Q2 2022 Results
Investor presentation

NOVARTIS | Reimagining Medicine

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Vas Narasimhan

Chief Executive Officer

Company overview

Novartis delivers solid Q2 performance across our value drivers

Growth, cc 1

Group sales Q2 **+5%** (H1 +5%)
IM sales Q2 **+5%** (H1 +5%)
Sandoz sales Q2 **+5%** (H1 +6%)

Innovation 3

Cosentyx® childhood arthritic conditions approved in EU
Kymriah® r/r FL approved in US and EU
Scemblix® Ph+ CML received positive CHMP opinion

Productivity, cc 2

Group core operating income Q2 **+5%** (H1 +7%)
IM core operating income Q2 **+6%** (H1 +6%)
IM core margin Q2 37.2%, **+0.5%**pts (H1 36.6%)
Sandoz core operating income Q2 **-4%** (H1 +10%)
SG&A savings expected to increase to ~USD 1.5bn by 2024

ESG 4

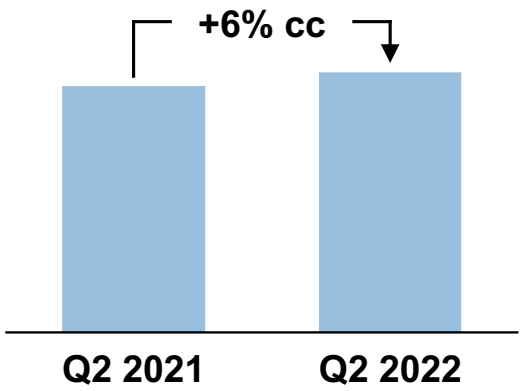
Innovation NTDs: USD 250m R&D investment over 5 years (Kigali declaration)
Innovation CT diversity: >USD 50m commitment over 10 years (Beacon of Hope)
MSCI upgrades Novartis to AA: Now top quartile within the industry

Constant currencies (cc), core results are non-IFRS measures; explanation can be found on page 47 of Condensed Interim Financial Report. Unless otherwise noted, all growth rates refer to same period in PY. IM – Innovative Medicines division r/r FL – relapsed or refractory follicular lymphoma GvHD – acute and chronic graft-versus-host disease CML – chronic myeloid leukemia NTDs – Neglected tropical diseases CT – Clinical trial

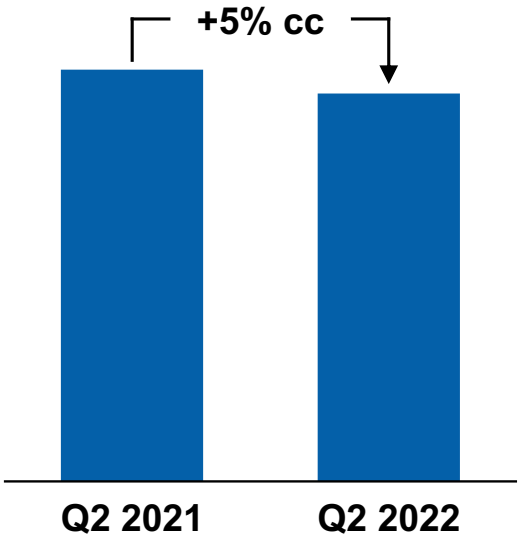
Q2 Innovative Medicines (IM) sales grew across US and ex-US, driven by our in-market growth drivers

IM sales USD 10.5bn (+5% cc)

US | Q2 2022 USD 3.9bn

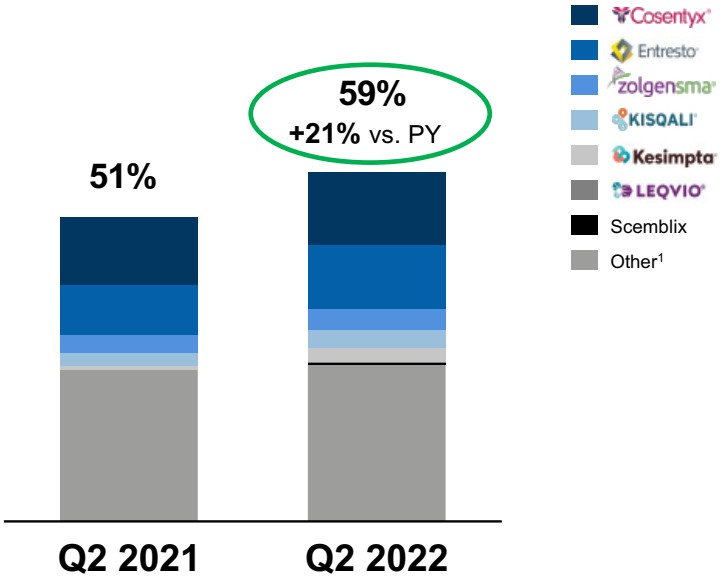


Ex-US | Q2 2022 USD 6.5bn



Growth drivers +21% cc, 59% of IM sales

Q2 2022 USD 6.1bn



All % growth relate to cc unless otherwise stated 1. Includes Promacta®, Taf-Mek®, Jakavi®, Ilaris®, Kymriah®, Xiidra®, Lutathera®, Piqray®, Mayzent®, Aimovig®, Xolair®, Beovu®, Adakveo®, Tabrecta®, Enerzair®, Atectura® , Luxturna®, Pluvicto™

Strong performance of Entresto®, Kesimpta®, Cosentyx®, Kisqali ®, Zolgensma® and launching Leqvio®...

Q2 sales[1]

	Sales USD million	Growth vs. PY USD million	Growth vs. PY cc
Entresto	1,125	239	33%
Kesimpta (ofