.3

According to a disclosure notification filed with Novartis AG, Norges Bank (Central Bank of Norway), Oslo, Norway, held 2.1% of the share capital of Novartis AG, or 54 217 976 shares, as of December 31, 2019, with the right to vote all its Novartis shares, but was not registered in our share register as of December 31, 2019.

According to a disclosure notification filed with Novartis AG and the SIX Swiss Exchange, each of BlackRock, Inc., New York, NY, and The Capital Group Companies, Inc., Los Angeles, CA, held between 3% and 5%, but was not registered, or was registered with less than 2%, of the share capital of Novartis AG in our share register as of December 31, 2019.

As of December 31, 2019, no other shareholder was registered as owner of more than 2% of the registered share capital.

The Articles of Incorporation provide that no shareholder shall be registered with the right to vote shares comprising more than 2% of the registered share capital. The Board of Directors may, upon request, grant an

exemption from this restriction. Considerations include whether the shareholder supports the Novartis goal of creating sustainable value and has a long-term investment horizon. Exemptions are in force for the registered major shareholders as described above. Novartis has not entered into any agreement with any shareholder regarding the voting or holding of Novartis shares.

7.B Related party transactions

The information set forth under "Item 18. Financial Statements—Note 27. Transactions with related parties" is incorporated by reference.

7.C Interests of experts and counsel

Not applicable.

Item 8. Financial Information

8.A Consolidated statements and other financial information

See “Item 18. Financial Statements.”

Dividend policy

Subject to the dividend policy described below, our Board of Directors expects to recommend the payment of a dividend in respect of each financial year. If approved by our shareholders at the relevant annual shareholders' meeting, the dividends will be payable shortly following such approval. Any shareholder who purchases our shares before the ex-dividend date and holds the shares until that date shall be deemed to be entitled to receive the dividends approved at that meeting. Dividends are reflected in our financial statements in the year in which they are approved by our shareholders.

Our dividend policy is to pay a growing annual dividend in Swiss francs. This policy is subject to our financial conditions and outlook at the time, the results of our operations, and other factors.

The Board will propose a dividend of CHF 2.95 per share to the shareholders for approval at the Annual General Meeting to be held on February 28, 2020. Because we pay dividends in Swiss francs, exchange rate fluctuations will affect the US dollar amounts received by holders of ADRs. For a summary of dividends we paid in the past five years, see “Item 3. Key Information—Item 3.A Selected financial data—Cash dividends per share.”

Disclosure pursuant to Section 219 of the Iran Threat Reduction & Syria Human Rights Act (ITRA)

At Novartis, our purpose is to reimagine medicine to improve and extend people's lives, regardless of where they live. This includes the compliant sale of medicines and other healthcare products worldwide. To help us fulfill this mission, we have for many years maintained two representative offices located in Iran.

As of October 18, 2010, a non-US affiliate within our Innovative Medicines Division entered into a non-binding Memorandum of Understanding (MoU) with the Ministry of Health and Medical Education of the Islamic Republic of Iran. Pursuant to the MoU, the Iranian Ministry of Health acknowledges certain benefits that may apply to sales of certain Innovative Medicines Division medicines by third-party distributors in Iran. These include fast-track registration, market exclusivity, end-user subsidies, and exemptions from customs tariffs. Novartis receives no payments from the Iranian Ministry of Health under the MoU, and the MoU creates no obligations on the part of either Novartis or the Iranian Ministry of Health.

From time to time, including in 2019, non-US affiliates in our Innovative Medicines and Sandoz Divisions made payments to government entities in Iran related to patents, trademarks, exit fees and other transactions ordinarily incident to travel by doctors and other medical professionals resident in Iran to attend conferences or other events outside Iran.

From time to time, including in 2019, non-US affiliates in our Innovative Medicines and Sandoz Divisions enter into agreements with hospitals, research institutes, medical associations and universities in Iran to provide grants and sponsor congresses, seminars and symposia, and with doctors and other healthcare professionals for consulting services, including participation in advisory boards and investigator services for observational (non-interventional) studies. Some hospitals and research institutes are owned or controlled by the government of Iran, and some doctors and healthcare professionals are employed by hospitals that may be public or government-owned.

Because our Innovative Medicines and Sandoz Divisions have operations in Iran, including employees, they obtain services and have other dealings incidental to their activities in that country, including paying taxes and salaries either directly or indirectly through a service provider, and obtaining office rentals, insurance, electricity, water and telecommunications services, office and similar supplies, and customs-related services from Iranian companies that may be owned or controlled by the government of Iran. In addition, from time to time, representatives of our non-US affiliates participate in meetings with Iranian officials to discuss issues relevant to our business and the pharmaceutical industry.

Non-US affiliates in our Innovative Medicines and Sandoz Divisions maintain local accounts at banks that are, as of November 5, 2018, on the Specially Designated Nationals and Blocked Persons List (SDN List). These non-US affiliates make local transactions for employee payroll and local vendor payment purposes only with SDN-listed Iranian banks that are not subject to secondary sanctions. Payments to employees and vendors are only made to accounts in Iranian banks that are not subject to secondary sanctions.

8.B Significant changes

None.

Item 9. The Offer and Listing

9.A Offer and listing details

Our shares are listed in Switzerland on the SIX Swiss Exchange (SIX).

ADSs, each representing one share, have been available in the US through an ADR program since December 1996. This program was established pursuant to a deposit agreement that we entered into with JPMorgan Chase Bank, N.A., as depositary (Deposit Agreement). Our ADRs have been listed on the NYSE since May 2000 and are traded under the symbol NVS.

The depositary has informed us that as of January 23, 2020, there were 318 million ADRs outstanding, each representing one Novartis share (approximately 12.6% of total Novartis shares issued). On January 23, 2020, the closing price per share on the SIX was CHF 91.82 and USD 94.92 per ADR on the NYSE.

9.B Plan of distribution

Not applicable.

9.C Markets

See "—Item 9.A Offer and listing details."

9.D Selling shareholders

Not applicable.

9.E Dilution

Not applicable.

9.F Expenses of the issue

Not applicable.

Item 10. Additional Information

10.A Share capital

Not applicable.

10.B Memorandum and articles of association

The following is a summary (and therefore not purported to be complete) of certain provisions of our Articles of Incorporation ("Articles"), our Regulations of the Board of Directors ("Board Regulations") and of Swiss law, particularly the Swiss Code of Obligations ("Swiss CO"), and is qualified in its entirety by reference to the Articles and the Board Regulations, which are an exhibit to this Form 20-F, and to Swiss law.

10.B.1 Company purpose

Novartis AG is registered in the commercial register of the canton of Basel-Stadt, Switzerland, under number CHE-103.867.266. Our business purpose, as stated in Article 2 of the Articles, is to hold interests in enterprises in the area of healthcare or nutrition. We may also hold interests in enterprises in the areas of biology, chemistry, physics, information technology or related areas. We may acquire, mortgage, liquidate or sell real estate and intellectual property rights in Switzerland or abroad. In pursuing our business purpose, we strive to create sustainable value.

10.B.2 Directors

According to our Articles, the Board of Directors ("Board") consists of a minimum of eight and a maximum of 16 members. The members of the Board and the Chairman of the Board are elected individually by the General Meeting of Shareholders for a term of office lasting until completion of the next Annual General Meeting of Shareholders.

(a) A Board resolution requires the affirmative majority of the votes cast. According to our Board Regulations, a member of our Board ("Director") may not participate in deliberations or resolutions on matters that affect, or reasonably might affect, the Director's interests or the interests of a person close to the Director.
(b) Compensation of the Directors is subject to the approval of the aggregate amounts of such compensation by a shareholders' resolution under the Ordinance against Excessive Compensation in Public Companies of the Swiss Federal Council (the "Compensation Ordinance").
(c) The Articles prohibit the granting of loans or credits to Directors.
(d) Directors who have turned 70 years of age at the date of the General Meeting of Shareholders may no longer be elected as members of the Board. The General Meeting of Shareholders may, under special circumstances, grant an exemption from this rule.
(e) Our Directors are not required to be shareholders.

10.B.3 Shareholder rights

Because Novartis AG has only one class of registered shares, the following information applies to all shareholders.

(a) Under the Swiss CO, we may only pay dividends out of balance sheet profits or out of distributable reserves. In any event, under the Swiss CO, while the Board may propose that a dividend be paid, we may only pay dividends upon shareholders' approval at a General Meeting of Shareholders. Furthermore, the Swiss CO requires us to accrue general legal reserves under certain circumstances so long as these reserves amount to less than 20% of our registered share capital, and Swiss law and the Articles permit us to accrue additional reserves beyond the statutory reserves. Our auditors must confirm that the dividend proposal of our Board conforms with the Swiss CO and the Articles. Our Board intends to propose a dividend once each year. See "Item 3. Key Information—Item 3.A. Selected financial data—Cash dividends per share" and "Item 8. Financial Information—Item 8.A. Consolidated statements and other financial information—Dividend policy."

    Dividends are usually due and payable shortly after the shareholders have passed a resolution approving the payment. Dividends that have not been claimed within five years after the due date revert to us and are allocated to our general reserves. For information about deduction of the withholding tax or other duties from dividend payments, see "—Item 10.E Taxation."
(b) Each share is entitled to one vote at a General Meeting of Shareholders. Voting rights may only be exercised for shares registered with the right to vote on the record date for the applicable General Meeting of Shareholders. In order to do so, the shareholder must file a share registration form with us, setting forth the shareholder's name, address and citizenship (or, in the case of a legal entity, its registered office). If the shareholder has not timely registered its shares, then the shareholder may not vote at, or participate in, General Meetings of Shareholders.

To vote its shares, the shareholder must also explicitly declare that it has acquired the shares in its own name and for its own account. If the shareholder refuses to make such a declaration, the shares may not be voted unless the Board recognizes such shareholder as a nominee.

The Articles provide that no shareholder shall be registered with the right to vote shares comprising more than 2% of the registered share capital. The Board may, upon request, grant an exemption from this restriction. Considerations include whether the shareholder supports our goal of creating sustainable value and has a long-term investment horizon. Furthermore, the Articles provide that no nominee shall be registered with the right to vote shares comprising more than 0.5% of the registered share capital. The Board may, upon request, grant an exemption from this restriction if the nominee discloses the names, addresses and number of shares of the persons for whose account it holds more than 0.5% of the registered share capital. The same restrictions indirectly apply to holders of ADRs. We have in the past granted exemptions from the 2% rule for shareholders and the 0.5% rule for nominees. Under the Articles, the Board may delegate the power to grant such exemptions. The Board has delegated this power to the Chairman of the Board.

For purposes of the 2% rule for shareholders and the 0.5% rule for nominees, groups of companies and groups of shareholders acting in concert are considered to be one shareholder. These rules also apply to shares acquired or subscribed by the exercise of subscription, option or conversion rights.

After hearing the registered shareholder or nominee, the Board may cancel, with retroactive effect as of the date of registration, the registration of the shareholders if the registration was effected based on false information.

Registration restrictions in the Articles may only be removed upon a resolution carrying a two-thirds majority of the votes represented at a General Meeting of Shareholders.

Except as noted in the paragraph immediately below, shareholders' resolutions require the approval of a majority of the votes present at a General Meeting of Shareholders. As a result, abstentions have the effect of votes against such resolutions. Some examples of shareholders' resolutions requiring a vote by such "absolute majority of the votes" are (1) amendments to the Articles; (2) elections of Directors, the Chairman, the Compensation Committee members, the Independent Proxy and the statutory auditor; (3) approval of the management report and the financial statements; (4) setting the annual dividend, if any; (5) approval of the aggregate amounts of compensation of the Directors and the members of the Executive Committee; (6) decisions to discharge Directors and management from liability for matters disclosed to the General Meeting of Shareholders; and (7) the ordering of an independent investigation into specific matters proposed to the General Meeting of Shareholders.

According to the Articles and Swiss law, the following matters require the approval of a "supermajority" of at least two-thirds of the votes present at a General Meeting of Shareholders: (1) an alteration of our corporate purpose; (2) the creation of shares with increased voting powers; (3) an implementation of restrictions on the transfer of registered shares and the removal of such restrictions; (4) an authorized or conditional increase of the share capital; (5) an increase of the share capital by conversion of equity, by contribution in kind, or for the purpose of an acquisition of property or the grant of special rights; (6) a restriction or an exclusion of shareholders' pre-emptive rights; (7) a change of our registered office; (8) our dissolution; or (9) any amendment to the Articles that would create or eliminate a supermajority requirement. As a matter of Swiss law, certain other matters require a supermajority as well, including certain mergers, scissions and transformations under the Swiss Merger Act.

Our shareholders are required to annually elect all of the members of the Board, as well as the Chairman of the Board, the members of the Compensation Committee, the statutory auditor and the Independent Proxy. The Articles do not provide for cumulative voting of shares.

At General Meetings of Shareholders, shareholders can be represented by proxy. However, a proxy must either be: the shareholder's legal representative, another shareholder with the right to vote, or the Independent Proxy. Votes are taken either by a show of hands or by electronic voting, unless the General Meeting of Shareholders resolves to have a ballot or where a ballot is ordered by the chairman of the meeting.

American Depositary Shares (ADSs), each representing one Novartis AG share and evidenced by American Depositary Receipts (ADRs), are issued by our depositary JPMorgan Chase Bank, N.A., New York, and not by us. The ADR is vested with rights defined and enumerated in the Deposit Agreement (such as the rights to vote, to receive a dividend and to receive a share of Novartis AG in exchange for a certain number of ADRs). The enumeration of rights, including any limitations on those rights in the Deposit Agreement, is final. There are no other rights given to the ADR holders. Only the ADS depositary, holding our shares underlying the ADRs, is registered as shareholder in our share register. An ADR is not a Novartis AG share and an ADR holder is not a Novartis AG shareholder.

The Deposit Agreement between our depositary, the ADR holder and us has granted certain indirect rights to vote to the ADR holders. ADR holders may not attend Novartis AG general meetings in person. ADR holders exercise their voting rights by instructing JPMorgan Chase Bank, N.A., our depositary, to exercise the voting rights attached to the registered shares underlying the ADRs. Each ADR represents one Novartis AG share. JPMorgan Chase Bank exercises the voting rights for registered shares underlying ADRs for which no voting instructions have been given by providing a discretionary proxy to an uninstructed independent designee pursuant to paragraph 13 of the form of ADR. Such designee has to

be a shareholder of Novartis AG. The same voting restrictions apply to ADR holders as to those holding Novartis AG shares (i.e., the right to vote up to 2% of the Novartis AG registered share capital – unless otherwise granted an exemption by the Board – and the disclosure requirement for nominees).

(c) Shareholders have the right to allocate the profit shown on our balance sheet and to distribute dividends by vote taken at the General Meeting of Shareholders, subject to the legal requirements described in "Item 10.B.3(a) Shareholder rights."

(d) Under the Swiss CO, any surplus arising out of a liquidation of Novartis AG (i.e., after the settlement of all claims of all creditors) would be distributed to the shareholders in proportion to the paid-in nominal value of their shares.

(e) The Swiss CO limits a corporation's ability to hold or repurchase its own shares. We and our subsidiaries may only repurchase shares if we have sufficient freely disposable equity in the amount of the purchase price of the acquired shares. The aggregate nominal value of all Novartis AG shares held by us and our subsidiaries may not exceed 10% of our registered share capital. However, it is accepted that a Swiss corporation may repurchase its own shares beyond the statutory limit of 10% if the repurchased shares are clearly earmarked for cancellation. In addition, we are required to recognize a negative position or if our subsidiaries acquire our shares, to create a special reserve on our balance sheet in the amount of the purchase price of the acquired shares. Repurchased shares held by us or our subsidiaries do not carry any rights to vote at a General Meeting of Shareholders, but are entitled to the economic benefits generally connected with the shares. The definition of subsidiaries, and therefore, treasury shares, for purposes of the above described reserves requirement and voting restrictions differs from the definition of subsidiaries for purposes of consolidation in our consolidated financial statements. The definition in the consolidated financial statements requires consolidation for financial reporting purposes of special purpose entities in instances where we have the power to govern the financial and operating policies of the entity so as to obtain benefits from its activities. Therefore, our consolidated financial statements include special purpose entities, mainly foundations, which do not qualify as subsidiaries subject to the reserve requirements and voting restrictions of the Swiss CO because we do not hold a majority participation in these special purpose entities. Accordingly, no reserve requirements apply to shares held by such special purpose entities, and such entities are not restricted from independently voting their shares.

Under the Swiss CO, we may not cancel treasury shares without the approval of a capital reduction by our shareholders.

(f) Not applicable.

(g) Since all of our issued and outstanding shares have been fully paid in, our shareholders are not obliged to make further contributions with respect to their shares.

(h) See "—Item 10.B.3(b) Shareholder rights" and "—Item 10.B.7 Change in control."

10.B.4 Changes to shareholder rights

Under the Swiss CO, we may not issue new shares without the prior approval of a capital increase by our shareholders. If a capital increase is approved, then our shareholders would generally have certain pre-emptive rights to obtain newly issued shares in an amount proportional to the nominal value of the shares they already hold. These pre-emptive rights could be excluded in certain limited circumstances with the approval of a resolution adopted at a General Meeting of Shareholders by a supermajority of two-thirds of the votes. In addition, we may not create shares with increased voting powers or place restrictions on the transfer of registered shares without the approval of a resolution adopted at a General Meeting of Shareholders by a supermajority of votes. In addition, see "—Item 10.B.3(b) Shareholder rights" with regard to the Board's ability to cancel the registration of shares under limited circumstances.

10.B.5 Shareholder meetings

Under the Swiss CO and the Articles, we must hold an annual ordinary General Meeting of Shareholders within six months after the end of our financial year. General Meetings of Shareholders may be convened by the Board or, if necessary, by the statutory auditors. The Board is further required to convene an extraordinary General Meeting of Shareholders if so resolved by a General Meeting of Shareholders, or if so requested by shareholders holding an aggregate of at least 10% of the share capital, specifying the items for the agenda and their proposals. Shareholders holding shares with an aggregate nominal value of at least CHF 1 000 000 (i.e., 2 000 000 Novartis AG shares) or at least 10% of the share capital have the right to request that a specific proposal be put on the agenda and voted upon at the next General Meeting of Shareholders. A General Meeting of Shareholders is convened by publishing a notice in the Swiss Official Gazette of Commerce (*Schweizerisches Handelsamtsblatt*) at least 20 days prior to such meeting. Shareholders may also be informed by mail. There is no provision in the Swiss CO or the Articles requiring a quorum for the holding of a General Meeting of Shareholders. In addition, see "—Item 10.B.3(b) Shareholder rights" regarding conditions for exercising a shareholder's right to vote at a General Meeting of Shareholders.

10.B.6 Limitations

There are no limitations under the Swiss CO or our Articles on the right of non-Swiss residents or nationals to own or vote shares other than the restrictions applicable to all shareholders. But see "—Item 10.B.3(b) Shareholder rights" regarding conditions for exercising an ADR holder's right to vote at a shareholder meeting.

10.B.7 Change in control

The Articles and the Board Regulations contain no provision that would have an effect of delaying, deferring or

preventing a change in control of Novartis AG and that would operate only with respect to a merger, acquisition or corporate restructuring involving us or any of our subsidiaries.

According to the Swiss Merger Act, shareholders may pass a resolution to merge with another corporation at any time. Such a resolution would require the consent of at least two-thirds of all votes present at the necessary General Meeting of Shareholders.

Under the Swiss Financial Market Infrastructure Act, shareholders and groups of shareholders acting in concert who acquire more than 33 1/3% of our shares would be under an obligation to make an offer to acquire all remaining Novartis AG shares. Novartis AG has neither opted out from the mandatory takeover offer obligation nor opted to increase the threshold for mandatory takeover offers in its Articles.

10.B.8 Disclosure of shareholdings

Under the Swiss Financial Market Infrastructure Act, persons who directly, indirectly or in concert with other parties acquire or dispose of our shares or purchase or sale rights relating to our shares are required to notify us and SIX of the level of their holdings whenever such holdings reach, exceed or fall below certain thresholds – 3%, 5%, 10%, 15%, 20%, 25%, 33 1/3%, 50% and 66 2/3% – of the voting rights represented by our share capital (whether exercisable or not). This also applies to anyone who has discretionary power to exercise voting rights associated with our shares. Following receipt of such notification, we are required to inform the public by publishing the information via the electronic publication platform operated by SIX.

An additional disclosure obligation exists under the Swiss CO that requires us to disclose, once a year in the notes to the financial statements published in our Annual Report, the identity of all of our shareholders (or related groups of shareholders) who have been granted exemption entitling them to vote more than 2% of our registered share capital, as described in "—Item 10.B.3(b) Shareholder rights."

10.B.9 Differences in the law

See the references to Swiss law throughout this "—Item 10.B Memorandum and articles of association."

10.B.10 Changes in capital

The requirements of the Articles regarding changes in capital are not more stringent than the requirements of Swiss law.

10.C Material contracts

Alcon spin-off

In connection with the spin-off of our Alcon business, we entered into a Separation and Distribution Agreement, a Tax Matters Agreement and several other agreements with Alcon to effect the separation of the Alcon business and provide a framework for our relationship with Alcon after the spin-off.

The Separation and Distribution Agreement sets forth the parties' agreements regarding the principal actions to be taken in connection with the separation of the Alcon business and the spin-off, including the conditions of the spin-off and the rights and obligations of the parties with respect to the distribution. The Separation and Distribution Agreement identifies the assets to be transferred, liabilities to be assumed and contracts to be assigned to each of Novartis and Alcon as part of the internal transactions effected prior to the distribution and provides for when and how such transfers, assumptions and assignments should occur.

The Tax Matters Agreement imposes certain restrictions and indemnity obligations on Alcon designed to preserve the tax-neutral nature of the spin-off for Swiss tax and US federal income tax purposes. The Tax Matters Agreement also provides that Alcon will generally indemnify Novartis for any taxes of Novartis and its subsidiaries to the extent such taxes are attributable to the Alcon business, and Novartis will generally indemnify Alcon for any of Alcon's or its subsidiaries' taxes to the extent such taxes are attributable to the Novartis retained businesses.

In connection with the spin-off, we also entered into an employee matters agreement, a transition services agreement, forward and reverse manufacturing supply agreements, and certain intellectual property agreements, each of which is not material to Novartis.

Acquisition of The Medicines Company

On November 23, 2019, we entered into an Agreement and Plan of Merger (the Merger Agreement) with US-based pharmaceutical company The Medicines Company. Pursuant to the Merger Agreement, on December 5, 2019, Novartis, through a subsidiary, commenced a tender offer to acquire all outstanding shares of The Medicines Company for USD 85 per share, or a total consideration of approximately USD 9.7 billion in cash on a fully diluted basis. The tender offer expired on January 3, 2020, and on January 6, 2020, the acquiring subsidiary merged with and into The Medicines Company, resulting in The Medicines Company becoming an indirect wholly owned subsidiary of Novartis. This merger broadens our cardiovascular portfolio by adding inclisiran, an investigational cholesterol-lowering therapy.

10.D Exchange controls

There are no Swiss governmental laws, decrees or regulations that affect – in a manner material to Novartis AG – the export or import of capital, including the availability of cash and cash equivalents for use by Novartis or any foreign exchange controls that affect the remittance of dividends, interest or other payments to non-residents or non-citizens of Switzerland who hold Novartis AG securities.

10.E Taxation

The taxation discussion set forth below is intended only as a descriptive summary and does not purport to be a complete analysis or listing of all potential tax effects relevant to the ownership or disposition of our shares or ADRs. The statements of US and Swiss tax laws set forth below are based on the laws and regulations in force as of the date of this 20-F – including the current Convention Between the US and the Swiss Confederation for the Avoidance of Double Taxation with Respect to Taxes on Income, entered into force on December 19, 1997 (the Treaty); the US Internal Revenue Code of 1986, as amended (the Code); Treasury regulations; rulings; judicial decisions; and administrative pronouncements – and may be subject to any changes in US and Swiss law, and in any double taxation convention or treaty between the US and Switzerland occurring after that date, which changes may have retroactive effect.

Swiss taxation

Swiss residents

Withholding Tax on dividends and distributions. Dividends that we pay and similar cash or in-kind distributions that we may make to a holder of shares or ADRs (including distributions of liquidation proceeds in excess of the nominal value, stock dividends and, under certain circumstances, proceeds from repurchases of shares by us in excess of the nominal value) are generally subject to a Swiss federal withholding tax (the Withholding Tax) at a current rate of 35%. Under certain circumstances, distributions out of capital contribution reserves made by shareholders after December 31, 1996, are exempt from the Withholding Tax. We are required to withhold Withholding Tax due from the gross distribution and to pay the Withholding Tax to the Swiss Federal Tax Administration. The Withholding Tax is refundable in full to Swiss tax residents who are the beneficial owners of the taxable distribution at the time it is resolved and duly report the gross distribution received on their personal tax return or in their financial statements for tax purposes, as the case may be.

Income tax on dividends. A Swiss tax resident who receives dividends and similar distributions (including stock dividends and liquidation surplus) on shares or ADRs is required to include such amounts in the shareholder's personal income tax return. However, distributions out of qualified capital contribution reserves are not subject to income tax. A corporate shareholder may claim substantial relief from taxation of dividends and similar distributions received if the shares held represent a fair market value of at least CHF 1 million.

Capital gains tax upon disposal of shares. Under current Swiss tax law, the gain realized on shares held by a Swiss resident who holds shares or ADRs as part of his private property is generally not subject to any federal, cantonal or municipal income taxation on gains realized on the sale or other disposal of shares or ADRs. However, gains realized upon a repurchase of shares by us may be characterized as taxable dividend income if certain conditions are met. Book gains realized on shares or ADRs held by a Swiss corporate entity or by a Swiss resident individual as part of the shareholder's business property are, in general, included in the taxable income of such person. However, the Federal Law on the Direct Federal Tax of December 14, 1990, and several cantonal laws on direct cantonal taxes provide for exceptions for Swiss corporate entities holding more than 10% of our voting stock for more than one year.

Residents of other countries

Recipients of dividends and similar distributions on our shares who are neither residents of Switzerland for tax purposes nor holding shares as part of a business conducted through a permanent establishment situated in Switzerland (Non-Resident Holders) are not subject to Swiss income taxes in respect of such distributions. Moreover, gains realized by such recipients upon the disposal of shares are not subject to Swiss income taxes.

Non-Resident Holders of shares are, however, subject to the Withholding Tax on dividends and similar distributions mentioned above and, under certain circumstances, to the Stamp Duty described below. Such Non-Resident Holders may be entitled to a partial refund of the Withholding Tax if the country in which they reside has entered into a bilateral treaty for the avoidance of double taxation with Switzerland. Non-Resident Holders should be aware that the procedures for claiming treaty refunds (and the timeframe required for obtaining a refund) may differ from country to country. Non-Resident Holders should consult their own tax advisors regarding receipt, ownership, purchase, sale or other dispositions of shares or ADRs, and the procedures for claiming a refund of the Withholding Tax.

As of January 1, 2020, Switzerland has entered into bilateral treaties for the avoidance of double taxation with respect to income taxes with the following countries, whereby a part of the above-mentioned Withholding Tax may be refunded (subject to the limitations set forth in such treaties):

Albania
Algeria
Argentina
Armenia
Australia
Austria
Azerbaijan
Bahrain
Bangladesh
Belarus
Belgium
Bulgaria
Canada
Chile
China
Colombia
Croatia
Cyprus
Czech Republic
Denmark
Ecuador
Egypt
Estonia
Finland
France
Georgia
Germany
Ghana
Greece
Hong Kong
Hungary
Iceland
India
Indonesia
Iran
Republic of Ireland
Israel
Italy
Ivory Coast
Jamaica
Japan
Kazakhstan
Republic of Korea
(South Korea)
Kosovo
Kuwait
Kyrgyzstan
Latvia
Liechtenstein
Lithuania
Luxembourg
Macedonia
Malaysia
Malta
Mexico
Moldova
Mongolia
Montenegro
Morocco
Netherlands
New Zealand
Norway
Oman
Pakistan
Peru
Philippines
Poland
Portugal
Qatar
Romania
Russia
Serbia
Singapore
Slovak Republic
Slovenia
South Africa
Spain
Sri Lanka
Sweden
Taiwan
Tajikistan
Thailand
Trinidad and Tobago
Tunisia
Turkey
Turkmenistan
Ukraine
United Arab Emirates
United Kingdom
United States of America
Uruguay
Uzbekistan
Venezuela
Vietnam
Zambia

The tax treaty with Bahrain is not applicable to the healthcare industry. Tax treaty negotiations are underway, or have been conducted, with Bosnia and Herzegovina, Brazil, Costa Rica, Ethiopia, Libya, North Korea, Saudi Arabia, Senegal, Syria and Zimbabwe. Tax treaty negotiations between Switzerland and some of the countries listed in the immediately preceding sentence have been ongoing for an extended period of time, and we are not certain when or if such negotiations will be completed, and when or if the corresponding treaties will come into effect.

A Non-Resident Holder of shares or ADRs will not be liable for any Swiss taxes other than the Withholding Tax described above and, if the transfer occurs through or with a Swiss bank or other Swiss securities dealer, the Stamp Duty described below. If, however, the shares or ADRs of Non-Resident Holders can be attributed to a permanent establishment or a fixed place of business maintained by such person within Switzerland during the relevant tax year, the shares or ADRs may be subject to Swiss income taxes in respect of income and gains realized on the shares or ADRs, and such person may qualify for a full refund of the Withholding Tax based on Swiss tax law.

Residents of the US. A Non-Resident Holder who is a resident of the US for purposes of the Treaty is eligible for a reduced rate of tax on dividends equal to 15% of the dividend, provided that such holder (i) qualifies for benefits under the Treaty, (ii) holds, directly and indirectly, less than 10% of our voting stock, and (iii) does not conduct business through a permanent establishment or fixed base in Switzerland to which the shares or ADRs are attributable. Such an eligible holder must apply for a refund of the amount of the Withholding Tax in excess of the 15% Treaty rate. A Non-Resident Holder who is a resident of the US for purposes of the Treaty is eligible for a reduced rate of tax on dividends equal to 5% of the dividend, provided that such holder (i) is a company, (ii) qualifies for benefits under the Treaty, (iii) holds directly at least 10% of our voting stock, and (iv) does not conduct business through a permanent establishment or fixed place of business in Switzerland to which the shares or ADRs are attributable. Such an eligible holder must apply for a refund of the amount of the Withholding Tax in excess of the 5% Treaty rate. Claims for refunds must be filed on Swiss Tax Form 82 (82C for corporations; 82I for individuals; 82E for other entities), which may be obtained from any Swiss Consulate General in the US or from the Federal Tax Administration of Switzerland at the address below, together with an instruction form. Four copies of the form must be duly completed, signed before a notary public of the US, and sent to the Federal Tax Administration of Switzerland, Eigerstrasse 65, CH-3003 Bern, Switzerland. The form must be accompanied by suitable evidence of deduction of Swiss tax withheld at source, such as certificates of deduction, signed bank vouchers or credit slips. The form may be filed on or after July 1 or January 1 following the date the dividend was payable, but no later than December 31 of the third year following the calendar year in which the dividend became payable. For US resident holders of ADRs, JPMorgan Chase Bank, N.A., as depositary, will comply with these Swiss procedures on behalf of the holders, and will remit the net amount to the holders.

Stamp Duty upon transfer of securities. The sale of shares, whether by Swiss residents or Non-Resident Holders, may be subject to federal securities transfer Stamp Duty of 0.15%, calculated on the sale proceeds, if the sale occurs through or with a Swiss bank or other Swiss securities dealer, as defined in the Swiss Federal Stamp Duty Act. The Stamp Duty has to be paid by the securities dealer and may be charged to the parties in a taxable transaction who are not securities dealers. Stamp Duty may also be due if a sale of shares occurs with or through a non-Swiss bank or securities dealer, provided (i) such bank or dealer is a member of the SIX, and (ii) the sale takes place on the SIX. In addition to this Stamp Duty, the sale of shares by or through a member of the SIX may be subject to a minor stock exchange levy.

US federal income taxation

The following is a general discussion of the material US federal income tax consequences of the ownership and disposition of our shares or ADRs that may be relevant to you if you are a US Holder (as defined below). Because this discussion does not consider any specific circumstances of any particular holder of our shares or ADRs, persons who are subject to US taxation are strongly urged to consult their own tax advisors as to the overall US federal, state and local tax consequences, as well as to the overall Swiss and other foreign tax consequences, of the ownership and disposition of our shares or ADRs. In particular, additional or different rules may apply to US expatriates; banks and other financial institutions; regulated investment companies; traders in securities who elect to apply a mark-to-market method of accounting; dealers in securities or currencies; tax-exempt entities; insurance companies; broker-dealers; investors liable for alternative minimum tax; investors that hold shares or ADRs as part of a straddle, hedging or conversion transaction; holders whose functional currency is not the US dollar; partnerships or other pass-through entities; persons who acquired our shares pursuant to the exercise of employee stock options or otherwise as compensation; and persons who hold, directly, indirectly or by attribution, 10% or more of our outstanding shares. This discussion generally applies only to US Holders who hold the shares or ADRs as a capital asset (generally, for investment purposes), and whose functional currency is the US dollar. Investors are urged to consult their own tax advisors concerning whether they are eligible for benefits under the Treaty.

For purposes of this discussion, a US Holder is a beneficial owner of our shares or ADRs who is (i) an individual who is a citizen or resident of the US for US federal income tax purposes; (ii) a corporation (or other entity taxable as a corporation for US federal income tax purposes) created or organized in or under the laws of the US or a state thereof or the District of Columbia; (iii) an estate the income of which is subject to US federal income taxation regardless of its source; or (iv) a trust (i) subject to the primary supervision of a US court and the control of one or more US persons, or (ii) that has a valid election in place to be treated as a US person. If a partnership (or other entity treated as a partnership for US federal income tax purposes) holds shares or ADRs, the tax treatment of a partner generally will depend upon the status of the partner and the activities of the partnership. Partners in a partnership that holds shares or ADRs are urged to consult their own tax advisor regarding the specific tax consequences of the owning and disposing of such shares or ADRs by the partnership.

For US federal income tax purposes, a US Holder of ADRs generally will be treated as the beneficial owner of our shares represented by the ADRs. However, see the discussion below under "—Dividends" regarding certain statements made by the US Treasury concerning depositary arrangements.

This discussion assumes that each obligation in the Deposit Agreement and any related agreement will be performed in accordance with its terms.

Dividends. US Holders will be required to include in gross income, as an item of ordinary income, the full amount (including the amount of any Withholding Tax) of a dividend paid with respect to our shares or ADRs at the time that such dividend is received by the US Holder, in the case of shares, or by the depositary, in the case of ADRs. For this purpose, a "dividend" will include any distribution paid by us with respect to our shares or ADRs (other than certain pro rata distributions of our capital stock) paid out of our current or accumulated earnings and profits, as determined under US federal income tax principles. To the extent the amount of a distribution by us exceeds our current and accumulated earnings and profits, such excess will first be treated as a tax-free return of capital to the extent of a US Holder's tax basis in the shares or ADRs (with a corresponding reduction in such tax basis), and thereafter will be treated as capital gain, which will be long-term capital gain if the US Holder held our shares or ADRs for more than one year. Under the Code, dividend payments by us on the shares or ADRs are not eligible for the dividends received deduction generally allowed to corporate shareholders.

Dividend income in respect of our shares or ADRs will constitute income from sources outside the US for US foreign tax credit purposes. Subject to the limitations and conditions provided in the Code, US Holders generally may claim as a credit against their US federal income tax liability, any Withholding Tax withheld from a dividend. The rules governing the foreign tax credit are complex. Each US Holder is urged to consult its own tax advisor concerning whether, and to what extent, a foreign tax credit will be available with respect to dividends received from us. Alternatively, a US Holder may claim the Withholding Tax as a deduction for the taxable year within which the Withholding Tax is paid or accrued, provided a deduction is claimed for all of the foreign income taxes the US Holder pays or accrues in the particular year. A deduction does not reduce US tax on a dollar-for-dollar basis like a tax credit. The deduction, however, is not subject to the limitations applicable to foreign tax credits, but may be subject to other limitations, and each US Holder is urged to consult its own tax advisor.

The US Treasury has expressed concern that parties to whom ADRs are released may be taking actions inconsistent with the claiming of foreign tax credits for US Holders of ADRs. Accordingly, the summary above of the

creditability of the Withholding Tax could be affected by future actions that may be taken by the US Treasury.

In general, a US Holder will be required to determine the amount of any dividend paid in Swiss francs, including the amount of any Withholding Tax imposed thereon, by translating the Swiss francs into US dollars at the spot rate on the date the dividend is actually or constructively received by a US Holder, in the case of shares, or by the depositary, in the case of ADRs, regardless of whether the Swiss francs are in fact converted into US dollars. If a US Holder converts the Swiss francs so received into US dollars on the date of receipt, the US Holder generally should not recognize foreign currency gain or loss on such conversion. If a US Holder does not convert the Swiss francs so received into US dollars on the date of receipt, the US Holder will have a tax basis in the Swiss francs equal to the US dollar value on such date. Any foreign currency gain or loss that a US Holder recognizes on a subsequent conversion or other disposition of the Swiss francs generally will be treated as US source ordinary income or loss.

For a non-corporate US Holder, the US dollar amount of any dividends paid that constitute qualified dividend income generally will be taxable at a maximum rate of 15% (or 20% in the case of taxpayers with annual income that exceeds certain thresholds), provided that the US Holder meets certain holding period and other requirements. In addition, the dividends could be subject to a 3.8% net investment income tax. This tax is applied against the lesser of the US Holder's net investment income or the amount by which modified adjusted gross income exceeds a statutory threshold amount based on filing status. We currently believe that dividends paid with respect to our shares and ADRs will constitute qualified dividend income for US federal income tax purposes. US Holders of shares or ADRs are urged to consult their own tax advisors regarding the availability to them of the reduced dividend rate in light of their own particular situation and the computations of their foreign tax credit limitation with respect to any qualified dividends paid to them, as applicable.

Sale or other taxable disposition. Upon a sale or other taxable disposition of shares or ADRs, US Holders generally will recognize capital gain or loss in an amount equal to the difference between the US dollar value of the amount realized on the disposition and the US Holder's tax basis (determined in US dollars) in the shares or ADRs. This capital gain or loss generally will be US source gain or loss and will be treated as long-term capital gain or loss if the holding period in the shares or ADRs exceeds one year. In the case of a non-corporate US Holder, any long-term capital gain generally will be subject to US federal income tax at preferential rates, with a maximum rate of 15% (or 20% in the case of taxpayers with annual income that exceeds certain thresholds). In addition, the gains could be subject to a 3.8% investment income tax. This tax is applied against the lesser of the US Holder's net investment income or the amount by which modified adjusted gross income exceeds a statutory threshold amount based on filing status. The deductibility of capital losses is subject to significant limitations under the Code. Deposits or withdrawals of our shares by US Holders in exchanges for ADRs will not result in the realization of gain or loss for US federal income tax purposes.

US information reporting and backup withholding. Dividend payments with respect to shares or ADRs and proceeds from the sale, exchange or other disposition of shares or ADRs received in the United States or through US-related financial intermediaries may be subject to information reporting to the US Internal Revenue Service (IRS) and possible US backup withholding. Certain exempt recipients (such as corporations) are not subject to these information reporting and backup withholding requirements. Backup withholding will not apply to a US Holder who furnishes a correct taxpayer identification number and makes any other required certification or who is otherwise exempt from backup withholding. Any US Holders required to establish their exempt status generally must provide a properly executed IRS Form W-9 (Request for Taxpayer Identification Number and Certification). Backup withholding is not an additional tax. Amounts withheld as backup withholding may be credited against a US Holder's US federal income tax liability, and a US Holder may obtain a refund of any excess amounts withheld under the backup withholding rules by timely filing the appropriate claim for refund with the IRS and furnishing any required information.

Tax consequences of the Alcon spin-off

To implement the Alcon spin-off, we distributed all of the Alcon shares held by Novartis to Novartis shareholders, pro rata to their respective holdings. Each Novartis shareholder received one Alcon share for every five Novartis shares or five Novartis ADRs they held or had acquired prior to the close of business on April 8, 2019.

The following statements are based on the requirement of the continuing effectiveness and validity of the written confirmations (the Swiss Tax Rulings) from the Swiss Federal Tax Administration and from the tax administration of the Canton of Basel-Stadt, a private letter ruling from the IRS (the IRS Ruling) and a written opinion of Cravath, Swaine & Moore LLP, counsel to Novartis (the Tax Opinion), each to the effect that the spin-off qualifies as a tax-neutral transaction.

Material tax consequences to Novartis

The following is a summary of the material tax consequences to Novartis in connection with the spin-off that may be relevant to holders of Novartis shares.

The spin-off was preceded by several internal restructuring steps to separate the Alcon business from Novartis. Novartis has received the Swiss Tax Rulings, the IRS Ruling and the Tax Opinion, providing that the spin-off and certain internal restructuring steps taken prior to the spin-off should qualify for nonrecognition of gain or loss for US federal income tax purposes or preserve the tax-neutral nature for Swiss tax purposes, as applicable. In addition, the Swiss Tax Rulings provide that no Swiss withholding tax or stamp duty should apply to the distribution of Alcon shares in the spin-off. The Tax Opinion and IRS Ruling are subject to the qualifications and limitations set forth below under "—Consequences to US

Holders of Novartis shares." Additionally, Novartis has entered into the Tax Matters Agreement with Alcon, which restricts Alcon from taking certain actions that could affect the qualification of the spin-off and certain internal restructuring steps taken prior to the spin-off for nonrecognition of gain or loss or as tax neutral, as applicable.

Consequences to Swiss Holders of Novartis shares

General

Subject to the qualifications and limitations set forth herein (including the discussion below relating to the receipt of cash in lieu of fractional shares), for Swiss tax purposes no gain or loss should be recognized by, or be includible in the income of, a Swiss Holder as a result of the tax neutral spin-off, provided that Swiss Holders who hold Novartis shares as business assets accurately maintain the tax and book values of their Novartis and Alcon shares. This means that for Swiss Holders who hold Novartis shares as business assets, the aggregate tax basis of the Novartis shares and Alcon shares immediately after the distribution should be the same as the aggregate tax basis of the Novartis shares held immediately before the distribution, allocated between the Novartis shares and Alcon shares.

If a Swiss Holder that holds Novartis shares as business assets is classified as a "professional securities dealer" or is a legal entity and receives cash in lieu of a fractional share, such Swiss Holder will generally recognize a capital gain or loss measured by the difference between the cash received for such fractional share and the Swiss Holder's tax basis in that fractional share. The same Swiss income tax treatment applies to Swiss Holders of Novartis physical share certificates (Heimverwahrer) held as business assets who receive cash due to non-response by March 18, 2019.

If a Swiss Holder who holds Novartis shares as private assets receives cash in lieu of fractional shares, the receipt of such cash will be tax-free to the holder. The same Swiss income tax treatment applies to Swiss Holders of Novartis physical share certificates (Heimverwahrer) held as private assets who receive cash due to non-response by March 18, 2019.

Novartis has received the Swiss Tax Rulings that cover the relevant Swiss tax aspects of the separation and spin-off. The Swiss Tax Rulings rely upon certain facts, assumptions, representations and undertakings from Novartis and Alcon regarding the past and future conduct of Novartis and Alcon businesses and other matters. If any of the facts, assumptions, representations or undertakings described therein are incorrect or not otherwise satisfied, Novartis may not be able to rely upon the Swiss Tax Rulings.

Accordingly, notwithstanding the Swiss Tax Rulings, there can be no assurance that the relevant Swiss tax authorities will not assert, or that a court would not sustain, a position contrary to one or more of the conclusions set forth above.

Consequences to US Holders of Novartis shares

The following is a summary of the material US federal income tax consequences to holders of Novartis shares or ADRs in connection with the Alcon distribution. For purposes of the following discussion, any reference to Novartis shares includes Novartis ADRs. This summary does not address any US state or local or foreign tax consequences or any estate, gift or other non-income tax consequences.

General

The IRS Ruling and the Tax Opinion, described below, rely upon certain facts, assumptions, representations and undertakings from Novartis and Alcon regarding the past and future conduct of Novartis and Alcon businesses and other matters. If any of the facts, assumptions, representations or undertakings described therein are incorrect or not otherwise satisfied, Novartis may not be able to rely upon the IRS Ruling or the Tax Opinion. Accordingly, notwithstanding the Tax Opinion and the IRS Ruling, there can be no assurance that the IRS will not assert, or that a court would not sustain, a position contrary to one or more of the conclusions set forth below.

Novartis has received an IRS Ruling and a Tax Opinion providing, in each case, that the distribution should qualify for nonrecognition of gain or loss under Section 355 of the Internal Revenue Code. As a result:

- No gain or loss should be recognized by, or be includible in the income of, a US Holder as a result of the distribution.

- The aggregate tax basis of the Novartis shares and Alcon shares held by each US Holder immediately after the distribution should be the same as the aggregate tax basis of the Novartis shares held by the US Holder immediately before the distribution, allocated between the Novartis shares and Alcon shares in proportion to their relative fair market values on the date of the distribution.

- The holding period of Alcon shares received by each US Holder should include the holding period of its Novartis shares.

Generally, if a Novartis shareholder holds different blocks of Novartis shares (generally Novartis shares purchased or acquired on different dates or at different prices), a US Holder must perform the tax basis allocation described above with respect to each block and will have a holding period in Alcon shares determined with respect to the holding period of such block.

A US Holder that received cash in lieu of a fractional share as part of the distribution will be treated as though it first received a distribution of the fractional share in the distribution and then sold it for the amount of cash actually received. The US Holder will generally recognize a capital gain or loss measured by the difference between the cash received for such fractional share and the US Holder's tax basis in that fractional share, as determined above. Such capital gain or loss will be a long-term capital gain or loss if the US Holder's holding period for the Novartis shares is more than one year on the date of the distribution. Certain US Holders are eligible for reduced rates of taxation on their long-term capital gains.

A US Holder of Novartis physical share certificates (Heimverwahrer) who received cash due to non-response by March 18, 2019, will be treated as if the US

Holder received Alcon shares with respect to its physical share certificates in the distribution and then sold such shares for the cash actually received. The deemed receipt and sale of Alcon shares for cash will be subject to the same treatment as the receipt of cash in lieu of a fractional share for US federal income tax purposes as described above.

Backup Withholding
Payments of cash in lieu of a fractional share and cash payments to a US Holder of Novartis physical share certificates (Heimverwahrer) who receives cash due to non-response by March 18, 2019, may, under certain circumstances, be subject to "backup withholding," unless the US Holder provides proof of an applicable exemption or a correct taxpayer identification number, and otherwise complies with the requirements of the backup withholding rules.

Information Reporting
Treasury regulations require each Novartis shareholder, that immediately before the distribution, owned 5% or more (by vote or value) of the total outstanding stock of Novartis to attach to such shareholder's US federal income tax return for the year in which the distribution occurs a statement setting forth certain information related to the distribution.

10.F Dividends and paying agents

Not applicable.

10.G Statement by experts

Not applicable.

10.H Documents on display

Any statement in this Form 20-F about any of our contracts or other documents is not necessarily complete. If the contract or document is filed as an exhibit to the Form 20-F, the contract or document is deemed to modify the description contained in this Form 20-F. You must review the exhibits themselves for a complete description of the contract or document.

The SEC maintains an internet site at http://www.sec.gov that contains reports and other information regarding issuers that file electronically with the SEC. These SEC filings are also available to the public from commercial document retrieval services.

We are required to file or furnish reports and other information with the SEC under the Exchange Act and regulations under that act. As a foreign private issuer, we are exempt from the rules under the Exchange Act prescribing the form and content of proxy statements, and our officers, directors and principal shareholders are exempt from the reporting and short swing profit recovery provisions contained in Section 16 of the Exchange Act.

10.I Subsidiary information

Not applicable.

Item 11. Quantitative and Qualitative Disclosures About Market Risk

The major financial risks facing the Group are managed centrally by Group Treasury. We have a written Treasury Directive and have implemented a strict segregation of front-office and back-office controls. The Group does regular reconciliations of its positions with its counterparties. In addition, the Treasury function is included in management's internal control assessment.

For information about the effects of currency fluctuations and how we manage currency risk, see "Item 5. Operating and Financial Review and Prospects—Item 5.B Liquidity and capital resources."

The information set forth under "Item 18. Financial Statements—Note 29. Financial instruments—additional disclosures" is incorporated by reference.

Item 12. Description of Securities Other Than Equity Securities

12.A Debt securities

Not applicable.

12.B Warrants and rights

Not applicable.

12.C Other securities

Not applicable.

12.D American Depositary Shares

Fees payable by ADR holders

According to our Deposit Agreement with the ADS depositary, JPMorgan Chase Bank, N.A. (JPMorgan), holders of our ADRs may have to pay to JPMorgan, either directly or indirectly, fees or charges up to the amounts set forth below:

Category	Depositary actions	Associated fee
Depositing or substituting underlying shares	Acceptance of shares surrendered, and issuance of ADRs in exchange, including surrenders and issuances in respect of: — Share distributions — Stock split — Rights — Merger — Exchange of shares or any other transaction or event or other distribution affecting the ADSs or the deposited shares	USD 5.00 for each 100 ADSs (or portion thereof) evidenced by the new ADRs delivered
Withdrawing underlying shares	Acceptance of ADRs surrendered for withdrawal of deposited shares	USD 5.00 for each 100 ADSs (or portion thereof) evidenced by the ADRs surrendered
Selling or exercising rights	Distribution or sale of shares, the fee being in an amount equal to the fee for the execution and delivery of ADRs that would have been charged as a result of the deposit of such shares	USD 5.00 for each 100 ADSs (or portion thereof)
Transferring, splitting or grouping receipts	Transfers, combining or grouping of depositary receipts	USD 1.50 per ADR
Expenses of the depositary	Expenses incurred on behalf of holders in connection with: — Compliance with foreign exchange control regulations or any law or regulation relating to foreign investment — The depositary's or its custodian's compliance with applicable law, rule or regulation — Stock transfer or other taxes and other governmental charges — Cable, telex and facsimile transmission and delivery — Expenses of the depositary in connection with the conversion of foreign currency into US dollars (which are paid out of such foreign currency) — Any other charge payable by any of the depositary or its agents	Expenses payable at the sole discretion of the depositary by billing holders or by deducting charges from one or more cash dividends or other cash distributions
Advance tax relief	Tax relief/reclamation process for qualified holders	A depositary service charge of USD 0.008 per ADS

Fees payable by the depositary to the issuer

Pursuant to an agreement effective as of May 11, 2017 (the Agreement), JPMorgan, as our ADS depositary, has agreed to make an annual contribution payment to Novartis at the end of each 12-month period beginning on the effective date of the Agreement and on each subsequent anniversary of the effective date of the Agreement (each such 12-month period is a "Contract Year"). This annual contribution payment will equal: (a)(1) USD 1.7 million less (a)(2) the custody costs, fees and expenses (including, without limitation, any central securities depository fees, charges and expenses) incurred during the applicable Contract Year (the items in (a)(2) collectively are the "Custody Costs") plus (b) 70% of the gross issuance and cancellation fees collected by JPMorgan under the Deposit Agreement during such Contract Year minus (c) that portion (if any) of JPMorgan's legal fees, charges and out-of-pocket expenses in excess of USD 50 000 for such Contract Year. To the extent that the Custody Costs for a Contract Year exceed USD 1.7 million, these costs would be capped at USD 1.7 million.

JPMorgan has further agreed to waive the USD 0.05 per ADS issuance fees that would normally be owed by Novartis in connection with our deposits of shares as part of our employee stock ownership and employee participation plans. Novartis is responsible for reimbursing JPMorgan for all taxes and governmental charges required to have been withheld and/or paid, and not so withheld and/or paid, arising from such waived fees.

PART II

Item 13. Defaults, Dividend Arrearages and Delinquencies

None.

Item 14. Material Modifications to the Rights of Security Holders and Use of Proceeds

None.

Item 15. Controls and Procedures

Report of Novartis Management on Internal Control Over Financial Reporting

Novartis AG's Chief Executive Officer and Chief Financial Officer, after evaluating the effectiveness of our disclosure controls and procedures (as defined in Exchange Act Rule 13a-15(e)) as of the end of the period covered by this Annual Report, have concluded that, as of such date, our disclosure controls and procedures were effective.

The Board of Directors and management of the Group are responsible for establishing and maintaining adequate internal control over financial reporting. The Group's internal control system was designed to provide reasonable assurance to the Group's management and Board of Directors regarding the reliability of financial reporting and the preparation and fair presentation of its published consolidated financial statements.

All internal control systems, no matter how well designed, have inherent limitations. Therefore, even those systems determined to be effective may not prevent or detect misstatements and can provide only reasonable assurance with respect to financial statement preparation and presentation. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Group management assessed the effectiveness of the Group's internal control over financial reporting as of December 31, 2019. In making this assessment, it used the criteria established in *Internal Control—Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on our assessment, management concluded that, as of December 31, 2019, the Group's internal control over financial reporting is effective based on those criteria.

PricewaterhouseCoopers AG, Switzerland, an independent registered public accounting firm, has issued an unqualified opinion on the effectiveness of the Group's internal control over financial reporting, which is included in this Annual Report under "Item 18. Financial Statements—Report of independent registered public accounting firm."

See the report of PwC, an independent registered public accounting firm, included under "Item 18. Financial Statements—Report of independent registered public accounting firm."

There were no changes to our internal control over financial reporting that occurred during the period covered by this Annual Report that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Vas Narasimhan
Chief Executive Officer

Harry Kirsch
Chief Financial Officer

Basel, January 28, 2020

Item 16A. Audit Committee Financial Expert

Our Audit and Compliance Committee has determined that Srikant Datar and Elizabeth Doherty each possess specific accounting and financial management expertise and that each is an Audit Committee Financial Expert as defined by the SEC. The Board of Directors has also determined that Srikant Datar and Elizabeth Doherty are each "independent" in accordance with the applicable requirements of Rule 10A-3 of the Exchange Act, and that other members of the Audit and Compliance Committee have sufficient experience and ability in finance and compliance matters to enable them to adequately discharge their responsibilities.

Item 16B. Code of Ethics

In addition to our Code of Conduct and Professional Practices Policy, which are applicable to all of our associates, we have adopted Ethical Conduct Requirements that impose additional obligations on our principal executive officer, principal financial officer, principal accounting officer, and persons performing similar functions. This document is accessible on our internet website at: https://www.novartis.com/investors/company-overview/corporate-governance

Item 16C. Principal Accountant Fees and Services

The information set forth under “Item 6. Directors, Senior Management and Employees—Item 6.C Board practices—Corporate governance—Auditors” is incorporated by reference.

Item 16D. Exemptions from the Listing Standards for Audit Committees

Not applicable.

Item 16E. Purchases of Equity Securities by the Issuer and Affiliated Purchasers

2019	Total Number of Shares Purchased (a)[1]	Average price paid per share in USD (b)	Total number of shares purchased as part of publicly announced plans or programs (c)[2]	Maximum approximate value of shares that may yet be purchased under the plans or programs (CHF millions) (d)	Maximum approximate value of shares that may yet be purchased under the plans or programs (USD millions) (e)[3]
Jan. 1-31	1 913 205	87.38	830 000	2 137	2 152
Feb. 1-28	203 399	88.31	0	10 000	10 027
Mar. 1-31	81 551	92.09	0	10 000	10 042
Apr. 1-30	3 687 215	80.82	3 452 000	9 716	9 539
May 1-31	15 719 319	83.55	15 695 000	8 392	8 338
Jun. 1-30	12 852 939	90.27	12 840 000	7 247	7 433
Jul. 1-31	23 550 117	92.10	23 538 500	5 106	5 156
Aug. 1-31	3 966 974	91.76	3 958 400	4 752	4 809
Sep. 1-30	36 197	89.69	0	4 752	4 790
Oct. 1-31	2 031	84.92	0	4 752	4 811
Nov. 1-30	16 065	87.12	0	4 752	4 758
Dec. 1-31	18 567	90.12	0	4 752	4 903
Total	**62 047 579**	**88.70**	**60 313 900**		

[1] Column (a) shows shares repurchased on the SIX Swiss Exchange second trading line plus shares we purchased from employees who had obtained the shares through a Novartis Employee Ownership Plan. See "Item 18. Financial Statements – Note 26 Equity-based participation plans for associates."

[2] Column (c) shows shares repurchased on the SIX Swiss Exchange second trading line under the seventh CHF 10 billion share buyback authority approved at the 2016 Annual General Meeting (AGM) for transactions before February 28, 2019 and under the eighth CHF 10 billion share buyback authority approved at the 2019 AGM for transactions after such date. See "Item 6. Directors, Senior Management and Employees – Item 6C. Board Practices – Our capital structure – Changes in capital."

[3] Column (e) shows the Swiss franc amount from column (d) converted into US dollars as of the month-end, using the Swiss franc/US dollar exchange rate at the applicable month-end

Item 16F. Change in Registrant's Certifying Accountant

Not applicable.

Item 16G. Corporate Governance

Novartis AG is subject to and compliant with the laws and regulations of Switzerland (in particular, Swiss company and securities laws, SIX Swiss Exchange rules and the Swiss Code of Best Practice for Corporate Governance) and the securities laws of the United States, including New York Stock Exchange (NYSE) rules, as applicable to foreign private issuers of securities. The following summarizes some significant ways in which our corporate governance practices differ from those followed by domestic listed US companies under the listing standards of the NYSE:

- Novartis AG shareholders do not receive written reports directly from Board committees.
- External auditors are appointed by shareholders at the Annual General Meeting of Shareholders (AGM), as opposed to being appointed by the Audit and Compliance Committee.
- While shareholders cannot vote on all equity compensation plans, they are entitled to hold separate, yearly binding votes on Board and Executive Committee compensation.
- The Board has set up a separate Risk Committee that oversees the risk management system and processes, as opposed to delegating this responsibility to the Audit and Compliance Committee.
- The full Board is responsible for overseeing the performance evaluation of the Board and Executive Committee.
- The full Board is responsible for setting objectives relevant to the CEO's compensation and for evaluating his performance.

Item 16H. Mine Safety Disclosure

Not applicable.

PART III

Item 17. Financial Statements

See response to “Item 18. Financial Statements.”

Item 18. Financial Statements

The following financial statements are filed as part of this Annual Report.

Item 19. Exhibits

The SEC maintains an internet site at http://www.sec.gov that contains reports and other information regarding issuers that file electronically with the SEC. These SEC filings are also available to the public from commercial document retrieval services.

1.1 Articles of Incorporation of Novartis AG, as amended February 28, 2019 (English translation).

1.2 Regulations of the Board of Directors, the Board Committees and the Executive Committee of Novartis AG, effective May 1, 2019.

2.1 Amended and Restated Deposit Agreement, dated as of May 11, 2000, among Novartis AG, JPMorgan Chase Bank (fka Morgan Guaranty Trust Company of New York), as depositary, and all holders from time to time of ADRs issued thereunder (incorporated by reference to Exhibit (a)(1) to Post-Effective Amendment No. 1 to Novartis AG's registration statement on Form F-6 (File No. 333-11758) as filed with the SEC on September 8, 2000).

2.2 Amendment No. 1 to the Amended and Restated Deposit Agreement (incorporated by reference to Exhibit (a)(2) to Post-Effective Amendment No. 1 to Novartis AG's registration statement on Form F-6 (File No. 333-11758) as filed with the SEC on September 8, 2000).

2.3 Amendment No. 2 to the Amended and Restated Deposit Agreement (incorporated by reference to Exhibit (a)(3) to Novartis AG's registration statement on Form F-6 (File No. 333-13446) as filed with the SEC on May 3, 2001).

2.4 Restricted Issuance Agreement, dated as of January 11, 2002, among Novartis AG, JPMorgan Chase Bank, as depositary, and all holders from time to time of ADRs representing ADSs issued thereunder (incorporated by reference to Exhibit 4 to the Registration Statement on Form F-3 (File No. 333-81862) as filed with the SEC on January 31, 2002).

2.5 Letter Agreement, dated December 14, 2007, between Novartis AG and JPMorgan Chase Bank, as depositary (incorporated by reference to Exhibit 2.4 to the Form 20-F for the year ended December 31, 2007, as filed with the SEC on January 28, 2008).

2.6 Form of American Depositary Receipt (incorporated by reference to Exhibit (a)(7) to the Registration Statement on Form F-6 (File No. 333-198623) as filed with the SEC on September 8, 2014).

2.7 The total amount of long-term debt securities authorized under any instrument does not exceed 10% of the total assets of the Company and its subsidiaries on a consolidated basis. We hereby agree to furnish to the SEC, upon its request, a copy of any instrument defining the rights of holders of long-term debt of the Company or of its subsidiaries for which consolidated or unconsolidated financial statements are required to be filed.

2.8 Description of Securities registered under Section 12 of the Exchange Act.

4.1 Separation and Distribution Agreement by and between Novartis AG and Alcon Inc., dated as of April 8, 2019 (incorporated by reference to Exhibit 99.1 to the Current Report on Form 6-K of Alcon Inc. (File No. 001-31269) as filed with the SEC on April 9, 2019).

4.2 Tax Matters Agreement by and between Novartis AG and Alcon Inc., dated as of April 8, 2019 (incorporated by reference to Exhibit 99.2 to the Current Report on Form 6-K of Alcon Inc. (File No. 001-31269) as filed with the SEC on April 9, 2019).

4.3 Agreement and Plan of Merger, dated as of November 23, 2019, by and among The Medicines Company, Novartis AG and Medusa Merger Corporation (incorporated by reference to Exhibit 2.1 to the Current Report on Form 8-K of The Medicines Company (File No. 000-31191) as filed with the SEC on November 25, 2019).

8.1 For a list of all of our principal Group subsidiaries and associated companies, see "Item 18. Financial Statements—Note 32. Principal Group subsidiaries and associated companies."

12.1	Certification of Vasant Narasimhan, Chief Executive Officer of Novartis AG, pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
12.2	Certification of Harry Kirsch, Chief Financial Officer of Novartis AG, pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
13.1	Certification of Vasant Narasimhan, Chief Executive Officer of Novartis AG, pursuant to Section 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
13.2	Certification of Harry Kirsch, Chief Financial Officer of Novartis AG, pursuant to Section 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
15.1	Consent of PricewaterhouseCoopers AG.
101.INS	XBRL Instance Document
101.SCH	XBRL Taxonomy Extension Schema Document
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	XBRL Taxonomy Extension Label Linkbase Document
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document

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Novartis Group consolidated financial statements

Consolidated income statements

(For the years ended December 31, 2019, 2018 and 2017)

(USD millions unless indicated otherwise)	Note	2019	2018	2017
Net sales to third parties from continuing operations	3	**47 445**	**44 751**	**42 338**
Sales to discontinued segment		53	82	43
Net sales from continuing operations		**47 498**	**44 833**	**42 381**
Other revenues	3	1 179	1 266	1 023
Cost of goods sold		– 14 425	– 14 510	– 13 633
Gross profit from continuing operations		**34 252**	**31 589**	**29 771**
Selling, general and administration		– 14 369	– 13 717	– 12 465
Research and development		– 9 402	– 8 489	– 8 389
Other income		2 031	1 629	1 922
Other expense		– 3 426	– 2 609	– 2 137
Operating income from continuing operations		**9 086**	**8 403**	**8 702**
Income from associated companies	4	659	6 438	1 108
Interest expense	5	– 850	– 932	– 750
Other financial income and expense	5	45	186	42
Income before taxes from continuing operations		**8 940**	**14 095**	**9 102**
Taxes	6	– 1 793	– 1 295	– 1 603
Net income from continuing operations		**7 147**	**12 800**	**7 499**
Net (loss)/income from discontinued operations before gain on distribution of Alcon Inc. to Novartis AG shareholders	30	– 101	– 186	204
Gain on distribution of Alcon Inc. to Novartis AG shareholders	2	4 691		
Net income/(loss) from discontinued operations	30	**4 590**	**– 186**	**204**
Net income		**11 737**	**12 614**	**7 703**
Attributable to:				
Shareholders of Novartis AG		*11 732*	*12 611*	*7 703*
Non-controlling interests		*5*	*3*	*0*
Basic earnings per share (USD) from continuing operations		3.12	5.52	3.20
Basic earnings per share (USD) from discontinued operations		2.00	– 0.08	0.08
Total basic earnings per share (USD)	7	**5.12**	**5.44**	**3.28**
Diluted earnings per share (USD) from continuing operations		3.08	5.46	3.17
Diluted earnings per share (USD) from discontinued operations		1.98	– 0.08	0.08
Total diluted earnings per share (USD)	7	**5.06**	**5.38**	**3.25**

The accompanying Notes form an integral part of the consolidated financial statements.

Consolidated statements of comprehensive income

(For the years ended December 31, 2019, 2018 and 2017)

(USD millions)	Note	**2019**	2018	2017
Net income		**11 737**	**12 614**	**7 703**
Other comprehensive income to be eventually recycled into the consolidated income statement:				
Fair value adjustments on marketable securities, net of taxes	8.1			39
Fair value adjustments on debt securities, net of taxes	8.1	1		– 1
Fair value adjustments on deferred cash flow hedges, net of taxes	8.1	1	12	12
Total fair value adjustments on financial instruments, net of taxes		2	12	50
Novartis share of other comprehensive income recognized by associated companies, net of taxes	4	– 94	– 482	– 37
Net investment hedge	8	44	95	– 237
Currency translation effects	8.2	352	315	2 210
Total of items to eventually recycle		304	– 60	1 986
Other comprehensive income never to be recycled into the consolidated income statement:				
Actuarial (losses)/gains from defined benefit plans, net of taxes	8.3	– 467	– 359	851
Fair value adjustments on equity securities, net of taxes	8.1	– 47	13	
Total of items never to be recycled		– 514	– 346	851
Total comprehensive income		**11 527**	**12 208**	**10 540**
Attributable to:				
Shareholders of Novartis AG		*11 525*	*12 210*	*10 538*
Continuing operations		*6 948*	*12 417*	*10 211*
Discontinued operations		*4 577*	*– 207*	*327*
Non-controlling interests		*2*	*– 2*	*2*

The accompanying Notes form an integral part of the consolidated financial statements.

Consolidated balance sheets

(At December 31, 2019 and 2018)

(USD millions)	Note	2019	2018
Assets			
Non-current assets			
Property, plant and equipment	9	12 069	15 696
Right-of-use assets	10	1 677	
Goodwill	11	26 524	35 294
Intangible assets other than goodwill	11	28 787	38 719
Investments in associated companies	4	8 644	8 352
Deferred tax assets	12	7 909	8 699
Financial assets	13	2 518	2 345
Other non-current assets	13	738	895
Total non-current assets		**88 866**	**110 000**
Current assets			
Inventories	14	5 982	6 956
Trade receivables	15	8 301	8 727
Income tax receivables		254	248
Marketable securities, commodities, time deposits and derivative financial instruments	16	334	2 693
Cash and cash equivalents	16	11 112	13 271
Other current assets	17	2 680	2 861
Total current assets without disposal group		**28 663**	**34 756**
Assets of disposal group held for sale	2	841	807
Total current assets		**29 504**	**35 563**
Total assets		**118 370**	**145 563**
Equity and liabilities			
Equity			
Share capital	18	936	944
Treasury shares	18	– 80	– 69
Reserves		54 618	77 739
Issued share capital and reserves attributable to Novartis AG shareholders		**55 474**	**78 614**
Non-controlling interests		77	78
Total equity		**55 551**	**78 692**
Liabilities			
Non-current liabilities			
Financial debts	19	20 353	22 470
Lease liabilities	10	1 703	
Deferred tax liabilities	12	5 867	7 475
Provisions and other non-current liabilities	20	6 632	7 319
Total non-current liabilities		**34 555**	**37 264**
Current liabilities			
Trade payables		5 424	5 556
Financial debts and derivative financial instruments	21	7 031	9 678
Lease liabilities	10	246	
Current income tax liabilities		2 194	2 038
Provisions and other current liabilities	22	13 338	12 284
Total current liabilities without disposal group		**28 233**	**29 556**
Liabilities of disposal group held for sale	2	31	51
Total current liabilities		**28 264**	**29 607**
Total liabilities		**62 819**	**66 871**
Total equity and liabilities		**118 370**	**145 563**

The accompanying Notes form an integral part of the consolidated financial statements.

Consolidated statements of changes in equity

(For the years ended December 31, 2019, 2018 and 2017)

(USD millions)	Note	Share capital	Treasury shares	Retained earnings	Total value adjustments	Issued share capital and reserves attributable to Novartis shareholders	Non-controlling interests	Total equity
Total equity at January 1, 2017		**972**	**– 76**	**81 148**	**– 7 212**	**74 832**	**59**	**74 891**
Net income				7 703		7 703		7 703
Other comprehensive income	8			– 37	2 872	2 835	2	2 837
Total comprehensive income				**7 666**	**2 872**	**10 538**	**2**	**10 540**
Dividends	18.1			– 6 495		– 6 495		– 6 495
Purchase of treasury shares	18.2		– 36	– 5 538		– 5 574		– 5 574
Reduction of share capital	18	– 3	5	– 2				
Exercise of options and employee transactions	18.2		2	253		255		255
Equity-based compensation	18.2		5	607		612		612
Changes in non-controlling interests	18.6						– 2	– 2
Total of other equity movements		**– 3**	**– 24**	**– 11 175**		**– 11 202**	**– 2**	**– 11 204**
Total equity at December 31, 2017, as previously reported		**969**	**– 100**	**77 639**	**– 4 340**	**74 168**	**59**	**74 227**
Impact of change in accounting policies	1			237	– 177	60		60
Restated equity at January 1, 2018		**969**	**– 100**	**77 876**	**– 4 517**	**74 228**	**59**	**74 287**
Net income				12 611		12 611	3	12 614
Other comprehensive income	8			– 482	81	– 401	– 5	– 406
Total comprehensive income				**12 129**	**81**	**12 210**	**– 2**	**12 208**
Dividends	18.1			– 6 966		– 6 966		– 6 966
Purchase of treasury shares	18.2		– 13	– 1 960		– 1 973		– 1 973
Reduction of share capital	18	– 25	34	– 9				
Exercise of options and employee transactions	18.2		4	430		434		434
Other share sales	18.2		2	261		263		263
Equity-based compensation	18.2		4	752		756		756
Increase of treasury share repurchase obligation under a share buyback trading plan	18.3			– 284		– 284		– 284
Transaction costs, net of taxes	18.4			– 79		– 79		– 79
Fair value adjustments on financial assets sold	8			16	– 16			
Impact of change in ownership of consolidated entities	18.5			– 13		– 13	22	9
Changes in non-controlling interests	18.6						– 1	– 1
Other movements	18.7			38		38		38
Total of other equity movements		**– 25**	**31**	**– 7 814**	**– 16**	**– 7 824**	**21**	**– 7 803**
Total equity at December 31, 2018, as previously reported		**944**	**– 69**	**82 191**	**– 4 452**	**78 614**	**78**	**78 692**
Impact of change in accounting policies	1			3		3		3
Restated equity at January 1, 2019		**944**	**– 69**	**82 194**	**– 4 452**	**78 617**	**78**	**78 695**
Net income				11 732		11 732	5	11 737
Other comprehensive income	8			– 94	– 113	– 207	– 3	– 210
Total comprehensive income				**11 638**	**– 113**	**11 525**	**2**	**11 527**
Dividends	18.1			– 6 645		– 6 645		– 6 645
Dividend in kind to effect the spin-off of Alcon Inc.	2			– 23 434		– 23 434		– 23 434
Purchase of treasury shares	18.2		– 31	– 5 480		– 5 511		– 5 511
Reduction of share capital	18	– 8	12	– 4				
Exercise of options and employee transactions	18.2		3	207		210		210
Equity-based compensation	18.2		5	828		833		833
Shares delivered to Alcon employees as a result of the Alcon spin-off	18.2			18		18		18
Taxes on treasury share transactions				– 189		– 189		– 189
Decrease of treasury share repurchase obligation under a share buyback trading plan	18.3			284		284		284
Transaction costs, net of taxes	18.4			– 253		– 253		– 253
Fair value adjustments on financial assets sold	8			95	– 95			
Impact of change in ownership of consolidated entities	18.5			– 3		– 3	– 2	– 5
Changes in non-controlling interests	18.6						– 1	– 1
Fair value adjustments related to divestments	8			– 3	3			
Other movements	18.7			22		22		22
Total of other equity movements		**– 8**	**– 11**	**– 34 557**	**– 92**	**– 34 668**	**– 3**	**– 34 671**
Total equity at December 31, 2019		**936**	**– 80**	**59 275**	**– 4 657**	**55 474**	**77**	**55 551**

The accompanying Notes form an integral part of the consolidated financial statements.

Consolidated statements of cash flows

(For the years ended December 31, 2019, 2018 and 2017)

(USD millions)	Note	2019	2018	2017
Net income from continuing operations		**7 147**	**12 800**	**7 499**
Adjustments to reconcile net income from continuing operations to net cash flows from operating activities from continuing operations				
Reversal of non-cash items and other adjustments	23.1	9 122	1 486	5 787
Dividends received from associated companies and others		463	719	987
Interest received		214	241	97
Interest paid		– 793	– 816	– 697
Other financial receipts		28	218	
Other financial payments		– 33	– 31	– 270
Taxes paid	23.2	– 1 876	– 1 506	– 1 487
Net cash flows from operating activities from continuing operations before working capital and provision changes		**14 272**	**13 111**	**11 916**
Payments out of provisions and other net cash movements in non-current liabilities		– 924	– 638	– 829
Change in net current assets and other operating cash flow items	23.3	199	576	332
Net cash flows from operating activities from continuing operations		**13 547**	**13 049**	**11 419**
Net cash flows from operating activities from discontinued operations		78	1 223	1 202
Total net cash flows from operating activities		**13 625**	**14 272**	**12 621**
Purchase of property, plant and equipment		– 1 379	– 1 254	– 1 325
Proceeds from sales of property, plant and equipment		857	102	91
Purchase of intangible assets		– 878	– 1 394	– 969
Proceeds from sales of intangible assets		973	823	640
Purchase of financial assets		– 302	– 205	– 354
Proceeds from sales of financial assets		1 152	165	328
Purchase of other non-current assets		– 60	– 39	– 40
Proceeds from sales of other non-current assets		3	9	1
Acquisitions and divestments of interests in associated companies, net	23.4	– 6	12 854	29
Acquisitions and divestments of businesses, net	23.5	– 3 760	– 13 683	– 714
Purchase of marketable securities and commodities		– 228	– 2 440	– 580
Proceeds from sales of marketable securities and commodities		2 561	472	549
Net cash flows used in investing activities from continuing operations		**– 1 067**	**– 4 590**	**– 2 344**
Net cash flows used in investing activities from discontinued operations	30	– 1 159	– 1 001	– 775
Total net cash flows used in investing activities		**– 2 226**	**– 5 591**	**– 3 119**
Dividends paid to shareholders of Novartis AG		– 6 645	– 6 966	– 6 495
Acquisition of treasury shares		– 5 533	– 2 036	– 5 490
Proceeds from exercise of options and other treasury share transactions		201	700	252
Increase in non-current financial debts	23.6	93	2 856	4 933
Repayment of non-current financial debts	23.6	– 3 195	– 366	– 188
Change in current financial debts	23.6	– 1 582	1 687	– 644
Payments of lease liabilities, net	23.6	– 273		
Impact of change in ownership of consolidated entities		– 6	– 19	0
Other financing cash flows, net		56	67	314
Net cash flows used in financing activities from continuing operations		**– 16 884**	**– 4 077**	**– 7 318**
Net cash flows from/used in financing activities from discontinued operations	30	3 257	– 167	– 415
Total net cash flows used in financing activities		**– 13 627**	**– 4 244**	**– 7 733**
Net change in cash and cash equivalents before effect of exchange rate changes		**– 2 228**	**4 437**	**1 769**
Effect of exchange rate changes on cash and cash equivalents		69	– 26	84
Total net change in cash and cash equivalents		**– 2 159**	**4 411**	**1 853**
Cash and cash equivalents at January 1		13 271	8 860	7 007
Cash and cash equivalents at December 31		**11 112**	**13 271**	**8 860**

The accompanying Notes form an integral part of the consolidated financial statements.

Notes to the Novartis Group consolidated financial statements

1. Significant accounting policies

The Novartis Group (Novartis or Group) is a multinational group of companies specializing in the research, development, manufacturing and marketing of a broad range of healthcare products led by innovative pharmaceuticals and cost-saving generic pharmaceuticals. The Group is headquartered in Basel, Switzerland.

The consolidated financial statements of the Group are prepared in accordance with International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board (IASB). They are prepared in accordance with the historical cost convention, except for items that are required to be accounted for at fair value.

The Group's financial year-end is December 31, which is also the annual closing date of the individual entities' financial statements incorporated into the Group's consolidated financial statements.

The preparation of financial statements requires management to make certain estimates and assumptions, either at the balance sheet date or during the year, which affect the reported amounts of assets and liabilities, including any contingent amounts, the distribution liability recognized in connection with the distribution of Alcon Inc. to Novartis AG shareholders, as well as of revenues and expenses. Actual outcomes and results could differ from those estimates and assumptions.

Listed below are accounting policies of significance to Novartis or, in cases where IFRS provides alternatives, the option adopted by Novartis.

Scope of consolidation

The consolidated financial statements include all entities, including structured entities, over which Novartis AG, Basel, Switzerland, directly or indirectly has control (generally as a result of owning more than 50% of the entity's voting interest). Consolidated entities are also referred to as "subsidiaries."

In cases where Novartis does not fully own a subsidiary, it has elected to value any remaining outstanding non-controlling interest at the time of acquiring control of the subsidiary at its proportionate share of the fair value of the net identified assets.

The contribution of a business to an associate or joint venture is accounted for by applying the option under IFRS that permits the accounting for the retained interest of the business contributed at its net book value at the time of the contribution.

Investments in associated companies (generally defined as investments in entities in which Novartis holds between 20% and 50% of voting shares or over which it otherwise has significant influence) and joint ventures are accounted for using the equity method, except for selected venture fund investments for which the Group has elected to apply the method of fair value through the consolidated income statement.

Foreign currencies

The consolidated financial statements of Novartis are presented in US dollars (USD). The functional currency of subsidiaries is generally the local currency of the respective entity. The functional currency used for the reporting of certain Swiss and foreign finance entities is USD instead of their respective local currencies. This reflects the fact that the cash flows and transactions of these entities are primarily denominated in these currencies.

For subsidiaries not operating in hyperinflationary economies, the subsidiary's results, financial position and cash flows that do not have USD as their functional currency are translated into USD using the following exchange rates:

- Income, expense and cash flows using for each month the average exchange rate, with the US dollar values for each month being aggregated during the year
- Balance sheets using year-end exchange rates
- Resulting exchange rate differences are recognized in other comprehensive income

For subsidiaries operating in hyperinflationary economies, the impact of the restatement of the non-monetary assets and liabilities with the general price index at the beginning of the period is recorded in retained earnings in equity. The subsequent gains or losses resulting from the restatement of non-monetary assets are recorded in "Other financial income and expense" in the consolidated income statement.

Non-current assets held for sale or held for distribution to owners

Non-current assets are classified as assets held for sale or related to discontinued operations when their carrying amount is to be recovered principally through a sale transaction or distribution to owners, and a sale or distribution to owners is considered highly probable. They are stated at the lower of carrying amount and fair value less costs to sell with any resulting impairment recognized. Assets related to discontinued operations and assets of disposal group held for sale are not depreci-

ated or amortized. The prior-year consolidated balance sheet is not restated.

Distribution of Alcon Inc. to Novartis AG shareholders

During the first quarter of 2019, at the Annual General Meeting (AGM) of Novartis AG shareholders, held on February 28, 2019, the Novartis AG shareholders approved a special distribution by way of a dividend in kind to effect the spin-off of Alcon Inc.

The February 28, 2019, shareholder approval for the spin-off required the Alcon Division and selected portions of corporate activities attributable to Alcon's business (the "Alcon business") to be reported as discontinued operations.

The shareholder approval to spin off the Alcon business also required the recognition of a distribution liability at the fair value of the Alcon business. The Group elected to measure the distribution liability at the fair value of the Alcon business net assets taken as a whole. The distribution liability was recognized through a reduction in retained earnings. It was required to be adjusted at each balance sheet date for changes in its estimated fair value, up to the date of the distribution to shareholders through retained earnings. Any resulting impairment of the business assets to be distributed would have been recognized in the consolidated income statements in "Other expense" of discontinued operations, at the date of initial recognition of the distribution liability or at subsequent dates resulting from changes of the distribution liability valuation. At the April 8, 2019 distribution settlement date, the resulting gain, which was measured as the excess amount of the distribution liability over the then-carrying value of the net assets of the business distributed, was recognized on the line "Gain on distribution of Alcon Inc. to Novartis AG shareholders" in the income statement of discontinued operations.

The recognition of the distribution liability required the use of valuation techniques for purposes of impairment testing of the Alcon business' assets to be distributed and for the measurement of the fair value of the distribution liability. These valuations required the use of management assumptions and estimates related to the Alcon business' future cash flows, market multiples to estimate day one market value, and control premiums to apply in estimating the Alcon business fair value. These fair value measurements were classified as "Level 3" in the fair value hierarchy. The section "—Impairment of goodwill and intangible assets" in this Note 1 provides additional information on key assumptions that are highly sensitive in the estimation of fair values using valuation techniques.

Transaction costs that were directly attributable to the distribution (spin-off) of Alcon to the Novartis shareholders, and that would otherwise have been avoided, were recorded as a deduction from equity.

For additional disclosures, refer to "Note 2. Significant transactions—Significant transactions in 2019—Completion of the spin-off of the Alcon business through a dividend in kind distribution to Novartis AG shareholders," and "Note 30. Discontinued operations."

Acquisition of assets

Acquired assets are initially recognized on the balance sheet at cost if they meet the criteria for capitalization. If acquired as part of a business combination, the fair value of identified assets represents the cost for these assets. If separately acquired, the cost of the asset includes the purchase price and any directly attributable costs for bringing the asset into the condition to operate as intended. Expected costs for obligations to dismantle and remove property, plant and equipment when they are no longer used are included in their cost.

Property, plant and equipment

Property, plant and equipment are depreciated on a straight-line basis in the consolidated income statement over their estimated useful lives. Leasehold land is depreciated over the period of its lease, whereas freehold land is not depreciated. The related depreciation expense is included in the costs of the functions using the asset.

Property, plant and equipment are assessed for impairment whenever there is an indication that the balance sheet carrying amount may not be recoverable using cash flow projections for the useful life.

The following table shows the respective useful lives for property, plant and equipment:

	Useful life
Buildings	20 to 40 years
Machinery and other equipment	
Machinery and equipment	7 to 20 years
Furniture and vehicles	5 to 10 years
Computer hardware	3 to 7 years

Government grants obtained for construction activities, including any related equipment, are deducted from the gross acquisition cost to arrive at the balance sheet carrying value of the related assets.

Leases and right-of-use assets

From January 1, 2019, with the adoption of IFRS 16 Leases, the Group adopted the following accounting policies for leases and right-of-use assets:

As lessee, the Group assesses whether a contract contains a lease at inception of a contract and upon the modification of a contract. The Group elected to allocate the consideration in the contract to the lease and non-lease components on the basis of the relative standalone price.

The Group recognizes a right-of-use asset and a corresponding lease liability for all arrangements in which it is a lessee, except for leases with a term of 12 months or less (short-term leases) and low-value leases. For these short-term and low-value leases, the Group recognizes the lease payments as an operating expense on a straight-line basis over the term of the lease.

The lease liability is initially measured at the present value of the future lease payments as from the com-

mencement date of the lease to end of the lease term. The lease term includes the period of any lease extension that in management's assessment is highly probable to be exercised by the Group. The lease payments are discounted using the interest rate implicit in the lease or, if not readily determinable, the Novartis incremental borrowing rate for the asset subject to the lease in the respective markets.

The Group remeasures the lease liability (and makes a corresponding adjustment to the related right-of-use asset) whenever there is a change to the lease terms or expected payments under the lease, or a modification that is not accounted for as a separate lease.

The portion of the lease payments attributable to the repayment of lease liabilities is recognized in cash flows used in financing activities, and the portion attributable to the payment of interest is included in cash flows from operating activities.

Right-of-use assets are initially recognized on the balance sheet at cost, which comprises the amount of the initial measurement of the corresponding lease liability, adjusted for any lease payments made at or prior to the commencement date of the lease, any lease incentive received and any initial direct costs incurred by Novartis, and expected costs for obligations to dismantle and remove right-of-use assets when they are no longer used.

Right-of-use assets are depreciated on a straight-line basis from the commencement date of the lease over the shorter of the useful life of the right-of-use asset or the end of the lease term.

Right-of-use assets are assessed for impairment whenever there is an indication that the balance sheet carrying amount may not be recoverable using cash flow projections for the useful life.

In arrangements where the Group is the lessor, it determines at lease inception whether the lease is a finance lease or an operating lease. Leases that transfer substantially all of the risk and rewards incidental to ownership of the underlying asset to the counterparty (the lessee) are accounted for as finance leases. Leases that do not transfer substantially all of the risks and rewards of ownership are accounted for as operating leases. Lease payments received under operating leases are recognized on a straight-line basis over the lease term in the consolidated income statement in either "net sales" or "other income," depending on the nature of and underlying asset to the lease arrangement.

Prior to January 1, 2019, the Group applied the following accounting policies for leases:

Leases that transferred substantially all of the risks and rewards of ownership were recognized as finance leases, with the leased asset measured initially at an amount equal to the lower of their fair value and the present value of the minimum lease payments. Minimum lease payments were the payments over the lease term that the Group, as leasee, was required to make, excluding contingent rent. The underlying asset was accounted for in accordance with the accounting policy applicable to that asset.

Leases that did not transfer substantially all of the risks and rewards of ownership were accounted for as operating leases and were not recognized in the consolidated balance sheet. Payments made under operating leases were recognized in the consolidated income statement on a straight-line basis over the term of the lease. Lease incentives received were deferred and recognized as a component of lease expense over the term of the lease. The future undiscounted lease payments under operating leases were disclosed as commitments in the notes to the consolidated financial statements.

Lessor accounting policies were not substantially different from those applied upon the adoption of IFRS 16 Leases, as described above.

The section "—Impact of adopting significant new IFRS standards in 2019" in this Note 1 provides additional disclosures on the impact of adoption of IFRS 16 Leases.

Goodwill and intangible assets

Goodwill

Goodwill arises in a business combination and is the excess of the consideration transferred to acquire a business over the underlying fair value of the net identified assets acquired. It is allocated to groups of cash-generating units (CGUs), which are usually represented by the reported segments. Goodwill is tested for impairment annually at the level of these groups of CGUs, and any impairment charges are recorded under "Other expense" in the consolidated income statement.

Intangible assets available for use

Novartis has the following classes of available-for-use intangible assets: currently marketed products; technologies; other intangible assets (including computer software); and up to the spin-off date of Alcon business, marketing know-how and the Alcon brand name.

Currently marketed products represent the composite value of acquired intellectual property (IP), patents, and distribution rights and product trade names.

Marketing know-how represents the value attributable to the expertise acquired for marketing and distributing Alcon surgical products.

Technologies represent identified and separable acquired know-how used in the research, development and production processes.

Significant investments in internally developed and acquired computer software are capitalized and included in the "Other" category, and amortized once available for use.

The Alcon brand name was shown separately, as it was the only Novartis intangible asset that was available for use with an indefinite useful life. Novartis considers that it was appropriate that the Alcon brand name had an indefinite life since Alcon-branded products had a history of strong revenue and cash flow performance, and Novartis had the intent and ability to support the brand with spending to maintain its value for the foreseeable future.

Except for the Alcon brand name, intangible assets available for use are amortized over their estimated useful lives on a straight-line basis and are evaluated for potential impairment whenever facts and circumstances

indicate that their carrying value may not be recoverable. The Alcon brand name was not amortized, but evaluated for potential impairment annually.

The following table shows the respective useful lives for available-for-use intangible assets and the location in the consolidated income statement in which the respective amortization and any potential impairment charge is recognized:

	Useful life	Income statement location for amortization and impairment charges
Currently marketed products	5 to 20 years	"Cost of goods sold"
Marketing know-how	25 years	"Cost of goods sold"
Technologies	10 to 20 years	"Cost of goods sold" or "Research and development"
Other (including computer software)	3 to 7 years	In the respective functional expense
Alcon brand name	Not amortized, indefinite useful life	"Other expense"

Intangible assets not yet available for use

Acquired research and development intangible assets that are still under development and have accordingly not yet obtained marketing approval are recognized as in-process research and development (IPR&D).

IPR&D is not amortized, but is evaluated for potential impairment on an annual basis or when facts and circumstances warrant. Any impairment charge is recorded in the consolidated income statement under "Research and development." Once a project included in IPR&D has been successfully developed, it is transferred to the "Currently marketed products" category.

Impairment of goodwill and intangible assets

An asset is considered impaired when its balance sheet carrying amount exceeds its estimated recoverable amount, which is defined as the higher of its fair value less costs of disposal and its value in use. Usually, Novartis applies the fair value less costs of disposal method for its impairment assessment. In most cases, no directly observable market inputs are available to measure the fair value less costs of disposal. Therefore, an estimate is derived indirectly and is based on net present value techniques utilizing post-tax cash flows and discount rates. In the limited cases where the value in use method would be applied, net present value techniques would be applied using pre-tax cash flows and discount rates.

Fair value less costs of disposal reflects estimates of assumptions that market participants would be expected to use when pricing the asset or CGUs, and for this purpose, management considers the range of economic conditions that are expected to exist over the remaining useful life of the asset.

The estimates used in calculating the net present values are highly sensitive and depend on assumptions specific to the nature of the Group's activities with regard to:

- Amount and timing of projected future cash flows
- Long-term sales forecasts
- Actions of competitors (launch of competing products, marketing initiatives, etc.)
- Sales erosion rates after the end of patent or other intellectual property rights protection, and timing of the entry of generic competition
- Outcome of research and development activities (compound efficacy, results of clinical trials, etc.)
- Amount and timing of projected costs to develop IPR&D into commercially viable products
- Profit margins
- Probability of obtaining regulatory approval
- Future tax rate
- Appropriate royalty rate for the Alcon brand name
- Appropriate terminal growth rate
- Appropriate discount rate

Generally, for intangible assets with a definite useful life, Novartis uses cash flow projections for the whole useful life of these assets. For goodwill and the Alcon brand name, Novartis generally utilizes cash flow projections for a five-year period based on management forecasts, with a terminal value based on cash flow projections usually in line with inflation rates for later periods. Probability-weighted scenarios are typically used.

Discount rates used consider the Group's estimated weighted average cost of capital, adjusted for specific country and currency risks associated with cash flow projections to approximate the discount rate that market participants would use to value the asset.

Due to the above factors, actual cash flows and values could vary significantly from forecasted future cash flows and related values derived using discounting techniques.

Impairment of associated companies accounted for at equity

Novartis considers investments in associated companies for impairment evaluation whenever objective evidence indicates the net investment may be impaired, including when a quoted share price indicates a fair value less than the per-share balance sheet carrying value for the investment.

If the recoverable amount of the investment is estimated to be lower than the balance sheet carrying amount, an impairment charge is recognized for the difference in the consolidated income statement under "Income from associated companies."

Cash and cash equivalents

Cash and cash equivalents include highly liquid investments with original maturities of three months or less, which are readily convertible to known amounts of cash. Bank overdrafts are usually presented within current financial debts on the consolidated balance sheet, except in cases where a right of offset has been agreed with a bank, which then allows for presentation on a net basis.

Marketable securities, commodities and non-current financial assets

Commodities, which include gold bullion or coins, are valued at the lower of cost or fair value using current market prices. The changes in fair value below cost are immediately recorded in "Other financial income and expense."

Marketable securities are financial assets consisting principally of equity and debt securities as well as fund investments. Marketable securities held for short-term purposes are principally traded in liquid markets and are classified as marketable securities within current assets on the consolidated balance sheet. The financial impacts related to these financial assets are recorded in "Other financial income and expense" in the consolidated income statement. Marketable securities held for long-term strategic purposes are classified as non-current financial assets on the consolidated balance sheet. The financial impacts related to these financial assets are recorded in "Other income" and "Other expense" in the consolidated income statement.

Marketable securities are initially recorded at fair value on their trade date, which is different from the settlement date when the transaction is ultimately effected. Quoted securities are remeasured at each reporting date to fair value based on current market prices. If the market for a financial asset is not active or no market is available, fair values are established using valuation techniques. The majority of non-quoted investments are valued initially at fair value through the established purchase price between a willing buyer and seller. Non-quoted investments are subsequently adjusted based on values derived from discounted cash flow analysis or other pricing models. These investment values are classified as "Level 3" in the fair value hierarchy.

From January 1, 2018, with the adoption of IFRS 9 Financial Instruments, the Group classifies and accounts for its marketable securities and non-current financial assets in the following categories:

- Debt securities are valued at fair value through other comprehensive income with subsequent recycling into the consolidated income statement, as they meet both the "solely payment of principal and interest" and the business model criteria. Unrealized gains and losses, except exchange gains and losses, are recorded as a fair value adjustment in the consolidated statement of comprehensive income. They are recognized in the consolidated income statement when the debt instrument is sold, at which time the gain is transferred to "Other financial income and expense." Exchange gains and losses related to debt instruments are immediately recognized in the consolidated income statement to "Other financial income and expense."
- Fund investments, equity securities of the Novartis venture fund and derivative assets are valued at fair value through profit and loss (FVPL). Unrealized gains and losses, including exchange gains and losses, are recognized in the consolidated income statement, for all fund investments and for equity securities of the Novartis venture fund, to "Other income" for gains and "Other expense" for losses, and for derivative assets to "Other financial income and expense."
- Equity securities held as strategic investments, typically held outside of the Novartis venture fund, are generally designated at date of acquisition as financial assets valued at fair value through other comprehensive income with no subsequent recycling through profit and loss. Unrealized gains and losses, including exchange gains and losses, are recorded as a fair value adjustment in the consolidated statement of comprehensive income. They are reclassified to retained earnings when the equity security is sold. If these equity securities are not designated at date of acquisition as financial assets valued at fair value through other comprehensive income, they are valued at FVPL, as described above.
- Other non-current financial assets, such as loans and long-term receivables from customers, advances and other deposits, are valued at amortized cost, which reflects the time value of money less any allowances for expected credit losses.

The Group assesses on a forward-looking basis the expected credit losses associated with its debt securities valued at fair value through other comprehensive income. Impairments on debt securities are recorded in "Other financial income and expense."

For other financial assets valued at amortized costs, impairments, which are based on their expected credit losses, and exchange rate losses are included in "Other expense" in the consolidated income statement. Exchange rate gains and interest income, using the effective interest rate method, are included in "Other income" or "Other financial income" in the consolidated income statement, depending on the nature of the item.

Prior to the adoption of IFRS 9, the Group classified and accounted for its marketable securities and non-current financial assets in the following categories:

- The Group classified all its equity and quoted debt securities as well as fund investments as available for sale, as they were not acquired to generate profit from short-term fluctuations in price. Unrealized gains, except exchange gains related to quoted debt instruments, were recorded as a fair value adjustment in the consolidated statement of comprehensive income. They were recognized in the consolidated income statement when the financial asset was sold, at which time the gain was transferred either to "Other financial income and expense," for the marketable securities held for short-term non-strategic purposes, or to "Other income," for all other equity securities and fund investments. Exchange gains related to quoted debt instruments were immediately recognized in the consolidated income statement under "Other financial income and expense."
- A security was assessed for impairment when its market value at the balance sheet date was less than initial cost reduced by any previously recognized impairment. Impairments on equity securities, quoted debt securities and fund investments, and exchange rate losses on quoted debt securities in a foreign currency that were held for short-term non-strategic purposes were recorded in "Other financial income and expense."

Impairments were recorded for all other equity securities and other fund investments in "Other expense" in the consolidated income statement.
- Other non-current financial assets, including loans held for long-term strategic purposes, were carried at amortized cost, which reflects the time value of money less any allowances for uncollectable amounts. For these financial assets, impairments and exchange rate losses were included in "Other expense" in the consolidated income statement, and exchange rate gains and interest income using the effective interest rate method were included in "Other income" in the consolidated income statement.

The section "—Impact of adopting significant new IFRS standards in 2018" provides additional disclosure on the impact of adoption of IFRS 9 Financial Instruments.

Derivative financial instruments

Derivative financial instruments are initially recognized in the balance sheet at fair value and are remeasured to their current fair value at the end of each subsequent reporting period. The valuation of a forward exchange rate contract is based on the discounted cash flow model, using interest curves and spot rates at the reporting date as observable inputs.

Options are valued based on a modified Black-Scholes model using volatility and exercise prices as major observable inputs.

The Group utilizes derivative financial instruments for the purpose of hedging to reduce the volatility in the Group's performance due to the exposure to various business related risks. To mitigate these risks, the Group enters into certain derivative financial instruments. The risk reduction is obtained because the derivative's value or cash flows are expected, wholly or partly, to offset changes in the value or cash flows of the recognized assets or liabilities. The overall strategy is aiming to mitigate the currency and interest rate risk of positions that are contractually agreed, and to partially mitigate the exposure risk of selected anticipated transactions.

Certain derivative financial instruments meet the criteria for hedge accounting treatment. A prerequisite for obtaining this accounting-hedge relationship is extensive documentation on inception and proving on a regular basis that the economic hedge is effective for accounting purposes. Other derivative financial instruments do not meet the criteria to qualify for hedge accounting. Changes in the fair value of those derivative instruments are recognized immediately in "Other financial income and expense" in the consolidated income statement.

In addition, the Group has designated certain long-term debt components as hedges of the translation risk arising on certain net investments in foreign operations. On consolidation, foreign currency differences arising on long-term debt designated as net investment hedges of a foreign operation are recognized in other comprehensive income and accumulated in currency translation effects, to the extent that the hedge is effective. The foreign currency differences arising from hedge ineffectiveness are recognized in the income statement in "Other financial income and expense."

When a hedged net investment is disposed of, the proportionate portion of the cumulative amount recognized in equity in relation to the hedged net investment is transferred to the consolidated income statement as an adjustment to the gain or loss on disposal.

Inventories

Inventory is valued at the lower of acquisition or production cost determined on a first-in, first-out basis and net realizable value. This value is used for the "Cost of goods sold" in the consolidated income statement. Unsalable inventory is fully written off in the consolidated income statement under "Cost of goods sold."

Trade receivables

Trade receivables are initially recognized at their invoiced amounts, including any related sales taxes less adjustments for estimated revenue deductions such as rebates, chargebacks and cash discounts.

From January 1, 2018, with the adoption of IFRS 9 Financial Instruments, the provisions for doubtful trade receivable are established using an expected credit loss model (ECL). The provisions are based on a forward-looking ECL, which includes possible default events on the trade receivables over the entire holding period of the trade receivable. These provisions represent the difference between the trade receivable's carrying amount in the consolidated balance sheet and the estimated collectible amount. Charges for doubtful trade receivables are recorded as marketing and selling costs recognized in the consolidated income statement within "Selling, general and administration" expenses.

Prior to the adoption of IFRS 9, the Group's accounting policy for provisions for doubtful trade receivables was as follows:

Provisions for doubtful trade receivables were established once there was an indication that it was likely that a loss would be incurred. These provisions represent the difference between the trade receivable's carrying amount in the consolidated balance sheet and the estimated collectible amount. Significant financial difficulties of a customer, such as probability of bankruptcy, financial reorganization, default or delinquency in payments, were considered indicators that recovery of the trade receivable was doubtful. Charges for doubtful trade receivables, recorded as marketing and selling costs, were recognized in the consolidated income statement within "Selling, general and administration" expenses.

The section "—Impact of adopting significant new IFRS standards in 2018" provides additional disclosure on the impact of adoption of IFRS 9 Financial Instruments.

Legal and environmental liabilities

Novartis and its subsidiaries are subject to contingencies arising in the ordinary course of business, such as patent litigation, environmental remediation liabilities and

other product-related litigation, commercial litigation, and governmental investigations and proceedings. Provisions are recorded where a reliable estimate can be made of the probable outcome of legal or other disputes against the subsidiary.

Contingent consideration

In a business combination or divestment of a business, it is necessary to recognize contingent future amounts due to previous owners, representing contractually defined potential amounts as a liability or asset. Usually for Novartis, these are linked to milestone or royalty payments related to certain assets and are recognized as a financial liability or financial asset at their fair value, which is then remeasured at each subsequent reporting date. These estimations typically depend on factors such as technical milestones or market performance, and are adjusted for the probability of their likelihood of payment and are appropriately discounted to reflect the impact of time.

Changes in the fair value of contingent consideration liabilities in subsequent periods are recognized in the consolidated income statement in "Cost of goods sold" for currently marketed products and in "Research and development" for IPR&D. Changes in contingent consideration assets are recognized in "Other income" or "Other expense," depending on its nature.

The effect of unwinding the discount over time is recognized for contingent liabilities in "Interest expense" and for contingent assets as interest income recognized in the consolidated income statement within "Other financial income and expense."

Defined benefit pension plans and other post-employment benefits

The liability in respect of defined benefit pension plans and other post-employment benefits is the defined benefit obligation calculated annually by independent actuaries using the projected unit credit method. The current service cost for such post-employment benefit plans is included in the personnel expenses of the various functions in which associates are employed, while the net interest on the net defined benefit liability or asset is recognized as "Other expense" or "Other income."

Treasury shares

Treasury shares are initially recorded at fair value on their trade date, which is different from the settlement date, when the transaction is ultimately effected. Treasury shares are deducted from consolidated equity at their nominal value of CHF 0.50 per share. Differences between the nominal amount and the transaction price on purchases or sales of treasury shares with third parties, or the value of services received for the shares allocated to associates as part of share-based compensation arrangements, are recorded in "Retained earnings" in the consolidated statement of changes in equity.

Revenue recognition

From January 1, 2018, with the implementation of the new standard IFRS 15 Revenue from Contracts with Customers, the Group accounting policy for revenue recognition is as follows:

Revenue on the sale of Novartis Group products and services, which is recorded as "Net sales" in the consolidated income statement, is recognized when a contractual promise to a customer (performance obligation) has been fulfilled by transferring control over the promised goods and services to the customer, substantially all of which is at the point in time of shipment to or receipt of the products by the customer or when the services are performed. If contracts contain customer acceptance provisions, revenue is recognized upon the satisfaction of the acceptance criteria. If products are stockpiled at the request of the customer, revenue is only recognized once the products have been inspected and accepted by the customer, and there is no right of return or replenishment on product expiry. The amount of revenue recognized is based on the consideration Novartis expects to receive in exchange for its goods and services, when it is highly probable that a significant reversal will not occur. If a contract contains more than one performance obligation, the consideration is allocated based on the standalone selling price of each performance obligation.

In the Alcon Division, which is reported as discontinued operations, surgical equipment may be sold together with other products and services under a single contract. Revenues were recognized upon satisfaction of each of the performance obligations in the contract and the consideration was allocated based on the standalone selling price of each performance obligation.

For surgical equipment, in addition to cash and installment sales, revenue was recognized under finance and operating lease arrangements. Arrangements in which substantially all the risks and rewards incidental to ownership transfers to the customer were treated as finance lease arrangements. Revenue from finance lease arrangements was recognized at amounts equal to the fair value of the equipment, which approximated the present value of the minimum lease payments under the arrangements. As interest rates embedded in lease arrangements were approximately market rates, revenue under finance lease arrangements was comparable to revenue for outright sales. Finance income for arrangements longer than 12 months was deferred and subsequently recognized based on a pattern that approximates the use of the effective interest method and recorded in "Other income." Operating lease revenue for equipment rentals was recognized on a straight-line basis over the lease term.

The consideration Novartis receives in exchange for its goods or services may be fixed or variable. Variable consideration is only recognized when it is highly probable that a significant reversal will not occur. The most common elements of variable consideration are listed below.

- Rebates and discounts granted to government agencies, wholesalers, retail pharmacies, managed healthcare organizations and other customers are provisioned and recorded as a deduction from revenue at the time the related revenues are recorded or when

the incentives are offered. They are calculated on the basis of historical experience, regulations, the specific terms in the individual agreements, product pricing and the mix of products, contracts, channels and payors.

- Refunds granted to healthcare providers under innovative pay-for-performance agreements (i.e. outcome based arrangements) are provisioned and recorded as a revenue deduction at the time the related sales are recorded. They are calculated on the basis of historical experience and clinical data available for the product, as well as the specific terms in the individual agreements. In cases where historical experience and clinical data are not sufficient for a reliable estimation of the outcome, revenue recognition is deferred until the uncertainty is resolved or until such history is available.
- Cash discounts offered to customers are to encourage prompt payment and are provisioned and recorded as revenue deductions at the time the related sales are recorded.
- Shelf stock adjustments are generally granted to customers, primarily of the Sandoz Division, to cover the inventory held by them at the time a price decline becomes effective. Revenue deduction provisions for shelf stock adjustments are recorded when the price decline is anticipated, based on the impact of the price decline on the customer's estimated inventory levels.
- Sales returns provisions are recognized and recorded as revenue deductions when there is historical experience of Novartis agreeing to customer returns and Novartis can reasonably estimate expected future returns. In doing so, the estimated rate of return is applied, determined on the basis of historical experience of customer returns and considering any other relevant factors. This is applied to the amounts invoiced, also considering the amount of returned products to be destroyed versus products that can be placed back in inventory for resale. Where shipments are made on a resale or return basis, without sufficient historical experience for estimating sales returns, revenue is only recorded when there is evidence of consumption or when the right of return has expired.

Provisions for revenue deductions are adjusted to actual amounts as rebates, refunds, discounts and returns are processed. The provision represents estimates of the related obligations, requiring the use of judgment when estimating the effect of these sales deductions.

"Other revenue" includes income from profit-sharing arrangements with our collaboration partners, and royalty and milestone income from the out-licensing of intellectual property when Novartis retains an interest in the IP through a license. Royalty income earned through a license is recognized when the underlying sales have occurred. Milestone income is recognized at the point in time when it is highly probable that the relevant milestone event criteria is met, and the risk of reversal of revenue recognition is remote. Other revenue also includes revenue from activities such as manufacturing or other services rendered, to the extent such revenue is not recorded under net sales, and is recognized when control transfers to the third party and our performance obligations are satisfied.

Prior to the adoption of IFRS 15 on January 1, 2018, the Group accounting policy for revenue recognition was as follows:

Revenue was recognized on the sale of Novartis Group products and services, and was recorded as "Net sales" in the consolidated income statement when there was persuasive evidence that a sales arrangement exists; title, risks and rewards for the products are transferred to the customer; the price was determinable; and collectability was reasonably assured. If contracts contain customer acceptance provisions, revenue would be recognized upon the satisfaction of acceptance criteria. If products are stockpiled at the request of the customer, revenue was only recognized once the products have been inspected and accepted by the customer, and there was no right of return or replenishment on product expiry.

In the Alcon Division, which is reported as discontinued operations, surgical equipment may be sold together with other products and services under a single contract. The total consideration was allocated to the separate elements based on their relative fair values. Revenue was recognized once the recognition criteria have been met for each element of the contract.

For surgical equipment, in addition to cash and installment sales, revenue was recognized under finance and operating lease arrangements. Arrangements in which Novartis transfers substantially all the risks and rewards incidental to ownership to the customer are treated as finance lease arrangements. Revenue from finance lease arrangements was recognized at amounts equal to the fair values of the equipment, which approximate the present values of the minimum lease payments under the arrangements. As interest rates embedded in lease arrangements are approximately market rates, revenue under finance lease arrangements was comparable to revenue for outright sales. Finance income for arrangements in excess of 12 months was deferred and subsequently recognized based on a pattern that approximates the use of the effective interest method and recorded in "Other income." Operating lease revenue for equipment rentals was recognized on a straight-line basis over the lease term.

Provisions for rebates and discounts granted to government agencies, wholesalers, retail pharmacies, managed healthcare organizations and other customers were recorded as a deduction from revenue at the time the related revenues were recorded or when the incentives were offered. They were calculated on the basis of historical experience and the specific terms in the individual agreements.

Provisions for refunds granted to healthcare providers under innovative pay-for-performance agreements were recorded as a revenue deduction at the time the related sales were recorded. They were calculated on the basis of historical experience and clinical data available for the product, as well as the specific terms in the individual agreements. In cases where historical experience and clinical data were not sufficient for a reliable estimation of the outcome, revenue recognition was deferred until such history was available.

Cash discounts were offered to customers to encourage prompt payment and were recorded as revenue deductions.

Following a decrease in the price of a product, we generally grant customers a "shelf stock adjustment" for their existing inventory for the involved product. Provisions for shelf stock adjustments, which are primarily relevant within the Sandoz Division, were determined at the time of the price decline or at the point of sale, if the impact of a price decline on the products sold could be reasonably estimated based on the customer's inventory levels of the relevant product.

When there was historical experience of Novartis agreeing to customer returns, and Novartis could reasonably estimate expected future returns, a provision was recorded for estimated sales returns. In doing so, the estimated rate of return was applied, determined based on historical experience of customer returns and considering any other relevant factors. This was applied to the amounts invoiced, also considering the amount of returned products to be destroyed versus products that could be placed back in inventory for resale. Where shipments were made on a resale or return basis, without sufficient historical experience for estimating sales returns, revenue was only recorded when there was evidence of consumption or when the right of return had expired.

Provisions for revenue deductions were adjusted to actual amounts as rebates, discounts and returns were processed. The provision represents estimates of the related obligations, requiring the use of judgment when estimating the effect of these sales deductions.

"Other revenue" includes royalty and profit-sharing income, and revenue from activities such as manufacturing services or other services rendered, to the extent such revenue was not recorded under net sales.

The section "—Impact of adopting significant new IFRS standards in 2018" provides additional disclosure on the impact of adoption.

Research and development

Internal research and development (R&D) costs are fully charged to "Research and development" in the consolidated income statement in the period in which they are incurred. The Group considers that regulatory and other uncertainties inherent in the development of new products preclude the capitalization of internal development expenses as an intangible asset until marketing approval from a regulatory authority is obtained in a major market such as the United States, the European Union, Switzerland or Japan.

Payments made to third parties, such as contract research and development organizations in compensation for subcontracted R&D, that are deemed not to transfer intellectual property to Novartis are expensed as internal R&D expenses in the period in which they are incurred. Such payments are only capitalized if they meet the criteria for recognition of an internally generated intangible asset, usually when marketing approval has been achieved from a regulatory authority in a major market.

Payments made to third parties to in-license or acquire intellectual property rights, compounds and products, including initial upfront and subsequent milestone payments, are capitalized, as are payments for other assets, such as technologies to be used in R&D activities. If additional payments are made to the originator company to continue to perform R&D activities, an evaluation is made as to the nature of the payments. Such additional payments will be expensed if they are deemed to be compensation for subcontracted R&D services not resulting in an additional transfer of intellectual property rights to Novartis. Such additional payments will be capitalized if they are deemed to be compensation for the transfer to Novartis of additional intellectual property developed at the risk of the originator company. Subsequent internal R&D costs in relation to IPR&D and other assets are expensed, since the technical feasibility of the internal R&D activity can only be demonstrated by the receipt of marketing approval for a related product from a regulatory authority in a major market.

Costs for post-approval studies performed to support the continued registration of a marketed product are recognized as marketing expenses. Costs for activities that are required by regulatory authorities as a condition for obtaining marketing approval are capitalized and recognized as currently marketed products.

Inventory produced ahead of regulatory approval is fully provisioned, and the charge is included in "Other expense" in the consolidated income statement, as its ultimate use cannot be assured. If this inventory can be subsequently sold, the provision is released to "Other income" in the consolidated income statement, either on approval by the appropriate regulatory authority or, exceptionally in Europe, on recommendation by the Committee for Medicinal Products for Human Use (CHMP), if approval is virtually certain.

Share-based compensation

Vested Novartis shares and American Depositary Receipts (ADRs) that are granted as compensation are valued at their market value on the grant date and are immediately expensed in the consolidated income statement.

The fair values of unvested restricted shares (RSs), restricted share units (RSUs) and performance share units (PSUs) in Novartis shares and ADRs granted to associates as compensation are recognized as an expense over the related vesting period. The expense recorded in the consolidated income statement is included in the personnel expenses of the various functions in which the associates are employed.

Unvested restricted shares, restricted ADRs and RSUs are only conditional on the provision of services by the plan participant during the vesting period. They are valued at fair value on the grant date. As RSUs do not entitle the holder to dividends, the fair value is based on the Novartis share price at the grant date adjusted for the net present value of the dividends expected to be paid during the holding period. The fair value of these grants, after making adjustments for assumptions related to forfeiture during the vesting period, is expensed on a straight-line basis over the respective vesting period.

PSUs are subject to the achievement of certain performance criteria during the vesting period and require

plan participants to provide services during this period. The following paragraphs provide an overview of the accounting policies for the share-based compensation plans that grant PSUs.

For PSUs granted under plans that are subject to performance criteria based on Novartis internal performance metrics and that are conditional on the provision of service by plan participants during the vesting period, the expense is recognized on a straight-line basis over the vesting period, and is determined based on assumptions concerning the expected performance against the internal performance metrics throughout the vesting period. The assumptions are based on the Group's targets for those performance metrics, and the expected forfeitures due to plan participants not meeting their service conditions. The assumptions are periodically adjusted over the vesting period. Any change in estimates for past services is recorded immediately as an expense or income in the consolidated income statement, and amounts for the remaining vesting period are expensed on a straight-line basis. As a result, at the end of the vesting period, the charge during the entire vesting period represents the amount that will finally vest. The number of equity instruments that finally vest is determined at the vesting date.

For PSUs granted under plans that are subject to performance criteria based on variables that can be observed in the market, which for Novartis plans is the Novartis total shareholder return (TSR) relative to a specific peer group of companies over the vesting period, and that are conditional on the provision of services by the plan participants during the vesting period, the expense is recognized on a straight-line basis over the vesting period, and is determined based on the total fair value of the grant over the vesting period. IFRS requires that these variables that can be observed in the market are taken into account in determining the fair value of the PSUs at the grant date. Novartis determined the fair value of these PSUs at the date of grant using a Monte Carlo simulation model. Adjustments to the number of equity instruments granted are only made if a plan participant does not fulfill the service conditions.

For PSUs granted under plans that are subject to both performance criteria based on Novartis internal performance metrics and Novartis TSR relative to a specific peer group of companies over the vesting period and that are conditional on the provision of service by plan participants during the vesting period, the expense is recognized on a straight-line basis over the vesting period, and is determined based on a bifurcation into the components based on the performance criteria related to Novartis internal performance metrics and TSR, as described in the paragraphs above.

Measuring the fair values of PSUs granted that include TSR performance criteria requires use of estimates. The Monte Carlo simulation used to determine the fair value of the PSUs TSR performance criteria requires the probability of factors related to uncertain future events; the term of the award; the grant price of underlying shares or ADRs; expected volatilities; the expected correlation matrix of the underlying equity instruments with those of the peer group of companies; and the risk-free interest rate as input parameters.

If a plan participant leaves Novartis for reasons other than retirement, disability or death, then unvested restricted shares, restricted ADRs, RSUs and PSUs are forfeited, unless determined otherwise by the provision of the plan rules or by the Compensation Committee of the Novartis Board of Directors, for example, in connection with a reorganization or divestment.

Government grants

Grants from governments or similar organizations are recognized at their fair value when there is a reasonable assurance that the grant will be received and the Group will comply with all attached conditions.

Government grants related to income are deferred and recognized in the consolidated income statement over the period necessary to match them with the related costs that they are intended to compensate.

The accounting policy for property, plant and equipment describes the treatment of any related grants.

Restructuring charges

Restructuring provisions are recognized for the direct expenditures arising from the restructuring, where the plans are sufficiently detailed and where appropriate communication to those affected has been made.

Charges to increase restructuring provisions are included in "Other expense" in the consolidated income statements. Corresponding releases are recorded in "Other income" in the consolidated income statement.

Taxes

Taxes on income are provided in the same periods as the revenues and expenses to which they relate and include interest and penalties incurred during the period. Deferred taxes are determined using the comprehensive liability method and are calculated on the temporary differences that arise between the tax base of an asset or liability and its carrying value in the balance sheet prepared for consolidation purposes, except for those temporary differences related to investments in subsidiaries and associated companies, where the timing of their reversal can be controlled and it is probable that the difference will not reverse in the foreseeable future. Since the retained earnings are reinvested, withholding or other taxes on eventual distribution of a subsidiary's retained earnings are only taken into account when a dividend has been planned.

The estimated amounts for current and deferred tax assets or liabilities, including any amounts related to any uncertain tax positions, are based on currently known facts and circumstances. Tax returns are based on an interpretation of tax laws and regulations, and reflect estimates based on these judgments and interpretations. The tax returns are subject to examination by the competent taxing authorities, which may result in an assessment being made requiring payments of additional tax, interest or penalties. Inherent uncertainties exist in the estimates of the tax positions.

Impact of adopting significant new IFRS standard in 2019

The following new IFRS standard has been adopted by Novartis from January 1, 2019:

IFRS 16 Leases

IFRS 16 Leases substantially changed the financial statements, as the majority of leases for which the Group is the lessee became on-balance sheet liabilities with corresponding right-of-use assets also recognized on the balance sheet. The lease liability reflects the net present value of the remaining lease payments, and the right-of-use asset corresponds to the lease liability, adjusted for payments made before the commencement date, lease incentives and other items related to the lease agreement. The standard replaces IAS 17 Leases and related interpretations.

Upon adoption of the new standard, a portion of the annual operating lease costs, which was previously fully recognized as functional expenses, as a component of operating income, is recorded as interest expense. In addition, the portion of the lease payments that represents the reduction of the lease liability is recognized in the cash flow statement as an outflow from financing activities, which was previously fully recognized as an outflow from operating activities. Given the leases involved, these effects are not significant to the consolidated income statement and consolidated statement of cash flow.

The Group implemented the new standard on January 1, 2019, and applied the modified retrospective method, with right-of-use assets measured at an amount equal to the lease liability, adjusted by the amount of the prepaid or accrued lease payments relating to those leases recognized in the balance sheet immediately before the date of initial application and did not restate prior years.

Results of our impact assessment:

The undiscounted operating lease commitments as of December 31, 2018, amounted to USD 3.6 billion. This includes approximately USD 0.1 billion of leases with a commencement date in 2019, as well as short-term leases and low-value leases that are recognized from January 1, 2019, upon adoption of IFRS 16, on a straight-line basis as expense in profit and loss. This also includes USD 0.2 billion lease commitments related to the Alcon Division, which is attributable to discontinued operation in 2019. For the remaining undiscounted lease commitments attributable to continuing operations of USD 3.3 billion, the Group recognized on January 1, 2019, lease liabilities of USD 1.74 billion and right-of-use assets of USD 1.55 billion (after the reclassification of USD 0.1 billion from property, plant & equipment, and net adjustments for the USD 0.3 billion recognition of sublease receivables, prepayments, and accrued lease payments recognized as at December 31, 2018). For the lease commitments attributable to discontinued operations, the Group recognized on January 1, 2019, lease liabilities and right-of-use assets of USD 0.2 billion. This does not include the discontinued operations right-of-use assets and lease liability on finance lease agreements of USD 75 million and USD 89 million, respectively. There was an insignificant increase to retained earnings upon adoption of IFRS 16 of USD 3 million that arose from subleases that were accounted for as operating lease agreements under IAS 17 and are accounted for as finance leases under IFRS 16.

As a lessor, the Group had no significant impact upon adoption.

For further information on the impact of adoption and additional disclosures of IFRS 16 Leases, see Note 10.

Impact of adopting significant new IFRS standards in 2018

The following IFRS standards have been adopted by Novartis from January 1, 2018:

IFRS 9 Financial Instruments

Novartis implemented IFRS 9 Financial Instruments as of January 1, 2018, which substantially changed the classification and measurement of financial instruments. The standard requires impairments to be based on a forward-looking model, changed the approach to hedging financial exposures and related documentation, changed the recognition of certain fair value changes, and amends disclosure requirements.

The impairment of financial assets, including trade and lease receivables, is now assessed using an expected credit loss model; previously, the incurred loss model was used. Given the nature of Novartis financial assets, the Group had no significant impact to its provisions for doubtful accounts or impairments from this change.

The new hedge accounting model introduced by the standard requires hedge accounting relationships to be based upon the Group's own risk management strategy and objectives, and to be discontinued only when the relationships no longer qualify for hedge accounting. There was no impact upon adoption of the new standard, as the Group's existing hedge relationships continue to be designated as such under the new hedge accounting requirements.

The most significant impact to the Group upon adoption of IFRS 9 relates to the treatment of the unrealized gains and losses from changes in fair value on certain of the Group's financial instruments, which were previously classified as available-for-sale marketable securities and financial investments. The unrealized gains and losses (to the extent of previous recognized unrealized gains), which the Group recognized previously in the consolidated statement of other comprehensive income, are from January 1, 2018, recognized in the consolidated income statement. This approach is applied to equity securities where the fair value through other comprehensive income irrevocable option is not applied.

The Group applied the modified retrospective method upon adoption of IFRS 9 on January 1, 2018. This method requires the recognition of the cumulative effect of initially applying IFRS 9 to retained earnings and not to restate prior years. The cumulative effect recorded at January 1, 2018, was an increase to retained earnings of USD 177 million.

IFRS 15 Revenue from Contracts with Customers
Novartis implemented the new standard IFRS 15 Revenue from Contracts with Customers as of January 1, 2018. The standard amended revenue recognition requirements and established principles for reporting information about the nature, amount, timing and uncertainty of revenue and cash flows arising from contracts with customers. The standard replaced IAS 18 Revenue and IAS 11 Construction contracts and related interpretations.

The impacts of adoption of the new standard are summarized below:

- The Group's "net sales" are derived from the sale of drug substances, vision care products, surgical equipment, and other products and services, where control transfers to our customers and our performance obligations are satisfied at the time of shipment to or receipt of the products by the customer, or when the services are performed. The adoption of IFRS 15 did not significantly change the timing or amount of revenue recognized under these arrangements.
- The Group's "other revenue" consists of royalty income from the out-licensing of intellectual property, which is recognized as earned, and from manufacturing and other services, where revenue is recognized when control transfers to the third party and our performance obligations are satisfied. The adoption of IFRS 15 did not significantly change the timing or amount of revenue recognized from these manufacturing and other services arrangements, nor did it change accounting for these royalty arrangements, as the standard's royalty exception is applied for IP licenses. "Other revenue" also includes revenue from profit-sharing arrangements with our collaboration partners. Furthermore, the Group receives milestone payments related to the out-licensing of IP. The adoption of IFRS 15 did not significantly change the timing or amount of revenue recognized under these arrangements.

The Group applied the modified retrospective method upon adoption of IFRS 15 on January 1, 2018. This method requires the recognition of the cumulative effect of initially applying IFRS 15 to retained earnings and not to restate prior years. The cumulative effect recorded at January 1, 2018, was an increase to retained earnings of USD 60 million.

New IFRS standard effective as of January 1, 2020

IFRS 3 Business Combination amendments
The IASB issued an amendment to IFRS 3 Business Combinations that revised the definition of a business, which assist entities with the evaluation of when an asset or group of assets acquired or disposed of should be considered a business. This amended standard is effective for the Group as of January 1, 2020 and is applicable to transactions entered into on or after January 1, 2020. The amended standard allows an entity to apply an optional concentration test, on a transaction-by-transaction basis, to evaluate whether substantially all of the fair value of the gross assets acquired is concentrated in a single identifiable asset or group of similar identifiable assets. If this optional concentration test is met, the entity may choose to consider the transaction an acquisition of an asset or set of assets. The Group does not expect the adoption of this amended standard on January 1, 2020 to have a significant impact on our consolidated financial statements in future periods. However, this will depend on the facts and circumstances of future transactions and if the Group decides to apply the optional concentration test in the assessment of whether an acquired set of activities and assets is or is not a business.

There are no other IFRS standards or interpretations not yet effective that would be expected to have a material impact on the Group.

2. Significant transactions

Significant transactions in 2019

Completion of the spin-off of the Alcon business through a dividend in kind distribution to Novartis AG shareholders
On June 29, 2018, Novartis announced its intention to seek shareholder approval for the spin-off of the Alcon business into a separately traded standalone company, following the complete structural separation of the Alcon business into a standalone company (the Alcon business or Alcon Inc.).

The Novartis AG shareholders approved the spin-off of the Alcon business at the 2019 Annual General Meeting held on February 28, 2019, subject to completion of certain conditions precedent to the distribution. Upon shareholder approval, the Alcon business was reported as discontinued operations, and the fair value of the Alcon business exceeded the carrying value of its net assets.

The conditions precedent to the spin-off were met and on April 8, 2019 the spin-off of the Alcon business was effected by way of a distribution of a dividend in kind of Alcon Inc. shares to Novartis AG shareholders and ADR (American Depositary Receipt) holders (the Distribution), which amounted to USD 23.4 billion and is recognized as a reduction to retained earnings. Through the

Distribution, each Novartis AG shareholder received one Alcon Inc. share for every five Novartis AG shares/ADRs they held on April 8, 2019, close of business. As of April 9, 2019, the shares of Alcon Inc. are listed on the SIX Swiss Exchange (SIX) and on the New York Stock Exchange (NYSE) under the symbol "ALC."

The dividend in kind distribution liability to effect the spin-off of the Alcon business (the distribution liability) amounted to USD 26.4 billion at March 31, 2019, unchanged from its initial recognition on February 28, 2019, and was in excess of the carrying value of the Alcon business net assets as of February 28, 2019, and as of March 31, 2019. The net assets of the Alcon business amounted to USD 23.1 billion as at March 31, 2019.

On March 6, 2019, Alcon entered into financing arrangements with a syndicate of banks under which it borrowed on April 2, 2019, a total amount of USD 3.2 billion. These borrowings consisted of approximately USD 2.8 billion and the equivalent of USD 0.4 billion in EUR in bridge and other term loans under such Alcon facilities agreement. In addition, approximately USD 0.3 billion of borrowings under a number of local bilateral facilities in different countries, with the largest share of borrowings in Japan, were raised. This resulted in a total gross debt of USD 3.5 billion. These outstanding borrowings of the Alcon legal entities were recorded in the balance sheet and financing cash flow from discontinued operations. Prior to the spin-off, through a series of intercompany transactions, Alcon legal entities paid approximately USD 3.1 billion in cash to Novartis and its affiliates.

At the April 8, 2019 Distribution, the fair value of the distribution liability of the Alcon business amounted to USD 23.4 billion, a decrease of USD 3.0 billion from March 31, 2019. As mentioned above, prior to the spin-off, through a series of intercompany transactions, Alcon legal entities incurred additional net financial debt and paid approximately USD 3.1 billion in cash to Novartis and its affiliates. This additional net debt and transactions resulted in a decrease in Alcon's net assets to USD 20.0 billion at the date of the Distribution of the dividend in kind to Novartis AG shareholders on April 8, 2019. The distribution liability at April 8, 2019, remained in excess of the then-carrying value of the Alcon business net assets.

Certain consolidated foundations own Novartis AG dividend-bearing shares restricting their availability for use by the Group. These Novartis AG shares are accounted for as treasury shares. Through the Distribution, these foundations received Alcon Inc. shares representing an approximate 4.7% equity interest in Alcon Inc. Upon the loss of control of Alcon Inc. through the Distribution, the financial investment in Alcon Inc. was recognized at its fair value based on the opening traded share price of Alcon Inc. on April 9, 2019 (a Level 1 hierarchy valuation). At initial recognition, its fair value of USD 1.3 billion was reported on the Group's consolidated balance sheet as a financial asset. Management has designated this investment at fair value through other comprehensive income.

The total non-taxable, non-cash gain recognized at the distribution date of the spin-off of the Alcon business amounted to USD 4.7 billion consisting of:

(USD millions)	April 8, 2019
Net assets derecognized [1]	– 20 025
Derecognition of distribution liability	23 434
Difference between net assets and distribution liability	**3 409**
Recognition of Alcon Inc. shares obtained through consolidated foundations	1 273
Currency translation gains recycled into the consolidated income statement	123
Transaction costs recognized in the consolidated income statement	– 114
Gain on distribution of Alcon Inc. to Novartis AG shareholders	**4 691**

[1] See Note 30 for additional information.

For additional disclosures on discontinued operations, refer to Note 30.

Innovative Medicines – acquisition of IFM Tre, Inc.

On May 7, 2019, Novartis acquired IFM Tre, Inc., a privately held, US-based biopharmaceutical company focused on developing anti-inflammatory medicines targeting the NLRP3 inflammasome. The acquisition gives Novartis full rights to IFM Tre, Inc.'s portfolio of NLRP3 antagonists. The NLRP3 antagonists portfolio consists of one clinical program and two preclinical programs: IFM-2427, a first-in-class, clinical-stage systemic antagonist for an array of chronic inflammatory disorders, including atherosclerosis and nonalcoholic steatohepatitis (NASH); a preclinical-stage gutdirected molecule for the treatment of inflammatory bowel disease; and a preclinical-stage central nervous system (CNS)-penetrant molecule.

The previously held interest of 9% was adjusted to its fair value of USD 33 million through the consolidated income statement at acquisition date. This remeasurement resulted in a gain of USD 14 million. The fair value of the total purchase consideration for acquiring the 91% stake Novartis did not already own amounted to USD 361 million. The amount consisted of an initial cash payment of USD 285 million, and the fair value of the contingent consideration of USD 76 million due to the IFM Tre, Inc. shareholders, which they are eligible to receive upon the achievement of specified development and commercialization milestones. The purchase price allocation resulted in net identifiable assets of USD 355 million, mainly intangibles, and goodwill of USD 39 million. Results of operations since the date of acquisition were not material.

Innovative Medicines – acquisition of *Xiidra*

On May 8, 2019, Novartis entered into an agreement with Takeda Pharmaceutical Company Limited (Takeda) to acquire the assets associated with *Xiidra* (lifitegrast ophthalmic solution) 5% worldwide. *Xiidra* is the first and only prescription treatment approved to treat both signs and symptoms of dry eye by inhibiting inflammation caused by the disease. The transaction bolsters the Novartis front-of-the-eye portfolio and ophthalmic leadership. The transaction closed on July 1, 2019. The purchase price consists of a USD 3.4 billion upfront payment, customary purchase price adjustments of USD 0.1 billion, and the potential milestone payments of up to USD 1.9 billion, which Takeda is eligible to receive upon the achievement of specified commercialization milestones.

The fair value of the total purchase consideration is USD 3.7 billion. The amount consists of an initial cash payment of USD 3.5 billion, and the net present value of the contingent consideration of USD 0.2 billion, which Takeda is eligible to receive upon the achievement of specified commercialization milestones.

The purchase price allocation resulted in net identifiable assets of approximately USD 3.6 billion, consisting mainly of intangible assets of USD 3.6 billion, and goodwill amounted to approximately USD 0.1 billion. In 2019, from the date of acquisition, the business generated net sales of USD 0.2 billion. Management estimates that net sales for the entire year of 2019 would have amounted to USD 0.3 billion, had the business been acquired at the beginning of the 2019 reporting period. Results of operations since the date of acquisition were not material.

Significant transactions entered into in 2019 and closed in January 2020

Innovative Medicines – acquisition of The Medicines Company

On November 23, 2019, Novartis entered into an agreement and plan of merger (the Merger Agreement) with The Medicines Company, a US-based pharmaceutical company headquartered in Parsippany, New Jersey USA. Pursuant to the Merger Agreement, on December 5, 2019, Novartis, through a subsidiary, commenced a tender offer to acquire all outstanding shares of The Medicines Company for USD 85 per share, or a total consideration of approximately USD 9.7 billion in cash on a fully diluted basis. The tender offer expired on January 3, 2020, and on January 6, 2020, the acquiring subsidiary merged with and into The Medicines Company, resulting in The Medicines Company becoming an indirect wholly owned subsidiary of Novartis. Novartis will finance the transaction through available cash and short- and long-term borrowings. As the transaction closed on January 6, 2020 the purchase price allocation is incomplete.

The Medicines Company is focused on the development of inclisiran, a potentially first-in-class, twice-yearly therapy that allows administration during patients' routine visits to their healthcare professionals and will potentially contribute to improved patient adherence and sustained lower LDL-C levels.

Significant pending transactions

Sandoz – divestment of US dermatology business and generic US oral solids portfolio

On September 6, 2018, Novartis announced that it has agreed to sell selected portions of its Sandoz US portfolio, specifically the Sandoz US dermatology business and generic US oral solids portfolio, to Aurobindo Pharma USA Inc. (Aurobindo) for USD 0.8 billion in cash and potential earnouts.

The Sandoz US portfolios to be sold to Aurobindo include approximately 300 products as well as additional development projects. The sale includes the Sandoz US generic and branded dermatology businesses as well as its dermatology development center. As part of the transaction, Aurobindo will acquire the manufacturing facilities in Wilson, North Carolina, and in Hicksville and Melville, New York.

The transaction is expected to be completed in the first quarter of 2020, pending regulatory approval. As the fair value of the consideration (USD 0.8 billion) less costs to sell is below the carrying value of the divested business (USD 1.0 billion, which includes an allocation of Sandoz goodwill of USD 0.2 billion), an impairment of the net assets to be divested in the amount of USD 0.2 billion was recognized as a reduction to goodwill in 2018.

In the Group's consolidated balance sheet at December 31, 2019 and 2018, the business assets and liabilities of the Sandoz US dermatology business and generic US oral solids portfolio are separately shown as assets and liabilities of disposal group held for sale.

The disposal group, assets and liabilities classified as held for sale consist of the following:

(USD millions)	December 31, 2019	December 31, 2018
Assets of disposal group classified as held for sale		
Property, plant and equipment	169	148
Intangible assets other than goodwill	475	478
Deferred tax assets	11	8
Other non-current assets	2	1
Inventories	181	165
Other current assets	3	7
Total	**841**	**807**

(USD millions)	December 31, 2019	December 31, 2018
Liabilities of disposal group classified as held for sale		
Deferred tax liabilities	2	2
Provisions and other non-current liabilities	4	4
Provisions and other current liabilities	25	45
Total	**31**	**51**

There are no cumulative income or expenses included in other comprehensive income relating to the disposal group.

Sandoz – acquisition of the Japanese business of Aspen Global Incorporated

On November 11, 2019, Sandoz entered into an agreement for the acquisition of the Japanese business of Aspen Global Incorporated (AGI), a wholly owned subsidiary of Aspen Pharmacare Holdings Limited. Under the agreement, Sandoz will acquire the shares in Aspen Japan K.K. and associated assets held by AGI. Pursuant to the agreed terms of the transaction, on closing the Group will pay an initial cash consideration of EUR 300 million (approximately USD 336 million). In addition, deferred consideration is due to AGI, upon fulfillment of certain conditions after closing, currently estimated at approximately EUR 100 million (approximately USD 112 million).

We have received all relevant approvals and this transaction is expected to be completed in the first quarter of 2020.

Aspen's portfolio in Japan consists of off-patent medicines with a focus on anesthetics and specialty brands. The acquisition will enable Sandoz to expand its presence in the third-largest worldwide generics marketplace.

Significant transactions in 2018

Innovative Medicines – acquisition of Advanced Accelerator Applications S.A.

On October 30, 2017, Novartis entered into a binding memorandum of understanding with Advanced Accelerator Applications S.A. (AAA), a company headquartered in Saint-Genis-Pouilly, France, under which Novartis agreed to commence a tender offer for 100% of the share capital of AAA subject to certain conditions. Novartis commenced the tender offer on December 7, 2017, to purchase all of the outstanding ordinary shares for a price of USD 41 per share and USD 82 per American Depositary Share (ADS), each representing two ordinary shares of AAA, which expired on January 19, 2018. The offer valued AAA's equity at USD 3.9 billion, on a fully diluted basis.

As of January 19, 2018, the expiration date of the tender offer, approximately 97% of the then-outstanding fully diluted ordinary shares, including ordinary shares represented by ADSs (hereinafter collectively referred to as "the outstanding shares"), were validly tendered. On January 22, 2018, Novartis accepted and paid USD 3.9 billion for the outstanding shares tendered in the offer. On January 22, 2018, Novartis commenced a subsequent offering period that expired on January 31, 2018. As of the expiration of the subsequent offering period, an additional 1.8% of the outstanding shares were validly tendered. Novartis accepted and paid approximately USD 60 million, resulting in an increase in Novartis ownership in AAA to 98.7%.

The fair value of the total purchase consideration was USD 3.9 billion. The purchase price allocation resulted in net identifiable assets of approximately USD 1.9 billion, consisting of USD 2.5 billion intangible assets, USD 0.6 billion net deferred tax liabilities, and goodwill of approximately USD 2.0 billion. In 2018, from the date of the acquisition, the business generated net sales of USD 0.4 billion. Management estimated that net sales for the entire year of 2018 would have amounted to USD 0.4 billion had AAA been acquired at the beginning of 2018. The 2018 results from operations since the acquisition were not material.

As of December 31, 2019, Novartis held 99.2% of the then-outstanding fully diluted ordinary shares, including ordinary shares represented by ADSs.

AAA is a radiopharmaceutical company that develops, produces and commercializes molecular nuclear medicines – including *Lutathera* (USAN: lutetium Lu 177 dotatate/INN: lutetium (^{177}Lu) oxodotreotide), a first-in-class radioligand therapy product for neuroendocrine tumors – and a portfolio of diagnostic products. Radiopharmaceuticals, such as *Lutathera*, are unique medicinal formulations containing radioisotopes, which are used clinically for both diagnosis and therapy.

Innovative Medicines – acquisition of AveXis, Inc.

On April 6, 2018, Novartis entered into an agreement and plan of merger with AveXis, Inc., a US-based clinical stage gene therapy company, under which Novartis commenced on April 17, 2018, a tender offer to purchase all outstanding common stock of AveXis, Inc. for USD 218 per share in cash. On May 15, 2018, Novartis completed the acquisition of the common stock of AveXis, Inc. and paid a total of USD 8.7 billion.

The fair value of the total purchase consideration was USD 8.7 billion. The purchase price allocation resulted in net identifiable assets of approximately USD 7.2 billion, consisting of USD 8.5 billion intangible assets, USD 1.6 billion net deferred tax liabilities and other net assets of USD 0.3 billion, and goodwill of approximately USD 1.5 billion. The 2018 results of operations since the date of acquisition were not material.

AveXis, Inc. is focused on developing and commercializing novel treatments for patients suffering from rare and life-threatening neurological genetic diseases. AveXis, Inc.'s initial product candidate, AVXS-101, is a proprietary gene therapy currently in development for the treatment of spinal muscular atrophy (SMA) type 1 – the leading genetic cause of infant mortality – and SMA types 2 and 3. In addition, AveXis, Inc. has a pipeline of other novel treatments for rare neurological diseases, including Rett syndrome (RTT) and a genetic form of amyotrophic lateral sclerosis (ALS) caused by mutations in the superoxide dismutase 1 (SOD1) gene.

Innovative Medicines – acquisition of Endocyte, Inc.

On October 18, 2018, Novartis entered into an agreement and plan of merger with Endocyte, Inc. (Endocyte), a US-based biopharmaceutical company focused on developing targeted therapeutics for cancer treatment. The transaction was completed on December 21, 2018. Under the terms of the agreement, Novartis acquired all outstanding shares of Endocyte common stock for USD 24 per share. The total consideration amounted to USD 2.1 billion.

The fair value of the total purchase consideration was USD 2.1 billion. The purchase price allocation resulted in net identifiable assets of approximately USD 1.5 billion, consisting of USD 1.5 billion intangible assets, USD 0.3 billion net deferred tax liabilities and other net assets of USD 0.3 billion, and goodwill of approximately USD 0.6 billion. The purchase price allocation was preliminary at December 31, 2018, as the transaction closed on December 21, 2018, which was close to the Group's year-end and therefore did not provide sufficient time to complete the valuation of the intangible assets, deferred taxes, assumed liabilities and goodwill. During 2019, there were no significant revisions to the purchase price allocation.

Endocyte uses drug conjugation technology to develop targeted therapies with companion imaging agents, including ^{177}Lu-PSMA-617, a potential first-in-class investigational radioligand therapy for the treatment of metastatic castration-resistant prostate cancer (mCRPC).

Corporate – divestment of 36.5% stake in GlaxoSmithKline Consumer Healthcare Holdings Ltd.
On March 27, 2018, Novartis entered into an agreement with GlaxoSmithKline plc (GSK) to divest its 36.5% stake in GlaxoSmithKline Consumer Healthcare Holdings Ltd. to GSK for USD 13.0 billion in cash. As a result, Novartis discontinued the use of equity method accounting starting from April 1, 2018.

On June 1, 2018, the transaction closed and Novartis realized a pre-tax gain of USD 5.8 billion, recorded in income from associated companies.

Significant transactions in 2017

Innovative Medicines – acquisition of Ziarco Group Limited
On January 20, 2017, Novartis acquired Ziarco Group Limited (Ziarco), a privately-held company in the United Kingdom that focuses on the development of novel treatments in dermatology. This acquisition added a once-daily oral H4 receptor antagonist in development for atopic dermatitis, commonly known as eczema, to complement the Novartis dermatology portfolio and pipeline. The fair value of the total purchase consideration was USD 420 million. The amount consisted of an initial cash payment of USD 325 million and the net present value of the contingent consideration of USD 95 million, due to Ziarco shareholders, which they are eligible to receive upon the achievement of specified development milestones. The purchase price allocation resulted in net identifiable assets of USD 395 million and goodwill of USD 25 million. The 2017 results of operations since the date of acquisition were not material.

Innovative Medicines – acquisition of Encore Vision, Inc.
On January 20, 2017, Novartis acquired Encore Vision, Inc. (Encore), a privately-held company in Fort Worth, Texas, in the United States, that focuses on the development of a novel treatment in presbyopia. The fair value of the total purchase consideration was USD 456 million. The amount consisted of an initial cash payment of USD 366 million and the net present value of the contingent consideration of USD 90 million, due to Encore shareholders, which they are eligible to receive upon the achievement of specified development and commercialization milestones. The purchase price allocation resulted in net identifiable assets of USD 389 million and goodwill of USD 67 million. The 2017 results of operations since the date of acquisition were not material.

For significant transactions in 2019 for discontinued operations, see Note 30. There were no significant transactions in 2018 and 2017 for discontinued operations.

3. Segmentation of key figures 2019, 2018 and 2017

The businesses of Novartis are divided operationally on a worldwide basis into two identified reporting segments: Innovative Medicines and Sandoz. In addition, we separately report Corporate activities.

Reporting segments are presented in a manner consistent with the internal reporting to the chief operating decision-maker, which is the Executive Committee of Novartis. The reporting segments are managed separately because they each research, develop, manufacture, distribute and sell distinct products that require differing marketing strategies.

The Executive Committee of Novartis is responsible for allocating resources and assessing the performance of the reporting segments.

The reporting segments are as follows:

Innovative Medicines researches, develops, manufactures, distributes and sells patented prescription medicines. The Innovative Medicines Division is organized into two global business units: Novartis Oncology and Novartis Pharmaceuticals. Novartis Oncology consists of the global business franchise Oncology, and Novartis Pharmaceuticals consists of the global business franchises Ophthalmology; Neuroscience; Immunology, Hepatology and Dermatology; Respiratory; Cardiovascular, Renal and Metabolism; and Established Medicines.

Sandoz develops, manufactures and markets finished dosage form medicines as well as intermediary products including active pharmaceutical ingredients. Sandoz is organized globally into three franchises: Retail Generics, Anti-Infectives and Biopharmaceuticals. In Retail Generics, Sandoz develops, manufactures and markets active ingredients and finished dosage forms of small molecule pharmaceuticals to third parties across a broad range of therapeutic areas, as well as finished dosage form of anti-infectives sold to third parties. In Anti-Infectives, Sandoz manufactures and supplies active pharmaceutical ingredients and intermediates, mainly antibiotics, for internal use by Retail Generics and for sale to third-party customers. In Biopharmaceuticals, Sandoz develops, manufactures and markets protein- or other biotechnology-based products, including biosimilars, and provides biotechnology manufacturing services to other companies.

Income and expenses relating to Corporate include the costs of the Group headquarters and those of corporate coordination functions in major countries. In addition, Corporate includes other items of income and expense that are not attributable to specific segments, such as certain revenues from intellectual property rights, certain expenses related to post-employment benefits, environmental remediation liabilities, charitable activities, donations and sponsorships. Usually, no allocation of Corporate items is made to the segments. As a result, Corporate assets and liabilities principally consist of net liquidity (cash and cash equivalents, marketable securities less financial debts), investments in associated companies, and current and deferred taxes and non-segment-specific environmental remediation and post-employment benefit liabilities.

Our divisions are supported by the Novartis Institutes for BioMedical Research, Global Drug Development, Novartis Technical Operations and Novartis Business Services organizations.

- The Novartis Institutes for BioMedical Research (NIBR) conducts research activities for the Innovative Medicines Division and also collaborates with Sandoz.
- The Global Drug Development organization oversees all drug development activities for our Innovative Medicines Division and collaborates with our Sandoz Division on development of its biosimilars portfolio.
- The Novartis Technical Operations organization manages our manufacturing operations across our Innovative Medicines and Sandoz Divisions.
- Novartis Business Services (NBS) is our shared services organization that delivers business support services across the Group, such as information technology, real estate and facility services, procurement, product lifecycle services, human resources, and financial reporting and accounting operations.

Following the February 28, 2019, shareholders' approval of the spin-off of the Alcon business (refer to Notes 1, 2 and 30 for further details), the Group reported its consolidated financial statements for the current and prior years as "continuing operations" and "discontinued operations."

Continuing operations comprise the activities of the Innovative Medicines and Sandoz Divisions, and the continuing Corporate activities.

Discontinued operations include the operational results from the Alcon eye care devices business and certain corporate activities attributable to the Alcon business prior to the spin-off, the gain on distribution of Alcon Inc. to Novartis AG shareholders, and certain other expenses related to the Distribution (refer to Notes 1, 2 and 30 for further details).

The accounting policies mentioned in Note 1 are used in the reporting of segment results. Inter-segmental sales are made at amounts that are considered to approximate arm's length transactions. The Executive Committee of Novartis evaluates segmental performance and allocates resources among the segments based on a number of measures, including net sales, operating income and net operating assets. Segment net operating assets consist primarily of property, plant and equipment; right-of-use assets; intangible assets; goodwill; inventories; and trade and other operating receivables less operating liabilities.

Segmentation – consolidated income statements

	Innovative Medicines		Sandoz		Corporate (including eliminations)		Group	
(USD millions)	**2019**	2018	**2019**	2018	**2019**	2018	**2019**	2018
Net sales to third parties from continuing operations	**37 714**	**34 892**	**9 731**	**9 859**			**47 445**	**44 751**
Sales to continuing and discontinued segments	783	741	141	177	– 871	– 836	53	82
Net sales from continuing operations	**38 497**	**35 633**	**9 872**	**10 036**	**– 871**	**– 836**	**47 498**	**44 833**
Other revenues	1 092	1 188	63	62	24	16	1 179	1 266
Cost of goods sold	– 10 050	– 9 870	– 5 334	– 5 530	959	890	– 14 425	– 14 510
Gross profit from continuing operations	**29 539**	**26 951**	**4 601**	**4 568**	**112**	**70**	**34 252**	**31 589**
Selling, general and administration	– 11 617	– 10 907	– 2 218	– 2 305	– 534	– 505	– 14 369	– 13 717
Research and development	– 8 152	– 7 675	– 1 250	– 814			– 9 402	– 8 489
Other income	1 586	977	167	505	278	147	2 031	1 629
Other expense	– 2 069	– 1 475	– 749	– 622	– 608	– 512	– 3 426	– 2 609
Operating income from continuing operations	**9 287**	**7 871**	**551**	**1 332**	**– 752**	**– 800**	**9 086**	**8 403**
Income from associated companies	1	1	2	5	656	6 432	659	6 438
Interest expense							– 850	– 932
Other financial income and expense							45	186
Income before taxes from continuing operations							**8 940**	**14 095**
Taxes							– 1 793	– 1 295
Net income from continuing operations							**7 147**	**12 800**
Net loss from discontinued operations before gain on distribution of Alcon Inc. to Novartis AG shareholders							– 101	– 186
Gain on distribution of Alcon Inc. to Novartis AG shareholders							4 691	
Net income/(loss) from discontinued operations							**4 590**	**– 186**
Net income							**11 737**	**12 614**
Attributable to:								
Shareholders of Novartis AG							*11 732*	*12 611*
Non-controlling interests							*5*	3
Included in net income from continuing operations are:								
Interest income							245	292
Depreciation of property, plant and equipment	– 952	– 1 075	– 283	– 285	– 110	– 122	– 1 345	– 1 482
Depreciation of right-of-use assets [1]	– 247		– 41		– 17		– 305	
Amortization of intangible assets	– 2 509	– 2 214	– 315	– 366	– 12	– 7	– 2 836	– 2 587
Impairment charges on property, plant and equipment, net	– 100	– 239	– 101	– 60	– 1	– 2	– 202	– 301
Impairment charges on intangible assets, net	– 632	– 592	– 506	– 249			– 1 138	– 841
Impairment charges and fair value changes on financial assets, net	18	107			20	– 113	38	– 6
Additions to restructuring provisions	– 229	– 395	– 165	– 32	– 98	– 94	– 492	– 521
Equity-based compensation of Novartis equity plans	– 761	– 645	– 67	– 53	– 239	– 220	– 1 067	– 918

[1] Depreciation of right-of-use assets recognized from January 1, 2019, the date of implementation of IFRS 16 leases. Notes 1 and 10 provide additional disclosures.

	Innovative Medicines		Sandoz		Corporate (including eliminations)		Group	
(USD millions)	2018	2017	2018	2017	2018	2017	2018	2017
Net sales to third parties from continuing operations	**34 892**	**32 278**	**9 859**	**10 060**			**44 751**	**42 338**
Sales to continuing and discontinued segments	741	668	177	118	– 836	– 743	82	43
Net sales from continuing operations	**35 633**	**32 946**	**10 036**	**10 178**	**– 836**	**– 743**	**44 833**	**42 381**
Other revenues	1 188	898	62	37	16	88	1 266	1 023
Cost of goods sold	– 9 870	– 8 650	– 5 530	– 5 800	890	817	– 14 510	– 13 633
Gross profit from continuing operations	**26 951**	**25 194**	**4 568**	**4 415**	**70**	**162**	**31 589**	**29 771**
Selling, general and administration	– 10 907	– 9 887	– 2 305	– 2 126	– 505	– 452	– 13 717	– 12 465
Research and development	– 7 675	– 7 615	– 814	– 774			– 8 489	– 8 389
Other income	977	1 027	505	204	147	691	1 629	1 922
Other expense	– 1 475	– 1 124	– 622	– 351	– 512	– 662	– 2 609	– 2 137
Operating income from continuing operations	**7 871**	**7 595**	**1 332**	**1 368**	**– 800**	**– 261**	**8 403**	**8 702**
Income from associated companies	1	– 1	5	23	6 432	1 086	6 438	1 108
Interest expense							– 932	– 750
Other financial income and expense							186	42
Income before taxes from continuing operations							**14 095**	**9 102**
Taxes							– 1 295	– 1 603
Net income from continuing operations							**12 800**	**7 499**
Net (loss)/income from discontinued operations							**– 186**	**204**
Net income							**12 614**	**7 703**
Attributable to:								
Shareholders of Novartis AG							*12 611*	*7 703*
Non-controlling interests							*3*	*0*
Included in net income from continuing operations are:								
Interest income							292	110
Depreciation of property, plant and equipment	– 1 075	– 916	– 285	– 270	– 122	– 117	– 1 482	– 1 303
Amortization of intangible assets	– 2 214	– 2 167	– 366	– 447	– 7	– 10	– 2 587	– 2 624
Impairment charges on property, plant and equipment, net	– 239	– 84	– 60	– 73	– 2		– 301	– 157
Impairment charges on intangible assets, net	– 592	– 591	– 249	– 61			– 841	– 652
Impairment charges and fair value changes on financial assets, net	107	– 42			– 113	– 185	– 6	– 227
Additions to restructuring provisions	– 395	– 122	– 32	– 61	– 94	– 3	– 521	– 186
Equity-based compensation of Novartis equity plans	– 645	– 593	– 53	– 52	– 220	– 208	– 918	– 853

Segmentation – consolidated balance sheets

	Innovative Medicines		Sandoz		Alcon[1]		Corporate (including eliminations)		Group	
(USD millions)	**2019**	2018	**2019**	2018	**2019**	2018	**2019**	2018	**2019**	2018
Total assets	**71 225**	67 055	**16 468**	17 328		25 971	**30 677**	35 209	**118 370**	145 563
Total liabilities	**– 15 332**	– 13 056	**– 3 804**	– 3 377		– 1 964	**– 43 683**	– 48 474	**– 62 819**	– 66 871
Total equity									**55 551**	78 692
Net debt									15 938	16 184
Net operating assets	**55 893**	53 999	**12 664**	13 951		24 007			**71 489**	94 876
Included in assets and liabilities are:										
Total property, plant and equipment	9 632	10 098	1 888	2 159		2 878	549	561	12 069	15 696
Additions to property, plant and equipment[2]	1 114	822	217	294		519	143	139	1 474	1 774
Total right-of-use assets[3]	1 487		136				54		1 677	
Additions to right-of-use assets[2, 3]	454		49				34		537	
Total goodwill and intangible assets	46 336	44 593	8 892	9 712		19 578	83	130	55 311	74 013
Additions to goodwill and intangible assets[2]	647	1 265	68	107		196	52	24	767	1 592
Total investment in associated companies	128	81	7	7			8 509	8 264	8 644	8 352
Additions to investment in associated companies	44	18					11	11	55	29
Cash and cash equivalents, marketable securities, commodities, time deposits and derivative financial instruments							11 446	15 964	11 446	15 964
Financial debts and derivative financial instruments							27 384	32 148	27 384	32 148
Current income tax and deferred tax liabilities							8 061	9 513	8 061	9 513

[1] From February 28, 2019, the Alcon Division was reported as discontinued operations (see Notes 1, 2 and 30). In accordance with IFRS, the December 31, 2018, consolidated balance sheet includes the assets and liabilities of the Alcon eye care devices business and certain Corporate assets and liabilities attributable to the Alcon business. Note 30 provides additional information on discontinued operations.
[2] Excluding the impact of business combinations.
[3] Total right-of-use assets and additions to right-of-use assets recognized in 2019 with the implementation of IFRS 16 Leases on January 1, 2019. See Notes 1 and 10 for additional disclosures.

The following table shows countries that accounted for more than 5% of at least one of the respective Group totals, as well as regional information for net sales for the years ended December 31, 2019, 2018 and 2017, and for selected non-current assets for the years ended December 31, 2019 and 2018:

	Net sales[1]						Total of selected non-current assets[2]			
(USD millions)	**2019**	**%**	2018	%	2017	%	**2019**	**%**	2018	%
Country										
Switzerland	848	2	795	2	780	2	33 032	43	41 972	43
United States	16 280	34	14 618	33	14 135	33	28 893	37	39 082	40
France	2 442	5	2 505	6	2 289	5	3 933	5	3 976	4
Germany	4 120	9	3 972	9	3 484	8	2 554	3	3 124	3
Japan	2 656	6	2 575	6	2 617	6	309		144	
Other	21 099	44	20 286	44	19 033	46	8 980	12	9 763	10
Group	**47 445**	**100**	**44 751**	**100**	**42 338**	**100**	**77 701**	**100**	**98 061**	**100**
Region										
Europe	17 933	38	17 259	39	15 760	37	46 103	59	55 913	57
Americas	19 713	41	18 032	39	17 485	41	29 389	38	39 082	40
Asia/Africa/Australasia	9 799	21	9 460	22	9 093	22	2 209	3	3 066	3
Group	**47 445**	**100**	**44 751**	**100**	**42 338**	**100**	**77 701**	**100**	**98 061**	**100**

[1] Net sales from operations by location of third-party customer
[2] Total of property, plant and equipment; goodwill; intangible assets; and investment in associated companies, and in 2019 right-of-use assets recognized with the implementation of IFRS 16 Leases on January 1, 2019. See Notes 1 and 10 for additional disclosures.

The Group's largest, second-largest and third-largest customers account for approximately 23%, 17% and 10% of net sales, respectively (2018: 18%, 14% and 8%, respectively; 2017: 19%, 14% and 7%, respectively). All segments had sales to these customers in 2019, 2018 and 2017. No other customer accounted for 6% or more of net sales in any year.

The highest amounts of trade receivables outstanding were for these same three customers and amounted to 14%, 12% and 7%, respectively, of the trade receivables at December 31, 2019 (2018: 12%, 10% and 6%, respectively).

Segmentation – net sales by region[1]

	2019 USD m	2018 USD m	Change (2018 to 2019) USD %	2017 USD m	Change (2017 to 2018) USD %
Innovative Medicines					
Europe	12 818	12 296	4	11 127	11
US	13 789	11 864	16	10 857	9
Asia/Africa/Australasia	8 458	8 097	4	7 702	5
Canada and Latin America	2 649	2 635	1	2 592	2
Total	**37 714**	**34 892**	**8**	**32 278**	**8**
Of which in Established Markets	28 573	26 258	9	24 174	9
Of which in Emerging Growth Markets	9 141	8 634	6	8 104	7
Sandoz					
Europe	5 115	4 963	3	4 633	7
US	2 491	2 754	– 10	3 278	– 16
Asia/Africa/Australasia	1 341	1 363	– 2	1 391	– 2
Canada and Latin America	784	779	1	758	3
Total	**9 731**	**9 859**	**– 1**	**10 060**	**– 2**
Of which in Established Markets	7 111	7 233	– 2	7 383	– 2
Of which in Emerging Growth Markets	2 620	2 626	0	2 677	– 2
Group					
Europe	17 933	17 259	4	15 760	10
US	16 280	14 618	11	14 135	3
Asia/Africa/Australasia	9 799	9 460	4	9 093	4
Canada and Latin America	3 433	3 414	1	3 350	2
Total	**47 445**	**44 751**	**6**	**42 338**	**6**
Of which in Established Markets	35 684	33 491	7	31 557	6
Of which in Emerging Growth Markets	11 761	11 260	4	10 781	4

[1] Net sales from operations by location of third-party customer. Emerging Growth Markets comprise all markets other than the Established Markets of the US, Canada, Western Europe, Japan, Australia and New Zealand.

Innovative Medicines Division net sales by business franchise

	2019 USD m	2018 USD m	Change (2018 to 2019) USD %	2017 USD m	Change (2017 to 2018) USD %
Oncology					
Tasigna	1 880	1 874	0	1 841	2
Sandostatin	1 585	1 587	0	1 612	– 2
Afinitor/Votubia	1 539	1 556	– 1	1 525	2
Promacta/Revolade	1 416	1 174	21	867	35
Tafinlar + Mekinist	1 338	1 155	16	873	32
Gleevec/Glivec	1 263	1 561	– 19	1 943	– 20
Jakavi	1 114	977	14	777	26
Exjade/Jadenu	975	1 099	– 11	1 059	4
Votrient	755	828	– 9	808	2
Kisqali	480	235	104	76	nm
Lutathera	441	167	164	0	nm
Kymriah	278	76	nm	6	nm
Piqray	116		nm		nm
Other	1 190	1 139	4	887	28
Total Novartis Oncology business unit	**14 370**	**13 428**	**7**	**12 274**	**9**
Ophthalmology					
Lucentis	2 086	2 046	2	1 888	8
Travoprost Group	433	517	– 16	589	– 12
Xiidra	192		nm		nm
Beovu	35		nm		nm
Other	2 030	1 995	2	2 144	– 7
Total Ophthalmology	**4 776**	**4 558**	**5**	**4 621**	**– 1**
Immunology, Hepatology and Dermatology					
Cosentyx	3 551	2 837	25	2 071	37
Ilaris	671	554	21	402	38
Other		1	nm	1	0
Total Immunology, Hepatology and Dermatology	**4 222**	**3 392**	**24**	**2 474**	**37**
Neuroscience					
Gilenya	3 223	3 341	– 4	3 185	5
Zolgensma	361		nm		nm
Aimovig	103	8	nm		nm
Mayzent	26		nm		nm
Other	60	80	– 25	102	– 22
Total Neuroscience	**3 773**	**3 429**	**10**	**3 287**	**4**
Respiratory					
Xolair [1]	1 173	1 039	13	920	13
Ultibro Breezhaler	427	454	– 6	411	10
Seebri Breezhaler	121	148	– 18	151	– 2
Onbrez Breezhaler	82	101	– 19	112	– 10
Other	22	25	– 12	23	9
Total Respiratory	**1 825**	**1 767**	**3**	**1 617**	**9**
Cardiovascular, Renal and Metabolism					
Entresto	1 726	1 028	68	507	103
Other	24	22	9	17	29
Total Cardiovascular, Renal and Metabolism	**1 750**	**1 050**	**67**	**524**	**100**
Established Medicines					
Galvus Group	1 297	1 284	1	1 233	4
Diovan Group	1 064	1 023	4	957	7
Exforge Group	1 025	1 002	2	960	4
Zortress/Certican	485	464	5	414	12
Neoral/Sandimmun(e)	419	463	– 10	488	– 5
Voltaren/Cataflam	417	445	– 6	465	– 4
Other	2 291	2 587	– 11	2 964	– 13
Total Established Medicines	**6 998**	**7 268**	**– 4**	**7 481**	**– 3**
Total Novartis Pharmaceuticals business unit	**23 344**	**21 464**	**9**	**20 004**	**7**
Total division net sales	**37 714**	**34 892**	**8**	**32 278**	**8**

[1] Net sales reflect *Xolair* sales for all indications.

nm = not meaningful

Top 20 Innovative Medicines Division product net sales – 2019

Brands	Business franchise	Indication	US USD m	Rest of world USD m	Total USD m
Cosentyx	Immunology, Hepatology and Dermatology	Psoriasis, ankylosing spondylitis and psoriatic arthritis	2 220	1 331	**3 551**
Gilenya	Neuroscience	Relapsing multiple sclerosis	1 736	1 487	**3 223**
Lucentis	Ophthalmology	Age-related macular degeneration		2 086	**2 086**
Tasigna	Oncology	Chronic myeloid leukemia	804	1 076	**1 880**
Entresto	Cardiovascular, Renal and Metabolism	Chronic heart failure	925	801	**1 726**
Sandostatin	Oncology	Carcinoid tumors and acromegaly	881	704	**1 585**
Afinitor/Votubia	Oncology	Breast cancer/TSC	1 003	536	**1 539**
Promacta/Revolade	Oncology	Immune thrombocytopenia (ITP), severe aplastic anemia (SAA)	691	725	**1 416**
Tafinlar + Mekinist	Oncology	BRAF V600+ metastatic and adjuvant melanoma; advanced non-small cell lung cancer (NSCLC)	481	857	**1 338**
Galvus Group	Established Medicines	Diabetes		1 297	**1 297**
Gleevec/Glivec	Oncology	Chronic myeloid leukemia and GIST	334	929	**1 263**
Xolair [1]	Respiratory	Severe Allergic Asthma (SAA) and Chronic Spontaneous Urticaria (CSU)		1 173	**1 173**
Jakavi	Oncology	Myelofibrosis (MF), polycytomia vera (PV)		1 114	**1 114**
Diovan Group	Established Medicines	Hypertension	86	978	**1 064**
Exforge Group	Established Medicines	Hypertension	13	1 012	**1 025**
Exjade/Jadenu	Oncology	Chronic iron overload	450	525	**975**
Votrient	Oncology	Renal cell carcinoma	332	423	**755**
Ilaris	Immunology, Hepatology and Dermatology	Auto-inflammatory (CAPS, TRAPS, HIDS/MKD, FMF, SJIA, AOSD and gout)	304	367	**671**
Zortress/Certican	Established Medicines	Transplantation	169	316	**485**
Kisqali	Oncology	HR+/HER2- metastatic breast cancer	250	230	**480**
Top 20 products total			**10 679**	**17 967**	**28 646**
Rest of portfolio			3 110	5 958	**9 068**
Total division sales			**13 789**	**23 925**	**37 714**

[1] Net sales reflect *Xolair* sales for all indications.

Top 20 Innovative Medicines Division product net sales – 2018

Brands	Business franchise	Indication	US USD m	Rest of world USD m	Total USD m
Gilenya	Neuroscience	Relapsing multiple sclerosis	1 765	1 576	**3 341**
Cosentyx	Immunology, Hepatology and Dermatology	Psoriasis, ankylosing spondylitis and psoriatic arthritis	1 674	1 163	**2 837**
Lucentis	Ophthalmology	Age-related macular degeneration		2 046	**2 046**
Tasigna	Oncology	Chronic myeloid leukemia	806	1 068	**1 874**
Sandostatin	Oncology	Carcinoid tumors and acromegaly	817	770	**1 587**
Gleevec/Glivec	Oncology	Chronic myeloid leukemia and GIST	440	1 121	**1 561**
Afinitor/Votubia	Oncology	Breast cancer/TSC	929	627	**1 556**
Galvus Group	Established Medicines	Diabetes		1 284	**1 284**
Promacta/Revolade	Oncology	Immune thrombocytopenia (ITP), severe aplastic anemia (SAA)	581	593	**1 174**
Tafinlar + Mekinist	Oncology	BRAF V600+ metastatic and adjuvant melanoma; advanced non-small cell lung cancer (NSCLC)	457	698	**1 155**
Exjade/Jadenu	Oncology	Chronic iron overload	521	578	**1 099**
Xolair [1]	Respiratory	Severe Allergic Asthma (SAA) and Chronic Spontaneous Urticaria (CSU)		1 039	**1 039**
Entresto	Cardiovascular, Renal and Metabolism	Chronic heart failure	556	472	**1 028**
Diovan Group	Established Medicines	Hypertension	84	939	**1 023**
Exforge Group	Established Medicines	Hypertension	19	983	**1 002**
Jakavi	Oncology	Myelofibrosis (MF), polycytomia vera (PV)		977	**977**
Votrient	Oncology	Renal cell carcinoma	404	424	**828**
Ilaris	Immunology, Hepatology and Dermatology	Auto-inflammatory (CAPS, TRAPS, HIDS/MKD, FMF, SJIA, AOSD and gout)	262	292	**554**
Travoprost Group	Ophthalmology	Reduction of elevated intraocular pressure	194	323	**517**
Zortress/Certican	Established Medicines	Transplantation	145	319	**464**
Top 20 products total			**9 654**	**17 292**	**26 946**
Rest of portfolio			2 210	5 736	**7 946**
Total division sales			**11 864**	**23 028**	**34 892**

[1] Net sales reflect *Xolair* sales for all indications.

Top 20 Innovative Medicines Division product net sales – 2017

Brands	Business franchise	Indication	US USD m	Rest of world USD m	Total USD m
Gilenya	Neuroscience	Relapsing multiple sclerosis	1 709	1 476	**3 185**
Cosentyx	Immunology, Hepatology and Dermatology	Psoriasis, ankylosing spondylitis and psoriatic arthritis	1 275	796	**2 071**
Gleevec/Glivec	Oncology	Chronic myeloid leukemia and GIST	627	1 316	**1 943**
Lucentis	Ophthalmology	Age-related macular degeneration		1 888	**1 888**
Tasigna	Oncology	Chronic myeloid leukemia	810	1 031	**1 841**
Sandostatin	Oncology	Carcinoid tumors and acromegaly	832	780	**1 612**
Afinitor/Votubia	Oncology	Breast cancer/TSC	819	706	**1 525**
Galvus Group	Established Medicines	Diabetes		1 233	**1 233**
Exjade/Jadenu	Oncology	Chronic iron overload	515	544	**1 059**
Exforge Group	Established Medicines	Hypertension	28	932	**960**
Diovan Group	Established Medicines	Hypertension	87	870	**957**
Xolair [1]	Respiratory	Severe Allergic Asthma (SAA) and Chronic Spontaneous Urticaria (CSU)		920	**920**
Tafinlar + Mekinist	Oncology	BRAF V600+ metastatic and adjuvant melanoma; advanced non-small cell lung cancer (NSCLC)	339	534	**873**
Promacta/Revolade	Oncology	Immune thrombocytopenia (ITP), severe aplastic anemia (SAA)	446	421	**867**
Votrient	Oncology	Renal cell carcinoma	407	401	**808**
Jakavi	Oncology	Myelofibrosis (MF), polycytomia vera (PV)		777	**777**
Travoprost Group	Ophthalmology	Reduction of elevated intraocular pressure	216	373	**589**
Entresto	Cardiovascular, Renal and Metabolism	Chronic heart failure	297	210	**507**
Neoral/Sandimmun(e)	Immunology, Hepatology and Dermatology	Transplantation	38	450	**488**
Voltaren/Cataflam	Established Medicines	Inflammation/pain		465	**465**
Top 20 products total			**8 445**	**16 123**	**24 568**
Rest of portfolio			2 412	5 298	**7 710**
Total division sales			**10 857**	**21 421**	**32 278**

[1] Net sales reflect *Xolair* sales for all indications.

Sandoz Division net sales by business franchise

	2019 USD m	2018 USD m	Change (2018 to 2019) USD %	2017 USD m	Change (2017 to 2018) USD %
Retail Generics [1]	7 590	7 880	– 4	8 409	– 6
Biopharmaceuticals	1 607	1 436	12	1 135	27
Anti-Infectives	534	543	– 2	516	5
Total division net sales	**9 731**	**9 859**	**– 1**	**10 060**	**– 2**

[1] Of which USD 784 million (2018: USD 826 million; 2017: USD 880 million) represents anti-infectives sold under the Sandoz name

The product portfolio of Sandoz is widely spread in 2019, 2018 and 2017.

Segmentation – other revenue

	Innovative Medicines		Sandoz		Corporate (including eliminations)		Group	
(USD millions)	**2019**	2018	**2019**	2018	**2019**	2018	**2019**	2018
Profit-sharing income	732	874	2	3			734	877
Royalty income	104	162	19	10	24	16	147	188
Milestone income	201	128	30	45			231	173
Other [1]	55	24	12	4			67	28
Total other revenues	**1 092**	**1 188**	**63**	**62**	**24**	**16**	**1 179**	**1 266**

[1] Other includes revenue from activities such as manufacturing or other services rendered, to the extent such revenue is not recorded under net sales.

	Innovative Medicines		Sandoz		Corporate (including eliminations)		Group	
(USD millions)	2018	2017	2018	2017	2018	2017	2018	2017
Profit-sharing income	874	648	3	4			877	652
Royalty income	162	186	10	24	16	88	188	298
Milestone income	128	28	45				173	28
Other [1]	24	36	4	9			28	45
Total other revenues	**1 188**	**898**	**62**	**37**	**16**	**88**	**1 266**	**1 023**

[1] Other includes revenue from activities such as manufacturing or other services rendered, to the extent such revenue is not recorded under net sales.

4. Associated companies

	Net income statement effect			Other comprehensive income effect [1]			Total comprehensive income effect		
(USD millions)	**2019**	2018	2017	**2019**	2018	2017	**2019**	2018	2017
Roche Holding AG, Switzerland	662	526	456	– 94	75	108	568	601	564
GlaxoSmithKline Consumer Healthcare Holdings Ltd., UK		5 910	629		– 557	– 145		5 353	484
Others	– 3	2	23				– 3	2	23
Associated companies related to continuing operations	**659**	**6 438**	**1 108**	**– 94**	**– 482**	**– 37**	**565**	**5 956**	**1 071**

[1] In 2018, Novartis share of other comprehensive income recognized by associated companies, net of taxes of USD 511 million was recycled into the consolidated income statement as a result of the divestment of the investment in GSK Consumer Healthcare Holdings Ltd. No Novartis share of other comprehensive income recognized by associated companies, net of taxes was recycled into the consolidated income statement in 2019 and 2017.

Novartis has a significant investment in Roche Holding AG, Basel (Roche), as well as certain other smaller investments that are accounted for as associated companies. The investment in GlaxoSmithKline Consumer Healthcare Holdings Ltd., Brentford, Middlesex, UK, was divested on June 1, 2018, to GlaxoSmithKline plc, Great Britain.

	Balance sheet value	
(USD millions)	**December 31, 2019**	December 31, 2018
Roche Holding AG, Switzerland	8 445	8 195
Others	199	157
Total	**8 644**	**8 352**

Roche Holding AG

The Group's holding in Roche voting shares was 33.3% at December 31, 2019, 2018 and 2017. This investment represents approximately 6.2% of Roche's total outstanding voting and non-voting equity instruments at December 31, 2019, 2018 and 2017.

Since full-year 2019 financial data for Roche is not available when Novartis produces its consolidated financial results, a survey of analyst estimates is used to estimate the Group's share of Roche's net income. Any differences between these estimates and actual results will be adjusted in the Group's 2020 consolidated financial statements when available.

The following tables show summarized financial information for Roche, including current values of fair value adjustments made at the time of the acquisition of the shares, for the year ended December 31, 2018, and for the six months ended June 30, 2019 (since full-year 2019 data is not yet available):

(CHF billions)	Current assets	Non-current assets	Current liabilities	Non-current liabilities
December 31, 2018	32.2	53.7	23.0	25.1
June 30, 2019	32.3	53.8	23.4	25.7

(CHF billions)	Revenue	Net income	Other comprehensive income	Total comprehensive income
December 31, 2018	59.5	8.6	– 0.1	8.5
June 30, 2019	31.8	8.3	– 0.6	7.7

A purchase price allocation was performed on the basis of publicly available information at the time of acquisition of the investment. The December 31, 2019, balance sheet value allocation is as follows:

(USD millions)	**December 31, 2019**
Novartis share of Roche's estimated net assets	2 404
Novartis share of reappraised intangible assets	297
Implicit Novartis goodwill	2 939
Current value of share in net identifiable assets and goodwill	**5 640**
Accumulated equity accounting adjustments and translation effects less dividends received	2 805
Balance sheet value	**8 445**

The identified intangible assets principally relate to the value of currently marketed products and are amortized on a straight-line basis over their estimated average useful life of 20 years.

In 2019, dividends received from Roche in relation to the distribution of its 2018 net income amounted to USD 460 million (2018: USD 464 million in relation to the distribution of its 2017 net income).

The consolidated income statement effects from applying Novartis accounting principles for this investment in 2019, 2018 and 2017 are as follows:

(USD millions)	**2019**	2018	2017
Novartis share of Roche's estimated current-year consolidated net income	910	799	669
Prior-year adjustment	– 129	– 125	– 67
Amortization of fair value adjustments relating to intangible assets, net of taxes of USD 24 million (2018: USD 40 million; 2017: USD 42 million)	– 162	– 148	– 146
Partial release of deferred tax liability recognized	43		
Net income effect	**662**	**526**	**456**

The publicly quoted market value of the Novartis interest in Roche (SIX symbol: RO) at December 31, 2019, was USD 16.9 billion (2018: USD 12.9 billion).

GlaxoSmithKline Consumer Healthcare Holdings Ltd.

On March 27, 2018, Novartis entered into an agreement with GlaxoSmithKline plc, Great Britain (GSK), to divest its 36.5% stake in GSK Consumer Healthcare Holdings Ltd. (GSK Consumer Healthcare) to GSK for USD 13.0 billion in cash. As a result, Novartis discontinued the use of equity method accounting starting from April 1, 2018. The divestment transaction closed on June 1, 2018, and Novartis realized a pre-tax gain of USD 5.8 billion, recorded in income from associated companies. See Note 2.

GSK Consumer Healthcare was formed in March 2015 via contribution of businesses from both Novartis and GSK.

At December 31, 2017, Novartis had a 36.5% interest in GSK Consumer Healthcare and had four of 11 seats on the GSK Consumer Healthcare board of directors. Furthermore, Novartis had customary minority rights as well as exit rights at a predefined, market-based pricing mechanism.

In 2018, dividends received from GSK Consumer Healthcare amounted to USD 252 million.

The consolidated income statement effects from applying Novartis accounting principles for this investment in 2018 and 2017 are as follows:

(USD millions)	2018	2017
Novartis share of GSK Consumer Healthcare's estimated current-year consolidated net income	119	589
Prior-year adjustment	4	47
Amortization of fair value adjustments relating to intangible assets and inventory, net of taxes of USD 1 million (2017: USD 1 million)	– 3	– 7
Pre-tax gain on divestment of GSK Consumer Healthcare	5 790	
Net income effect	**5 910**	**629**

5. Interest expense and other financial income and expense

Interest expense

(USD millions)	**2019**	2018	2017
Interest expense	– 714	– 877	– 741
Interest expense on lease liabilities	– 66		
Expense arising from discounting long-term liabilities and capitalized borrowing costs	– 70	– 55	– 9
Total interest expense from continuing operations	**– 850**	**– 932**	**– 750**

Other financial income and expense

(USD millions)	**2019**	2018	2017
Interest income	245	292	110
Other financial income	12	1	1
Financial expense	– 52	– 39	– 11
Currency result, net	– 160	– 68	– 58
Total other financial income and expense from continuing operations	**45**	**186**	**42**

6. Taxes

Income before taxes

(USD millions)	2019	2018	2017
Switzerland	8 097	11 887	5 385
Foreign	843	2 208	3 717
Income before taxes from continuing operations	**8 940**	**14 095**	**9 102**

Current and deferred income tax expense

(USD millions)	2019	2018	2017
Switzerland	– 1 186	– 615	– 462
Foreign	– 961	– 988	– 1 451
Current income tax expense	**– 2 147**	**– 1 603**	**– 1 913**
Switzerland	– 93	– 120	– 305
Foreign	447	428	615
Deferred tax income	**354**	**308**	**310**
Income tax expense from continuing operations	**– 1 793**	**– 1 295**	**– 1 603**

Analysis of tax rate

Novartis has a substantial business presence in many countries and is therefore subject to different income and expense items that are non-taxable (permanent differences) or are taxed at different rates in those tax jurisdictions. This results in a difference between our applicable tax rate and effective tax rate.

The main elements contributing to the difference between the Group's overall applicable tax rate (which can change each year since it is calculated as the weighted average tax rate based on the pre-tax income of each subsidiary) and the effective tax rate are shown in the table below:

(As a percentage)	2019	2018	2017
Applicable tax rate	11.7	14.3	14.3
Effect of disallowed expenditures	4.8	1.7	3.1
Effect of utilization of tax losses brought forward from prior periods	– 0.1	– 0.1	– 0.1
Effect of income taxed at reduced rates	– 0.7	– 0.4	– 0.2
Effect of income not subject to tax [1]	0.0	– 3.7	0.0
Effect of tax credits and allowances	– 2.3	– 2.3	– 2.1
Effect of release of contingent consideration liability	– 0.5	– 0.2	– 1.3
Effect of tax rate change on current and deferred tax assets and liabilities [2]	– 1.4	– 0.1	4.8
Effect of write-off of deferred tax assets [3]	4.0	0.2	0.0
Effect of write-down and reversal of write-down of investments in subsidiaries	– 0.6	0.0	– 1.1
Effect of tax benefits expiring in 2017	0.0	0.0	– 0.9
Effect of prior-year items	2.2	– 0.5	1.2
Effect of other items [4]	3.0	0.3	– 0.1
Effective tax rate for continuing operations	**20.1**	**9.2**	**17.6**

[1] Included in 2018 is the effect of income not subject to tax (-3.7%) arising from the portion of the non-taxable gain on the divestment of the Group's investment in GSK Consumer Healthcare Holdings Ltd. attributable to Switzerland.

[2] 2019 is mainly related to the revaluation of the deferred tax assets and liabilities resulting from the tax reforms enacted in Switzerland in 2019, refer to Note 12 for additional disclosures.
Included in 2017 is a 4.8% impact related to the revaluation of the deferred tax assets and liabilities and a portion of current tax payables. This revaluation resulted from the US tax reform legislation enacted on December 22, 2017, refer to Note 12 for additional disclosures.

[3] 2019 is primarily related to a non-cash, one-time deferred tax expense for the write-off of a deferred tax asset resulting from legal entity reorganizations.

[4] In 2019, other items (+3.0%) include changes in uncertain tax positions (+2.6%) and other items (+0.4%).

The utilization of tax-loss carry-forwards lowered the tax charge by USD 11 million in 2019, by USD 19 million in 2018, and by USD 7 million in 2017.

For the amount of taxes attributable to discontinued operations, see Note 30.

7. Earnings per share

	2019	2018	2017
Net income attributable to shareholders of Novartis AG (USD millions)			
- Continuing operations	7 142	12 797	7 499
- Discontinued operations	4 590	– 186	204
Total	**11 732**	12 611	7 703
Number of shares (in millions)			
Weighted average number of shares outstanding used in basic earnings per share	2 291	2 319	2 346
Adjustment for vesting of restricted shares, restricted share units and dilutive shares from options	28	25	25
Weighted average number of shares in diluted earnings per share	**2 319**	**2 344**	**2 371**
Basic earnings per share (USD)			
- Continuing operations	3.12	5.52	3.20
- Discontinued operations	2.00	– 0.08	0.08
Total	**5.12**	**5.44**	**3.28**
Diluted earnings per share (USD)			
- Continuing operations	3.08	5.46	3.17
- Discontinued operations	1.98	– 0.08	0.08
Total	**5.06**	**5.38**	**3.25**

Basic earnings per share (EPS) is calculated by dividing net income attributable to shareholders of Novartis AG by the weighted average number of shares outstanding in a reporting period. This calculation excludes the average number of issued shares purchased by the Group and held as treasury shares.

For diluted EPS, the weighted average number of shares outstanding is adjusted to assume the vesting of all restricted shares, restricted share units, and the conversion of all potentially dilutive shares arising from options on Novartis shares that have been issued.

No options were excluded from the calculation of diluted EPS in 2019, 2018 or 2017, as all options were dilutive in all years.

8. Changes in consolidated statements of comprehensive income

The consolidated statements of comprehensive income include the Group's net income for the year as well as all other valuation adjustments recorded in the Group's consolidated balance sheet but that under IFRS are not recorded in the consolidated income statement. These include fair value adjustments to financial instruments, actuarial gains or losses on defined benefit pension and other post-employment plans, and currency translation effects, net of tax.

The following table summarizes these value adjustments and currency translation effects attributable to Novartis shareholders:

(USD millions)	Fair value adjustments on marketable securities	Fair value adjustments on debt securities	Fair value adjustments on deferred cash flow hedges	Fair value adjustments on equity securities	Actuarial gains/(losses) from defined benefit plans	Cumulative currency translation effects	Total value adjustments
Value adjustments at January 1, 2017	**349**	**– 1**	**– 3**		**– 5 915**	**– 1 642**	**– 7 212**
Fair value adjustments on financial instruments	39	– 1	12				50
Net investment hedge						– 237	– 237
Net actuarial losses from defined benefit plans					851		851
Currency translation effects						2 208	2 208
Total value adjustments in 2017	**39**	**– 1**	**12**		**851**	**1 971**	**2 872**
Value adjustments at December 31, 2017, as previously reported	**388**	**– 2**	**9**		**– 5 064**	**329**	**– 4 340**
Impact of adoption of IFRS 9 on retained earnings and OCI [1]	– 177						– 177
Reclassification to presentation required under IFRS 9 [1]	– 211			211			
Restated value adjustments at January 1, 2018		**– 2**	**9**	**211**	**– 5 064**	**329**	**– 4 517**
Fair value adjustments on financial instruments			12	13			25
Fair value adjustments on financial assets sold				– 16			– 16
Net investment hedge						95	95
Net actuarial gains from defined benefit plans					– 359		– 359
Currency translation effects						320	320
Total value adjustments in 2018			**12**	**– 3**	**– 359**	**415**	**65**
Value adjustments at December 31, 2018		**– 2**	**21**	**208**	**– 5 423**	**744**	**– 4 452**
Fair value adjustments on financial instruments		1	1	– 47			– 45
Fair value adjustments on financial assets sold				– 95			– 95
Net investment hedge						44	44
Net actuarial gains from defined benefit plans					– 466		– 466
Currency translation effects						354	354
Total value adjustments in 2019		**1**	**1**	**– 142**	**– 466**	**398**	**– 208**
Fair value adjustments related to divestments				33	– 30		3
Value adjustments at December 31, 2019		**– 1**	**22**	**99**	**– 5 919**	**1 142**	**– 4 657**

[1] Note 1 provides additional disclosures related to the impact of adoption of IFRS 9 Financial Instruments. OCI: other comprehensive income

8.1) The 2019, 2018 and 2017 changes in the fair value of financial instruments were as follows:

(USD millions)	Fair value adjustments on equity securities[1]	Fair value adjustments on debt securities	Fair value adjustments on deferred cash flow hedges	Total
Fair value adjustments at January 1, 2019	**208**	**– 2**	**21**	**227**
Changes in fair value:				
– Debt securities sold		1		1
– Equity securities	– 94			– 94
Amortized net losses on cash flow hedges transferred to the consolidated income statement			1	1
Deferred tax on above items	47			47
Realized net gains reclassified to the retained earnings:				
– Other financial assets sold	– 95			– 95
Fair value adjustments during the year	**– 142**	**1**	**1**	**– 140**
Fair value adjustments related to divestments	33			33
Fair value adjustments at December 31, 2019	**99**	**– 1**	**22**	**120**

[1] Includes fair value adjustments on equity securities designated as financial assets valued at fair value through other comprehensive income with no subsequent recycling into the consolidated income statement

(USD millions)	Fair value adjustments on marketable securities	Fair value adjustments on equity securities[1]	Fair value adjustments on debt securities	Fair value adjustments on deferred cash flow hedges	Total
Fair value adjustments at January 1, 2018, as previously reported	**388**		**– 2**	**9**	**395**
Impact of adoption of IFRS 9 on retained earnings and other comprehensive income[2]	– 177				– 177
Reclassification to presentation required under IFRS 9	– 211	211			
Restated fair value adjustments at January 1, 2018		**211**	**– 2**	**9**	**218**
Changes in fair value:					
– Equity securities		18			18
Amortized net losses on cash flow hedges transferred to the consolidated income statement				13	13
Deferred tax on above items		– 5		– 1	– 6
Realized net gains reclassified to the retained earnings:					
– Other financial assets sold		– 16			– 16
Fair value adjustments during the year		**– 3**		**12**	**9**
Fair value adjustments at December 31, 2018		**208**	**– 2**	**21**	**227**

[1] Includes fair value adjustments on equity securities designated as financial assets valued at fair value through other comprehensive income with no subsequent recycling into the consolidated income statement
[2] Note 1 provides aditional disclosures on the impact of adoption of IFRS 9 Financial Instruments.

(USD millions)	Fair value adjustments on marketable securities	Fair value adjustments on debt securities	Fair value adjustments on deferred cash flow hedges	Total
Fair value adjustments at January 1, 2017	**349**	**– 1**	**– 3**	**345**
Changes in fair value:				
– Available-for-sale marketable securities	12	– 1		11
– Available-for-sale financial investments	47			47
Realized net gains transferred to the consolidated income statement:				
– Other financial assets sold	– 109			– 109
Amortized net losses on cash flow hedges transferred to the consolidated income statement			13	13
Impaired financial assets transferred to the consolidated income statement	102			102
Deferred tax on above items[1]	– 13		– 1	– 14
Fair value adjustments during the year	**39**	**– 1**	**12**	**50**
Fair value adjustments at December 31, 2017	**388**	**– 2**	**9**	**395**

[1] Included is a USD 18 million impact related to the revaluation of deferred tax liabilities on available-for-sale financial investments held in the US that were previously recognized through other comprehensive income related to continuing operrations. This revaluation resulted from the US tax reform legislation enacted on December 22, 2017. Refer to Note 12 for additional disclosures.

8.2) In 2019, cumulative currency translation gains of USD 129 million were recycled through the income statement mainly as a result of the spin-off of the Alcon business through a dividend in kind distribution to Novartis AG shareholders. See Notes 2 and 30.

In 2018, cumulative currency translation losses of USD 946 million were recycled through the income statement as a result of the divestment of the investment in GSK Consumer Healthcare Holdings Ltd. See Notes 2 and 4.

No currency translation losses or gains were recycled through the income statement in 2017.

8.3) Remeasurements from defined benefit plans arise as follows:

(USD millions)	**2019**	2018	2017
Defined benefit pension plans before tax	– 119	– 482	1 367
Other post-employment benefit plans before tax	– 35	54	76
Taxation on above items [1]	– 313	69	– 592
Total after tax	**– 467**	**– 359**	**851**
Attributable to:			
Shareholders of Novartis AG	*– 466*	*– 359*	*851*
Non-controlling interests	*– 1*		

[1] Included in 2019 is a USD -358 million impact related to the revaluation of deferred tax assets on Swiss post-employment benefits that were previously recognized through other comprehensive income. This revaluation resulted from the Swiss tax reforms enacted by the voters in 2019. Refer to Note 12 for additional disclosures.
Included in 2017 is a USD -272 million impact related to the revaluation of deferred tax assets on US post-employment benefits that were previously recognized through other comprehensive income (continuing operations USD-259 million and discontinued operations USD -13 million). This revaluation resulted from the US tax reform legislation enacted on December 22, 2017. Refer to Note 12 for additional disclosures.

9. Property, plant and equipment

The following table summarizes the movements of property, plant and equipment during 2019:

(USD millions)	Land	Buildings	Construction in progress	Machinery and other equipment	Total
Cost					
January 1, 2019	**696**	**14 135**	**2 042**	**17 155**	**34 028**
Cost of assets related to discontinued operations [1]	– 61	– 1 615	– 655	– 2 678	– 5 009
Reclassification to right-of-use assets [2]	– 122	– 3		– 2	– 127
Cost of assets related to disposal group held for sale [3]		– 3	– 12	– 8	– 23
Impact of business combinations	10	24	1	9	44
Reclassifications [4]	57	332	– 1 019	630	
Additions [5]	6	112	1 001	355	1 474
Disposals and derecognitions [6]	– 75	– 1 551	– 9	– 1 774	– 3 409
Currency translation effects	1	32	1	– 13	21
December 31, 2019	**512**	**11 463**	**1 350**	**13 674**	**26 999**
Accumulated depreciation					
January 1, 2019	**– 43**	**– 6 328**	**– 37**	**– 11 924**	**– 18 332**
Accumulated depreciation on assets related to discontinued operations [1]	8	562	7	1 541	2 118
Reclassification to right-of-use assets [2]	26				26
Accumulated depreciation on assets related to disposal group held for sale [3]		2			2
Accumulated depreciation on disposals and derecognitions [6]		1 170	2	1 674	2 846
Depreciation charge [7]		– 447		– 898	– 1 345
Impairment charge [8]	– 10	– 51	– 34	– 110	– 205
Reversal of impairment charge		1	2		3
Currency translation effects	– 1	– 33		– 9	– 43
December 31, 2019	**– 20**	**– 5 124**	**– 60**	**– 9 726**	**– 14 930**
Net book value at December 31, 2019	**492**	**6 339**	**1 290**	**3 948**	**12 069**
Commitments for purchases of property, plant and equipment					**220**
Capitalized borrowing costs					**4**

[1] Represents the cost of assets and accumulated depreciation at January 1, 2019 related to the Alcon business reported as discontinued operations. Notes 1, 2 and 30 provide information related to discontinued operations.
[2] Reclassification to right-of-use assets at January 1, 2019, upon adoption of IFRS 16 Leases. Refer to Notes 1 and 10 for additional disclosure.
[3] Note 2 provides additional disclosures related to disposal group held for sale.
[4] Reclassifications between various asset categories due to completion of plant and other equipment under construction
[5] Additions in the disposal group held for sale for the period from January 1, 2019, to December 31, 2019 were USD 23 million.
[6] Derecognition of assets that are no longer used and are not considered to have a significant disposal value or other alternative use
[7] No depreciation charge in the disposal group held for sale for the period from January 1, 2019, to December 31, 2019 was recorded.
[8] Impairments in the disposal group held for sale for the period from January 1, 2019, to December 31, 2019 were USD 2 million.

The following table summarizes the movements of property, plant and equipment during 2018:

(USD millions)	Land	Buildings	Construction in progress	Machinery and other equipment	Total
Cost					
January 1, 2018	**720**	**14 064**	**2 368**	**16 858**	**34 010**
Cost of assets related to disposal group held for sale [1]	– 11	– 114	– 24	– 160	– 309
Impact of business combinations	2	40	15	80	137
Reclassifications [2]	1	538	– 1 470	931	
Additions [3]	7	110	1 250	407	1 774
Disposals and derecognitions [4]	– 7	– 212	– 21	– 457	– 697
Currency translation effects	– 16	– 291	– 76	– 504	– 887
December 31, 2018	**696**	**14 135**	**2 042**	**17 155**	**34 028**
Accumulated depreciation					
January 1, 2018	**– 40**	**– 5 983**	**– 38**	**– 11 485**	**– 17 546**
Accumulated depreciation on assets related to disposal group held for sale [1]		56	4	101	161
Depreciation charge [5]	– 3	– 574		– 1 140	– 1 717
Accumulated depreciation on disposals and derecognitions [4]		180	3	412	595
Impairment charge	– 1	– 122	– 16	– 185	– 324
Reversal of impairment charge			8	12	20
Currency translation effects	1	115	2	361	479
December 31, 2018	**– 43**	**– 6 328**	**– 37**	**– 11 924**	**– 18 332**
Net book value at December 31, 2018	**653**	**7 807**	**2 005**	**5 231**	**15 696**
Net book value of property, plant and equipment under finance lease contracts		**79**			**79**
Commitments for purchases of property, plant and equipment					**289**
Capitalized borrowing costs					**6**

[1] Note 2 provides additional disclosures related to disposal group held for sale.
[2] Reclassifications between various asset categories due to completion of plant and other equipment under construction
[3] Additions in the disposal group held for sale were USD 21 million.
[4] Derecognition of assets that are no longer used and are not considered to have a significant disposal value or other alternative use
[5] Depreciation charge in the disposal group held for sale for the period from January 1, 2018, to the date of reclassification to assets held for sale was USD 15 million. For depreciation charge related to discontinued operations, refer to Note 30.

10. Right-of-use assets and lease liabilities

Impact of adoption of IFRS 16 Leases

Note 1 explains the changes and new accounting policy introduced on January 1, 2019, resulting from the adoption of the new accounting standard IFRS 16 Leases.

On transition to IFRS 16, the Group elected to apply the practical expedient to not reassess whether a contract is, or contains, a lease at January 1, 2019, the implementation date of IFRS 16. As a result, at the date of implementation, the Group applied IFRS 16 only to contracts that were previously identified as leases under IAS 17 Leases and related interpretations, and the definition of a lease under IFRS 16 was applied only to contracts entered into or changed on or after January 1, 2019.

The impact on retained earnings upon implementation of IFRS 16 was USD 3 million arising from subleases that were accounted for as operating lease agreements under IAS 17 and are accounted for as finance leases under IFRS 16.

The Group has entered into various fixed-term leases, mainly for vehicles and real estate.

The lease liabilities recorded in continuing operations on January 1, 2019, were USD 1.7 billion and the right-of-use assets were USD 1.6 billion.

Reconciliation of lease commitment disclosed on December 31, 2018, and lease liability recorded in continuing operations on January 1, 2019, is as follows:

(USD millions)	
Operating lease commitments December 31, 2018 [1]	3 612
Operating lease commitments December 31, 2018 related to discontinued operations	– 222
Operating lease commitments December 31, 2018 related to continuing operations	**3 390**
Recognition exemption for short-term leases	– 30
Recognition exception for low-value leases	– 12
Lease arrangements with commencement date after December 31, 2018	– 65
Undiscounted future lease payments continuing operations as of January 1, 2019	**3 283**
Effect of discounting	**– 1 547**
Lease liabilities recognized as of January 1, 2019 [2]	**1 736**

[1] As reported in Annual Report 2018 Note 27

[2] The weighted average incremental borrowing rate at January 1, 2019, the date of implementation of IFRS 16 Leases, was 3.5%.

The right-of-use assets of continuing operations at January 1, 2019, by underlying class of asset comprise the following:

(USD millions)	January 1, 2019
Land	536
Buildings	848
Vehicles	147
Machinery and equipment, and other assets	23
Right-of-use assets [1]	**1 554**

[1] Right-of-use assets were lower than the lease liability at the date of implementation of IFRS 16 by USD 182 million, due to adjustments made for recognition of sublease receivables, prepayments and accrued lease payments and transfers from leased assets recorded in property, plant and equipment at December 31, 2018.

The adoption of IFRS 16 on January 1, 2019 had an impact on the classification of the annual lease expense in the consolidated income statement, the recognition of right-of-use assets and lease liabilities in the balance sheet and the classification of the annual lease payments in the consolidated statement of cash flows.

The adoption of IFRS 16 on January 1, 2019 did not significantly impact the individual lines of the consolidated income statement.

The following table shows the adjustments to the line items of the January 1, 2019, consolidated balance sheet, due to the implementation of IFRS 16:

(USD millions)	January 1, 2019
Assets	
Non-current assets	
Property, plant and equipment	– 101
Right-of-use assets	1 554
Other non-current assets	74
Total non-current assets	**1 527**
Total assets	**1 527**
Equity and liabilities	
Equity	
Reserves	3
Total equity	**3**
Liabilities	
Non-current liabilities	
Financial debts	– 2
Lease liabilities	1 471
Provision and other non-current liabilities	– 212
Total non-current liabilities	**1 257**
Current liabilities	
Financial debts and derivative financial instruments	– 1
Lease liabilities	268
Total current liabilities	**267**
Total liabilities	**1 524**
Total equity and liabilities	**1 527**

As a result of applying the modified retrospective method at the date of implementation of IFRS 16 on January 1, 2019, whereby the right-of-use assets were measured at the amount equal to the lease liabilities, there is no impact to the reported deferred tax assets and deferred tax liabilities on the consolidated balance sheet, as the corresponding deferred tax assets and deferred tax liabilities attributable to the lease liability and right-of-use asset relate to income taxes levied by the same taxation authority within the same legal entity, and were therefore offset.

The adoption of IFRS 16 on January 1, 2019 had no significant impact on the individual lines of the consolidated statement of cash flows, except for the principal portion of the lease payments (USD 0.3 billion for the year ended December 31, 2019) that is recognized as an

outflow in the cash flow from financing activities and the interest portion of the lease payment (USD 0.1 billion for the year ended December 31, 2019) is recognized as an outflow in the cash flow from operating activities. Prior to the adoption of IFRS 16, the full amount of the lease payments was recognized as an outflow in the cash flow from operating activities.

Current year disclosures

The following table summarizes the movements of the right-of-use assets of continuing operations:

(USD millions)	
Right-of-use assets at January 1, 2019	**1 554**
Additions	537
Depreciation charge	– 305
Lease contract terminations [1]	– 98
Impact of divestments	– 17
Currency translation effects	6
Total right-of-use assets at December 31, 2019	**1 677**

No impairments were recorded in the period.

[1] Lease contract terminations also includes modifications to existing leases that result in reductions to the right-of-use assets, and reductions due to sub-leasing.

The right-of-use assets carrying value and depreciation charge of continuing operations at December 31, 2019, are shown below by underlying class of asset:

(USD millions)	December 31, 2019 carrying value	Depreciation charge 2019
Land	537	14
Buildings	990	194
Vehicles	129	87
Machinery and equipment, and other assets	21	10
Total right-of-use assets	**1 677**	**305**

The lease liabilities of continuing operations at December 31, 2019, by maturity are as follows:

(USD millions)	Lease liabilities 2019	Lease liabilities undiscounted 2019
Less than one year	246	295
Between one and two years	202	246
Between two and three years	163	202
Between three and four years	138	173
Between four and five years	119	150
After five years	1 081	2 419
Total lease liabilities	**1 949**	**3 485**
Less current portion of lease liabilities	– 246	– 295
Non-current portion of lease liabilities	**1 703**	**3 190**

At January 1, 2019 and December 31, 2019, there were no material future cash outflows, including extension options, excluded from the measurement of lease liabilities. The Group's most material lease with a lease term extension, representing a lease liability value of USD 0.6 billion, has a determined lease term end date of 2071.

In 2019, the Group completed sale and leaseback transactions for certain property, plant and equipment as part of its plans to consolidate sites. Transactions resulted in net cash inflows of USD 0.7 billion and the recognition of USD 96 million of lease liabilities, and USD 37 million of right-of-use assets. The right-of-use assets value reflects the proportion of the property, plant and equipment retained for a period of one to five years, with two five-year extension periods for certain right-of-use assets. The liabilities reflect the net present value of future lease payments. The net gain on the sale and leaseback transactions amounted to USD 478 million.

The following table provides additional disclosures related to right-of-use assets and lease liabilities of continuing operations:

(USD millions)	**2019**
Interest expense on lease liabilities [1]	66
Expense on short-term leases	7
Expense on low-value leases	8
Total cash outflows for leases	339
Thereof:	
Cash outflows for short-term leases and low-value leases [2]	*15*
Payments of interest [3]	*51*
Payments of lease liabilities [4]	*273*

[1] The weighted average interest rate is 3.9%.

[2] Cash flows from short-term and low-value leases are included within total net cash flows from operating activities. The portfolio of short-term leases to which the Group is committed to at December 31, 2019, is similar to the portfolio of short-term leases the Group entered into during 2019.

[3] Included within total net cash flows from operating activities.

[4] Reported as cash outflows used in financing activities net of lease incentives received of USD 33 million.

The net investment held and the income from subleasing right-of-use assets was not significant.

Note 30 provides additional disclosures on discontinued operations.

11. Goodwill and intangible assets

The following table summarizes the movements of goodwill and intangible assets in 2019:

	Goodwill	Intangible assets other than goodwill						
(USD millions)	Total	In-process research and development	Alcon brand name	Technologies	Currently marketed products	Marketing know-how	Other intangible assets	Total
Cost								
January 1, 2019	**35 700**	**16 167**	**2 980**	**6 253**	**35 412**	**5 960**	**2 253**	**69 025**
Cost of assets related to discontinued operations [1]	– 9 000	– 249	– 2 980	– 5 369	– 4 440	– 5 960	– 572	– 19 570
Cost of assets related to disposal group held for sale, net [2]		– 1			4			3
Impact of business combinations	186	342			3 550		22	3 914
Reclassifications [3]		– 9 069			9 069			
Additions [4]		265			243		259	767
Disposals and derecognitions [5]		– 75			– 544		– 436	– 1 055
Currency translation effects	– 61	49			254		32	335
December 31, 2019	**26 825**	**7 429**		**884**	**43 548**		**1 558**	**53 419**
Accumulated amortization								
January 1, 2019	**– 406**	**– 1 120**		**– 4 758**	**– 21 218**	**– 1 906**	**– 1 304**	**– 30 306**
Accumulated amortization/impairments on assets related to discontinued operations [1]	101	3		4 184	2 592	1 906	128	8 813
Amortization charge [6]				– 42	– 2 657		– 137	– 2 836
Accumulated impairments on disposals and derecognitions [5]		70			494		419	983
Impairment charge [6]		– 984		– 105	– 54		– 32	– 1 175
Reversal of impairment charge		37						37
Currency translation effects	4	– 11			– 126		– 11	– 148
December 31, 2019	**– 301**	**– 2 005**		**– 721**	**– 20 969**		**– 937**	**– 24 632**
Net book value at December 31, 2019	**26 524**	**5 424**		**163**	**22 579**		**621**	**28 787**

[1] Represents the cost of assets and accumulated amortization at January 1, 2019, related to the Alcon business reported as discontinued operations. Notes 1, 2 and 30 provide information related to discontinued operations.
[2] Note 2 provides additional disclosures related to assets of disposal group held for sale.
[3] Reclassifications between various asset categories as a result of product launches of acquired in-process research and development, and completion of software development
[4] No addition in the disposal group held for sale for the period from January 1, 2019 to December 31, 2019
[5] Derecognitions of assets that are no longer used or being developed and are not considered to have a significant disposal value or other alternative use
[6] No amortization or impairment charges related to the disposal group held for sale for the period from January 1, 2019, to December 31, 2019.

The following table summarizes the movements of goodwill and intangible assets in 2018:

	Goodwill	Intangible assets other than goodwill						
(USD millions)	Total	In-process research and development	Alcon brand name	Technologies	Currently marketed products	Marketing know-how	Other intangible assets	Total
Cost								
January 1, 2018	**32 179**	**6 462**	**2 980**	**6 638**	**34 105**	**5 960**	**1 852**	**57 997**
Cost of assets related to disposal group held for sale [1]		– 9		– 276	– 1 116		– 2	– 1 403
Impact of business combinations	4 084	10 224			2 531		1	12 756
Reclassifications [2]		– 697			479		218	
Additions [3]		477		2	728		385	1 592
Disposals and derecognitions [4]		– 214		– 70	– 928		– 183	– 1 395
Impairment charge [5]	– 183							
Currency translation effects	– 380	– 76		– 41	– 387		– 18	– 522
December 31, 2018	**35 700**	**16 167**	**2 980**	**6 253**	**35 412**	**5 960**	**2 253**	**69 025**
Accumulated amortization								
January 1, 2018	**– 429**	**– 1 170**		**– 4 268**	**– 19 631**	**– 1 668**	**– 1 263**	**– 28 000**
Accumulated amortization/impairments on assets related to disposal group held for sale [1]		2		107	816			925
Amortization charge [6]				– 570	– 2 521	– 238	– 310	– 3 639
Accumulated impairments on disposals and derecognitions [4]		209			791		257	1 257
Impairment charge [5]		– 167		– 53	– 825		– 4	– 1 049
Currency translation effects	23	6		26	152		16	200
December 31, 2018	**– 406**	**– 1 120**		**– 4 758**	**– 21 218**	**– 1 906**	**– 1 304**	**– 30 306**
Net book value at December 31, 2018	**35 294**	**15 047**	**2 980**	**1 495**	**14 194**	**4 054**	**949**	**38 719**

[1] Note 2 provides additional disclosures related to assets of disposal group held for sale.
[2] Reclassifications between various asset categories as a result of product launches of acquired in-process research and development, and completion of software development
[3] No addition in the disposal group held for sale for the period from January 1, 2018, to the date of reclassification to assets held for sale
[4] Derecognitions of assets that are no longer used or being developed and are not considered to have a significant disposal value or other alternative use
[5] Impairment charges related to the disposal group held for sale for the write-down of the allocated goodwill were USD 183 million and for the currently marketed products were USD 37 million (thereof USD 9 million recognized for the period from January 1, 2018, to the date of reclassification to assets held for sale). For amortization related to discontinued operations, refer to Note 30.
[6] Amortization related to the disposal group held for sale for the period from January 1, 2018, to the date of reclassification to assets held for sale was USD 45 million.

The following table summarizes the allocation of the net book values of goodwill and intangible assets by reporting segment at December 31, 2019:

	Goodwill	Intangible assets other than goodwill				
(USD millions)	Total	In-process research and development	Technologies	Currently marketed products	Other intangible assets	Total
Innovative Medicines	18 750	5 339	7	21 720	520	27 586
Sandoz	7 767	85	156	859	25	1 125
Corporate	7				76	76
Net book value at December 31, 2019	**26 524**	**5 424**	**163**	**22 579**	**621**	**28 787**

The following table summarizes the allocation of the net book values of goodwill and intangible assets by reporting segment at December 31, 2018:[1]

	Goodwill	Intangible assets other than goodwill						
(USD millions)	Total	In-process research and development	Alcon brand name	Technologies	Currently marketed products	Marketing know-how	Other intangible assets	Total
Innovative Medicines	18 551	14 377		6	11 228		431	26 042
Sandoz	7 837	419		304	1 115		37	1 875
Alcon [1]	8 899	246	2 980	1 185	1 851	4 054	363	10 679
Corporate	7	5					118	123
Net book value at December 31, 2018	**35 294**	**15 047**	**2 980**	**1 495**	**14 194**	**4 054**	**949**	**38 719**

[1] From February 28, 2019, the Alcon Division was reported as discontinued operations (see Notes 1, 2 and 30). In accordance with IFRS, the December 31, 2018, consolidated balance sheet includes the assets and liabilities of the Alcon eye care devices business and certain Corporate assets and liabilities attributable to the Alcon business. Note 30 provides additional information on discontinued operations.

The Innovative Medicines and Sandoz Divisions' cash-generating units, to which goodwill is allocated, each comprise a group of smaller cash-generating units. The valuation method of the recoverable amount of the cash-generating units, to which goodwill is allocated, is based on the fair value less costs of disposal.

The following assumptions are used in the calculations:

(As a percentage)	Innovative Medicines	Sandoz
Terminal growth rate	1.5	2.0
Discount rate (post-tax)	6.5	6.5

The discount rates for all divisions consider the Group's weighted average cost of capital, adjusted to approximate the weighted average cost of capital of a comparable market participant.

The fair value less costs of disposal, for all groupings of cash-generating units containing goodwill, is reviewed for the impact of reasonably possible changes in key assumptions. In particular, we considered an increase in the discount rate, a decrease in the terminal growth rate, and certain negative impacts on the forecasted cash flows. These reasonably possible changes in key assumptions did not indicate an impairment.

"Note 1. Significant accounting policies—Impairment of goodwill and intangible assets" provides additional disclosures on how the Group performs goodwill and intangible asset impairment testing.

The following table shows the intangible asset and goodwill impairment charges for continuing operations for 2019, 2018 and 2017:

(USD millions)	**2019**	2018	2017
Innovative Medicines [1]	– 669	– 592	– 591
Sandoz [2]	– 506	– 249	– 61
Total	**– 1 175**	**– 841**	**– 652**

[1] 2019 includes an impairment of USD 416 million related to the write-down of IPR&D acquired through the 2015 Spinifex Pharmaceuticals Inc. acquisition and USD 108 million write-down related to cessation of clinical development program MOR106 for atopic dermatitis.
2018 includes an impairment of USD 400 million related to a partial write-down of the *Votrient* currently marketed product.
2017 includes an impairment of USD 465 million related to the write-down of the Serelaxin IPR&D.

[2] 2019 includes impairment of USD 442 million related to the write-down of IPR&D related to the discontinuation of the generic Advair® development program.
2018 includes impairments of USD 220 million related to the write-down of the allocated goodwill (USD 183 million) and the currently marketed products (USD 37 million) related to the pending divestment of the Sandoz US dermatology business and generic US oral solids portfolio. See Note 2.

In 2019, the reversal of prior year impairment charges amounted to USD 37 million (2018: nil, 2017: nil).

Note 30 provides additional disclosures on discontinued operations.

12. Deferred tax assets and liabilities

(USD millions)	Property, plant and equipment	Intangible assets	Pensions and other benefit obligations of associates	Inventories	Tax loss carry-forwards	Other assets, provisions and accruals	Total
Gross deferred tax assets at January 1, 2019	**191**	**1 233**	**1 188**	**3 722**	**273**	**2 175**	**8 782**
Gross deferred tax liabilities at January 1, 2019	**– 622**	**– 5 384**	**– 273**	**– 474**		**– 805**	**– 7 558**
Net deferred tax balance at January 1, 2019	**– 431**	**– 4 151**	**915**	**3 248**	**273**	**1 370**	**1 224**
At January 1, 2019	**– 431**	**– 4 151**	**915**	**3 248**	**273**	**1 370**	**1 224**
Net deferred tax balance related to discontinued operations [1]	82	1 403	– 123	– 248	– 39	– 217	858
Credited/(charged) to income	74	605	308	– 818	– 113	298	354
Charged to equity		8			75	– 166	– 83
Charged to other comprehensive income			– 313			24	– 289
Impact of business combinations	3	– 45			21	– 26	– 47
Other movements [2]	– 10	39		– 23	31	– 12	25
Net deferred tax balance at December 31, 2019	**– 282**	**– 2 141**	**787**	**2 159**	**248**	**1 271**	**2 042**
Gross deferred tax assets at December 31, 2019	108	1 469	1 078	2 446	255	2 596	7 952
Gross deferred tax liabilities at December 31, 2019	– 390	– 3 610	– 291	– 287	– 7	– 1 325	– 5 910
Net deferred tax balance at December 31, 2019	**– 282**	**– 2 141**	**787**	**2 159**	**248**	**1 271**	**2 042**

After offsetting the following amount of deferred tax assets and liabilities within the same tax jurisdiction, the balance amounts to:	43
Deferred tax assets at December 31, 2019	7 909
Deferred tax liabilities at December 31, 2019	– 5 867
Net deferred tax balance at December 31, 2019	**2 042**

Gross deferred tax assets at January 1, 2018	**137**	**1 287**	**1 090**	**3 786**	**97**	**1 983**	**8 380**
Gross deferred tax liabilities at January 1, 2018	**– 613**	**– 2 985**	**– 254**	**– 455**	**– 9**	**– 1 003**	**– 5 319**
Net deferred tax balance at January 1, 2018	**– 476**	**– 1 698**	**836**	**3 331**	**88**	**980**	**3 061**
At January 1, 2018	**– 476**	**– 1 698**	**836**	**3 331**	**88**	**980**	**3 061**
Net deferred tax balance related to disposal group held for sale	1	1		– 6	– 1	– 1	– 6
Credited/(charged) to income	31	378	4	– 86	– 113	368	582
Charged to equity						– 17	– 17
Charged to other comprehensive income			69			8	77
Impact of business combinations		– 2 874			298	83	– 2 493
Other movements	13	42	6	9	1	– 51	20
Net deferred tax balance at December 31, 2018	**– 431**	**– 4 151**	**915**	**3 248**	**273**	**1 370**	**1 224**
Gross deferred tax assets at December 31, 2018	191	1 233	1 188	3 722	273	2 175	8 782
Gross deferred tax liabilities at December 31, 2018	– 622	– 5 384	– 273	– 474		– 805	– 7 558
Net deferred tax balance at December 31, 2018	**– 431**	**– 4 151**	**915**	**3 248**	**273**	**1 370**	**1 224**

After offsetting the following amount of deferred tax assets and liabilities within the same tax jurisdiction, the balance amounts to:	83
Deferred tax assets at December 31, 2018	8 699
Deferred tax liabilities at December 31, 2018	– 7 475
Net deferred tax balance at December 31, 2018	**1 224**

[1] Notes 1, 2 and 30 provide information related to discontinued operations.
[2] Includes USD 3 million net deferred tax movement related to disposal group held for sale

The following table presents deferred tax assets and deferred tax liabilities, which are expected to have an impact on current taxes payable after more than 12 months:

(USD billions)	**2019**	2018
Expected to have an impact on current tax payable after more than 12 months		
– Deferred tax assets	4.3	3.9
– Deferred tax liabilities	5.2	6.7

For unremitted earnings retained by consolidated entities for reinvestment, no provision is made for income taxes that would be payable upon the distribution of these earnings. If these earnings were remitted, an income tax charge could result based on the tax statutes currently in effect.

(USD billions)	**2019**	2018
Unremitted earnings that have been retained by consolidated entities for reinvestment	61	73

Temporary differences on which no deferred tax has been provided as they are permanent in nature related to:

(USD billions)	**2019**	2018
Investments in subsidiaries	3	3
Goodwill from acquisitions	– 24	– 33

The gross value of tax-loss carry-forwards that have or have not been capitalized as deferred tax assets, with their expiry dates, is as follows:

(USD millions)	Not capitalized	Capitalized	**2019 total**
One year	14	0	14
Two years	28	0	28
Three years	28	6	34
Four years	16	46	62
Five years	127	37	164
More than five years	435	2 249	2 684
Total	**648**	**2 338**	**2 986**

(USD millions)	Not capitalized	Capitalized	2018 total
One year	23	4	27
Two years	14	0	14
Three years	27	12	39
Four years	65	5	70
Five years	345	36	381
More than five years	522	2 288	2 810
Total	**996**	**2 345**	**3 341**

(USD millions)	**2019**	2018	2017
Tax losses carried forward that expired	9	8	1

Deferred tax assets related to taxable losses of relevant Group entities are recognized to the extent it is considered probable that future taxable profits will be available against which such losses can be utilized in the foreseeable future.

The Basel-Stadt cantonal tax reform was approved by voters in February 2019, with parts of the reform retroactively enacted per January 1, 2019. The newly enacted tax rate resulted in a decrease of the blended cantonal and federal tax rate from 22% to 13%. This change impacts the Group's Basel-Stadt-domiciled operating subsidiaries.

The Swiss federal tax reform was approved by voters in May 2019. The enactment of the Swiss federal tax reform requires the abolishment of the holding company tax regimes as of January 1, 2020. As a result, the holding company tax rate will increase from the current 8% to 13%, effective January 1, 2020.

The enactment of these Swiss tax reforms required a revaluation of the deferred tax assets and liabilities to the newly enacted tax rates at the date of enactment.

The following table shows the impact on the revaluation of deferred assets and liabilities in 2019, as at the respective dates of the enactment of the Swiss tax reforms:

(USD millions)	Income statement continuing operations	Equity	**Total**
Deferred tax asset and liability revaluation			
Items previously recognized in consolidated income statement	234		234
Items previously recognized in other comprehensive income [1]		– 358	– 358
Total revaluation of deferred tax assets and liabilities	**234**	**– 358**	**– 124**

[1] Related to post-employment benefits

On December 22, 2017, the US enacted tax reform legislation (the Tax Cuts and Jobs Act), which – among other provisions – reduced the US corporate tax rate from 35% to 21%, effective January 1, 2018. This required a revaluation of the deferred tax assets and liabilities, and a portion of current tax payables to the newly enacted tax rates at the date of enactment.

The enacted US tax reform legislation includes a provision that requires the US parent company's foreign subsidiaries' unremitted earnings to be subject to an immediate toll tax on the qualifying amount of unremitted earnings (the deemed repatriated earnings). Previously, these earnings were taxable upon distribution to the US parent company. The toll tax amount owed is payable, without interest, in installments over an eight-year period through 2024. Certain of the Group's US subsidiaries are the parent company of non-US-domiciled companies, and as a result, USD 70 million of deferred tax liabilities related to these entities' unremitted earnings, the majority of which were recognized in 2016, were reclassified to current income tax liabilities at December 31, 2017.

The following table shows the impact on the revaluation of deferred assets and liabilities, and current income tax liabilities at December 31, 2017:

(USD millions)	Income statement continuing operations	Equity	Total
Deferred tax asset and liability revaluation			
Items previously recognized in consolidated income statement [1]	– 440		– 440
Items previously recognized in other comprehensive income [2]		– 254	– 254
Items previously recognized in retained earnings [3]		– 71	– 71
Total revaluation of deferred tax assets and liabilities	– 440	– 325	– 765
Total revaluation of current tax payables [4]	– 34		– 34
Total revaluation of deferred tax assets and liabilities, and current income tax liabilities	**– 474**	**– 325**	**– 799**

[1] Items previously recognized in discontinued operations amounted to USD 416 million
[2] Related to post-employment benefits and available-for-sale financial investments (attributable to continuing operations USD -241 million and attributable to discontinued operations USD -13 million)
[3] Related to equity-based compensation plans (attributable to continuing operations USD -66 million and attributable to discontinued operations USD -5 million)
[4] Revaluation of current tax payable attributable to discontinued operations amounted to USD -3 million.

13. Financial and other non-current assets

Financial assets

(USD millions)	**2019**	2018
Equity securities	1 524	1 155
Debt securities	33	31
Fund investments	233	251
Total financial investments	**1 790**	**1 437**
Long-term receivables from customers		164
Minimum lease payments from finance lease agreements [1]		91
Long-term receivables from finance subleases	66	
Other long-term receivables	104	3
Contingent consideration receivables [2]	399	396
Long-term loans, advances and security deposits	159	254
Total financial assets	**2 518**	**2 345**

[1] Note 30 provides additional disclosures on minimal lease payments from finance lease agreements that relate to discontinued operations.
[2] Note 29 provides additional disclosures related to contingent considerations.

Other non-current assets

(USD millions)	**2019**	2018
Deferred compensation plans	414	468
Prepaid post-employment benefit plans	148	137
Other non-current assets	176	290
Total other non-current assets	**738**	**895**

14. Inventories

(USD millions)	2019	2018
Raw material, consumables	751	931
Work in progress	3 024	3 087
Finished products	2 207	2 938
Total inventories	**5 982**	**6 956**

The following table shows the amount of inventory recognized as an expense in "Cost of goods sold" in the consolidated income statements from continuing operations:

(USD billions)	2019	2018	2017
Cost of goods sold	– 8.5	– 8.3	– 8.2

The following table shows the recognized amount of inventory provision and reversals of inventory provision recorded in the consolidated income statements from continuing operations:

(USD millions)	2019	2018	2017
Inventory provisions	– 752	– 603	– 416
Reversals of inventory provisions	218	216	172

The reversals mainly result from the release of products initially requiring additional quality control inspections and from the reassessment of inventory values manufactured prior to regulatory approval but for which approval was subsequently received.

15. Trade receivables

(USD millions)	2019	2018
Total gross trade receivables	8 396	8 853
Provisions for doubtful trade receivables	– 95	– 126
Total trade receivables, net	**8 301**	**8 727**

The following table summarizes the movement in the provision for doubtful trade receivables:

(USD millions)	2019	2018	2017
January 1	**– 126**	**– 190**	**– 162**
Provisions related to discontinued operations [1]	54		
Impact of divestments			12
Impact of business combination		– 1	
Provisions for doubtful trade receivables charged to the consolidated income statement [2]	– 89	– 47	– 119
Utilization of provisions for doubtful trade receivables	12	39	12
Reversal of provisions for doubtful trade receivables credited to the consolidated income statement [3]	53	61	76
Currency translation effects	1	12	– 9
December 31	**– 95**	**– 126**	**– 190**

[1] Notes 1, 2 and 30 provide information related to discontinued operations.
[2] Provisions charged to the consolidated income statement from continuing operations were USD 30 million in 2018 and USD 94 million in 2017.
[3] Reversal of provisions credited to the consolidated income statement from continuing operations were USD 44 million in 2018 and USD 60 million in 2017.

The following sets forth the trade receivables that are not overdue as specified in the payment terms and conditions established with Novartis customers, as well as an analysis of overdue amounts and related provisions for doubtful trade receivables:

(USD millions)	2019	2018
Not overdue	7 763	7 916
Past due for not more than one month	161	296
Past due for more than one month but less than three months	123	194
Past due for more than three months but less than six months	103	136
Past due for more than six months but less than one year	96	98
Past due for more than one year	150	213
Provisions for doubtful trade receivables	– 95	– 126
Total trade receivables, net	**8 301**	**8 727**

Trade receivable balances include sales to drug wholesalers, retailers, private health systems, government agencies, managed care providers, pharmacy benefit managers and government-supported healthcare systems. Novartis continues to monitor sovereign debt issues and economic conditions in the countries it operates, particularly in Argentina, Brazil, Greece, Italy, Portugal, Russia, Saudi Arabia, Spain and Turkey, and evaluates trade receivables in these countries for potential collection risks. The majority of the outstanding trade receivables from Portugal, Saudi Arabia and Spain are due directly from local governments or from government-funded entities. Deteriorating credit and economic conditions as well as other factors in these closely monitored countries have resulted in, and may continue to result in, an increase in the average length of time that it takes to collect these trade receivables, and may require the Group to re-evaluate the estimated collectible amount of these trade receivables in future periods.

The following table shows the gross trade receivables balance from these closely monitored countries at December 31, 2019 and 2018; the amounts that are past due for more than one year; and the related provisions that have been recorded:

(USD millions)	**2019**	2018
Total balance of gross trade receivables from closely monitored countries	1 588	1 729
Past due for more than one year	61	97
Provisions	24	44

At December 31, 2019, amounts past due for more than one year are not significant in any of these countries on a standalone basis.

Total trade receivables include amounts denominated in the following major currencies:

(USD millions)	**2019**	2018
US dollar (USD)	3 466	3 510
Euro (EUR)	1 384	1 551
Japanese yen (JPY)	466	658
Russian ruble (RUB)	341	247
Chinese yuan (CNY)	279	282
British pound (GBP)	202	183
Brazilian real (BRL)	165	206
Canadian dollar (CAD)	129	136
Australian dollar (AUD)	125	161
Swiss franc (CHF)	89	100
Other currencies	1 655	1 693
Total trade receivables, net	**8 301**	**8 727**

16. Marketable securities, commodities, time deposits, derivative financial instruments, and cash and cash equivalents

Marketable securities, commodities, time deposits and derivative financial instruments

(USD millions)	**2019**	2018
Debt securities	24	325
Fund investments	37	35
Total marketable securities	**61**	**360**
Commodities	110	104
Time deposits and short-term investments with original maturity more than 90 days	61	2 087
Derivative financial instruments	102	130
Accrued interest on debt securities, time deposits and short-term investments		12
Total marketable securities, commodities, time deposits and derivative financial instruments	**334**	**2 693**

The following table provides a breakdown of debt securities by currency:

(USD millions)	**2019**	2018
US dollar (USD)		302
Euro (EUR)	13	12
Japanese yen (JPY)	11	11
Total debt securities	**24**	**325**

Cash and cash equivalents

(USD millions)	2019	2018
Current accounts	3 247	3 121
Time deposits and short-term investments with original maturity less than 90 days	7 865	10 150
Total cash and cash equivalents	**11 112**	**13 271**

17. Other current assets

(USD millions)	2019	2018
VAT receivable	508	588
Withholding tax recoverable	108	99
Prepaid expenses		
– Third parties	898	811
– Associated companies		1
Receivables from associated companies	1	2
Other receivables and current assets	1 165	1 360
Total other current assets	**2 680**	**2 861**

18. Equity

The following table shows the movement in the share capital:

(USD millions)	Jan 1, 2017	Movement in year	Dec 31, 2017	Movement in year	Dec 31, 2018	Movement in year	Dec 31, 2019
Share capital	972	– 3	969	– 25	944	– 8	936
Treasury shares	– 76	– 24	– 100	31	– 69	– 11	– 80
Outstanding share capital	**896**	**– 27**	**869**	**6**	**875**	**– 19**	**856**

The following table shows the movement in the shares:

Number of outstanding shares (in millions)	Note	2019 Total Novartis shares	2019 Total treasury shares[1]	2019 Total outstanding shares	2018 Total Novartis shares	2018 Total treasury shares[1]	2018 Total outstanding shares	2017 Total Novartis shares	2017 Total treasury shares[1]	2017 Total outstanding shares
Balance at beginning of year		**2 550.6**	**– 239.4**	**2 311.2**	**2 616.8**	**– 299.3**	**2 317.5**	**2 627.1**	**– 253.0**	**2 374.1**
Shares canceled for capital reduction[2]		– 23.3	23.3		– 66.2	66.2		– 10.3	10.3	
Shares acquired to be canceled[3]			– 60.3	– 60.3		– 23.3	– 23.3		– 66.2	– 66.2
Other share purchases[4]			– 1.7	– 1.7		– 1.2	– 1.2		– 3.8	– 3.8
Exercise of options and employee transactions[5]	18.8		5.5	5.5		7.8	7.8		4.6	4.6
Equity-based compensation[5]			9.4	9.4		7.4	7.4		8.8	8.8
Shares delivered to Alcon employees			0.9	0.9						
Other share sales						3.0	3.0			
Total movements		**– 23.3**	**– 22.9**	**– 46.2**	**– 66.2**	**59.9**	**– 6.3**	**– 10.3**	**– 46.3**	**– 56.6**
Balance at end of year		**2 527.3**	**– 262.3**	**2 265.0**	**2 550.6**	**– 239.4**	**2 311.2**	**2 616.8**	**– 299.3**	**2 317.5**

[1] Approximately 117.6 million treasury shares (2018: 121.6 million; 2017: 131.3 million) are held in Novartis entities that restrict their availability for use.
[2] Novartis reduced its share capital by canceling shares that were repurchased on the SIX Swiss Exchange second trading line during previous years.
[3] Shares repurchased on the SIX Swiss Exchange second trading line under a CHF 10 billion share buyback authority approved at the 2016 Annual General Meeting (AGM) for transactions before February 28, 2019, and under a new CHF 10 billion share buyback authority approved at the 2019 AGM for transactions after such date
[4] Shares acquired from employees, which were previously granted to them under the respective programs
[5] Shares delivered as a result of options being exercised and physical share deliveries related to equity-based participation plans

18.1) The amount available for distribution as a dividend to shareholders is based on the available distributable retained earnings of Novartis AG determined in accordance with the legal provisions of the Swiss Code of Obligations.

	2019	2018	2017
Dividend per share (in CHF)	2.85	2.80	2.75
Total dividend payment (in USD billion)	6.6	7.0	6.5

18.2) The following table summarizes the treasury shares movements:

	Note	2019 Number of outstanding shares (in millions)	2019 Equity impact USD m	2018 Number of outstanding shares (in millions)	2018 Equity impact USD m	2017 Number of outstanding shares (in millions)	2017 Equity impact USD m
Shares acquired to be canceled[1]		– 60.3	– 5 351	– 23.3	– 1 859	– 66.2	– 5 270
Other share purchases[2]		– 1.7	– 160	– 1.2	– 114	– 3.8	– 304
Purchase of treasury shares		– 62.0	– 5 511	– 24.5	– 1 973	– 70.0	– 5 574
Exercise of options and employee transactions[3]	18.8	5.5	210	7.8	434	4.6	255
Equity-based compensation[4,5]		9.4	833	7.4	756	8.8	612
Shares delivered to Alcon employees		0.9	18				
Other share sales				3.0	263		
Total		**– 46.2**	**– 4 450**	**– 6.3**	**– 520**	**– 56.6**	**– 4 707**

[1] Shares repurchased on the SIX Swiss Exchange second trading line under a CHF 10 billion share buyback authority approved at the 2016 AGM for transactions before February 28, 2019, and under a new CHF 10 billion share buyback authority approved at the 2019 AGM for transactions after such date
[2] Shares acquired from employees, which were previously granted to them under the respective programs
[3] Shares delivered as a result of options being exercised related to equity-based participation plans and the delivery of treasury shares. The average share price of the shares delivered was significantly below market price, reflecting the strike price of the options exercised.
[4] Equity-settled share-based compensation is expensed in the consolidated income statement in accordance with the vesting period of the share-based compensation plans. The value for the shares and options granted is credited to consolidated equity over the respective vesting period. In addition, tax benefits arising from tax-deductible amounts exceeding the expense recognized in the income statement are credited to equity.
[5] Included in 2017 is a USD 71 million impact related to the revaluation of deferred tax assets on equity-based compensation that were previously recognized through retained earnings. This revaluation resulted from the US tax reform legislation enacted on December 22, 2017. Refer to Note 12 for additional disclosures.

18.3) In 2019, Novartis entered into an irrevocable, non-discretionary arrangement with a bank to repurchase Novartis shares on the second trading line under its up-to USD 5 billion share buyback. Novartis was able to cancel this arrangement at any time but could be subject to a 90-day waiting period. The commitment under

this arrangement therefore reflects the obligated purchases by the bank under such trading plan over a rolling 90-day period, or if shorter, until the maturity date of such trading plan.

As of December 31, 2019, this trading plan commitment was fully executed and expired, and as a consequence, there is no contingent liability related to this plan recognized.

In 2018 and 2017, Novartis entered into a similar irrevocable, non-discretionary arrangements with a bank to repurchase Novartis shares. The commitments under these arrangements reflected the expected purchases by the bank under such trading plans over a rolling 90-day period.

The commitment under this arrangement amounted to USD 284 million as of December 31, 2018.

As of December 31, 2017, this trading plan commitment was fully executed and expired, and as a consequence, there was no contingent liability related to this plan recognized.

18.4) Transaction costs of USD 253 million (2018: USD 79 million; 2017: USD nil) net of tax of USD 36 million (2018: USD 20 million; 2017: USD nil), that are directly attributable to the distribution (spin-off) of Alcon Inc. to Novartis shareholders and that would otherwise have been avoided, are recorded as a deduction from equity. See Note 1.

18.5) The impact of change in ownership of consolidated entities represents the excess of the amount paid to non-controlling interest over their carrying value and equity allocation to non-controlling interest due to change in ownership percentage.

18.6) Changes in non-controlling interests represent the impact on the non-controlling interest of transactions with minority shareholders, such as change in ownership percentage, dividend payments and other equity transactions.

18.7) Other movements includes, for subsidiaries in hyperinflationary economies, the impact of the restatement of the non-monetary assets and liabilities with the general price index at the beginning of the period as well as the restatement of the equity balances of the current year. In 2019, the amount recorded in equity related to hyperinflation accounting was USD 22 million (2018: USD 38 million; 2017: USD nil). See Note 29 for additional disclosures.

18.8) At December 31, 2019, the market maker held 13 million (2018: 11 million; 2017: 12 million) written call options, originally issued as part of the share-based compensation for associates, that have not yet been exercised. The weighted average exercise price of these options is USD 63.90 (2018: USD 62.70; 2017: USD 62.17), and they have contractual lives of 10 years, with remaining lives up to four years (2018: five years; 2017: six years).

In December 2018, Novartis entered into an agreement with the market maker for its employee options to repurchase a portion of the outstanding written call options that are not exercised in exchange for treasury shares. During 2019, this agreement was fully executed.

19. Non-current financial debt

(USD millions)	**2019**	2018
Straight bonds	22 167	25 283
Liabilities to banks and other financial institutions [1]	188	285
Finance lease obligations		92
Total, including current portion of non-current financial debt	**22 355**	**25 660**
Less current portion of non-current financial debt	– 2 002	– 3 190
Total non-current financial debt	**20 353**	**22 470**

[1] Average interest rate 0.2% (2018: 0.3%)

All bonds are initially recorded at the amount of proceeds received, net of transaction costs. They are subsequently carried at amortized cost, with the difference between the proceeds, net of transaction costs, and the amount due on redemption being recognized as a charge to the consolidated income statement over the period of the relevant bond. Financial debts, including current financial debts, contain only general default covenants. The Group is in compliance with these covenants.

The percentage of fixed-rate financial debt to total financial debt was 82% at December 31, 2019, and 80% at December 31, 2018.

The average interest rate on total financial debt in 2019 was 2.4% (2018: 2.7%).

Note 29 contains a maturity table of the Group's future contractual interest payments commitments.

The following table provides a breakdown of straight bonds:

Coupon	Currency	Nominal amount	Issuance year	Maturity year	Issuer	Issue price	**2019 (USD millions)**	2018 (USD millions)
5.125%	USD	3 000	2009	2019	Novartis Securities Investment Ltd., Hamilton, Bermuda	99.822%		3 000
4.400%	USD	1 000	2010	2020	Novartis Capital Corporation, New York, United States	99.237%	1 000	998
2.400%	USD	1 500	2012	2022	Novartis Capital Corporation, New York, United States	99.225%	1 495	1 493
3.700%	USD	500	2012	2042	Novartis Capital Corporation, New York, United States	98.325%	489	489
3.400%	USD	2 150	2014	2024	Novartis Capital Corporation, New York, United States	99.287%	2 139	2 137
4.400%	USD	1 850	2014	2044	Novartis Capital Corporation, New York, United States	99.196%	1 825	1 825
0.750%	EUR	600	2014	2021	Novartis Finance S.A., Luxembourg, Luxembourg	99.134%	670	683
1.625%	EUR	600	2014	2026	Novartis Finance S.A., Luxembourg, Luxembourg	99.697%	670	684
0.250%	CHF	500	2015	2025	Novartis AG, Basel, Switzerland	100.640%	517	508
0.625%	CHF	550	2015	2029	Novartis AG, Basel, Switzerland	100.502%	568	558
1.050%	CHF	325	2015	2035	Novartis AG, Basel, Switzerland	100.479%	336	330
3.000%	USD	1 750	2015	2025	Novartis Capital Corporation, New York, United States	99.010%	1 735	1 732
4.000%	USD	1 250	2015	2045	Novartis Capital Corporation, New York, United States	98.029%	1 219	1 219
0.125%	EUR	1 250	2016	2023	Novartis Finance S.A., Luxembourg, Luxembourg	99.127%	1 392	1 419
0.625%	EUR	500	2016	2028	Novartis Finance S.A., Luxembourg, Luxembourg	98.480%	553	563
1.800%	USD	1 000	2017	2020	Novartis Capital Corporation, New York, United States	99.609%	1 000	998
2.400%	USD	1 000	2017	2022	Novartis Capital Corporation, New York, United States	99.449%	996	995
3.100%	USD	1 000	2017	2027	Novartis Capital Corporation, New York, United States	99.109%	990	989
0.000%	EUR	1 250	2017	2021	Novartis Finance S.A., Luxembourg, Luxembourg	99.133%	1 396	1 421
1.125%	EUR	600	2017	2027	Novartis Finance S.A., Luxembourg, Luxembourg	99.874%	670	684
0.500%	EUR	750	2018	2023	Novartis Finance S.A., Luxembourg, Luxembourg	99.655%	837	853
1.375%	EUR	750	2018	2030	Novartis Finance S.A., Luxembourg, Luxembourg	99.957%	838	856
1.700%	EUR	750	2018	2038	Novartis Finance S.A., Luxembourg, Luxembourg	99.217%	832	849
Total straight bonds							**22 167**	**25 283**

The following tables provide a breakdown of total non-current financial debt, including current portion by maturity and currency:

Breakdown by maturity:

(USD millions)	**2019**	2018
2019		3 190
2020	2 002	2 006
2021	2 067	2 111
2022	2 583	2 585
2023	2 321	2 278
2024	2 139	2 137
After 2024	11 243	11 353
Total	**22 355**	**25 660**

Breakdown by currency:

(USD millions)	**2019**	2018
US dollar (USD)	12 889	15 964
Euro (EUR)	7 861	8 028
Japanese yen (JPY)	184	272
Swiss franc (CHF)	1 421	1 396
Total	**22 355**	**25 660**

The following table shows the comparison of balance sheet and fair value of total non-current financial debt, including current portion:

(USD millions)	**2019 Balance sheet**	**2019 Fair values**	2018 Balance sheet	2018 Fair values
Straight bonds	22 167	23 701	25 283	25 438
Others	188	188	377	377
Total	**22 355**	**23 889**	**25 660**	**25 815**

The fair values of straight bonds are determined by quoted market prices. Other financial debts are recorded at notional amounts, which are a reasonable approximation of the fair values.

The following table shows the pledged assets:

(USD millions)	**2019**	2018
Total net book value of property, plant and equipment pledged as collateral for non-current financial debts	3	96

20. Provisions and other non-current liabilities

(USD millions)	2019	2018
Accrued liability for employee benefits:		
Defined benefit pension plans [1]	3 469	3 546
Other long-term employee benefits and deferred compensation	546	600
Other post-employment benefits [1]	612	954
Environmental remediation provisions	592	634
Provisions for product liabilities, governmental investigations and other legal matters	200	214
Contingent consideration [2]	958	874
Other non-current liabilities	255	497
Total provisions and other non-current liabilities	**6 632**	**7 319**

[1] Note 25 provides additional disclosures related to post-employment benefits.
[2] Note 29 provides additional disclosures related to contingent consideration.

Novartis believes that its total provisions are adequate based upon currently available information. However, given the inherent difficulties in estimating liabilities in this area, Novartis may incur additional costs beyond the amounts provided. Management believes that such additional amounts, if any, would not be material to the Group's financial condition but could be material to the results of operations or cash flows in a given period.

Environmental remediation provisions

The following table shows the movements in the environmental liability provisions:

(USD millions)	2019	2018	2017
January 1	**692**	**761**	**773**
Cash payments	– 30	– 48	– 46
Releases [1]	– 83	– 21	– 153
Additions [2]	124	7	154
Currency translation effects	11	– 7	33
December 31	**714**	**692**	**761**
Less current provision	– 122	– 58	– 55
Non-current environmental remediation provisions at December 31	**592**	**634**	**706**

[1] Releases of provisions credited to the consolidated income statement from continuing operations were USD 21 million in 2018 and USD 153 million in 2017.
[2] Provisions charged to the consolidated income statement from continuing operations were USD 7 million in 2018 and USD 154 million in 2017.

The material components of the environmental remediation provisions consist of costs to sufficiently clean and refurbish contaminated sites to the extent necessary and to continue surveillance at sites where the environmental remediation exposure is less significant.

A substantial portion of the environmental remediation provisions relate to the remediation of Basel regional landfills in the adjacent border areas in Switzerland, Germany and France. The provisions are reassessed on a yearly basis and adjusted as necessary.

In the United States, Novartis has been named under federal legislation (the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended) as a potentially responsible party (PRP) in respect of certain sites. Novartis actively participates in, or monitors, the cleanup activities at the sites in which it is a PRP. The provision takes into consideration the number of other PRPs at each site as well as the identity and financial position of such parties in light of the joint and several nature of the liability.

The expected timing of the related cash outflows as of December 31, 2019, is currently projected as follows:

(USD millions)	Expected cash outflows
Due within two years	141
Due later than two years, but within five years	210
Due later than five years, but within 10 years	258
Due after 10 years	105
Total environmental remediation liability provisions	**714**

Provisions for product liabilities, governmental investigations and other legal matters

Novartis has established provisions for certain product liabilities, governmental investigations and other legal matters where a potential cash outflow is probable and Novartis can make a reliable estimate of the amount of the outflow. These provisions represent the Group's current best estimate of the total financial effect for the matters described below and for other less significant matters. Potential cash outflows reflected in a provision might be fully or partially offset by insurance in certain circumstances.

Novartis has not established provisions for potential damage awards for certain additional legal claims against its subsidiaries if Novartis currently believes that a payment is either not probable or cannot be reliably estimated. In total, these not-provisioned-for matters include more than 3 000 individual product liability cases and certain other legal matters. Plaintiffs' alleged claims in these matters, which Novartis does not believe to be entirely remote but which do not fulfill the conditions for the establishment of provisions, currently aggregate to, according to the current best belief of Novartis, approximately USD 0.9 billion. In addition, in some of these matters there are claims for punitive or multiple (treble) dam-

ages, civil penalties and disgorgement of profits that in the view of Novartis are either wholly or partially unspecified, or wholly or partially unquantifiable at present; the Group believes that information about these amounts claimed by plaintiffs generally is not meaningful for purposes of determining a reliable estimate of a loss that is probable or more than remote.

A number of other legal matters are in such early stages or the issues presented are such that the Group has not made any provisions since it cannot currently estimate either a potential outcome or the amount of any potential losses. For these reasons, among others, the Group generally is unable to make a reliable estimate of possible loss with respect to such cases. It is therefore not practicable to provide information about the potential financial impact of those cases.

There might also be cases for which the Group was able to make a reliable estimate of the possible loss or the range of possible loss, but the Group believes that publication of such information on a case-by-case basis would seriously prejudice the Group's position in ongoing legal proceedings or in any related settlement discussions. Accordingly, in such cases, information has been disclosed with respect to the nature of the contingency, but no disclosure is provided as to an estimate of the possible loss or range of possible loss.

Note 28 contains additional information on contingencies.

Alcon spin-off

On April 9, 2019, the Alcon spin-off was completed (see Note 2). Under the Separation and Distribution Agreement that Novartis entered into with Alcon in connection with the separation and the spin-off, Novartis and Alcon each agreed, subject to certain conditions and exclusions, and except to the extent otherwise described below with respect to any matter, to indemnify the other party and its directors, officers, employees and agents against any pending or future liabilities that constitute either a Novartis liability, in the case of Novartis, or an Alcon liability, in the case of Alcon, with the nature of any relevant liability being determined based on whether such claim or liability relates to the Novartis or the Alcon business and products.

Summary of significant legal proceedings

The following is a summary of significant legal proceedings to which Novartis or its subsidiaries are a party or were a party and that concluded in 2019.

Investigations and related litigations

Southern District of New York (S.D.N.Y.) marketing practices investigation and litigation

In 2013, the US government filed a civil complaint in intervention to an individual *qui tam* action against Novartis Pharmaceuticals Corporation (NPC) in the United States District Court (USDC) for the S.D.N.Y. The complaint, as subsequently amended, asserts federal False Claims Act (FCA) and common law claims with respect to speaker programs and other promotional activities for certain NPC cardiovascular medications (*Lotrel*, *Starlix* and *Valturna*) allegedly serving as mechanisms to provide kickbacks to healthcare professionals (HCPs). Also in 2013, New York State filed a civil complaint in intervention asserting similar claims. Neither government complaint in intervention adopted the individual relator's claims with respect to off-label promotion of *Valturna*, which were subsequently dismissed with prejudice by the court. The individual relator continues to litigate the kickback claims on behalf of other states and municipalities. Novartis is engaged in settlement discussions to resolve the above-described claims, and recorded a provision in the amount of USD 0.7 billion in 2019 in the Innovative Medicines Division.

S.D.N.Y. Gilenya marketing practices investigation and litigation

In 2013, NPC received a civil investigative demand from the United States Attorney's Office (USAO) for the S.D.N.Y. requesting the production of documents and information relating to marketing practices for *Gilenya*, including the remuneration of healthcare providers in connection therewith. In 2017, the S.D.N.Y. and New York State declined to intervene in claims raised by an individual relator in a *qui tam* complaint, which continue to be vigorously contested.

Government generic pricing antitrust investigations, antitrust class actions

Since 2016, Sandoz Inc. has received grand jury subpoenas and a civil investigative demand and interrogatories from the Antitrust and Civil Divisions of the US Department of Justice (DoJ), and a subpoena and interrogatories from the Attorney General of the State of Connecticut in connection with alleged price fixing and market allocation of generic drugs in the US market as well as alleged FCA violations. The requests are for documents related to the marketing and pricing of generic pharmaceutical products sold by Sandoz Inc. and its subsidiary, Fougera Pharmaceuticals Inc. (Fougera), and related communications with competitors. Sandoz Inc. is cooperating with these investigations, which it believes to be part of a broader inquiry into industry practice.

Since the third quarter of 2016, Sandoz Inc. and Fougera have been sued alongside other generic pharmaceutical companies in numerous individual and putative class action complaints by direct and indirect purchasers and Attorneys General for 54 states and territories. Plaintiffs claim that defendants, including Sandoz, engaged in price fixing and market allocation of generic drugs in the US market, and seek damages and injunctive relief. The actions contain product-specific complaints as well as complaints alleging the existence of an overarching industry conspiracy, and assert violations of federal and state antitrust laws as well as consumer protection laws. The cases have been consolidated for pretrial purposes in the USDC for the Eastern District of Pennsylvania (E.D. Pa.), and the claims are being vigorously contested.

Asia/Russia investigation

In 2017 and 2018, Alcon and Novartis Group companies received document requests and subpoenas from the DoJ and the US Securities and Exchange Commission (SEC) requesting information concerning Alcon accounting, internal controls and business practices in Asia and

Russia, including revenue recognition for surgical equipment and related products and services, as well as relationships with third-party distributors, both before and after Alcon became part of the Novartis Group. Alcon and Novartis are cooperating with this investigation. Pursuant to the terms of the Separation and Distribution Agreement, and subject to the conditions and exclusions therein, Novartis will indemnify Alcon in respect of certain fines or other monetary penalties that arise out of the investigations by the DoJ and the SEC at the time of the separation.

Lucentis/Avastin® matters

In connection with an investigation into whether Novartis entities, F. Hoffmann-La Roche AG, Genentech Inc. and Roche S.p.A. colluded to artificially preserve the market positions of Avastin® and *Lucentis*, in 2014 the Italian Competition Authority (ICA) imposed a fine equivalent to USD 125 million on the Novartis entities. Novartis paid the fine, subject to the right to later claim recoupment, and appealed before the Consiglio di Stato (CdS). In 2014 and 2015, the Italian Ministry of Health and the Lombardia region sent letters with payment requests for a total equivalent of approximately USD 1.3 billion in damages from Novartis and Roche entities based on the above allegations. In 2019, the CdS upheld the ICA decision and fine. Following the CdS decision, several additional Italian regions and hospitals sent letters claiming damages for an aggregate amount of approximately USD 330 million. None of these claims has been asserted in legal proceedings. Novartis has filed a further appeal of the CdS decision. In 2019, the French Competition Authority (FCA) issued a Statement of Objections against Novartis entities alleging anti-competitive practices on the French market for anti-vascular endothelial growth factor treatments for wet age-related macular degeneration from 2008 to 2013, and is expected to issue its final decision in the course of 2020. Novartis continues to vigorously contest all claims in Italy and France. Also, Novartis is challenging policies and regulations allowing off-label/unlicensed use and reimbursement for economic reasons in various countries, including Italy, the UK, Turkey and Brazil.

Japan investigation

In 2015, a trial started against a former Novartis Pharma K.K. (NPKK) employee, and also against NPKK under the dual liability concept in Japanese law, over allegations brought by the Tokyo District Public Prosecutor Office for alleged manipulation of data in sub-analysis publications of the Kyoto Heart Study regarding valsartan. The charges against NPKK are subject to a maximum total fine of JPY 4 million. In 2018, the Tokyo High Court upheld a not-guilty ruling of the Tokyo District Court for both the former NPKK employee and NPKK. A further appeal by the Tokyo District Public Prosecutor Office remains pending.

South Korea investigation

In 2016, the Seoul Western District Prosecutor initiated a criminal investigation into, among other things, allegations that Novartis Korea utilized medical journals to provide inappropriate economic benefits to HCPs, which resulted in a non-material fine in January 2020. Novartis has received requests for information from the DoJ and the SEC regarding this matter, and is cooperating with their ongoing inquiry.

Greece investigation

Novartis is investigating allegations of potentially inappropriate economic benefits to HCPs, government officials and others in Greece. Novartis is providing information to the Greek authorities investigating these allegations, including the Greek Coordinating Body for Inspection and Control, and the Greek Body of Prosecution of Financial Crime, from which it received a summons in 2018. Novartis is also responding to subpoenas and document requests from the SEC and DoJ that it received beginning in 2016 in connection with such allegations, and is cooperating with their investigation.

Antitrust class actions

Enoxaparin

In 2015, Sandoz and Momenta Pharmaceuticals were sued in a putative antitrust class action in federal court in Tennessee alleging that Momenta and Sandoz engaged in anticompetitive and unfair business conduct with regard to sales of enoxaparin. The same allegations were made by Amphastar in a lawsuit filed in federal court in California and subsequently moved to federal court in Massachusetts. In 2019, Sandoz resolved both matters, with Sandoz agreeing to pay USD 85 million to resolve the Tennessee class action and paying Amphastar approximately USD 39 million to resolve the Massachusetts case. The class action settlement is contingent upon, among other conditions, court approval and the class participants not exceeding an opt-out threshold. Sandoz, Momenta and Amphastar were also engaged in patent litigation concerning enoxaparin that concluded in June 2019.

Exforge

Since 2018, Novartis Group companies as well as other pharmaceutical companies have been sued by various direct and indirect purchasers of *Exforge* in multiple US individual and putative class action complaints. They claim that Novartis made a reverse payment in the form of an agreement not to launch an authorized generic, alleging violations of federal antitrust law and state antitrust, consumer protection and common laws, and seeking damages as well as injunctive relief. The cases have been consolidated in the S.D.N.Y. and the claims are being vigorously contested.

Product liability litigation

Reclast

NPC is a defendant in more than 20 US product liability actions involving *Reclast* and alleging atypical femur fracture injuries, all of which are in New Jersey state or federal court and in California state court, coordinated with claims against other bisphosphonate manufacturers. The claims are being vigorously contested.

Taxotere® (docetaxel)
Sandoz is a defendant in more than 2 900 US product liability actions involving Taxotere® (docetaxel), an oncology product, many of which have been transferred to Multidistrict Litigation in the Eastern District of Louisiana. The complaints allege misleading marketing and that Sanofi, as innovator, and several 505(b)(2) NDA holders (including Sandoz) failed to warn of the risk of permanent alopecia/hair loss. The claims are being vigorously contested.

Amiodarone
Sandoz entities are named in more than 10 individual and multi-plaintiff US product liability cases involving amiodarone, a cardiac drug indicated to treat life-threatening arrhythmias that have not responded to other treatment. The complaints allege failure to warn, off-label promotion and failure to include medication guides to pharmacies. The claims are being vigorously contested.

Sartans and Ranitidine
Since 2018, claims have been brought against Sandoz and other pharmaceutical companies alleging injury from carcinogenic impurities found in valsartan and valsartan/HCT film-coated tablets and/or losartan marketed or manufactured by Sandoz, including several putative class actions in Canada and a Multidistrict Litigation in New Jersey. Claims have also been brought alleging injury from carcinogenic impurities in ranitidine-containing medicines, including several putative class actions in Canada. All of these claims are being vigorously contested.

Other matters
Average Wholesale Price (AWP) litigation
Lawsuits have been brought, the latest in February 2016, by various US state governmental entities and private parties against various pharmaceutical companies, including NPC, alleging that they fraudulently overstated the AWP that is or has been used by payors, including state Medicaid agencies, to calculate reimbursements to healthcare providers. NPC remains a defendant in a putative class action brought by private payors in New Jersey, and vigorously contests those claims. NPC resolved an action brought by the state of Illinois for approximately USD 21 million.

Aimovig–Amgen Dispute
In 2015 and 2017, Novartis and Amgen entered into agreements regarding the development and commercialization of *Aimovig*, which the companies co-commercialize in the US and to which Novartis has exclusive rights in all territories outside of the US, excluding Japan. Amgen issued a termination notice in April 2019, based on an alleged material breach of the collaboration agreements, and this notice, as well as other ancillary matters, are the subject of legal proceedings between Novartis and Amgen. Novartis disputes Amgen's allegations vigorously. The collaboration continues during the litigation between the companies, and will remain in force until and unless a final court decision terminates the agreements.

Concluded legal matters
District of Massachusetts (D. Mass.) charitable foundation investigation
In 2016 and 2017, NPC received subpoenas from the USAO for the D. Mass. requesting documents related to NPC's support of 501(c)(3) organizations that provide copayment assistance to Medicare patients who are prescribed Novartis medicines, including the respective accounting and tax treatment, as well as related to pricing strategies for *Gleevec*, *Tasigna*, *Zometa* and *Gilenya*. In 2018, NPC agreed to a settlement in principle to pay USD 23 million to resolve the investigation into potential violations of federal healthcare laws, including the Anti-Kickback Statute and FCA. In 2019, NPC agreed in principle to pay an additional USD 28 million to resolve related allegations. These settlements are subject to mutually agreeable terms and finalization of the documentation. Novartis considers this matter concluded for the purpose of reporting legal proceedings.

MIVS platform patent infringement litigation
In 2015, Johns Hopkins University (JHU) filed a patent infringement lawsuit against certain Alcon entities alleging that the use of certain Alcon surgical products, principally by third parties, infringes a patent directed to certain methods of ocular surgery. In 2019, JHU and Alcon entered into a confidential resolution of the litigation. Novartis considers this matter concluded.

Summary of product liability, governmental investigations and other legal matters provision movements

(USD millions)	**2019**	2018	2017
January 1	**340**	**351**	**395**
Provisions related to discontinued operations [1]	– 42		
Impact of business combinations	10		
Cash payments	– 116	– 118	– 69
Releases of provisions [2]	– 52	– 107	– 70
Additions to provisions [3]	1 230	220	93
Currency translation effects	– 1	– 6	2
December 31	**1 369**	**340**	**351**
Less current portion	– 1 169	– 126	– 121
Non-current product liabilities, governmental investigations and other legal matters provisions at December 31	**200**	**214**	**230**

[1] Notes 1, 2 and 30 provide information related to discontinued operations.
[2] Releases of provisions credited to the consolidated income statement from continuing operations were USD 107 million in 2018 and USD 63 million in 2017.
[3] Provisions charged to the consolidated income statement from continuing operations were USD 220 million in 2018 and USD 47 million in 2017.

Novartis believes that its total provisions for investigations, product liability, arbitration and other legal matters are adequate based upon currently available information. However, given the inherent difficulties in estimating liabilities, there can be no assurance that additional liabilities and costs will not be incurred beyond the amounts provided.

21. Current financial debt and derivative financial instruments

(USD millions)	2019	2018
Interest-bearing accounts of associates payable on demand [1]	1 836	1 778
Bank and other financial debt [2]	719	701
Commercial paper	2 289	3 951
Current portion of non-current financial debt	2 002	3 190
Fair value of derivative financial instruments	185	58
Total current financial debt and derivative financial instruments	**7 031**	**9 678**

[1] Weighted average interest rate 0.5% (2018: 0.5%)
[2] Weighted average interest rate 12.9% (2018: 9.6%)

The consolidated balance sheet amounts of current financial debt, other than the current portion of non-current financial debt, approximate the estimated fair value due to the short-term nature of these instruments.

Details on commercial papers and short term borrowings are provided under “Liquidity risk” in Note 29.

22. Provisions and other current liabilities

(USD millions)	2019	2018
Taxes other than income taxes	471	528
Restructuring provisions	438	507
Accrued expenses for goods and services received but not invoiced	1 046	970
Accruals for royalties	653	651
Accrued interests on financial debt	98	156
Provisions for deductions from revenue	5 595	5 262
Accruals for compensation and benefits, including social security	2 464	2 527
Environmental remediation liabilities	122	58
Deferred income	114	236
Provisions for product liabilities, governmental investigations and other legal matters [1]	1 169	126
Accrued share-based payments	326	273
Contingent considerations [2]	78	33
Commitment for repurchase of own shares [3]		284
Other payables	764	673
Total provisions and other current liabilities	**13 338**	**12 284**

[1] Note 20 provides additional disclosures related to legal provisions.
[2] Note 29 provides additional disclosures related to contingent considerations.
[3] Note 18 provides additional disclosures related to commitment for repurchase of own shares.

Provisions are based upon management’s best estimate and adjusted for actual experience. Such adjustments to the historic estimates have not been material.

Provisions for deductions from revenue

The following table shows the movement of the provisions for deductions from revenue:

(USD millions)	Revenue deductions provisions at January 1	Revenue deductions provisions related to discontinued operations[1]	Effect of currency translation and business combinations	Payments/ utilizations	Income statement charge[2] Adjustments of prior years	Income statement charge[2] Current year	Change in provisions offset against gross trade receivables	Revenue deductions provisions at December 31
2019								
US-specific healthcare plans and program rebates	1 883	0		– 5 183	– 193	5 474		1 981
Non-US-specific healthcare plans and program rebates	1 625	– 28	– 19	– 2 467	– 2	2 659	1	1 769
Non-healthcare plans and program-related rebates, returns and other deductions	1 754	– 166	9	– 11 698	– 25	11 868	103	1 845
Total 2019	**5 262**	**– 194**	**– 10**	**– 19 348**	**– 220**	**20 001**	**104**	**5 595**
2018								
US-specific healthcare plans and program rebates	1 590			– 4 158	– 90	4 541		1 883
Non-US-specific healthcare plans and program rebates	1 356		– 78	– 2 182	83	2 555	– 109	1 625
Non-healthcare plans and program-related rebates, returns and other deductions	1 726		– 51	– 12 227	– 91	11 956	441	1 754
Total 2018	**4 672**		**– 129**	**– 18 567**	**– 98**	**19 052**	**332**	**5 262**
2017								
US-specific healthcare plans and program rebates	1 461			– 3 684	– 62	3 875		1 590
Non-US-specific healthcare plans and program rebates	1 020		131	– 1 954	80	2 186	– 107	1 356
Non-healthcare plans and program-related rebates, returns and other deductions	1 702		65	– 11 814	– 127	12 045	– 145	1 726
Total 2017	**4 183**		**196**	**– 17 452**	**– 109**	**18 106**	**– 252**	**4 672**

[1] Notes 1, 2 and 30 provide information related to discontinued operations.
[2] Charges to the consolidated income statement from continuing operations were USD 18 248 million in 2018 and USD 17 772 million in 2017.

Restructuring provisions movements

(USD millions)	2019	2018	2017
January 1	**507**	**153**	**222**
Provisions related to discontinued operations [1]	– 8		
Additions [2]	492	534	194
Cash payments	– 479	– 145	– 200
Releases [3]	– 72	– 33	– 64
Transfers			– 7
Currency translation effects	– 2	– 2	8
December 31	**438**	**507**	**153**

[1] Notes 1, 2 and 30 provide information related to discontinued operations.
[2] Provisions charged to the consolidated income statement from continuing operations were USD 521 million in 2018 and USD 186 million in 2017.
[3] Reversal of provisions credited to the consolidated income statement from continuing operations were USD 31 million in 2018 and USD 59 million in 2017.

In 2019, additions to provisions of USD 492 million were mainly related to the following reorganizations:

- The Innovative Medicines Division restructured its field force and supporting functions in Latin America, and following the *Xiidra* acquisition, its Ophthalmology field force in the US.
- The Sandoz Division initiatives to realign its organizational structures to improve competiveness. These initiatives include reduction in its headquarters, global functions and countries workforce, and the closure of its development center in Holzkirchen, Germany.
- Group-wide initiatives to streamline Novartis Technical Operations and implement new technologies, mainly in the Innovative Medicines Division and in the Sandoz Division, continued. In addition, Novartis Business Services launched the next phase of the new operating model to change outsourcing structures and transition activities to service centers.

In 2018, additions to provisions of USD 534 million were mainly related to the following reorganizations:

- The Innovative Medicines Division's Oncology business unit initiative to streamline its organizational structure. The objective was to enhance agility and efficiency,

resulting in an acceleration of operational execution. In addition, a program to reorganize the Japanese business model was launched. Region Europe transformed its approach to market in light of the changing product portfolio. The objective was to speed up patient access.
- Group-wide initiatives to streamline Novartis Technical Operations and implement new technologies, mainly in the Innovative Medicines Division and in the Sandoz Division, continued. In addition, Novartis Business Services launched an initiative to reorganize its organizational structure to achieve cost efficiencies by shifting activities to global service centers.

In 2017, additions to provisions of USD 194 million were mainly related to the following reorganizations:
- The Innovative Medicines Division's Pharmaceuticals business unit adjusted a regional promotional model, which led to a restructuring of the sales force. It also streamlined the above country operating model to facilitate an even higher external competition-oriented focus. Furthermore, the development organization streamlined its activities to create efficiencies.
- The former Alcon Division continued initiatives to realign its operations to focus on the Surgical and Vision Care businesses after the Ophthalmic Pharmaceuticals business transfer to the Innovative Medicines Division.
- The Sandoz Division launched initiatives to focus resources to gain efficiencies.
- Group-wide initiatives to streamline Novartis Technical Operations in the Innovative Medicines and Sandoz Divisions were launched.

23. Details to the consolidated statements of cash flows

23.1) Reversal of non-cash items and other adjustments from continuing operations

(USD millions)	**2019**	2018	2017
Depreciation, amortization and impairments on:			
Property, plant and equipment	1 547	1 783	1 460
Right-of-use assets [1]	305		
Intangible assets	3 974	3 428	3 276
Financial assets [2]	– 38	6	227
Non-cash change in provisions and other non-current liabilities	1 871	895	86
Gains on disposal and other adjustments on property, plant and equipment; intangible assets; financial assets; and other non-current assets, net	– 1 234	– 902	– 1 077
Equity-settled compensation expense	758	673	612
Income from associated companies [3]	– 659	– 6 438	– 1 108
Taxes	1 793	1 295	1 603
Net financial expense	805	746	708
Total	**9 122**	**1 486**	**5 787**

[1] Depreciation of right-of-use assets recognized from January 1, 2019, the date of implementation of IFRS 16 leases. Notes 1 and 10 provide additional disclosures.
[2] Includes fair value adjustments
[3] 2018 includes a reversal of a pre-tax gain (USD 5.8 billion) recognized from the divestment of the investment in GSK Consumer Healthcare Holdings Ltd. (see Note 2). The net cash proceed of USD 13.0 billion from the divestment was included in the consolidated statements of cash flows in the line "Acquisitions and divestments of interests in associated companies, net."

23.2) Total amount of taxes paid

In 2019, the total amount of taxes paid was USD 2.0 billion (2018: USD 1.8 billion, 2017: USD 1.6 billion), of which USD 1.9 billion (2018: USD 1.5 billion, 2017: USD 1.5 billion) was included within "Net cash flows from operating activities from continuing operations", USD 38 million (2018: USD 164 million, 2017: USD 124 million) was included within "Net cash flows from operating activities from discontinued operations," and USD 79 million (2018: nil, 2017: nil) was included within "Net cash flows used in investing activities from discontinued operations." In 2018, USD 139 million (2019: nil, 2017: nil) was included within "Net cash flows used in investing activities from continuing operations."

23.3) Cash flows from changes in working capital and other operating items included in the net cash flows from operating activities from continuing operations

(USD millions)	2019	2018	2017
(Increase) in inventories	– 382	– 387	– 203
(Increase) in trade receivables	– 980	– 544	– 655
Increase in trade payables	553	252	82
Change in other current assets	– 160	316	– 303
Change in other current liabilities	1 167	941	1 410
Other adjustments, net	1	– 2	1
Total	**199**	**576**	**332**

23.4) Cash flows arising from acquisitions and divestments of interests in associated companies

In 2018, acquisitions and divestments of interests in associated companies included USD 12 855 million net of taxes (USD 12 994 million before taxes) from the divestment of the investment in GSK Consumer Healthcare Holdings Ltd. (see Note 2).

23.5) Cash flows arising from acquisitions and divestments of businesses, net

The following is a summary of the cash flow impact of acquisitions and divestments. The most significant transactions are described in Note 2.

(USD millions)	Note	2019	2018	2017
Net assets recognized as a result of business combinations	24	**– 4 124**	**– 13 660**	**– 874**
Fair value of previously held equity interests		33		
Receivables and payables contingent consideration, net		242	– 5	151
Payments, deferred consideration and other adjustments, net		– 2	– 36	– 36
Cash flows used for acquisitions of businesses		**– 3 851**	**– 13 701**	**– 759**
Cash flows from divestments of businesses, net [1]		**91**	**18**	**45**
Cash flows used for acquisitions and divestments of businesses, net		**– 3 760**	**– 13 683**	**– 714**

[1] In 2019, the USD 91 million included USD 4 million net cash outflows from previous years divestments and USD 95 million net cash inflows from business divestments in 2019. The net identifiable assets of the 2019 divested businesses amounted to USD 196 million, comprised of non-current asset of USD 159 million, current assets of USD 96 million including USD 11 million cash and cash equivalents, non-current liabilities USD 18 million and current liabilities of USD 41 million.
In 2018, USD 18 million represented the net cash inflows from previous years divestments.
In 2017, the USD 45 million net cash inflows related to the net identifiable assets from a 2017 divestment. The 2017 divested business amounted to USD 48 million, comprised of non-current assets of USD 29 million, current assets of USD 34 million and current liabilities of USD 15 million.

Notes 2 and 24 provide further information regarding acquisitions and divestments of businesses. All acquisitions were for cash.

23.6) Reconciliation of liabilities arising from financing activities

(USD millions)	Non-current financial debts	Current financial debts and derivative financial instruments	Non-current lease liabilities	Current lease liabilities
January 1, 2019	**22 470**	**9 678**		
Impact of adoption of IFRS 16 Leases continuing operations [1]	– 2	– 1	1 471	268
Impact of adoption of IFRS 16 Leases discontinued operations [2]	– 89		246	40
Financial debts and lease liabilities related to discontinued operations [3]		– 47	– 246	– 40
Increase in non-current financial debts	93			
Repayment of non-current financial debts		– 3 195		
Change in current financial debts		– 1 582		
Payments of lease liabilities, net				– 273
Interest payments for amounts included in lease liabilities classified as cash flows from operating activities				– 51
New leases			362	131
Impact of business combinations and divestments		2	– 11	– 6
Changes in fair values, and other changes, net		129	33	20
Amortization of bonds discount	25			
Currency translation effects	– 141	44	4	1
Reclassification from non-current to current, net	– 2 003	2 003	– 156	156
December 31, 2019	**20 353**	**7 031**	**1 703**	**246**

[1] Lease liabilties recognized on January 1, 2019, the date of implementation of IFRS 16 Leases. Note 10 provides additional disclosure.
[2] In 2018, financial debts included USD 89 million for previously reported finance lease obligations of the Alcon business that have been reclassified on January 1, 2019, to lease liabilities, with the adoption of IFRS 16 Leases. Note 30 provides additional disclosures.
[3] Represents the financial debts and lease liabilities at January 1, 2019, related to the Alcon business reported as discontinued operations. See Notes 1, 2 and 30.

(USD millions)	Non-current financial debts	Current financial debts and derivative financial instruments
January 1, 2018	**23 224**	**5 308**
Increase in non-current financial debts [1]	2 856	
Repayment of non-current financial debts [2]		– 366
Change in current financial debts [3]		1 681
Impact of business combinations	10	4
Changes in fair values, and other changes	5	– 48
Amortization of bonds discount	27	2
Currency translation effects	– 462	– 93
Current portion of non-current financial debt	– 3 190	3 190
December 31, 2018	**22 470**	**9 678**

[1] Increases in non-current financial debts were only recorded in the consolidated statements of cash flows from continuing operations.
[2] Repayment of non-current financial debts were only recorded in the consolidated statements of cash flows from continuing operations.
[3] Changes in current financial debts included in the consolidated statements of cash flows from continuing operations were USD 1 687 million.

(USD millions)	Non-current financial debts	Current financial debts and derivative financial instruments
January 1, 2017	**17 897**	**5 905**
Increase in non-current financial debts [1]	4 933	
Repayment of non-current financial debts [2]	– 1	– 187
Change in current financial debts [3]		– 755
Changes in fair values, and other changes	– 6	– 140
Amortization of bonds discount	16	
Currency translation effects	744	126
Current portion of non-current financial debt	– 359	359
December 31, 2017	**23 224**	**5 308**

[1] Increases in non-current financial debts were only recorded in the consolidated statements of cash flows from continuing operations.
[2] Repayment of non-current financial debts were only recorded in the consolidated statements of cash flows from continuing operations.
[3] Changes in current financial debts included in the consolidated statements of cash flows from continuing operations were USD 644 million.

For net cash flows used in investing activities from discontinued operations, see Note 30.

24. Acquisitions of businesses

Fair value of assets and liabilities arising from acquisitions

(USD millions)	**2019**	2018	2017
Property, plant and equipment	44	137	
Currently marketed products	3 550	2 531	
Acquired research and development	342	10 224	1 223
Other intangible assets	22	1	
Deferred tax assets	60	381	8
Financial and other assets	8	19	
Inventories	195	20	
Trade receivables and other current assets	4	90	
Cash and cash equivalents		1 112	20
Deferred tax liabilities	– 107	– 2 874	– 325
Current and non-current financial debts	– 2	– 14	
Trade payables and other liabilities	– 178	– 627	– 1
Net identifiable assets acquired	**3 938**	**11 000**	**925**
Cash and cash equivalents		– 1 112	– 20
Non-controlling interests		– 26	
Goodwill	186	4 084	94
Net assets recognized as a result of business combinations [1]	**4 124**	**13 946**	**999**

[1] Net assets recognized as a result of business combinations in the consolidated balance sheet from continuing operations were USD 13 660 million in 2018 and USD 874 million in 2017.

Note 2 details significant acquisitions of businesses, specifically, *Xiidra* and IFM Tre, Inc. in 2019; AAA, AveXis and Endocyte in 2018; and Ziarco and Encore in 2017. The goodwill arising out of these acquisitions is attributable to the growth platform, the assembled workforce, and the accounting for deferred tax liabilities on the acquired assets. Goodwill of USD 98 million from 2019 is tax deductible. No goodwill from 2018 and 2017 is tax-deductible.

25. Post-employment benefits for associates

Defined benefit plans

In addition to the legally required social security schemes, the Group has numerous independent pension and other post-employment benefit plans. In most cases, these plans are externally funded in entities that are legally separate from the Group. For certain Group companies, however, no independent plan assets exist for the pension and other post-employment benefit obligations of associates. In these cases, the related unfunded liability is included in the balance sheet. The defined benefit obligations (DBOs) of all major pension and other post-employment benefit plans are reappraised annually by independent actuaries. Plan assets are recognized at fair value. The major plans are based in Switzerland, the United States, the United Kingdom, Germany and Japan, which represent 95% of the Group's total DBO for pension plans. Details of the plans in the two most significant countries, Switzerland and the United States, which represent 81% of the Group's total DBO for post-employment benefit plans, are provided below.

Swiss-based pension plans represent the most significant portion of the Group's total DBO and plan assets. For the active insured members born on or after January 1, 1956, or having joined the plans after December 31, 2010, the benefits are partially linked to the contributions paid into the plan. Certain features of Swiss pension plans required by law preclude the plans from being categorized as defined contribution plans. These factors include a minimum interest guarantee on retirement savings accounts, a predetermined factor for converting the accumulated savings account balance into a pension, and embedded death and disability benefits.

All benefits granted under Swiss-based pension plans are vested, and Swiss legislation prescribes that the employer has to contribute a fixed percentage of an associate's pay to an external pension fund. Additional employer contributions may be required whenever the plan's statutory funding ratio falls below a certain level. The associate also contributes to the plan. The pension plans are run by separate legal entities, each governed by a board of trustees that – for the principal plans – consists of representatives nominated by Novartis and the active insured associates. The boards of trustees are responsible for the plan design and asset investment strategy.

In September 2017, the pension regulations in Switzerland were amended, which resulted in a change in accounting from defined benefit to defined contribution for a component of the Swiss pension plans. This change resulted in a reduction to the defined benefit pension plans liability and in a corresponding net pre-tax gain of USD 225 million (CHF 216 million).

The United States pension plans represent the second-largest component of the Group's total DBO and plan assets. The principal plans (Qualified Plans) are funded, whereas plans providing additional benefits for executives (Restoration Plans) are unfunded. Employer contributions are required for Qualified Plans whenever the statutory funding ratio falls below a certain level.

Furthermore, in certain countries, associates are covered under other post-employment benefit plans and post-retirement medical plans.

In the US, other post-employment benefit plans consist primarily of post-employment healthcare benefits, which have been closed to new members since 2015. Part of the costs of these plans is reimbursable under the Medicare Prescription Drug, Improvement, and Modernization Act of 2003. There is no statutory funding requirement for these plans. The Group is funding these plans to the extent that it is tax efficient.

The following tables are a summary of the funded and unfunded defined benefit obligation for pension and other postemployment benefit plans of associates at December 31, 2019 and 2018:

	Pension plans		Other post-employment benefit plans	
(USD millions)	**2019**	2018	**2019**	2018
Benefit obligation at January 1	**22 179**	**23 210**	**1 073**	**1 115**
Benefit obligations related to discontinued operations [1]	– 662		– 385	
Current service cost	336	378	13	34
Interest cost	330	321	29	39
Past service costs and settlements	– 168	– 1		
Administrative expenses	24	26		
Remeasurement losses/(gains) arising from changes in financial assumptions	1 791	– 567	76	– 31
Remeasurement (gains)/losses arising from changes in demographic assumptions	– 193	5	– 9	1
Experience-related remeasurement losses/(gains)	184	264	– 22	– 32
Currency translation effects	283	– 374		– 7
Benefit payments	– 1 256	– 1 263	– 30	– 46
Contributions of associates	169	169		
Effect of acquisitions, divestments or transfers	49	11	1	
Benefit obligation at December 31	**23 066**	**22 179**	**746**	**1 073**
Fair value of plan assets at January 1	**18 838**	**20 275**	**119**	**162**
Plan assets related to discontinued operations [1]	– 424		– 40	
Interest income	257	249	3	5
Return on plan assets excluding interest income	1 656	– 805	10	– 8
Currency translation effects	304	– 310		
Novartis Group contributions	420	520	74	6
Contributions of associates	169	169		
Settlements	– 193	– 3		
Benefit payments	– 1 256	– 1 263	– 30	– 46
Effect of acquisitions, divestments or transfers	39	6	– 2	
Fair value of plan assets at December 31	**19 810**	**18 838**	**134**	**119**
Funded status	**– 3 256**	**– 3 341**	**– 612**	**– 954**
Limitation on recognition of fund surplus at January 1	**– 68**	**– 89**		
Change in limitation on recognition of fund surplus (incl. exchange rate differences)	7	25		
Interest income on limitation of fund surplus	– 4	– 4		
Limitation on recognition of fund surplus at December 31	**– 65**	**– 68**		
Net liability in the balance sheet at December 31	**– 3 321**	**– 3 409**	**– 612**	**– 954**

[1] Notes 1, 2 and 30 provide information related to discontinued operations.

The reconciliation of the net liability from January 1 to December 31 is as follows:

	Pension plans		Other post-employment benefit plans	
(USD millions)	**2019**	2018	**2019**	2018
Net liability at January 1	**– 3 409**	**– 3 024**	**– 954**	**– 953**
Less: net liability related to discontinued operations [1]	238		345	
Current service cost	– 336	– 378	– 13	– 34
Net interest expense	– 77	– 76	– 26	– 34
Administrative expenses	– 24	– 26		
Past service costs and settlements	– 25	– 2		
Remeasurements	– 126	– 507	– 35	54
Currency translation effects	21	64		7
Novartis Group contributions	420	520	74	6
Effect of acquisitions, divestments or transfers	– 10	– 5	– 3	
Change in limitation on recognition of fund surplus	7	25		
Net liability at December 31	**– 3 321**	**– 3 409**	**– 612**	**– 954**
Amounts recognized in the consolidated balance sheet				
Prepaid benefit cost	148	137		
Accrued benefit liability	– 3 469	– 3 546	– 612	– 954

[1] Notes 1, 2 and 30 provide information related to discontinued operations.

The following table shows a breakdown of the DBO for pension plans by geography and type of member, and the breakdown of plan assets into the geographical locations in which they are held:

	2019				2018			
(USD millions)	Switzerland	United States	Rest of the world	Total	Switzerland	United States	Rest of the world	Total
Benefit obligation at December 31	**15 106**	**3 552**	**4 408**	**23 066**	**14 263**	**3 348**	**4 568**	**22 179**
Thereof unfunded		*670*	*466*	*1 136*		*649*	*491*	*1 140*
By type of member								
Active	6 167	630	1 400	8 197	5 618	653	1 616	7 887
Deferred pensioners		1 205	1 517	2 722		1 131	1 531	2 662
Pensioners	8 939	1 717	1 491	12 147	8 645	1 564	1 421	11 630
Fair value of plan assets at December 31	**14 457**	**2 311**	**3 042**	**19 810**	**13 470**	**2 160**	**3 208**	**18 838**
Funded status	**– 649**	**– 1 241**	**– 1 366**	**– 3 256**	**– 793**	**– 1 188**	**– 1 360**	**– 3 341**

The following table shows a breakdown of the DBO for other post-employment benefit plans by geography and type of member, and the breakdown of plan assets into the geographical locations in which they are held:

	2019			2018		
(USD millions)	United States	Rest of the world	Total	United States	Rest of the world	Total
Benefit obligation at December 31	**658**	**88**	**746**	**1 001**	**72**	**1 073**
Thereof unfunded	*524*	*88*	*612*	*882*	*72*	*954*
By type of member						
Active	121	36	157	270	25	295
Deferred pensioners	15	0	15	18	0	18
Pensioners	522	52	574	713	47	760
Fair value of plan assets at December 31	**134**	**0**	**134**	**119**	**0**	**119**
Funded status	**– 524**	**– 88**	**– 612**	**– 882**	**– 72**	**– 954**

The following table shows the principal weighted average actuarial assumptions used for calculating defined benefit plans and other post-employment benefits of associates:

	Pension plans			Other post-employment benefit plans		
	2019	2018	2017	**2019**	2018	2017
Weighted average assumptions used to determine benefit obligations at December 31						
Discount rate	1.0%	1.6%	1.5%	3.6%	4.4%	3.7%
Expected rate of pension increase	0.3%	0.4%	0.5%			
Expected rate of salary increase	2.8%	2.8%	2.8%			
Interest on savings account	0.3%	0.8%	0.6%			
Current average life expectancy for a 65-year-old male in years	22	22	22	21	21	21
Current average life expectancy for a 65-year-old female in years	24	24	24	23	23	23

Changes in the aforementioned actuarial assumptions can result in significant volatility in the accounting for the Group's pension plans in the consolidated financial statements. This can result in substantial changes in the Group's other comprehensive income, long-term liabilities and prepaid pension assets.

The DBO is significantly impacted by assumptions regarding the rate that is used to discount the actuarially determined post-employment benefit liability. This rate is based on yields of high-quality corporate bonds in the country of the plan. Decreasing corporate bond yields decrease the discount rate, so that the DBO increases and the funded status decreases.

In Switzerland, an increase in the DBO due to lower discount rates is slightly offset by lower future benefits expected to be paid on the associate's savings account where the assumption on interest accrued changes in line with the discount rate.

The impact of decreasing interest rates on a plan's assets is more difficult to predict. A significant part of the plan assets is invested in bonds. Bond values usually rise when interest rates decrease and may therefore partially compensate for the decrease in the funded status. Furthermore, pension assets also include significant holdings of equity instruments. Share prices tend to rise when interest rates decrease and therefore often counteract the negative impact of the rising defined benefit obligation on the funded status (although the correlation of interest rates with equities is not as strong as with bonds, especially in the short term).

The expected rate for pension increases significantly affects the DBO of most plans in Switzerland, Germany and the United Kingdom. Such pension increases also decrease the funded status, although there is no strong correlation between the value of the plan assets and pension/inflation increases.

Assumptions regarding life expectancy significantly impact the DBO. An increase in longevity increases the DBO. There is no offsetting impact from the plan assets, as no longevity bonds or swaps are held by the pension funds. Generational mortality tables are used where this data is available.

The following table shows the sensitivity of the defined benefit pension obligation to the principal actuarial assumptions for the major plans in Switzerland, the United States, the United Kingdom, Germany and Japan on an aggregated basis:

(USD millions)	Change in 2019 year-end defined benefit pension obligation
25 basis point increase in discount rate	– 787
25 basis point decrease in discount rate	837
One-year increase in life expectancy	848
25 basis point increase in rate of pension increase	546
25 basis point decrease in rate of pension increase	– 135
25 basis point increase of interest on savings account	62
25 basis point decrease of interest on savings account	– 60
25 basis point increase in rate of salary increase	54
25 basis point decrease in rate of salary increase	– 55

The healthcare cost trend rate assumptions used for other post-employment benefits are as follows:

	2019	2018	2017
Healthcare cost trend rate assumed for next year	6.5%	7.0%	6.5%
Rate to which the cost trend rate is assumed to decline	4.5%	4.5%	4.5%
Year that the rate reaches the ultimate trend rate	2028	2028	2025

The following table shows the weighted average plan asset allocation of funded defined benefit pension plans at December 31, 2019 and 2018:

	Pension plans			
(as a percentage)	Long-term target minimum	Long-term target maximum	**2019**	2018
Equity securities	15	40	27	28
Debt securities	20	60	36	35
Real estate	5	20	17	17
Alternative investments	0	20	15	16
Cash and other investments	0	15	5	4
Total			**100**	**100**

Cash and most of the equity and debt securities have a quoted market price in an active market. Real estate and

alternative investments, which include hedge fund, private equity, infrastructure and commodity investments, usually have a quoted market price or a regularly updated net asset value.

The strategic allocation of assets of the different pension plans is determined with the objective of achieving an investment return that, together with the contributions paid by the Group and its associates, is sufficient to maintain reasonable control over the various funding risks of the plans. Based upon the market and economic environments, actual asset allocations may temporarily be permitted to deviate from policy targets. The asset allocation currently includes investments in shares of Novartis AG as per the below table:

	December 31, 2019	December 31, 2018
Investment in shares of Novartis AG		
Number of shares (in millions)	2.3	11.0
Market value (in USD billions)	0.2	0.9

The weighted average duration of the defined benefit obligation is 15.2 years (2018: 14.6 years).

The Group's ordinary contribution to the various pension plans is based on the rules of each plan. Additional contributions are made whenever this is required by statute or law (i.e., usually when statutory funding levels fall below predetermined thresholds). The only significant plans that are foreseen to require additional funding are those in the United Kingdom.

The expected future cash flows in respect of pension and other post-employment benefit plans at December 31, 2019, were as follows:

(USD millions)	Pension plans	Other post-employment benefit plans
Novartis Group contributions		
2020 (estimated)	410	46
Expected future benefit payments		
2020	1 201	46
2021	1 116	47
2022	1 106	48
2023	1 096	48
2024	1 087	48
2025–2029	5 270	231

Defined contribution plans

In many subsidiaries, associates are covered by defined contribution plans. Contributions charged to the consolidated income statement for the defined contribution plans were:

(USD millions)	**2019**	2018	2017
Contributions for defined contribution plans continuing operations	422	443	307

For defined contribution plans for discontinued operations, see Note 30.

26. Equity-based participation plans for associates

The expense related to all equity-based participation plans and the liabilities arising from equity-based payment transactions were as follows:

(USD millions)	**2019**	2018	2017
Expense related to equity-based participation plans	1 067	918	853
Liabilities arising from equity-based payment transactions	326	273	261

Equity-based participation plans can be separated into the following plans:

Annual Incentive

The Annual Incentive for the Novartis Group CEO and other Executive Committee members (ECN) is paid 50% in cash and 50% in Novartis restricted shares (RSs) or restricted share units (RSUs). For the Novartis Top Leaders (NTLs), the Annual Incentive is paid 70% in cash and 30% in RSs or RSUs. Both the ECN and NTLs can opt to invest up to the maximum cash portion of their Annual Incentive to receive further RSs or RSUs. Any cash is paid out during February or March in the year following the end of the performance period, and the shares are granted during January in the year following the end of the performance period.

Share savings plans

Associates in certain countries and certain key executives worldwide are encouraged to invest their Annual Incentive in a share savings plan.

Under the share savings plan, participants may elect to receive their relevant compensation fully or partially in Novartis shares in lieu of cash. As a reward for their participation in the share savings plan, at no additional cost to the participant, Novartis matches their investments in shares after a holding period of three or five years.

Novartis operates share savings plans for which associates may only participate in one of the share savings plans in any given year. The most significant are listed below:

- In Switzerland, Employee Share Ownership Plan (ESOP) participants may choose to receive their Annual Incentive (i) 100% in shares, (ii) 50% in shares and 50% in cash, or (iii) 100% in cash. After expiration of a three-year holding period for Novartis shares invested under the ESOP, participants will receive one matching share for every two invested shares. Associates eligible for the equity plan "Select" are not eligible to receive ESOP matching shares starting with the 2017 performance period.
- The Leveraged Share Savings Plan (LSSP) was available to key executives for performance periods prior to 2016. At the participant's election, the Annual Incentive was awarded partly or entirely in shares. The elected number of shares is subject to a holding period of five years. At the end of the holding period, Novartis will match the invested shares at a ratio of 1-to-1 (i.e., one share awarded for each invested share). In the United States, both the LSSP award and the corresponding match are cash settled.

Following the introduction of the new compensation programs in 2014, the Novartis Group CEO and the other Executive Committee members are no longer eligible to participate in the share savings plans. From the 2016 performance period onward, the NTLs are also no longer eligible to participate in the share savings plans.

Novartis equity plan "Select"

The equity plan "Select" is a global equity incentive plan under which eligible associates may annually be awarded a grant subject to a three-year, and for selected units a four-year, staggered vesting period. No awards are granted for performance ratings below a certain threshold. Executive Committee members are not eligible to participate in the equity plan "Select" effective from the performance period 2014, and the NTLs are not eligible to participate effective from the performance period 2016.

The equity plan "Select" currently allows participants in Switzerland to choose the form of their equity compensation in RSs or RSUs. In all other jurisdictions, RSs or RSUs are granted unilaterally. Until 2013, participants could also choose to receive part or the entire grant in the form of tradable share options.

Tradable share options expire on their 10th anniversary from the grant date. Each tradable share option entitles the holder to purchase after vesting (and before the 10th anniversary from the grant date) one Novartis share at a stated exercise price that equals the closing market price of the underlying share at the grant date. As the exercise price does not reflect the decrease in the Novartis share due to the Alcon spin, one-fifth of an Alcon share will also be awarded to the option holder upon exercise.

Options under Novartis equity plan "Select" outside North America

The following table shows the activity associated with the share options during the period. The weighted average prices in the table below are translated from Swiss francs into USD at historical rates.

	2019		2018	
	Options (millions)	Weighted average exercise price (USD)	Options (millions)	Weighted average exercise price (USD)
Options outstanding at January 1	**5.6**	**59.9**	**7.4**	**59.5**
Sold or exercised	– 2.2	58.4	– 1.8	58.2
Outstanding at December 31	**3.4**	**60.9**	**5.6**	**59.9**
Exercisable at December 31	**3.4**	**60.9**	**5.6**	**59.9**

All share options were granted at an exercise price that was equal to the closing market price of the Group's shares at the grant date. The weighted average share price at the dates of sale or exercise was USD 89.9.

The following table summarizes information about share options outstanding at December 31, 2019:

Options outstanding					Total/ weighted average
Number outstanding (millions)	0.3	0.7	0.9	1.5	**3.4**
Remaining contractual life (years)	0.0	1.0	2.0	3.0	**2.1**
Exercise price (USD)	54.5	57.0	57.6	66.0	**60.9**

Options under Novartis equity plan "Select" for North America

The following table shows the activity associated with the ADR options during the period:

	2019		2018	
	ADR options (millions)	Weighted average exercise price (USD)	ADR options (millions)	Weighted average exercise price (USD)
Options outstanding at January 1	**15.2**	**60.7**	**20.3**	**59.9**
Sold or exercised	– 5.6	58.6	– 5.1	57.4
Outstanding at December 31	**9.6**	**61.9**	**15.2**	**60.7**
Exercisable at December 31	**9.6**	**61.9**	**15.2**	**60.7**

All ADR options were granted at an exercise price that was equal to the closing market price of the ADRs at the grant date. The weighted average ADR price at the dates of sale or exercise was USD 85.1.

The following table summarizes information about ADR options outstanding at December 31, 2019:

ADR options outstanding					Total/ weighted average
Number outstanding (millions)	0.4	1.2	2.9	5.1	**9.6**
Remaining contractual life (years)	0.0	1.0	2.0	3.0	**2.3**
Exercise price (USD)	54.5	57.0	57.6	66.0	**61.9**

Long-Term Performance Plan

The Long-Term Performance Plan (LTPP) is an equity plan for the ECN, the NTLs and employees of Group units with specific targets.

Participants are granted a target number of performance share units (PSUs) at the beginning of every performance period, which are converted into unrestricted Novartis shares after the performance period. The actual payout depends on the achievement of the performance measures and ranges between 0% and 200% of the granted amount. PSUs granted under the LTPP do not carry voting rights, but do carry dividend equivalents that are paid in unrestricted Novartis shares at the end of the performance period.

The LTPP awards are subject to a three-year performance and vesting period. Until 2018, the performance criteria were based on Novartis internal performance metrics. Starting in 2019, for new grants the performance criteria are based on both Novartis internal performance metrics and variables that can be observed in the market, which is the ranking of the Novartis total shareholder return (TSR) relative to a global healthcare peer group of 14 companies (updated in November 2019 from 15 companies following the acquisition of one of the companies by another company within the peer group) other companies, over rolling three-year performance periods.

TSR for Novartis and the peer companies is calculated as the change in the company share price, which is translated to USD at the relevant exchange rate, including the reinvestment return of dividends, over the three-year performance period. The calculation is based on Bloomberg standard published TSR data, which is publicly available. The position of Novartis in the peer group determines the payout range based on a payout matrix.

Long-Term Relative Performance Plan

The LTRPP is an equity plan for the Novartis ECN and NTLs. The last grant under this plan was made in 2018. The LTRPP performance criteria is based on variables that can be observed in the market, which is the ranking of the Novartis TSR relative to a global healthcare peer group of 15 other companies, over rolling three-year performance periods. The TSR for Novartis and the peer companies is calculated as described in the LTPP section above.

Other share awards

Selected associates, excluding the ECN members, may exceptionally receive Special Share Awards of RSs or RSUs. These Special Share Awards provide an opportunity to reward outstanding achievements or exceptional performance, and aim to retain key contributors. They are based on a formal internal selection process, through which the individual performance of each candidate is thoroughly assessed at several management levels. Special Share Awards have a minimum three-year vesting period. In exceptional circumstances, Special Share Awards may be awarded to attract special expertise and new talents to the organization.

Worldwide, associates at different levels in the organization were awarded RSs and RSUs in 2019, 2018 and 2017.

In addition, in 2019, 2018 and 2017, Board members received unrestricted shares as part of their regular compensation.

Summary of non-vested share movements

The table below provides a summary of non-vested share movements (RSs, RSUs and PSUs) for all plans. At the Alcon spin-off date, all RSU and PSU holders, who were not entitled to the dividend in kind in the form of Alcon shares received keep whole awards in Novartis shares to compensate for the loss of the Alcon value from their Novartis shares. These keep whole awards were accounted for as a modification. As they did not increase the value of the original grant, they did not lead to additional expense. In the table below, this is reflected by a zero fair grant date fair value:

	2019			2018		
	Number of shares in millions	Weighted average fair value at grant date in USD	Fair value at grant date in USD millions	Number of shares in millions	Weighted average fair value at grant date in USD	Fair value at grant date in USD millions
Non-vested shares at January 1	**25.7**	**77.1**	**1 981**	**23.9**	**80.6**	**1 926**
Granted						
– Annual Incentive	1.1	78.4	86	1.3	83.9	109
– Share savings plans	4.2	83.0	349	4.1	84.9	348
– Select North America	5.3	64.0	339	3.9	77.8	303
– Select outside North America	2.6	67.4	175	2.1	79.7	167
– Long-Term Performance Plan	2.5	68.9	172	1.5	85.8	129
– Long-Term Relative Performance Plan	0.1	0.0	0	0.3	52.0	16
– Other share awards	1.9	67.7	129	1.2	77.9	93
Vested	– 13.3	80.3	– 1 068	– 10.7	90.2	– 965
Forfeited	– 4.3	76.3	– 328	– 1.9	76.4	– 145
Non-vested shares at December 31	**25.8**	**71.1**	**1 835**	**25.7**	**77.1**	**1 981**

27. Transactions with related parties

Genentech/Roche

Novartis has two agreements with Genentech, Inc., United States, and one agreement with Spark Therapeutics, Inc., United States. Both companies are subsidiaries of Roche Holding AG (Roche), which is indirectly included in the consolidated financial statements using equity accounting since Novartis holds 33.3% of the outstanding voting shares of Roche (see Note 4).

Lucentis
Novartis has licensed from Genentech/Roche the exclusive rights to develop and market *Lucentis* outside the United States for indications related to diseases of the eye. Novartis pays royalties on the net sales of *Lucentis* products outside the United States. In 2019, *Lucentis* sales of USD 2.1 billion (2018: USD 2.0 billion; 2017: USD 1.9 billion) were recognized by Novartis.

Xolair
Novartis and Genentech/Roche are co-promoting *Xolair* in the United States, where Genentech/Roche records all sales. Novartis records sales outside the United States.

Novartis markets *Xolair* and records all sales and related costs outside the United States as well as co-promotion costs in the US. Genentech/Roche and Novartis share the resulting profits from sales in the United States, Europe and other countries, according to agreed profit-sharing percentages. In 2019, Novartis recognized total sales of *Xolair* of USD 1.2 billion (2018: USD 1.0 billion; 2017: USD 920 million), including sales to Genentech/Roche for the United States market.

Luxturna
In 2018, Novartis entered into an exclusive licensing and commercialization agreement and a supply agreement with Spark Therapeutics, Inc. (Spark) for *Luxturna* outside the United States. The agreements include regulatory and sales milestones as well as royalties payable to Spark on ex-US sales. On December 17, 2019, Roche acquired Spark.

The net income for royalties, cost sharing and profit sharing arising out of the *Lucentis*, *Xolair* and *Luxturna* agreements with Roche totaled USD 101 million in 2019 (net income in 2018: USD 34 million; net expense in 2017: USD 33 million).

Furthermore, Novartis has several patent license, supply and distribution agreements with Roche.

Novartis Pension Fund

In 2018, a Group subsidiary provided an uncommitted overnight credit facility to the Novartis Pension Fund, Switzerland, for up to USD 500 million with interest at the US Federal Funds Rate. This credit facility was not utilized during the years 2019 and 2018.

Executive Officers and Non-Executive Directors compensation

During 2019, there were 15 Executive Committee members ("Executive Officers"), including those who stepped down during the year (there were 17 members in 2018 and 11 members in 2017, including those who stepped down).

The total compensation for Executive Committee members and the 13 Non-Executive Directors (13 in 2018 and 2017) using the Group's accounting policies for equity-based compensation and pension benefits was as follows:

	Executive Officers			Non-Executive Directors			Total		
(USD millions)	**2019**	2018	2017	**2019**	2018	2017	**2019**	2018	2017
Cash and other compensation	20.7	22.5	18.4	4.1	4.0	4.0	24.8	26.5	22.4
Post-employment benefits	2.6	2.5	2.0				2.6	2.5	2.0
Equity-based compensation	40.6	42.5	49.9	4.6	4.8	4.8	45.2	47.3	54.7
Total	**63.9**	**67.5**	**70.3**	**8.7**	**8.8**	**8.8**	**72.6**	**76.3**	**79.1**

During 2019, the IFRS compensation expense decreased due to lower cash buyout payments to new executive officers and the forfeiture of equity-based compensation as a result of the resignation of an executive officer. These effects were partially offset by higher equity based compensation of executive officers appointed over the last three years.

During 2018, there was a decrease in the IFRS compensation expense for Executive Officers, mainly due to the higher pro-rata accelerated vesting of equity compensation in 2017, required by IFRS, in accordance with the plan rules. This was partly offset by the cash portion of buyout payments for new Executive Officers.

The Annual Incentive award, which is fully included in equity-based compensation even when paid out in cash, is granted in January in the year following the reporting period.

The disclosures on Board and executive compensation required by the Swiss Code of Obligations and in accordance with the Swiss Ordinance against Excessive Compensation in Stock Exchange Listed Companies are shown in the Compensation Report of the Group.

Transactions with former members of the Board of Directors

During 2019, 2018 and 2017, the following payments (or waivers of claims) were made to former Board members or to "persons closely" linked to them:

	Currency	**2019**	2018	2017
Dr. Krauer	CHF	60 000	60 000	60 000
Dr. Vasella	CHF	0	18 228	26 279

Dr. Alex Krauer, Honorary Chairman, is entitled to an amount of CHF 60 000 for annual periods from one AGM to the next. This amount was fixed in 1998 upon his departure from the Board in 1999, and has not been revised since that date.

Dr. Daniel Vasella, Honorary Chairman, was paid CHF 18 228 in 2018, and CHF 26 279 in 2017, for reimbursable costs under his agreement with the Company, which expired on December 31, 2019.

28. Commitments and contingencies

Research and development commitments

The Group has entered into long-term research and development agreements with various institutions, which provide for potential milestone payments by Novartis that may be capitalized. As of December 31, 2019, the Group's commitments to make payments under those agreements, and their estimated timing, were as follows:

(USD millions)	**2019**
2020	809
2021	442
2022	319
2023	724
2024	167
Thereafter	1 943
Total	**4 404**

Commitments for capital calls

The Group holds investments in funds in which it has committed to invest further upon future capital calls. As of December 31, 2019, the total uncalled capital commitments for the Group's investments in funds amounts to USD 79 million.

Note 29 contains further information on the Group's investments in funds.

Other commitments

The Group has entered into various purchase commitments for services and materials as well as for equipment in the ordinary course of business. These commitments are generally entered into at current market prices and reflect normal business operations. For disclosure of property, plant and equipment purchase commitments, see Note 9.

Guarantees issued

The Group has issued guarantees to third parties in the ordinary course of business, mostly for tax, customs or other governmental agencies.

In addition, Novartis AG is guarantor of the Group's issued bonds, credit facilities and commercial paper program.

Contingencies

Group companies have to observe the laws, government orders and regulations of the country in which they operate.

A number of Novartis companies are, and will likely continue to be, subject to various legal proceedings and investigations that arise from time to time, including proceedings regarding product liability; sales and marketing practices; commercial disputes; employment and wrongful discharge; and antitrust, securities, health and safety, environmental, tax, international trade, privacy and intellectual property matters. As a result, the Group may become subject to substantial liabilities that may not be covered by insurance and that could affect our business, financial position and reputation. While Novartis does not believe that any of these legal proceedings will have a material adverse effect on its financial position, litigation is inherently unpredictable and large judgments sometimes occur. As a consequence, Novartis may in the future incur judgments or enter into settlements of claims that could have a material adverse effect on its results of operations or cash flow.

Governments and regulatory authorities around the world have been stepping up their compliance and law enforcement activities in recent years in key areas, including marketing practices, pricing, corruption, trade restrictions, embargo legislation, insider trading, antitrust, cyber security and data privacy. Further, when one government or regulatory authority undertakes an investigation, it is not uncommon for other governments or regulators to undertake investigations regarding the same or similar matters. Responding to such investigations is costly and requires an increasing amount of management's time and attention. In addition, such investigations may affect our reputation, create a risk of potential exclusion from government reimbursement programs in the United States and other countries, and lead to (or arise from) litigation. These factors have contributed to decisions by Novartis and other companies in the healthcare industry, when deemed in their interest, to enter into settlement agreements with governmental authorities around the world prior to any formal decision by the authorities or a court. Those government settlements have involved and may continue to involve, in current government investigations and proceedings, large cash payments, sometimes in the hundreds of millions of dollars or more, including the potential repayment of amounts allegedly obtained improperly and other penalties, including treble damages. In addition, settlements of government healthcare fraud cases often require companies to enter into corporate integrity agreements, which are intended to regulate company behavior for a period of years. Our affiliate Novartis Pharmaceuticals Corporation is a party to such an agreement, which will expire in 2020. Also, matters underlying governmental investigations and settlements may be the subject of separate private litigation.

While provisions have been made for probable losses, which management deems to be reasonable or appropriate, there are uncertainties connected with these estimates.

Note 20 contains additional information on these matters.

A number of Group companies are involved in legal proceedings concerning intellectual property rights. The inherent unpredictability of such proceedings means that there can be no assurances as to their ultimate outcome. A negative result in any such proceeding could potentially adversely affect the ability of certain Novartis companies to sell their products, or require the payment of substantial damages or royalties.

In the opinion of management, however, the outcome of these actions will not materially affect the Group's financial position but could be material to the results of operations or cash flow in a given period.

The Group's potential environmental remediation liability is assessed based on a risk assessment and investigation of the various sites identified by the Group as at risk for environmental remediation exposure. The Group's future remediation expenses are affected by a number of uncertainties. These uncertainties include, but are not limited to, the method and extent of remediation, the percentage of material attributable to the Group at the remediation sites relative to that attributable to other parties, and the financial capabilities of the other potentially responsible parties.

Note 20 contains additional information on environmental liabilities.

29. Financial instruments – additional disclosures

(USD millions)	Note	2019[1]	2018[1]
Cash and cash equivalents	16	**11 112**	**13 271**
Financial assets – measured at fair value through other comprehensive income			
Marketable securities			
Debt securities	16	24	325
Long-term financial investments			
Equity securities	13	1 158	802
Debt securities	13	33	31
Total long-term financial investments – fair value through other comprehensive income		**1 191**	**833**
Total financial assets – measured at fair value through other comprehensive income		**1 215**	**1 158**
Financial assets – measured at amortized costs			
Trade receivables, income tax receivables and other current assets (excluding pre-payments)	15/17	10 337	11 024
Accrued interest on debt securities, time deposits and short-term investments	16		12
Time deposits and short-term investments with original maturity more than 90 days	16	61	2 087
Long-term loans, advances, security deposits and other long-term receivables	13	329	512
Total financial assets – measured at amortized costs		**10 727**	**13 635**
Financial assets – measured at fair value through the consolidated income statement			
Equity securities	13	366	353
Fund investments	13/16	270	286
Associated companies at fair value through profit and loss		186	145
Derivative financial instruments	16	102	130
Contingent consideration receivables	13	399	396
Total financial assets – measured at fair value through the consolidated income statement		**1 323**	**1 310**
Total financial assets		**24 377**	29 374
Financial liabilities – measured at amortized costs			
Current financial debt			
Interest-bearing accounts of associates payable on demand	21	1 836	1 778
Bank and other financial debt	21	719	701
Commercial paper	21	2 289	3 951
Current portion of non-current debt	21	2 002	3 190
Total current financial debt		**6 846**	**9 620**
Non-current financial debt			
Straight bonds	19	22 167	25 283
Liabilities to banks and other financial institutions	19	188	285
Finance lease obligations	19		92
Current portion of non-current debt	19	– 2 002	– 3 190
Total non-current financial debt		**20 353**	**22 470**
Trade payables and commitment for repurchase of own shares[2]		**5 424**	**5 840**
Total financial liabilities – measured at amortized costs		**32 623**	**37 930**
Financial liabilities – measured at fair value through the consolidated income statement			
Contingent consideration (see Note 20/22) and other financial liabilities		1 065	917
Derivative financial instruments	21	185	58
Total financial liabilities – measured at fair value through the consolidated income statement		**1 250**	**975**
Lease liabilities	10	**1 949**	
Total financial liabilities		**35 822**	**38 905**

[1] Except for straight bonds (see Note 19), the carrying amount is a reasonable approximation of fair value.
[2] Notes 18 and 22 provide additional disclosures related to commitment for repurchase of own shares.

Derivative financial instruments

The following tables show the contract or underlying principal amounts and fair values of derivative financial instruments analyzed by type of contract at December 31, 2019 and 2018. Contract or underlying principal amounts indicate the gross volume of business outstanding at the consolidated balance sheet date and do not represent amounts at risk. The fair values are determined by reference to market prices or standard pricing models that use observable market inputs at December 31, 2019 and 2018.

	Contract or underlying principal amount		Positive fair values		Negative fair values	
(USD millions)	**2019**	2018	**2019**	2018	**2019**	2018
Forward foreign exchange rate contracts	10 779	10 823	96	130	– 75	– 58
Commodity purchase contract	9		6			
Options on equity securities	269				– 110	
Total derivative financial instruments included in marketable securities and in current financial debts	**11 057**	**10 823**	**102**	**130**	**– 185**	**– 58**

The following table shows by currency contract or underlying principal amount the derivative financial instruments at December 31, 2019 and 2018:

	2019			
(USD millions)	EUR	USD	Other	Total
Forward foreign exchange rate contracts	1 373	7 760	1 646	10 779
Commodity purchase contract		9		9
Options on equity securities		250	19	269
Total derivative financial instruments	**1 373**	**8 019**	**1 665**	**11 057**

	2018			
(USD millions)	EUR	USD	Other	Total
Forward foreign exchange rate contracts	2 989	6 558	1 276	10 823
Total derivative financial instruments	**2 989**	**6 558**	**1 276**	**10 823**

Derivative financial instruments effective for hedge accounting purposes

At the end of 2019 and 2018, there were no open hedging instruments for anticipated transactions.

Fair value by hierarchy

As required by IFRS, financial assets and liabilities recorded at fair value in the consolidated financial statements are categorized based upon the level of judgment associated with the inputs used to measure their fair value. There are three hierarchical levels, based on an increasing amount of subjectivity associated with the inputs to derive fair valuation for these assets and liabilities, which are as follows:

The assets carried at Level 1 fair value are equity and debt securities listed in active markets.

The assets generally included in Level 2 fair value hierarchy are foreign exchange and interest rate derivatives, and certain debt securities. Foreign exchange and interest rate derivatives are valued using corroborated market data. The liabilities generally included in this fair value hierarchy consist of foreign exchange and interest rate derivatives.

Level 3 inputs are unobservable for the asset or liability. The assets generally included in Level 3 fair value hierarchy are various investments in hedge funds and unquoted equity security investments. Contingent consideration carried at fair value is included in this category.

	2019				
(USD millions)	Level 1	Level 2	Level 3	Valued at amortized cost	Total
Financial assets					
Debt securities		24			24
Fund investments	37				37
Total marketable securities	**37**	**24**			**61**
Time deposits and short term investments with original maturity more than 90 days				61	61
Derivative financial instruments		102			102
Total marketable securities, time deposits and derivative financial instruments	**37**	**126**		**61**	**224**
Debt and equity securities	976		581		1 557
Fund investments			233		233
Contingent consideration receivables			399		399
Long-term loans, advances, security deposits and other long-term receivables				329	329
Total financial investments and long-term loans	**976**		**1 213**	**329**	**2 518**
Associated companies at fair value through profit and loss			**186**		**186**
Financial liabilities					
Contingent consideration payables			– 1 036		– 1 036
Other financial liabilities			– 29		– 29
Derivative financial instruments		– 185			– 185
Total financial liabilities at fair value		**– 185**	**– 1 065**		**– 1 250**

	2018				
(USD millions)	Level 1	Level 2	Level 3	Valued at amortized cost	Total
Financial assets					
Debt securities	302	23			325
Fund investments	35				35
Total marketable securities	**337**	**23**			**360**
Time deposits and short term investments with original maturity more than 90 days				2 087	2 087
Derivative financial instruments		130			130
Accrued interest on debt securities, time deposits and short-term investments				12	12
Total marketable securities, time deposits and derivative financial instruments	**337**	**153**		**2 099**	**2 589**
Debt and equity securities	698		488		1 186
Fund investments			251		251
Contingent consideration receivables			396		396
Long-term loans and receivables from customers and finance lease, advances, security deposits				512	512
Total financial investments and long-term loans	**698**		**1 135**	**512**	**2 345**
Associated companies at fair value through profit and loss			**145**		**145**
Financial liabilities					
Contingent consideration payables			– 907		– 907
Other financial liabilities			– 10		– 10
Derivative financial instruments		– 58			– 58
Total financial liabilities at fair value		**– 58**	**– 917**		**– 975**

The analysis above includes all financial instruments measured at fair value as well as certain financial assets measured at amortized cost.

The change in carrying values associated with Level 3 financial instruments, using significant unobservable inputs during the year ended December 31, is set forth below:

	2019					
(USD millions)	Associated companies at fair value through profit and loss	Fund investments	Long-term financial investments	Contingent consideration receivables	Contingent consideration payables	Other financial liabilities
January 1	**145**	**251**	**488**	**396**	**– 907**	**– 10**
Impact from discontinued operations [1]		– 28	– 19		163	
Fair value gains and other adjustments, including from divestments recognized in the consolidated income statement		12	6	35	195	1
Fair value losses (including impairments and amortizations) and other adjustments recognized in the consolidated income statement	– 15				– 89	– 48
Fair value adjustments recognized in the consolidated statement of comprehensive income			– 6			
Purchases	49	28	229		– 401	– 5
Cash receipts and payments				– 32	3	33
Disposals	– 3	– 30	– 53			
Reclassification	10		– 64			
December 31	**186**	**233**	**581**	**399**	**– 1 036**	**– 29**
Total of fair value gains and losses recognized in the consolidated income statement for assets and liabilities held at December 31, 2019	– 15	12	6	35	106	– 47

[1] Notes 1, 2 and 30 provide information related to discontinued operations.

	2018					
(USD millions)	Associated companies at fair value through profit and loss	Fund investments	Long-term financial investments	Contingent consideration receivables	Contingent consideration payables	Other financial liabilities
January 1	**188**	**166**	**437**	**844**	**– 852**	**– 72**
Fair value gains and other adjustments, including from divestments recognized in the consolidated income statement		93		36	213	
Fair value losses (including impairments and amortizations) and other adjustments recognized in the consolidated income statement	– 22		– 5		– 100	
Fair value adjustments recognized in the consolidated statement of comprehensive income			– 10			
Purchases	24	22	123		– 182	
Cash receipts and payments				– 484	11	62
Disposals	– 6	– 30	– 25			
Contingent consideration payable related to disposal group held for sale					3	
Reclassification	– 39		– 32			
December 31	**145**	**251**	**488**	**396**	**– 907**	**– 10**
Total of fair value gains and losses recognized in the consolidated income statement for assets and liabilities held at December 31, 2018	– 22	93	– 5	36	113	

During 2019, there were several individually non-significant transfers of financial investments from Level 3 to Level 1 for USD 64 million (2018: USD 78 million), mainly due to initial public offerings of the invested companies.

Realized gains and losses associated with Level 3 long-term financial investments measured at fair value through the consolidated income statement are recorded in the consolidated income statement under "Other income" or "Other expense," respectively. Realized gains and losses associated with Level 3 long-term financial investments measured at fair value through other comprehensive income are not recycled through the consolidated income statement but are instead reclassified to retained earnings.

During the year, the net loss and net gain recorded on associated companies, fund investments and long-term financial investments at fair value through profit and loss were USD 72 million and USD 110 million, respectively.

If the pricing parameters for the Level 3 input were to change for associated companies at fair value through profit and loss, fund investments and long-term financial investments by 10% positively or negatively, this would change the amounts recorded in the 2019 consolidated statement of comprehensive income by USD 100 million.

To determine the fair value of a contingent consideration, various unobservable inputs are used. A change in these inputs might result in a significantly higher or lower fair value measurement. The inputs used are, among others, the probability of success, sales forecast and assumptions regarding the discount rate and timing and different scenarios of triggering events. The inputs are interrelated. The significance and usage of these inputs to each contingent consideration may vary due to differences in the timing and triggering events for payments or in the nature of the asset related to the contingent consideration.

If the most significant parameters for the Level 3 input were to change by 10% positively or negatively, or where the probability of success (POS) is the most significant input parameter, 10% were added or deducted from the applied probability of success, for contingent consideration payables, other financial liabilities and contingent consideration receivables, this would change the amounts recorded in the 2019 consolidated income statement by USD 267 million and USD 202 million, respectively.

Equity securities measured at fair value through other comprehensive income

Equity securities held as strategic investments, typically held outside the Novartis Venture Fund, are generally designated at date of acquisition as financial assets valued at fair value through other comprehensive income with no subsequent recycling through profit and loss. Except for the investment in Alcon Inc. with a fair value of USD 382 million at December 31, 2019, these are made up of individually non-significant investments. At December 31, 2019, the Group holds 53 non-listed equity securities (December 31, 2018: 41) and 29 listed equity securities (December 31, 2018: 26) in this category with the following fair values:

(USD millions)	**2019**	2018
Listed equity securities	843	597
Non-listed equity securities	315	205
Total equity securities	**1 158**	**802**

There were no dividends recognized during 2019 and 2018 from these equity securities. In 2019, in accordance with the consolidated foundations Alcon Inc. shares divestment plans, Alcon Inc. shares with a fair value of USD 976 million were sold, and the USD 62 million gain on disposal was transferred from other comprehensive income to retained earnings during 2019. In addition, in 2019, equity securities that were no longer considered strategic, with a fair value of USD 33 million (2018: USD 21 million), were sold, and the USD 33 million gain on disposal (2018: USD 16 million gain) was transferred from other comprehensive income to retained earnings (see Note 8).

Nature and extent of risks arising from financial instruments

Market risk

Novartis is exposed to market risk, primarily related to foreign currency exchange rates, interest rates, and the market value of the investments of liquid funds. The Group actively monitors and seeks to reduce, where it deems it appropriate to do so, fluctuations in these exposures. It is the Group's policy and practice to enter into a variety of derivative financial instruments to manage the volatility of these exposures and to enhance the yield on the investment of liquid funds. It does not enter into any financial transactions containing a risk that cannot be quantified at the time the transaction is concluded. In addition, it does not sell short assets it does not have, or does not know it will have, in the future. The Group only sells existing assets or enters into transactions and future transactions (in the case of anticipatory hedges) that it confidently expects it will have in the future, based on past experience. In the case of liquid funds, the Group writes call options on assets it has, or writes put options on positions it wants to acquire and has the liquidity to acquire. The Group expects that any loss in value for these instruments generally would be offset by increases in the value of the underlying transactions.

Foreign currency exchange rate risk

The Group uses the US dollar as its reporting currency. As a result, the Group is exposed to foreign currency exchange movements, primarily in European, Japanese and emerging market currencies. Fluctuations in the exchange rates between the US dollar and other currencies can have a significant effect on both the Group's results of operations, including reported sales and earnings, as well as on the reported value of our assets, liabilities and cash flows. This, in turn, may significantly affect the comparability of period-to-period results of operations.

Because our expenditures in Swiss francs are significantly higher than our revenues in Swiss francs, volatility in the value of the Swiss franc can have a significant impact on the reported value of our earnings, assets and liabilities, and the timing and extent of such volatility can be difficult to predict.

There is also a risk that certain countries could devalue their currency. If this occurs, it could impact the effective prices we would be able to charge for our products and also have an adverse impact on both our consolidated income statement and balance sheet.

Certain countries have legal or economic restrictions on the ability of subsidiaries to transfer funds to the Group in the form of cash dividends, loans or advances, but these restrictions do not have an impact on the ability of the Group to meet its cash obligations.

The most significant countries in this respect are Argentina and Venezuela, where the governments have

implemented capital controls. The net outstanding intercompany payable balance of Argentina and Venezuela Subsidiaries were not material for the Group at December 31, 2019 and at December 31, 2018.

Subsidiaries whose functional currencies have experienced a cumulative inflation rate of more than 100% over the past three years apply the rules of IAS 29 "Financial reporting in Hyperinflationary Economies". The hyperinflationary economies in which Novartis operates are Argentina and Venezuela. Venezuela was hyperinflationary for all years presented, and Argentina became hyperinflationary effective July 1, 2018, requiring retroactive implementation of hyperinflation accounting as of January 1, 2018. The impacts of applying IAS 29 was not significant in all years presented.

The Group manages its global currency exposure by engaging in hedging transactions where management deems appropriate. Novartis may enter into various contracts that reflect the changes in the value of foreign currency exchange rates to preserve the value of assets, commitments and anticipated transactions. Novartis also uses forward contracts and foreign currency option contracts to hedge.

Net investments in subsidiaries in foreign countries are long-term investments. Their fair value changes through movements of foreign currency exchange rates. The Group has designated a certain portion of its long-term euro-denominated straight bonds as hedges of the translation risk arising on certain of these net investments in foreign operations with euro functional currency. As of December 31, 2019, long-term financial debt with a carrying amount of EUR 1.8 billion (USD 2.1 billion) (December 31, 2018: USD 2.1 billion), has been designated as a hedge instrument. During 2019, USD 44 million of unrealized income (unrealized income in 2018: USD 95 million) was recognized in other comprehensive income and accumulated in currency translation effects in relation with this net investment hedge. The hedge remained effective since inception, and no amount was recognized in the consolidated income statement in 2019, 2018 and 2017.

Commodity price risk

The Group has only a very limited exposure to price risk related to anticipated purchases of certain commodities used as raw materials by the Group's businesses. A change in those prices may alter the gross margin of a specific business, but generally by not more than 10% of the margin and thus below the Group's risk management tolerance levels. Accordingly, the Group does not enter into significant commodity futures, forward or option contracts to manage fluctuations in prices of anticipated purchases.

Interest rate risk

The Group addresses its net exposure to interest rate risk mainly through the ratio of its fixed-rate financial debt to variable-rate financial debt contained in its total financial debt portfolio. To manage this mix, Novartis may enter into interest rate swap agreements, in which it exchanges periodic payments based on a notional amount and agreed-upon fixed and variable interest rates.

Equity risk

The Group may purchase equities as investments of its liquid funds. As a policy, it limits its holdings in an unrelated company to less than 5% of its liquid funds. Potential investments are thoroughly analyzed. Call options are written on equities that the Group owns, and put options are written on equities that the Group wants to buy and for which cash is available.

Credit risk

Credit risks arise from the possibility that customers may not be able to settle their obligations as agreed. To manage this risk, the Group periodically assesses country and customer credit risk, assigns individual credit limits, and takes actions to mitigate credit risk where appropriate.

The provisions for expected credit losses for customers are based on a forward-looking expected credit loss, which includes possible default events on the trade receivables over the entire holding period of the trade receivables.

In measuring the expected credit losses, trade receivables are grouped based on shared credit risk characteristics (such as private versus public receivables) and days past due. In determining the expected credit loss rates, the Group considers current and forward-looking macroeconomic factors that may affect the ability of the customers to settle the receivables, and historical loss rates for each category of customers.

The Group's largest customer accounted for approximately 23% of net sales, and the second largest and third largest customers accounted for 17% and 10% of net sales, respectively (2018: 18%, 14% and 8%, respectively; 2017: 19%, 14% and 7%, respectively). No other customer accounted for 6% or more of net sales in either year.

The highest amounts of trade receivables outstanding were for these same three customers and amounted to 14%, 12% and 7%, respectively, of the Group's trade receivables at December 31, 2019 (2018: 12%, 10% and 6%, respectively). There is no other significant concentration of customer credit risk.

Counterparty risk

Counterparty risk encompasses issuer risk on marketable securities and money market instruments; credit risk on cash, time deposits and derivatives; as well as settlement risk for different instruments. Issuer risk is reduced by only buying securities that are at least A- rated. Counterparty credit risk and settlement risk are reduced by a policy of entering into transactions with counterparties (banks or financial institutions) that feature a strong credit rating. Exposure to these risks is closely monitored and kept within predetermined parameters. The limits are regularly assessed and determined based upon credit analysis, including financial statement and capital adequacy ratio reviews. In addition, reverse repurchasing agreements are contracted, and Novartis has entered into credit support agreements with various banks for derivative transactions. To further reduce the settlement risk, the Group has implemented a multi-currency system, CLS (Continuous Linked Settlement), providing multilateral netting (payment-versus-payment settlement) of cash flows from foreign exchange transactions.

The Group's cash and cash equivalents are held with major regulated financial institutions; the three largest ones hold approximately 12.6%, 10.4% and 8.3%, respectively (2018: 9.4%, 7.6% and 7.0%, respectively).

The Group does not expect any losses from non-performance by these counterparties and does not have any significant grouping of exposures to financial sector or country risk.

Liquidity risk

Liquidity risk is defined as the risk that the Group could not be able to settle or meet its obligations associated with financial liabilities that are settled by delivering cash or another financial asset. Group Treasury is responsible for liquidity, funding and settlement management. In addition, liquidity and funding risks, and related processes and policies, are overseen by management. Novartis manages its liquidity risk on a consolidated basis according to business needs and tax, capital or regulatory considerations, if applicable, through numerous sources of financing in order to maintain flexibility. Management monitors the Group's net debt or liquidity position through rolling forecasts on the basis of expected cash flows.

Novartis has two US commercial paper programs under which it can issue up to USD 9.0 billion in the aggregate of unsecured commercial paper notes. Novartis also has a Japanese commercial paper program under which it can issue up to JPY 150 billion (approximately USD 1.4 billion) of unsecured commercial paper notes. Commercial paper notes totaling USD 2.3 billion under these three programs were outstanding as per December 31, 2019 (2018: USD 4.0 billion). Novartis further has a committed credit facility of USD 6.0 billion, which was renewed in September 2019. This credit facility is provided by a syndicate of banks and is intended to be used as a backstop for the US commercial paper programs. The renewed facility matures in September 2024 and was undrawn as per December 31, 2019, and December 31, 2018.

In December 2019, Novartis entered into a short-term credit facility of USD 7 billion, with a maturity date of June 30, 2020 with a syndicate of banks. On January 7, 2020, Novartis borrowed USD 7 billion under the facility with interest based on the USD LIBOR.

The following table sets forth how management monitors net debt or liquidity based on details of the remaining contractual maturities of current financial assets and liabilities, excluding trade receivables and payables as well as contingent considerations at December 31, 2019, and December 31, 2018:

	2019					
(USD millions)	Due within one month	Due later than one month but less than three months	Due later than three months but less than one year	Due later than one year but less than five years	Due after five years	Total
Current assets						
Marketable securities, time deposits and short-term investments with original maturity more than 90 days	20	26	16	3	57	122
Commodities					110	110
Derivative financial instruments and accrued interest	14	79	3	3	3	102
Cash and cash equivalents	9 712	1 400				11 112
Total current financial assets	**9 746**	**1 505**	**19**	**6**	**170**	**11 446**
Non-current liabilities						
Financial debt				– 9 110	– 11 243	– 20 353
Financial debt – undiscounted				*– 9 150*	*– 11 355*	*– 20 505*
Total non-current financial debt				**– 9 110**	**– 11 243**	**– 20 353**
Current liabilities						
Financial debt	– 4 243	– 1 373	– 1 230			– 6 846
Financial debt – undiscounted	*– 4 243*	*– 1 373*	*– 1 230*			*– 6 846*
Derivative financial instruments	– 130	– 29	– 26			– 185
Total current financial debt	**– 4 373**	**– 1 402**	**– 1 256**			**– 7 031**
Net debt	**5 373**	**103**	**– 1 237**	**– 9 104**	**– 11 073**	**– 15 938**

(USD millions)	Due within one month	Due later than one month but less than three months	Due later than three months but less than one year	Due later than one year but less than five years	Due after five years	Total
	2018					
Current assets						
Marketable securities, time deposits and short-term investments with original maturity more than 90 days	39	56	2 091	198	63	2 447
Commodities					104	104
Derivative financial instruments and accrued interest	40	75	27			142
Cash and cash equivalents	3 571	9 700				13 271
Total current financial assets	**3 650**	**9 831**	**2 118**	**198**	**167**	**15 964**
Non-current liabilities						
Financial debt				– 8 980	– 13 490	– 22 470
Financial debt – undiscounted				*– 9 025*	*– 13 623*	*– 22 648*
Total non-current financial debt				**– 8 980**	**– 13 490**	**– 22 470**
Current liabilities						
Financial debt	– 5 217	– 4 084	– 319			– 9 620
Financial debt – undiscounted	*– 5 217*	*– 4 084*	*– 319*			*– 9 620*
Derivative financial instruments	– 16	– 34	– 8			– 58
Total current financial debt	**– 5 233**	**– 4 118**	**– 327**			**– 9 678**
Net debt	**– 1 583**	**5 713**	**1 791**	**– 8 782**	**– 13 323**	**– 16 184**

The consolidated balance sheet amounts of financial liabilities included in the above analysis are not materially different to the contractual amounts due on maturity. The positive and negative fair values on derivative financial instruments represent the net contractual amounts to be exchanged at maturity.

The Group's contractual undiscounted potential cash flows from derivative financial instruments to be settled on a gross basis are as follows:

(USD millions)	Due within one month	Due later than one month but less than three months	Due later than three months but less than one year	Total
	2019			
Derivative financial instruments and accrued interest on derivative financial instruments				
Potential outflows in various currencies – from financial derivative liabilities	– 814	– 4 624	– 952	– 6 390
Potential inflows in various currencies – from financial derivative assets	807	4 656	922	6 385

(USD millions)	Due within one month	Due later than one month but less than three months	Due later than three months but less than one year	Total
	2018			
Derivative financial instruments and accrued interest on derivative financial instruments				
Potential outflows in various currencies – from financial derivative liabilities	– 1 305	– 2 949	– 598	– 4 852
Potential inflows in various currencies – from financial derivative assets	1 328	2 974	593	4 895

Other contractual liabilities that are not part of management's monitoring of the net debt or liquidity consist of the following items:

	2019				
(USD millions)	Due later than one month but less than three months	Due later than three months but less than one year	Due later than one year but less than five years	Due after five years	Total
Contractual interest on non-current liabilities	– 36	– 428	– 1 531	– 3 439	– 5 434
Lease liabilities	– 65	– 181	– 622	– 1 081	– 1 949
Trade payables	– 5 222	– 202			– 5 424
Contingent consideration liabilities	– 62	– 9	– 582	– 383	– 1 036

	2018				
(USD millions)	Due later than one month but less than three months	Due later than three months but less than one year	Due later than one year but less than five years	Due after five years	Total
Contractual interest on non-current liabilities	– 113	– 459	– 1 667	– 3 755	– 5 994
Trade payables	– 5 556				– 5 556
Contingent consideration liabilities		– 98	– 470	– 339	– 907

Capital risk management

Novartis strives to maintain a strong credit rating. In managing its capital, Novartis focuses on maintaining a strong balance sheet. As of December 31, 2019, Moody's Investor Service rated the Company A1 for long-term maturities and P-1 for short-term maturities and S&P Global Ratings rated the company AA- for long-term maturities and A-1+ for short-term maturities.

Value at risk

The Group uses a value at risk (VAR) computation to estimate the potential 10-day loss in the fair value of its financial instruments.

A 10-day period is used because of an assumption that not all positions could be undone in one day given the size of the positions. The VAR computation includes all financial assets and financial liabilities as set forth in the table on page F-75, except:

- Trade receivables, income tax receivables and other current assets
- Long-term loans and receivables, advances and security deposits
- Contingent considerations
- Finance lease obligations
- Lease liabilities
- Trade payables and commitment for repurchase of own shares

The VAR estimates are made assuming normal market conditions, using a 95% confidence interval. The Group uses a "Delta Normal" model to determine the observed interrelationships between movements in interest rates, stock markets and various currencies. These interrelationships are determined by observing interest rate movements, stock market movements and foreign currency rate movements over a 60-day period for the calculation of VAR amounts.

The estimated potential 10-day loss in the fair value of the Group's foreign currency positions (including foreign exchange translation risk), the estimated potential 10-day loss of its equity holdings, and the estimated potential 10-day loss in fair value of its interest rate-sensitive instruments (primarily financial debt and investments of liquid funds under normal market conditions), as calculated in the VAR model, are the following:

(USD millions)	2019	2018
All financial instruments	355	337
Analyzed by components:		
Instruments sensitive to foreign currency exchange rates	89	217
Instruments sensitive to equity market movements	31	122
Instruments sensitive to interest rates	187	221

The average, high and low VAR amounts are as follows:

	2019		
(USD millions)	Average	High	Low
All financial instruments	348	385	303
Analyzed by components:			
Instruments sensitive to foreign currency exchange rates	143	195	86
Instruments sensitive to equity market movements	36	81	16
Instruments sensitive to interest rates	233	303	187

	2018		
(USD millions)	Average	High	Low
All financial instruments	443	553	337
Analyzed by components:			
Instruments sensitive to foreign currency exchange rates	324	473	217
Instruments sensitive to equity market movements	60	122	22
Instruments sensitive to interest rates	253	361	169

The VAR computation is a risk analysis tool designed to statistically estimate the potential 10-day loss from adverse movements in foreign currency exchange rates, equity prices and interest rates under normal market conditions. The computation does not purport to represent actual losses in fair value on earnings to be incurred by the Group, nor does it consider the effect of favorable changes in market rates. The Group cannot predict actual future movements in such market rates, and it does not claim that these VAR results are indicative of future movements in such market rates or are representative of any actual impact that future changes in market rates may have on the Group's future results of operations or financial position.

30. Discontinued operations

Discontinued operations include the operational results from the Alcon eye care devices business and certain Corporate activities attributable to the Alcon business prior to the spin-off, the gain on distribution of Alcon Inc. to Novartis AG shareholders, and certain other expenses related to the Distribution (refer to Notes 1 and 2 for further details).

The Alcon eye care devices business researched, discovered, developed, manufactured, distributed and sold a broad range of eye care products. Alcon was organized into two global business franchises, Surgical and Vision Care. Alcon also provided services, training, education and technical support for both the Surgical and Vision Care businesses.

Consolidated income statement

(USD millions)	**2019**[1]	2018	2017
Net sales to third parties from discontinued operations	**1 777**	**7 149**	**6 771**
Sales to continuing segments	32	4	3
Net sales from discontinued operations	**1 809**	**7 153**	**6 774**
Other revenues			3
Cost of goods sold	– 860	– 3 983	– 3 588
Gross profit from discontinued operations	**949**	**3 170**	**3 189**
Selling, general and administration	– 638	– 2 754	– 2 532
Research and development	– 142	– 585	– 583
Other income	15	61	47
Other expense	– 113	– 126	– 194
Operating income/(loss) from discontinued operations	**71**	**– 234**	**– 73**
Interest expense	– 10	– 25	– 27
Other financial income and expense	– 3	– 1	– 3
Income/(loss) before taxes from discontinued operations	**58**	**– 260**	**– 103**
Taxes	– 159	74	307
Net (loss)/income from discontinued operations before gain on distribution of Alcon Inc. to Novartis AG shareholders	**– 101**	**– 186**	**204**
Gain on distribution of Alcon Inc. to Novartis AG shareholders[2]	4 691		
Net income/(loss) from discontinued operations	**4 590**	**– 186**	**204**

[1] The consolidated income statement amounts are for the period from January 1, 2019, to the completion of the spin-off.
[2] See Note 2 for further details on the non-taxable non-cash gain on distribution of Alcon Inc. to Novartis AG shareholders.

Supplemental disclosures related to the Alcon business distributed to Novartis AG shareholders

Net income

Included in net income from discontinued operations are:

(USD millions)	**2019**	2018	2017
Interest income		2	
Depreciation of property, plant and equipment	– 42	– 235	– 217
Depreciation of right-of-use assets [1]	– 9		
Amortization of intangible assets	– 174	– 1 052	– 1 066
Impairment charges on property, plant and equipment		– 3	
Impairment charges on intangible assets [2]		– 391	– 57
Additions to restructuring provisions		– 13	– 8
Equity-based compensation of Novartis equity plans	– 9	– 93	– 71

[1] Depreciation of right-of-use assets recognized from January 1, 2019, the date of implementation of IFRS 16 leases. See Note 1 for additional disclosures.
[2] 2018 includes an impairment of USD 337 million related to the write-down of the CyPass currently marketed product, which was acquired with the Alcon Division 2016 acquisition of Transcend Medical, Inc.

Balance sheet

The following were in the balance sheet from discontinued operations for the period from January 1, 2019, to the date of reclassification:

(USD millions)	**2019**	2018
Additions to property, plant and equipment	113	519
Additions to right-of-use assets [1]	3	
Additions to goodwill and intangible assets	36	196

[1] Additions to right-of-use assets recognized in 2019 with the implementation of IFRS 16 Leases on January 1, 2019. See Note 1 for additional disclosures.

Cash flows used in investing activities from discontinued operations

Cash flows used in investing activities from discontinued operations include the investing activities of the Alcon business, and in addition in 2017 USD 140 million cash outflows for transaction-related expenditures attributable to the series of portfolio transformation transactions completed in 2015.

(USD millions)	**2019**	2018	2017
Payments out of provisions for transaction costs attributable to the spin-off of the Alcon business	– 29		
Divested cash and cash equivalents	– 628		
Cash flows attributable to the spin-off of the Alcon business	**– 657**		
Other cash flows used in investing activities, net	– 502	– 1 001	– 775
Net cash flows used in investing activities from discontinued operations	**– 1 159**	**– 1 001**	**– 775**

Cash flows from financing activities from discontinued operations

In 2019, the net cash inflows from financing activities from discontinued operations of USD 3.3 billion (2018: USD 167 million net cash outflows, 2017: USD 415 million net cash outflows) included USD 3.5 billion cash inflows from borrowings in connection with the distribution (spin-off) of the Alcon business to Novartis AG shareholders and USD 212 million (2018: USD 57 million, 2017: nil) transaction cost payment directly attributable to the distribution (spin-off) of the Alcon business to Novartis shareholders (see Notes 1 and 2).

Intangible assets

The Alcon Divisions' cash-generating units, to which goodwill is allocated, each comprise a group of smaller cash-generating units.

The valuation method of the recoverable amount of the cash-generating units, to which goodwill is allocated, is based on the fair value less costs of disposal.

In 2017, the Alcon brand name indefinite life intangible asset was reported in Corporate, as it was used to market products of the Alcon Division and products within the Ophthalmology business franchise of the Innovative Medicines Division. In connection with the spin-off of the Alcon Division, the Novartis Group transferred the full rights of the Alcon brand name to the Alcon Division. As a result, the Innovative Medicines Division started the process of rebranding the products within its Ophthalmology business franchise and is no longer using the Alcon brand name. The Alcon brand name indefinite life intangible asset is therefore reported in the Alcon Division in 2018. In 2018, net sales of the Alcon Division products together are the grouping of cash-generating units, which were used to determine the recoverable amount. In the year before, net sales of products within the Innovative Medicines Ophthalmology business franchise as well as Alcon Division products, which used the Alcon brand name, together were the grouping of cash-generating units, which were used to determine the recoverable amounts. The valuation method is based on the fair value less costs of disposal.

The assumptions used in the calculations of fair value were a discount rate (post-tax) of 7.5% and a terminal growth rate of 3%. The Alcon terminal growth rate assumption of 3% is higher than the expected inflation rate of the medical device industry, and more specifically the ophthalmic sub-segment of the industry. The growth rates are expected to exceed this long-term inflation rate, as the aging population to which Alcon's products are prescribed is growing faster than the general population. The discount rates consider the Group's weighted average cost of capital, adjusted to approximate the weighted average cost of capital of a comparable market participant.

The fair value less costs of disposal, for all groupings of cash-generating units containing goodwill or indefinite life intangible assets, is reviewed for the impact of reasonably possible changes in key assumptions. In particular, we considered an increase in the discount rate, a decrease in the terminal growth rate, and certain negative impacts on the forecasted cash flows. These reasonably possible changes in key assumptions did not indicate an impairment.

"Note 1. Significant accounting policies—Impairment of goodwill and intangible assets" provides additional disclosures on how the Group performs goodwill and intangible asset impairment testing.

The 2018 intangible asset and goodwill impairment charges were USD 391 million, including an impairment of USD 337 million related to the write-down of the CyPass currently marketed product, which was acquired with the Alcon Division 2016 acquisition of Transcend Medical, Inc.

Leases

The following table shows the receivables of the gross investments in finance leases and the net present value of the minimum lease payments, as well as unearned finance income, related to Alcon's surgical equipment lease arrangements. The finance income was recorded in "Other income."

	2018				
(USD millions)	Total future payments	Unearned finance income	Present value	Provision	Net book value
Not later than one year [1]	64	– 5	59	– 2	57
Between one and five years	117	– 9	108	– 28	80
Later than five years	48	– 2	46	– 35	11
Total	**229**	**– 16**	**213**	**– 65**	**148**

[1] The current portion of the minimum lease payments was recorded in trade receivables or other current assets (to the extent not invoiced).

The lease liabilities recorded in discontinued operations on January 1, 2019, the date of implementation of IFRS 16 leases (see Note 1), were USD 286 million, and the right-of-use assets were USD 276 million, including USD 89 million and USD 75 million, respectively, for the previously reported finance lease obligations. For discontinued operations, there were no impairments or significant contract terminations of right-of-use assets for the period from January 1, 2019, to February 28, 2019, the date of shareholder approval for the Alcon spin-off.

Net assets derecognized

The following table presents the Alcon business net assets at the date of spin-off at April 8, 2019:

(USD millions)	2019
Property, plant and equipment	2 858
Right-of-use assets	269
Goodwill	8 906
Intangible assets other than goodwill	11 121
Deferred tax assets	732
Financial and other non-current assets	526
Inventories	1 469
Trade receivables and other current assets	1 787
Cash and cash equivalents	628
Deferred tax liabilities	– 1 713
Current and non-current lease liabilities	– 269
Current and non-current financial debts	– 3 538
Trade payables, provisions and other liabilities	– 2 751
Net assets derecognized	**20 025**

Defined contribution plans

In many subsidiaries, associates are covered by defined contribution plans. Contributions charged to the consolidated income statement for the defined contribution plans were:

(USD millions)	2019	2018	2017
Contributions for defined contribution plans discontinued operations	33	104	99

Significant transactions

In March 2019, Alcon acquired PowerVision, Inc. (PowerVision), a privately held, US-based medical device development company focused on developing accommodative, implantable intraocular lenses. The fair value of the total purchase consideration was USD 424 million. The amount consisted of an initial cash payment of USD 289 million and the net present value of the contingent consideration of USD 135 million, due to PowerVision shareholders, which they are eligible to receive upon the achievement of specified regulatory and commercialization milestones. The purchase price allocation resulted in net identifiable assets of USD 418 million, consisting of intangible assets of USD 505 million, net deferred tax liabilities of USD 93 million, other net assets of USD 6 million, and goodwill of USD 6 million. The 2019 results of operations since the date of the acquisition are not material.

For additional information related to the distribution (spin-off) of the Alcon business to Novartis AG shareholders, effected through a dividend in kind distribution that was completed on April 8, 2019, refer to Note 1 and Note 2.

31. Events subsequent to the December 31, 2019, consolidated balance sheet date

Significant transaction closed in January 2020
On November 23, 2019, Novartis entered into an agreement and plan of merger with The Medicines Company, New Jersey, USA. The transaction was completed on January 6, 2020. For details see Note 2, significant transaction entered into in 2019 and closed in 2020.

Increase in current financial debts
On January 7, 2020, Novartis borrowed USD 7 billion under a short-term credit facility with a syndicate of banks. For additional information, see Note 29.

Dividend proposal for 2019 and approval of the Group's 2019 consolidated financial statements
On January 28, 2020, the Novartis AG Board of Directors proposed the acceptance of the 2019 consolidated financial statements of the Novartis Group for approval by the Annual General Meeting on February 28, 2020. Furthermore, also on January 28, 2020, the Board proposed a dividend of CHF 2.95 per share to be approved at the Annual General Meeting on February 28, 2020. If approved, total dividend payments would amount to approximately USD 7.0 billion (2018: USD 6.6 billion), using the CHF/USD December 31, 2019, exchange rate.

32. Principal Group subsidiaries and associated companies

The following table lists the principal subsidiaries controlled by Novartis, associated companies in which Novartis is deemed to have significant influence, and foundations required to be consolidated under IFRS. It includes all subsidiaries, associated companies and consolidated foundations with total assets or net sales to third parties in excess of USD 25 million. The equity interest percentage shown in the table also represents the share in voting rights in those entities, except where explicitly noted.

As at December 31, 2019		Share capital[1]	Equity interest
Algeria			
Société par actions SANDOZ, Algiers	DZD	650.0 m	100%
Argentina			
Novartis Argentina S.A., Buenos Aires	ARS	906.1 m	100%
Australia			
Novartis Australia Pty Ltd, Macquarie Park, NSW	AUD	2	100%
Novartis Pharmaceuticals Australia Pty Ltd, Macquarie Park, NSW	AUD	3.8 m	100%
Sandoz Pty Ltd, Macquarie Park, NSW	AUD	11.6 m	100%
Austria			
Novartis Austria GmbH, Vienna	EUR	1.0 m	100%
Novartis Pharma GmbH, Vienna	EUR	1.1 m	100%
Sandoz GmbH, Kundl	EUR	32.7 m	100%
EBEWE Pharma Ges.m.b.H Nfg. KG, Unterach am Attersee	EUR	1.0 m	100%
Bangladesh			
Novartis (Bangladesh) Limited, Gazipur	BDT	162.5 m	60%
Belgium			
Novartis Pharma NV, Vilvoorde	EUR	7.1 m	100%
Sandoz NV, Vilvoorde	EUR	19.2 m	100%
Alcon – Couvreur NV, Puurs	EUR	110.6 m	100%
Bermuda			
Novartis Investment Ltd., Hamilton[3]	USD	12 000	100%
Novartis Securities Investment Ltd., Hamilton	CHF	30 000	100%
Novartis Finance Services Ltd., Hamilton	CHF	20 000	100%
Triangle International Reinsurance Limited, Hamilton	CHF	1.0 m	100%
Trinity River Insurance Co Ltd., Hamilton	USD	370 000	100%
Brazil			
Novartis Biociências S.A., São Paulo	BRL	265.0 m	100%
Sandoz do Brasil Indústria Farmacêutica Ltda., Cambé, PR	BRL	190.0 m	100%
Canada			
Novartis Pharmaceuticals Canada Inc., Dorval, Quebec	CAD	1.2 m	100%
Sandoz Canada Inc., Boucherville, Quebec	CAD	80.8 m	100%
CIBA Vision Canada Inc., Mississauga, Ontario	CAD	82 886	100%
Chile			
Novartis Chile S.A., Santiago de Chile	CLP	2.0 bn	100%
China			
Beijing Novartis Pharma Co., Ltd., Beijing	USD	30.0 m	100%
Novartis Pharmaceuticals (HK) Limited, Hong Kong	HKD	200	100%
China Novartis Institutes for BioMedical Research Co., Ltd., Shanghai	USD	320.0 m	100%
Suzhou Novartis Technical Development Co., Ltd., Changshu	USD	12.0 m	100%
Shanghai Novartis Trading Ltd., Shanghai	USD	3.2 m	100%
Sandoz (China) Pharmaceutical Co., Ltd., Zhongshan	USD	57.6 m	100%
Colombia			
Novartis de Colombia S.A., Santafé de Bogotá	COP	7.9 bn	100%
Croatia			
Sandoz d.o.o. farmaceutska industrija, Zagreb	HRK	25.6 m	100%
Czech Republic			
Novartis s.r.o., Prague	CZK	51.5 m	100%
Sandoz s.r.o., Prague	CZK	44.7 m	100%
Denmark			
Novartis Healthcare A/S, Copenhagen	DKK	14.0 m	100%
Sandoz A/S, Copenhagen	DKK	12.0 m	100%
Ecuador			
Novartis Ecuador S.A., Quito	USD	4.0 m	100%
Egypt			
Novartis Pharma S.A.E., Cairo	EGP	193.8 m	99.77%
Sandoz Egypt Pharma S.A.E., New Cairo City	EGP	250 000	100%
Finland			
Novartis Finland Oy, Espoo	EUR	459 000	100%

As at December 31, 2019		Share capital[1]	Equity interest
France			
Novartis Groupe France S.A., Rueil-Malmaison	EUR	903.0 m	100%
Novartis Pharma S.A.S., Rueil-Malmaison	EUR	43.4 m	100%
Advanced Accelerator Applications S.A., Saint-Genis-Pouilly	EUR	9.6 m	99.2%
CELLforCURE, Les Ulis	EUR	4.2 m	100%
Sandoz S.A.S., Levallois-Perret	EUR	5.4 m	100%
Germany			
Novartis Deutschland GmbH, Nuremberg	EUR	155.5 m	100%
Novartis Pharma GmbH, Nuremberg	EUR	25.6 m	100%
Novartis Pharma Produktions GmbH, Wehr	EUR	2.0 m	100%
Novartis Manufacturing GmbH, Marburg	EUR	25 000	100%
Sandoz International GmbH, Holzkirchen	EUR	100 000	100%
1 A Pharma GmbH, Oberhaching	EUR	26 000	100%
HEXAL AG, Holzkirchen	EUR	93.7 m	100%
Salutas Pharma GmbH, Barleben	EUR	42.1 m	100%
Aeropharm GmbH, Rudolstadt	EUR	26 000	100%
Greece			
Novartis (Hellas) S.A.C.I., Metamorphosis / Athens	EUR	23.4 m	100%
Hungary			
Novartis Hungary Healthcare Limited Liability Company, Budapest	HUF	545.6 m	100%
Sandoz Hungary Limited Liability Company, Budapest	HUF	883.0 m	100%
India			
Novartis India Limited, Mumbai	INR	123.5 m	70.68%
Novartis Healthcare Private Limited, Mumbai	INR	60.0 m	100%
Sandoz Private Limited, Mumbai	INR	32.0 m	100%
Indonesia			
PT. Novartis Indonesia, Jakarta	IDR	7.7 bn	100%
Ireland			
Novartis Ireland Limited, Dublin	EUR	25 000	100%
Novartis Ringaskiddy Limited, Ringaskiddy, County Cork	EUR	2.0 m	100%
Israel			
Novartis Israel Ltd., Tel Aviv	ILS	1 000	100%
Italy			
Novartis Farma S.p.A., Origgio	EUR	18.2 m	100%
Advanced Accelerator Applications (Italy) S.r.l., Pozzilli	EUR	119 000	99.2%
Sandoz S.p.A., Origgio	EUR	1.7 m	100%
Japan			
Novartis Holding Japan K.K., Tokyo	JPY	10.0 m	100%
Novartis Pharma K.K., Tokyo	JPY	6.0 bn	100%
Ciba-Geigy Japan Limited, Tokyo	JPY	8.5 m	100%
Sandoz K.K., Tokyo	JPY	100.0 m	100%
Latvia			
Novartis Baltics SIA, Riga	EUR	3.0 m	100%
Luxembourg			
Novartis Investments S.à r.l., Luxembourg City	USD	100.0 m	100%
Novartis Finance S.A., Luxembourg City	USD	100 000	100%
Malaysia			
Novartis Corporation (Malaysia) Sdn. Bhd., Kuala Lumpur	MYR	3.3 m	100%
Mexico			
Novartis Farmacéutica, S.A. de C.V., Mexico City	MXN	205.0 m	100%
Sandoz, S.A. de C.V., Mexico City	MXN	468.2 m	100%
Morocco			
Novartis Pharma Maroc SA, Casablanca	MAD	80.0 m	100%
Netherlands			
Novartis Netherlands B.V., Amsterdam	EUR	1.4 m	100%
Novartis Pharma B.V., Amsterdam	EUR	4.5 m	100%
IDB Holland BV, Baarle-Nassau	EUR	18 000	99.2%
Sandoz B.V., Almere	EUR	907 560	100%
New Zealand			
Novartis New Zealand Ltd, Auckland	NZD	820 000	100%

As at December 31, 2019		Share capital[1]	Equity interest
Norway			
Novartis Norge AS, Oslo	NOK	1.5 m	100%
Pakistan			
Novartis Pharma (Pakistan) Limited, Karachi	PKR	6.7 bn	99.99%
Panama			
Novartis Pharma (Logistics), Inc., Panama City	USD	10 000	100%
Peru			
Novartis Biosciences Perú S.A., Lima	PEN	6.1 m	100%
Philippines			
Novartis Healthcare Philippines, Inc., Makati City	PHP	298.8 m	100%
Sandoz Philippines Corporation, Makati City	PHP	30.0 m	100%
Poland			
Novartis Poland Sp. z o.o., Warsaw	PLN	44.2 m	100%
Sandoz Polska Sp. z o.o., Warsaw	PLN	25.6 m	100%
Lek S.A., Strykow	PLN	11.4 m	100%
Portugal			
Novartis Portugal SGPS Lda., Porto Salvo	EUR	500 000	100%
Novartis Farma – Produtos Farmacêuticos S.A., Porto Salvo	EUR	2.4 m	100%
Sandoz Farmacêutica Lda., Porto Salvo	EUR	499 900	100%
Romania			
Novartis Pharma Services Romania S.R.L., Bucharest	RON	3.0 m	100%
Sandoz S.R.L., Targu-Mures	RON	105.2 m	100%
Russian Federation			
Novartis Pharma LLC, Moscow	RUB	20.0 m	100%
Novartis Neva LLC, St. Petersburg	RUB	500.0 m	100%
ZAO Sandoz, Moscow	RUB	57.4 m	100%
Saudi Arabia			
Novartis Saudi Ltd., Riyadh	SAR	26.8 m	75%
Singapore			
Novartis (Singapore) Pte Ltd., Singapore	SGD	100 000	100%
Novartis Singapore Pharmaceutical Manufacturing Pte Ltd, Singapore	SGD	45.0 m	100%
Novartis Asia Pacific Pharmaceuticals Pte Ltd, Singapore	SGD	39.0 m	100%
Slovakia			
Novartis Slovakia s.r.o., Bratislava	EUR	2.0 m	100%
Slovenia			
Lek Pharmaceuticals d.d., Ljubljana	EUR	48.4 m	100%
Sandoz Pharmaceuticals d.d., Ljubljana	EUR	1.5 m	100%
South Africa			
Novartis South Africa (Pty) Ltd, Midrand	ZAR	86.3 m	100%
Sandoz South Africa (Pty) Ltd, Kempton Park	ZAR	3.0 m	100%
South Korea			
Novartis Korea Ltd., Seoul	KRW	24.5 bn	98.55%
Spain			
Novartis Farmacéutica, S.A., Barcelona	EUR	63.0 m	100%
Advanced Accelerator Applications Iberica, S.L.U., Esplugues de Llobregat	EUR	22.6 m	99.2%
Sandoz Farmacéutica S.A., Madrid	EUR	270 450	100%
Sandoz Industrial Products S.A., Les Franqueses del Vallés / Barcelona	EUR	9.3 m	100%
Alcon Cusi S.A., El Masnou / Barcelona	EUR	10.1 m	100%
Abadia Retuerta S.A., Sardón de Duero / Valladolid	EUR	6.0 m	100%
Sweden			
Novartis Sverige AB, Stockholm	SEK	5.0 m	100%
Switzerland			
Novartis International AG, Basel	CHF	10.0 m	100%
Novartis Holding AG, Basel[3]	CHF	100.2 m	100%
Novartis International Pharmaceutical Investment AG, Basel	CHF	100 000	100%
Novartis Bioventures AG, Basel	CHF	100 000	100%
Novartis Forschungsstiftung, Basel	--	--	100%
Novartis Stiftung für Kaderausbildung, Basel	--	--	100%
Novartis Mitarbeiterbeteiligungsstiftung, Basel	--	--	100%
Novartis Stiftung für Mensch und Umwelt, Basel	--	--	100%
Stiftung der Novartis AG für Erziehung, Ausbildung und Bildung, Basel	--	--	100%
Novartis Overseas Investments AG, Basel	CHF	1.0 m	100%
Japat AG, Basel	CHF	50 000	100%
Novartis Pharma AG, Basel[3]	CHF	350.0 m	100%
Novartis International Pharmaceutical AG, Basel[3]	CHF	100 000	100%
Novartis Pharma Services AG, Basel	CHF	20.0 m	100%
Novartis Pharma Schweizerhalle AG, Muttenz	CHF	18.9 m	100%
Novartis Pharma Stein AG, Stein	CHF	251 000	100%
Novartis Pharma Schweiz AG, Risch	CHF	5.0 m	100%
Novartis Ophthalmics AG, Fribourg	CHF	100 000	100%
Advanced Accelerator Applications International SA, Geneva	CHF	9.3 m	99.2%
Sandoz AG, Basel	CHF	5.0 m	100%
Sandoz Pharmaceuticals AG, Risch	CHF	100 000	100%
Roche Holding AG, Basel	CHF	160.0 m	33/6[2]

As at December 31, 2019		Share capital[1]	Equity interest
Taiwan			
Novartis (Taiwan) Co., Ltd., Taipei	TWD	170.0 m	100%
Thailand			
Novartis (Thailand) Limited, Bangkok	THB	302.0 m	100%
Turkey			
Novartis Saglik, Gida ve Tarim Ürünleri Sanayi ve Ticaret A.S., Istanbul	TRY	98.0 m	100%
Farmanova Saglik Hizmetleri Ltd. Sti., Istanbul	TRY	6.7 m	100%
Sandoz Ilaç Sanayi ve Ticaret A.S., Istanbul	TRY	165.2 m	99.99%
Sandoz Grup Saglik Ürünleri Ilaçlari Sanayi ve Ticaret A.S., Gebze – Kocaeli	TRY	50.0 m	100%
Ukraine			
Sandoz Ukraine LLC, Kyiv	UAH	8.0 m	100%
United Arab Emirates			
Novartis Middle East FZE, Dubai	AED	7.0 m	100%
United Kingdom			
Novartis UK Limited, London	GBP	25.5 m	100%
Novartis Pharmaceuticals UK Limited, London	GBP	5.4 m	100%
Novartis Grimsby Limited, London	GBP	250.0 m	100%
Imaging Equipment Ltd, London	GBP	100	99.2%
Vivacta Limited, Frimley / Camberley	GBP	2.9 m	100.0%
Ziarco Group Limited, London	GBP	3 904	100%
Sandoz Limited, Frimley / Camberley	GBP	2.0 m	100%
United States of America			
Novartis Corporation, East Hanover, NJ	USD	72.2 m	100%
Novartis Finance Corporation, East Hanover, NJ[3]	USD	1 000	100%
Novartis Capital Corporation, East Hanover, NJ	USD	1	100%
Novartis Services, Inc., East Hanover, NJ	USD	1	100%
Novartis US Foundation, East Hanover, NJ	--	--	100%
Novartis Pharmaceuticals Corporation, East Hanover, NJ	USD	650	100%
Advanced Accelerator Applications USA, Inc., Millburn, NJ	USD	1	99.2%
AveXis, Inc., Bannockburn, IL	USD	1	100%
Novartis Inflammasome Research, Inc., East Hanover, NJ	USD	1	100%
Novartis Technology LLC, East Hanover, NJ	--	--	100%
Novartis Institutes for BioMedical Research, Inc., Cambridge, MA	USD	1	100%
CoStim Pharmaceuticals Inc., Cambridge, MA	USD	1	100%
Encore Vision, Inc., East Hanover, NJ	USD	1	100%
Endocyte, Inc., East Hanover, NJ	USD	1	100%
Navigate BioPharma Services, Inc., Carlsbad, CA	USD	1	100%
Reprixys Pharmaceuticals Corporation, East Hanover, NJ	USD	1	100%
Spinifex Pharmaceuticals, Inc., East Hanover, NJ	USD	1	100%
Novartis Institute for Functional Genomics, Inc., San Diego, CA	USD	1 000	100%
Sandoz Inc., Princeton, NJ	USD	25 000	100%
Oriel Therapeutics, Inc., Durham, NC	USD	1	100%
Fougera Pharmaceuticals Inc., Melville, NY	USD	1	100%
Eon Labs, Inc., Princeton, NJ	USD	1	100%
Novartis Vaccines and Diagnostics, Inc., East Hanover, NJ	USD	3	100%
Venezuela			
Novartis de Venezuela, S.A., Caracas	VES	14	100%

In addition, the Group is represented by subsidiaries and associated companies with total assets or net sales to third parties below USD 25 million in the following countries: Bosnia/Herzegovina, Bulgaria, Dominican Republic, Guatemala, Kenya, North Macedonia, Nigeria, Puerto Rico, Uruguay and Vietnam

[1] Share capital may not reflect the taxable share capital and does not include any paid-in surplus.

[2] Approximately 33% of voting shares; approximately 6% of total net income and equity attributable to Novartis.

[3] Significant subsidiary under SEC Regulation S-X Rule 1-02(w)

m = million; bn = billion

Report of the statutory auditor

to the General Meeting of Novartis AG, Basel

Report on the audit of the consolidated financial statements

Opinion

We have audited the consolidated financial statements of Novartis AG and its subsidiaries (the "Group"), which comprise the consolidated balance sheet as at December 31, 2019 and the consolidated income statement, consolidated statement of comprehensive income, consolidated statement of changes in equity, and consolidated statement of cash flows, and notes to the consolidated financial statements, including a summary of significant accounting policies, for the year ended December 31, 2019.

In our opinion, the consolidated financial statements (pages F-1 to F-90) give a true and fair view of the consolidated financial position of the Group as at December 31, 2019, and its consolidated financial performance and its consolidated cash flows for the year then ended in accordance with International Financial Reporting Standards (IFRS), as issued by the International Accounting Standards Board, and comply with Swiss law.

Basis for opinion

We conducted our audit in accordance with Swiss law, International Standards on Auditing (ISAs) and Swiss Auditing Standards. Our responsibilities under those provisions and standards are further described in the "Auditor's responsibilities for the audit of the consolidated financial statements" section of our report.

We are independent of the Group in accordance with the provisions of Swiss law and the requirements of the Swiss audit profession, as well as the IESBA Code of Ethics for Professional Accountants, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Our audit approach

Overview

- Overall Group materiality was USD 400 million, which represents slightly less than 5% of income before taxes from continuing operations.
- We conducted full scope audit work at the Group's two operating divisions and at seven reporting entities in five countries.
- In addition, specified procedures or full scope audit work on account balances was performed at 18 reporting entities in 13 countries.
- Our audit scope addressed 67% of the Group's net sales and 81% of Group's total assets.

As key audit matters, the following areas of focus have been identified:

- Valuation of the dividend in kind distribution liability of the Alcon business
- Carrying value of the Innovative Medicines division intangible assets
- Valuation of the US Managed Care, Medicare Part D, Medicaid and indirect rebates

Context of our audit 2019

The context of our audit is set by the Group's major activities in the reporting period during which the Alcon business was distributed to the shareholders in the form of a dividend in kind. The fair value of the Alcon business at the time of the distribution was USD 23.4 billion and the total gain recognized amounted to USD 4.7 billion upon distribution. As the transaction is significant and involved judgment, we placed additional focus on the valuation of the Alcon business for the purpose of the distribution. The rest of the audit process was largely unchanged as compared to the prior year.

Materiality

The scope of our audit was influenced by our application of materiality. Our audit opinion aims to provide reasonable assurance that the consolidated financial statements are free from material misstatement. Misstatements may arise due to fraud or error. They are considered material if, individually or in aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of the consolidated financial statements.

Based on our professional judgment, we determined certain quantitative thresholds for materiality, including the overall Group materiality for the consolidated financial statements as a whole, as set out below. These, together with qualitative considerations, helped us to determine the scope of our audit and the nature, timing and extent of our audit procedures, and to evaluate the effect of misstatements, if any, both individually and in aggregate, on the consolidated financial statements as a whole.

Overall Group materiality

USD 400 million

How we determined it

Materiality was determined provisionally as 5% of estimated 2019 income before taxes from continuing operations. This level was reassessed and confirmed as part of our completion procedures.

Rationale for the materiality benchmark applied
We chose income before taxes from continuing operations as the materiality measure because, in our view, it is the measure against which the performance of the Group is most commonly assessed and is a generally accepted benchmark.

We agreed with the Audit and Compliance Committee that we would report to them misstatements identified during our audit above USD 20 million as well as any misstatements below that amount which, in our view, warranted reporting for qualitative reasons.

Audit scope
We designed our audit by determining materiality and assessing the risks of material misstatement in the consolidated financial statements. In particular, we considered areas where subjective judgments were made, such as significant accounting estimates that involved making assumptions and consideration of future events that are inherently uncertain. As in all of our audits, we also addressed the risk of management override of internal controls, including – among other matters – consideration of whether there was evidence of bias that represented a risk of material misstatement due to fraud.

How we tailored the audit scope
We tailored the scope of our audit in order to perform sufficient work to enable us to provide an opinion on the financial statements as a whole, taking into account the structure of the Group, the accounting processes and controls, and the industry in which the Group operates.

The Group financial statements are a consolidation of over 200 reporting entities. We identified seven reporting entities that, in our view, required an audit of their complete financial information due to their size or risk characteristics. We worked very closely with and received full scope reporting from the divisional audit teams for Innovative Medicines and Sandoz, each being a global business with headquarters based in Switzerland and Germany, respectively. To obtain appropriate coverage of material balances, we also received one specified procedures report and 17 full scope reports from reporting entity audit teams for the full scope audit work performed on account balances. None of the reporting entities excluded from our Group audit scope individually contributed more than 5% to net sales or total assets. Audit procedures were also performed by the Group audit team over the Group's Corporate activities, certain Group functions (including accounting for associated companies, taxation, treasury, certain employee benefits, government investigations and litigation) and Group consolidation.

To exercise the appropriate direction and supervision over the work of the divisional and reporting entity audit teams, the Group audit team made several site visits, reviewed audit working papers, participated in meetings between the divisional and reporting entity audit teams, and attended selected meetings between divisional management and divisional audit teams. In addition, we hosted a planning workshop in September 2019 for the teams auditing the divisional and reporting entities.

Key Audit Matters

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the consolidated financial statements of the current period. These matters were addressed in the context of our audit of the consolidated financial statements as a whole, and in forming our opinion thereon, and we do not provide a separate opinion on these matters.

Key audit matter	How our audit addressed the key audit matter
Valuation of the dividend in kind distribution liability of the Alcon business As described in Notes 1 and 2 to the consolidated financial statements, the shareholder approval to spin off the Alcon business required the recognition of a distribution liability at the fair value of the Alcon business. At the April 8, 2019 distribution date, the fair value of the distribution liability of the Alcon business amounted to USD 23.4 billion. The total non-taxable, non-cash gain recognized at the completion of the spin-off of the Alcon business on April 8, 2019, amounted to USD 4.7 billion. The recognition of the distribution liability required the use of valuation techniques for purposes of impairment testing of the Alcon business' assets to be distributed and for the measurement of the fair value of the distribution liability. These valuations required the use of management assumptions and estimates related to the Alcon business' future cash flows, market multiples to estimate day one market value, and control premiums to apply in estimating the Alcon business fair value. The estimates used in calculating the Alcon business' future cash flows depend on assumptions specific to the nature of Alcon's activities with regard to the amount and timing of projected future cash flows; long-term sales forecasts; actions of competitors (launch of competing products, marketing initiatives, etc.); sales erosion rates after the end of patent or other intellectual property rights protection, and timing of the entry of generic competition; outcome of research and development activities (compound efficacy, results of clinical trials, etc.); amount and timing of projected costs to develop IPR&D into commercially viable products; profit margins; probability of obtaining regulatory approval; future tax rate; terminal growth rate; and discount rate. The principal considerations for our determination that performing procedures relating to the valuation of the dividend in kind distribution liability of the Alcon business is a key audit matter are there was significant judgment by management when developing the amount and timing of projected future cash flows (specifically the terminal growth rate, long-term sales forecasts and profit margin assumptions) and the discount rate. This in turn led to a high degree of auditor judgment, subjectivity, and effort in performing procedures to evaluate these assumptions. In addition, the audit effort involved the use of professionals with specialized skill and knowledge to assist in performing these procedures and evaluating the audit evidence obtained.	Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to management's valuation of the distribution liability, including controls over the key assumptions used in the projected future cash flows and the discount rate. These procedures also included, among others, testing management's process for developing the fair value estimate; evaluating the appropriateness of the discounted cash flow model; testing the completeness, accuracy, and relevance of underlying data used in the model; and evaluating the significant assumptions, including the amount and timing of projected future cash flows (specifically the terminal growth rate, long-term sales forecasts and profit margin assumptions) and the discount rate. Evaluating management's assumptions related to the amount and timing of projected future cash flows and the discount rate involved evaluating whether the assumptions used by management were reasonable considering the current and past performance of the Alcon business, the consistency with external market and industry data, and whether these assumptions were consistent with evidence obtained in other areas of the audit. Professionals with specialized skill and knowledge were used to assist in the evaluation of Alcon's discounted cash flow model and certain significant assumptions, including the terminal growth rate and the discount rate. As a result of our procedures, we did not propose any adjustment to the valuation of the dividend in kind distribution liability. We found that the assessment made by management was based upon reasonable assumptions.

Key audit matter	How our audit addressed the key audit matter
Carrying value of the Innovative Medicines division intangible assets As described in Notes 1 and 11 to the consolidated financial statements, the Group has intangible assets in its Innovative Medicines division other than goodwill totaling USD 27.6 billion at December 31, 2019, comprising in-process research and development (IPR&D), currently marketed products, and other intangible assets. The Group recognized impairments of intangible assets in its Innovative Medicines division other than goodwill of USD 669 million during the year. In most cases, no directly observable market inputs are available to measure the fair value less costs of disposal that is used to determine if the asset is impaired. Therefore, an estimate is derived indirectly and is based on net present value techniques utilizing post-tax cash flows and discount rates. The estimates used in calculating the net present values depend on assumptions specific to the nature of the Innovative Medicines division's activities with regard to the amount and timing of projected future cash flows; long-term sales forecasts; actions of competitors (launch of competing products, marketing initiatives, etc.); sales erosion rates after the end of patent or other intellectual property rights protection, and timing of the entry of generic competition; outcome of research and development activities (compound efficacy, results of clinical trials, etc.); amount and timing of projected costs to develop IPR&D into commercially viable products; profit margins; probability of obtaining regulatory approval; future tax rate; and discount rate. The principal considerations for our determination that performing procedures relating to the carrying value of the Innovative Medicines division intangible assets is a key audit matter are there was significant judgment by management when developing the amount and timing of projected future cash flows (specifically the long-term sales forecasts and the probability of obtaining regulatory approval) and the discount rate. This in turn led to a high degree of auditor judgment, subjectivity, and effort in performing procedures to evaluate these assumptions. In addition, the audit effort involved the use of professionals with specialized skill and knowledge to assist in performing these procedures and evaluating the audit evidence obtained.	Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the key assumptions used in the impairment testing of the intangible assets. These procedures also included, among others, testing management's process for developing the fair value estimate; evaluating the appropriateness of the discounted cash flow model; testing the completeness, accuracy, and relevance of underlying data used in the model; and evaluating the significant assumptions used by management, including the amount and timing of projected future cash flows and the discount rate. Evaluating management's assumptions related to the amount and timing of projected future cash flows and the discount rate involved evaluating whether the assumptions used by management were reasonable considering the current and past performance of the intangible, the consistency with external market and industry data, and whether these assumptions were consistent with evidence obtained in other areas of the audit. Professionals with specialized skill and knowledge were used to assist in the evaluation of the discount rate. As a result of our procedures, we did not propose any adjustments to the amount of impairment recognized in 2019. For intangible assets other than goodwill where management determined that no impairment was required, we found that the assessments made by management were based upon reasonable assumptions, consistently applied.

Key audit matter	How our audit addressed the key audit matter
Valuation of the US Managed Care, Medicare Part D, Medicaid and indirect rebates As described in Note 1 and 22 to the consolidated financial statements, the consideration Novartis receives in exchange for its goods or services may be fixed or variable. Variable consideration is only recognized when it is highly probable that a significant reversal will not occur. Rebates and discounts granted to government agencies, wholesalers, retail pharmacies, managed healthcare organizations and other customers are provisioned and recorded as a deduction from revenue at the time the related revenues are recorded or when the incentives are offered. They are calculated on the basis of historical experience, regulations, the specific terms in the individual agreements, product pricing and the mix of products, contracts, channels and payors. The provision reported as of December 31, 2019 for revenue deductions amounted to USD 5.6 billion, with a significant portion of which related to US Managed Care, Medicare Part D, Medicaid and indirect rebates. The principal considerations for our determination that performing procedures relating to the valuation of the US Managed Care, Medicare Part D, Medicaid and indirect rebates is a key audit matter are there was significant judgment by management due to the measurement uncertainty involved in developing these provisions, as the provisions are based on assumptions developed using historical experience, regulations, the specific terms in the individual agreements, product pricing and the mix of products, contracts, channels and payors. This in turn led to a high degree of auditor judgment, subjectivity and effort in applying procedures relating to these assumptions. In addition, the audit effort involved the use of professionals with specialized skill and knowledge to assist in performing these procedures and evaluating the audit evidence obtained.	Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to provisions for the US Managed Care, Medicare Part D, Medicaid and indirect rebate programs, including controls over the assumptions used to estimate these rebates. These procedures also included, among others, developing an independent estimate of the rebates by utilizing third-party information, the terms and regulation of the specific rebate programs, and the historical trend of actual rebate claims paid; comparing the independent estimate to management's estimates; and testing rebate claims processed by the Group, including evaluating those claims for consistency with the contractual and mandated terms of the Group's rebate arrangements. Professionals with specialized skill and knowledge were used to evaluate whether the policy is in compliance with government regulations. We did not identify any material differences between our expectations and the accruals, and we found the judgments made by management to be reasonable.

Other information in the Annual Report

The Board of Directors is responsible for the other information in the Annual Report. The other information comprises all information included in the Annual Report, but does not include the consolidated financial statements, the standalone financial statements, the compensation report of Novartis AG and our auditor's reports thereon.

Our opinion on the consolidated financial statements does not cover the other information in the Annual Report, and we do not express any form of assurance conclusion thereon.

In connection with our audit of the consolidated financial statements, our responsibility is to read the other information in the Annual Report and, in doing so, consider whether the other information is materially inconsistent with the consolidated financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Responsibilities of the Board of Directors for the consolidated financial statements

The Board of Directors is responsible for the preparation of the consolidated financial statements that give a true and fair view in accordance with IFRS and the provisions of Swiss law, and for such internal control as the Board of Directors determines is necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the consolidated financial statements, the Board of Directors is responsible for assessing the Group's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the Board of Directors either intends to liquidate the Group or to cease operations, or has no realistic alternative but to do so.

Auditor's responsibilities for the audit of the consolidated financial statements

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance but is not a guarantee that an audit conducted in accordance with Swiss law, ISAs and Swiss Auditing Standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements.

As part of an audit in accordance with Swiss law, ISAs and Swiss Auditing Standards, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the consolidated financial statements, whether due to fraud or error; design and perform audit procedures responsive to those risks; and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made.
- Conclude on the appropriateness of the Board of Directors' use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the consolidated financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Group to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements represent the underlying transactions and events in a manner that achieves fair presentation.
- Obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Group to express an opinion on the consolidated financial statements. We are responsible for the direction, supervision and performance of the Group audit. We remain solely responsible for our audit opinion.

We communicate with the Board of Directors, mostly through the Audit and Compliance Committee, regarding – among other matters – the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide the Board of Directors with a statement that we have complied with relevant ethical requirements regarding independence, and to communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, related safeguards.

From the matters communicated with the Board of Directors, we determine those matters that were of most significance in the audit of the consolidated financial statements of the current period and are therefore the key audit matters. We describe these matters in our auditor's report, unless law or regulation precludes public disclosure about the matter or when, in extremely rare circumstances, we determine that a matter should not be communicated in our report because the adverse consequences of doing so would reasonably be expected to outweigh the public interest benefits of such communication.

Report on other legal and regulatory requirements

In accordance with article 728a paragraph 1 item 3 CO and Swiss Auditing Standard 890, we confirm that an internal control system exists, which has been designed for the preparation of consolidated financial statements according to the instructions of the Board of Directors.

We recommend that the consolidated financial statements submitted to you be approved.

PricewaterhouseCoopers AG

Luc Schulthess
Audit Expert
Auditor in charge

Kris Muller
Global relationship partner

Basel, January 28, 2020

Financial statements of Novartis AG

Income statements

(For the years ended December 31, 2019 and 2018)

(CHF millions)	Note	**2019**	2018
Income from investment in Group subsidiaries		15 318	10 761
License income		221	1 475
Gain from disposal of intangible assets			91
Other income		2	8
Total income		15 541	12 335
Amortization of goodwill and other intangible assets	3	– 474	– 1 140
Impairment of investment in Group subsidiaries	4		– 263
Administrative expenses		– 11	– 23
Other expenses		– 2	– 2
Total expenses		– 487	– 1 428
Operating income		**15 054**	**10 907**
Financial income	5	512	488
Financial expenses	5	– 260	– 231
Extraordinary expenses	6	– 86	
Income before taxes		**15 220**	**11 164**
Direct taxes		– 40	– 197
Net income of the year		**15 180**	**10 967**

The accompanying Notes form an integral part of these financial statements.

Balance sheets

(At December 31, 2019 and 2018)

(CHF millions)	Note	2019	2018
Assets			
Current assets			
Cash and cash equivalents		3	3
Interest-bearing current receivables			
Group subsidiaries		4 078	4 574
Other current receivables			
Group subsidiaries		64	102
Third parties		1	7
Total current assets		**4 146**	**4 686**
Non-current assets			
Financial assets			
Group subsidiaries		14 966	14 966
Investments			
Group subsidiaries	7	14 251	13 011
Goodwill and other intangible assets	3	2 671	13 226
Total non-current assets		**31 888**	**41 203**
Total assets		**36 034**	**45 889**
Liabilities and equity			
Current liabilities			
Interest-bearing current liabilities			
Group subsidiaries		4 635	
Other current liabilities			
Group subsidiaries		42	37
Third parties		4	30
Accrued expenses		118	201
Total current liabilities		**4 799**	**268**
Non-current liabilities			
Interest-bearing non-current liabilities			
Bonds	8	1 377	1 377
Non-current provisions		482	486
Total non-current liabilities		**1 859**	**1 863**
Equity			
Share capital	9	**1 264**	**1 275**
Legal capital reserves – capital contribution reserve		**179**	**198**
General legal reserve		320	320
Legal reserve for treasury shares held by subsidiaries	10	1 984	2 596
Total legal reserves		**2 304**	**2 916**
Free reserves	11	6 949	25 433
Retained earnings		8 844	4 833
Net income of the year		15 180	10 967
Retained earnings available for distribution at the end of the year		24 024	15 800
Total unappropriated earnings and free reserves		**30 973**	**41 233**
Treasury shares held by Novartis AG	10	**– 5 344**	**– 1 864**
Total equity		**29 376**	**43 758**
Total liabilities and equity		**36 034**	**45 889**

The accompanying Notes form an integral part of these financial statements.

Notes to the financial statements of Novartis AG

1. Introduction

The financial statements of Novartis AG, with its registered office in Basel, comply with the requirements of the Swiss accounting legislation of the Swiss Code of Obligations (SCO).

Novartis AG is presenting consolidated financial statements according to IFRS. Therefore, Novartis AG has applied the exemption included in Art. 961d para. 1 SCO and has not prepared additional disclosures, a separate cash flow statement and a management report for SCO purposes.

The Novartis AG shareholders approved the spin-off of the Alcon business at the 2019 Annual General Meeting held on February 28, 2019, subject to completion of certain conditions precedent to the distribution.

The conditions precedent to the spin-off were met and on April 8, 2019 the spin-off of the Alcon business was effected by way of a distribution of a dividend in kind of Alcon Inc. shares to Novartis AG shareholders and ADR (American Depositary Receipt) holders (the Distribution).

Through the Distribution, each Novartis AG shareholder received one Alcon Inc. share for every five Novartis AG shares/ADRs they held on April 8, 2019, close of business. As of April 9, 2019, the shares of Alcon Inc. are listed on the SIX Swiss Exchange (SIX) and on the New York Stock Exchange (NYSE) under the symbol “ALC.”

At the date of the distribution, the book value of Alcon Inc. was CHF 17 288 million and consisted of Goodwill (CHF 10 081 million), Investments in Group subsidiaries (CHF 7 188 million) and cash (CHF 19 million). The Distribution was made at the book value of Alcon Inc. and is recognized as a reduction to free reserves (CHF 17 269 million) and legal capital reserves – capital contribution reserves (CHF 19 million).

2. Accounting policies

Financial income and expenses

Current assets and current liabilities denominated in foreign currencies are converted at year-end exchange rates. Realized exchange gains and losses, and all unrealized exchange losses arising from these as well as those from business transactions are recorded net as financial income or financial expenses.

Derivative financial instruments

Derivative financial instruments are used for hedging purposes. These instruments are valued at fair value. When different accounting policies apply for the hedged item and the derivative financial instrument, hedge accounting is applied through measuring the hedged item together with the derivative financial instrument.

Financial assets

Financial assets are valued at acquisition cost less adjustments for foreign currency losses and any other impairment of value.

Investments

Investments are initially recognized at cost. Investments in Novartis Group subsidiaries are assessed annually, and in case of an impairment, adjusted to their recoverable amount within their category.

Goodwill and other intangible assets

Goodwill and other intangible assets are capitalized and amortized over a period of between five and 20 years. Goodwill and other intangible assets are reviewed for impairment on a yearly basis. If necessary, an impairment loss is recognized.

Bonds

Bonds are valued at nominal value. Any bond premium is accrued over the duration of the bond so that at maturity, the balance sheet amount will equal the amount that is due to be paid.

Provisions

Provisions are made to cover general business risks of the Group.

3. Goodwill and other intangible asset movements

(CHF millions)	2019	2018
Goodwill		
January 1	**22 350**	**22 350**
Derecognition as a result of the Alcon Inc. spin-off	– 17 411	
December 31	**4 939**	**22 350**
Accumulated amortization		
January 1	**– 9 124**	**– 7 984**
Accumulated amortization on assets related to derecognition as a result of the Alcon Inc. spin-off	7 330	
Amortization charges	– 474	– 1 140
December 31	**– 2 268**	**– 9 124**
Net book value at December 31	**2 671**	**13 226**
Other intangible assets		
Cost		
January 1		**11**
Transfer to Group subsidiaries		– 11
December 31		
Accumulated amortization		
January 1		**– 11**
Transfer to Group subsidiaries		11
Net book value at December 31		
Goodwill and other intangible assets		
Net book value at December 31	**2 671**	**13 226**

4. Impairment of investment in Group subsidiaries

In 2018, Novartis AG impaired certain Group participations in conjunction with the separation of the Alcon business as described in Note 7.

5. Financial income and expenses

	2019		2018	
(CHF millions)	Income	Expenses	Income	Expenses
Interest	512	– 191	488	– 114
Foreign exchange		– 69		– 116
Others		-0		– 1
Total	**512**	**– 260**	**488**	**– 231**

6. Extraordinary expenses

In 2019, extraordinary expenses are related to the transaction costs attributable to the spin-off of Alcon Inc.

7. Investments

The principal direct and indirect subsidiaries and other holdings of Novartis AG are shown in Note 32 to the Group's consolidated financial statements.

In 2018, Alcon Pharmaceuticals Ltd. (APL), a wholly owned subsidiary of the Company, was separated into two distinct entities (Novartis Ophthalmics AG (NOAG) and APL) in preparation for the spin-off of Alcon Inc. The transaction consisted of a contribution of the net assets of APL, unrelated to the Alcon business to NOAG, with a subsequent distribution of the participation in NOAG to Novartis AG. To reflect the economics of the transaction, the dividend income and the related NOAG investment value (with an approximate book value of CHF 4.3 billion) were offset, ensuring that Novartis AG's combined carrying value of NOAG and APL equals the previous carrying value of APL.

In 2019, various participations in Group companies, including Alcon related participations, were distributed by subsidiaries to Novartis AG, which in turn contributed them to Alcon Inc. The participation in Alcon Inc. was distributed as a dividend in kind to the Novartis AG shareholders and ADR (American Depositary Receipt) holders on April 8, 2019.

8. Bonds

Straight bonds

Coupon	Currency	Nominal amount	Issuance year	Maturity year	Issuer	Issue price	**2019 (CHF millions)**	2018 (CHF millions)
0.250%	CHF	500	2015	2025	Novartis AG, Basel, Switzerland	100.640%	501	501
0.625%	CHF	550	2015	2029	Novartis AG, Basel, Switzerland	100.502%	551	551
1.050%	CHF	325	2015	2035	Novartis AG, Basel, Switzerland	100.479%	325	325
Total straight bonds							**1 377**	**1 377**

Breakdowns by maturity

(CHF millions)	**2019**	2018
After 2024	1 377	1 377
Total	**1 377**	**1 377**

Comparison of balance sheet and fair value

(CHF millions)	**2019 Balance sheet**	**2019 Fair value**	2018 Balance sheet	2018 Fair value
Straight bonds	1 377	1 454	1 377	1 373
Total	**1 377**	**1 454**	**1 377**	**1 373**

9. Share capital

	2019		2018	
	Number of shares	Share capital CHF millions	Number of shares	Share capital CHF millions
January 1	**2 550 624 820**	**1 275.3**	**2 616 844 820**	**1 308.4**
Number of shares canceled/capital reduced during the period	– 23 250 000	– 11.6	– 66 220 000	– 33.1
December 31	**2 527 374 820**	**1 263.7**	**2 550 624 820**	**1 275.3**

The Novartis AG share capital consists of registered shares with a nominal value of CHF 0.50 each.

The total share capital decreased from CHF 1 275.3 million at December 31, 2018, to CHF 1 263.7 million at December 31, 2019, due to a share capital reduction as a result of the cancellation of 23.3 million repurchased shares with a nominal value of CHF 11.6 million. The cancellation was approved at the Annual General Meeting of February 28, 2019, and became effective on May 8, 2019. During 2018, the total share capital decreased from CHF 1 308.4 million at December 31, 2017, to CHF 1 275.3 million at December 31, 2018, due to a share capital reduction as a result of the cancellation of 66.2 million repurchased shares with a nominal value of CHF 33.1 million. The cancellation was approved at the Annual General Meeting of March 2, 2018, and became effective on May 9, 2018.

10. Treasury shares

	2019		2018	
	Number of shares	Legal reserve for treasury shares held by subsidiaries CHF millions	Number of shares	Legal reserve for treasury shares held by subsidiaries CHF millions
Treasury shares held by subsidiaries [1]				
January 1	**43 229 470**	**2 596**	**50 506 375**	**3 005**
Number of shares purchased/sold; reserves transferred	– 10 132 468	– 612	– 7 276 905	– 409
December 31	**33 097 002**	**1 984**	**43 229 470**	**2 596**

[1] Excluding foundations

	2019		2018	
	Number of shares	Deduction from equity for treasury shares held by Novartis AG CHF millions	Number of shares	Deduction from equity for treasury shares held by Novartis AG CHF millions
Treasury shares held by Novartis AG				
January 1	**74 557 458**	**1 864**	**117 527 458**	**5 213**
Number of shares purchased/canceled; reserves transferred	37 063 900	3 480	– 42 970 000	– 3 349
December 31	**111 621 358**	**5 344**	**74 557 458**	**1 864**

	2019		2018	
	Number of shares	Total treasury shares CHF millions	Number of shares	Total treasury shares CHF millions
Total treasury shares [1]				
January 1	**117 786 928**	**4 460**	**168 033 833**	**8 218**
Total number of shares purchased/sold or canceled; reserves transferred	26 931 432	2 868	– 50 246 905	– 3 758
December 31	**144 718 360**	**7 328**	**117 786 928**	**4 460**

[1] Excluding foundations

Novartis AG has met the legal requirements for legal reserves under Articles 659 et. seq. and 663b.10 SCO for the treasury shares.

Treasury share purchases during 2019 totaled 62.0 million (2018: 24.4 million), with an average purchase price of CHF 88 (2018: CHF 79). Treasury share sales totaled 1.7 million (2018: 0.8 million), with an average sale price of CHF 62 (2018: CHF 67), and share-based compensation transactions totaled 10.2 million shares (2018: 7.6 million shares).

The number of treasury shares held by the Company and its subsidiaries meet the definitions and requirements of Article 659b SCO. At December 31, 2019, treasury shares held by Novartis AG and its subsidiaries totaled 144 718 360. As per the dividend payment date, Novartis AG and its subsidiaries are expected to hold 133 714 574 shares. These shares are non-dividend-bearing shares. It should be noted that within the Novartis Group's IFRS consolidated financial statements, some Novartis entities are included in the consolidation scope – mainly foundations, which do not qualify as subsidiaries in the sense of Article 659b SCO.

11. Free reserves

(CHF millions)	2019	2018
January 1	**25 433**	**30 178**
Special distribution by way of a dividend in kind to effect the spin-off of Alcon Inc.	– 17 269	
Free reserves after Alcon Inc. spin-off	8 164	
Reduction due to cancellation of treasury shares (CHF 1 839 million / CHF 5 188 million of repurchased shares less their nominal value of CHF 12 million / CHF 33 million)	– 1 827	– 5 154
Transfer from legal reserve for treasury shares	612	409
December 31	**6 949**	**25 433**

12. Contingent liabilities

(CHF millions)	Dec 31, 2019	Dec 31, 2018
Guarantees in favor of subsidiaries to cover capital and interest of bonds, credit facilities and commercial paper programs – total maximum amount CHF 41 356 million (2018: CHF 45 768 million)	22 471	27 635
Other guarantees in favor of subsidiaries, associated companies and others – total maximum amount CHF 1 870 million (2018: CHF 3 379 million)	495	1 649
Total contingent liabilities	**22 966**	**29 284**

Novartis AG is part of the Swiss Novartis value-added tax (VAT) group and is therefore jointly liable for existing and future VAT claims from the Swiss Federal Tax Administration.

In December 2019, a US subsidiary of Novartis AG entered into a short-term credit facility of USD 7 billion, with a maturity date of June 30, 2020 with a syndicate of banks related to the acquisition of The Medicines Company. The facility is guaranteed by Novartis AG. On January 7, 2020, USD 7 billion were borrowed under the facility.

13. Registration, voting restrictions and major shareholders

The Company's Articles of Incorporation state that no person or entity shall be registered with the right to vote for more than 2% of the share capital, as set forth in the commercial register. In particular cases, the Board of Directors may allow exemptions from the limitation for registration in the Novartis Share Register.

According to the Novartis Share Register, shareholders owning 2% or more of the Company's capital at December 31, 2019, and being entitled to voting rights on all of their shares, excluding treasury shares held by Novartis AG or its fully owned subsidiaries, are as follows:

	% holding of share capital Dec 31, 2019	% holding of share capital Dec 31, 2018
Shareholders registered for their own account:		
Emasan AG, Basel	3.5	3.5
Novartis Foundation for Employee Participation, Basel	2.1	2.3
UBS Fund Management (Switzerland) AG, Basel	2.1	2.2

Furthermore, there are the following other significant shareholders:

	% holding of share capital Dec 31, 2019	% holding of share capital Dec 31, 2018
Shareholders registered as nominees:		
Chase Nominees Ltd., London	10.4	9.8
The Bank of New York Mellon, New York	3.8	4.1
Through The Bank of New York Mellon, Everett	*2.0*	*2.1*
Through The Bank of New York Mellon, New York	*1.2*	*1.3*
Through The Bank of New York Mellon, SA/NV, Brussels	*0.6*	*0.7*
Nortrust Nominees Ltd., London	3.9	3.6
Shareholder acting as American Depositary Share (ADS) depositary:		
JPMorgan Chase Bank, N.A., New York	12.5	13.3

The following shareholder is disclosed through a notification filed with Novartis AG, but is not registered as of December 31, 2019, in the Novartis Share Register:

- Norges Bank (Central Bank of Norway), Oslo, holds 2.1% (2018: 2.1%).

The following shareholders are disclosed through notifications filed with Novartis AG and the SIX Swiss Exchange, but are not registered or registered with less than 2% of the share capital as of December 31, 2019, in the Novartis Share Register:

- BlackRock, Inc., New York, holds between 3% and 5%.
- The Capital Group Companies, Inc., Los Angeles, holds between 3% and 5%.

14. Equity instrument disclosures for the Board of Directors and Executive Committee members

Share ownership requirements for Board members

The Chairman is required to own a minimum of 30 000 Novartis shares, and other members of the Board of Directors are required to own at least 5 000 Novartis shares within five years after joining the Board of Directors, to ensure their interests are aligned with those of shareholders.

Board members are prohibited from hedging or pledging their ownership positions in Novartis shares that are part of their guideline share ownership requirement, and are required to hold these shares for 12 months after retiring from the Board of Directors. As at December 31, 2019, all current and former members of the Board of Directors who were required to meet the minimum share ownership requirements did so.

Shares, ADRs and share options owned by Board members

As at December 31, 2019, no member of the Board of Directors, either individually or together with "persons closely linked"[1] to them, owned 1% or more of the outstanding shares (or ADRs) of Novartis. As at the same date, no member of the Board of Directors held any share options to purchase Novartis shares.

The total number of vested Novartis shares and ADRs owned by members of the Board of Directors and "persons closely linked"[1] to them as at December 31, 2019 and as at December 31.2018, is shown in the table below.

Shares and ADRs owned by Board members[1]

	Number of shares[1,2]	
	At December 31, 2019	At December 31, 2018
Joerg Reinhardt	563 697	542 199
Enrico Vanni	26 645	23 500
Nancy Andrews	7 265	5 739
Ton Buechner	10 950	8 069
Patrice Bula	1 946	0
Srikant Datar	41 334	39 383
Elizabeth Doherty	6 765	4 882
Ann Fudge	14 114	14 818
Frans van Houten	4 764	2 728
Andreas von Planta	161 035	133 493
Charles L. Sawyers	10 986	9 460
William T. Winters	18 170	15 371
Total[3]	**867 671**	**799 642**

NA – Not applicable.

[1] Includes holdings of "persons closely linked" to Board members (see definition in "—Persons closely linked.")

[2] Each share provides entitlement to one vote.

[3] Dimitri Azar stepped down from the Board of Directors on February 28, 2019. On February 28, 2019, Mr. Azar owned 18 750 shares. His shares are not included in the total.

Share ownership requirements for Executive Committee members

Executive Committee members are required to own at least a minimum multiple of their annual base salary in Novartis shares or RSUs within five years of hire or promotion, as set out in the table below. In the event of a substantial rise or drop in the share price, the Board of Directors may, at its discretion, amend that time period accordingly.

Function	Ownership level
CEO	5 x base compensation
Other Executive Committee members	3 x base compensation

The determination of equity amounts against the share ownership requirements is defined to include vested and unvested Novartis shares or American Depositary Receipts (ADRs), and RSUs acquired under the Company's compensation plans. However, unvested matching shares granted under former matching programs, such as the Leveraged Share Savings Plan (LSSP), and any unvested PSUs are excluded. The determination also includes other shares and vested options of Novartis shares or ADRs that are owned directly or indirectly by "persons closely linked" to an Executive Committee member. The Compensation Committee reviews compliance with the share ownership guideline on an annual basis.

As at December 31, 2019, all members who have served at least five years on the Executive Committee have met or exceeded their personal Novartis share ownership requirements.

Shares, ADRs, equity rights and share options owned by Executive Committee members

As at December 31, 2019, no member of the Executive Committee, either individually or together with "persons closely linked"[1] to them, owned 1% or more of the outstanding shares (or ADRs) of Novartis. As at the same date, no member of the Executive Committee held any share options to purchase Novartis shares.

The following table shows the total number of shares, ADRs and other equity rights owned by Executive Committee members and "persons closely linked"[1] to them as at December 31, 2019 and as at December 31, 2018.

[1] "Persons closely linked" are (i) their spouse, (ii) their children below age 18, (iii) any legal entities that they own or otherwise control, and (iv) any legal or natural person who is acting as their fiduciary.

Shares, ADRs and other equity rights owned by Executive Committee members[1]

	Vested shares and ADRs	Unvested shares and other equity rights[2]	**Total at December 31, 2019**	Vested shares and ADRs	Unvested shares and other equity rights[2]	**Total at December 31, 2018**
Vasant Narasimhan	59 983	209 934	269 917	25 240	117 855	143 095
Steven Baert	39 785	96 428	136 213	23 365	62 059	85 424
Bertrand Bodson	4 600	26 529	31 129	0	8 514	8 514
James Bradner	21 794	150 910	172 704	924	90 190	91 114
Harry Kirsch	108 193	143 452	251 645	97 081	100 302	197 383
Shannon Thyme Klinger	12 193	58 633	70 826	14 007	40 111	54 118
Steffen Lang	56 063	51 565	107 628	23 793	33 577	57 370
Klaus Moosmayer	0	15 050	15 050	0	3 274	3 274
Susanne Schaffert	43 770	64 082	107 852	0	0	0
Richard Saynor (from July 15, 2019)	0	11 001	11 001	0	0	0
John Tsai	11 859	42 057	53 916	6 429	18 634	25 063
Marie-France Tschudin (from June 7, 2019)	5 500	69 793	75 293	0	0	0
Robert Weltevreden	150	19 137	19 287	150	3 690	3 840
Total[3]	**363 890**	**958 571**	**1 322 461**	**190 989**	**478 206**	**669 195**

NA – Not applicable.

[1] Includes holdings of "persons closely linked" to Executive Committee members (see definition in this Note 14)

[2] Includes restricted shares, RSUs and target number of PSUs. Matching shares under the ESOP and LSSP, and target number of PSUs are disclosed pro-rata to December 31, unless the award qualified for full vesting under the relevant plan rules. Awards under all other incentive plans are disclosed in full.

[3] Richard Francis stepped down from the Executive Committee in 2019 and Paul Hudson resigned.

Appropriation of available earnings and reserves of Novartis AG

1. Appropriation of available earnings of Novartis AG as per balance sheet and declaration of dividend

(CHF)	2019	2018
Available unappropriated earnings		
Balance brought forward	8 844 268 955	4 833 109 672
Net income of the year	15 179 937 729	10 966 901 239
Total available earnings at the disposal of the Annual General Meeting	**24 024 206 684**	**15 800 010 911**
Appropriation proposed by the Board of Directors (cash dividend)		
Payment of a gross dividend (before taxes and duties) of CHF 2.95 (2018: CHF 2.85) on 2 393 660 246 (2018: 2 443 373 372) dividend-bearing shares[1] with a nominal value of CHF 0.50 each	– 7 061 297 726	– 6 963 614 110
Total available earnings after appropriation of cash dividends	**16 962 908 958**	**8 836 396 801**
Dividend waived for additional treasury shares held by the Company		7 872 154
Balance to be carried forward after cash dividends	**16 962 908 958**	**8 844 268 955**

[1] No dividend will be declared on treasury shares held by Novartis AG or its fully owned subsidiaries.

If this proposal is approved, the dividend will be paid as from March 5, 2020. The last trading day with entitlement to receive the dividend is March 2, 2020. As from March 3, 2020 the shares will be traded ex-dividend.

2. Special distribution by way of a dividend in kind to effect the spin-off of Alcon Inc.

(CHF)	2019
Available reserves before special distribution	
Capital contribution reserves	198 385 279
Free reserves	25 432 646 806
Special distribution by way of a dividend in kind to effect the spin-off of Alcon Inc.	
Thereof appropriation from capital contribution reserves	– 19 548 000
Thereof appropriation from free reserves	– 17 269 355 019
Total distributable reserves after special distribution by way of dividend in kind to effect the spin-off of Alcon Inc.	
Capital contribution reserves	178 837 279
Free reserves	8 163 291 787

Novartis shareholders approved the proposed 100% spin-off of the Alcon Inc. at the Annual General Meeting on February 28, 2019. The conditions precedent to the spin-off were met and on April 8, 2019, the spin-off of Alcon Inc. was affected by the way of a distribution of dividend in kind of Alcon Inc. shares to Novartis AG shareholders and ADR (American Depository Receipt) holders. Through the distribution, each Novartis AG shareholder received one Alcon Inc. share for every five dividend bearing shares of Novartis AG/ADRs they held on April 8, 2019, close of business.

Report of the statutory auditor

to the General Meeting of Novartis AG, Basel

Report on the audit of the financial statements

Opinion

We have audited the financial statements of Novartis AG, which comprise the balance sheet as at December 31, 2019, income statement, and notes to the financial statements for the year then ended, including a summary of significant accounting policies.

In our opinion, the financial statements (pages A-1 to A-10) as at December 31, 2019, comply with Swiss law and the Company's Articles of Incorporation.

Basis for opinion

We conducted our audit in accordance with Swiss law and Swiss Auditing Standards. Our responsibilities under those provisions and standards are further described in the "Auditor's responsibilities for the audit of the financial statements" section of our report.

We are independent of the entity in accordance with the provisions of Swiss law and the requirements of the Swiss audit profession, and we have fulfilled our other ethical responsibilities in accordance with these requirements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Our audit approach

Materiality

The scope of our audit was influenced by our application of materiality. Our audit opinion aims to provide reasonable assurance that the financial statements are free from material misstatement. Misstatements may arise due to fraud or error. They are considered material if, individually or in aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of the financial statements.

Based on our professional judgment, we determined certain quantitative thresholds for materiality, including the overall materiality for the financial statements as a whole, as set out below. These, together with qualitative considerations, helped us to determine the scope of our audit and the nature, timing and extent of our audit procedures, and to evaluate the effect of misstatements, both individually and in aggregate, on the financial statements as a whole.

- Overall materiality: CHF 400 million
- How we determined it: With reference to our benchmark of 5% of income before taxes and for consistency with the Novartis Group consolidated financial statements, we determined materiality at CHF 400 million, which is 2.6% of income before taxes.
- Rationale for the materiality benchmark applied: We chose income before taxes as the measure because, in our view, it is the measure against which the performance of the entity is most commonly assessed and is a generally accepted benchmark.

We agreed with the Audit and Compliance Committee that we would report to them misstatements identified during our audit above CHF 20 million as well as any misstatements below that amount which, in our view, warranted reporting for qualitative reasons.

Audit scope

We designed our audit by determining materiality and assessing the risks of material misstatement in the financial statements. In particular, we considered areas where subjective judgments were made, such as significant accounting estimates that involved making assumptions and consideration of future events that are inherently uncertain. As in all of our audits, we also addressed the risk of management override of internal controls, including – among other matters – consideration of whether there was evidence of bias that represented a risk of material misstatement due to fraud.

We tailored the scope of our audit in order to perform sufficient work to enable us to provide an opinion on the financial statements as a whole, taking into account the structure of the entity, the accounting processes and controls, and the industry in which the entity operates.

Report on key audit matters based on the circular 1/2015 of the Federal Audit Oversight Authority

We have determined that there are no key audit matters to communicate in our report.

Responsibilities of the Board of Directors for the financial statements

The Board of Directors is responsible for the preparation of the financial statements in accordance with the provisions of Swiss law and the Company's Articles of Incorporation, and for such internal control as the Board of Directors determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the Board of Directors is responsible for assessing the entity's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going

concern basis of accounting unless the Board of Directors either intends to liquidate the entity or to cease operations, or has no realistic alternative but to do so.

Auditor's responsibilities for the audit of the financial statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance but is not a guarantee that an audit conducted in accordance with Swiss law and Swiss Auditing Standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with Swiss law and Swiss Auditing Standards, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error; design and perform audit procedures responsive to those risks; and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made
- Conclude on the appropriateness of the Board of Directors' use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the entity's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the entity to cease to continue as a going concern.

We communicate with the Board of Directors, mostly through the Audit and Compliance Committee, regarding – among other matters – the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide the Board of Directors with a statement that we have complied with relevant ethical requirements regarding independence, and to communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, related safeguards.

From the matters communicated with the Board of Directors, we determine those matters that were of most significance in the audit of the financial statements of the current period and are therefore the key audit matters. We describe these matters in our auditor's report, unless law or regulation precludes public disclosure about the matter or when, in extremely rare circumstances, we determine that a matter should not be communicated in our report because the adverse consequences of doing so would reasonably be expected to outweigh the public interest benefits of such communication.

Report on other legal and regulatory requirements

In accordance with article 728a paragraph 1 item 3 CO and Swiss Auditing Standard 890, we confirm that an internal control system exists, which has been designed for the preparation of financial statements according to the instructions of the Board of Directors.

We further confirm that the proposed appropriation of available earnings and reserves complies with Swiss law and the Company's Articles of Incorporation. We recommend that the financial statements submitted to you be approved.

PricewaterhouseCoopers AG

pwc

Luc Schulthess
Audit expert
Auditor in charge

Kris Muller
Global relationship partner

Basel, January 28, 2020


NOVARTIS
Newborn Screening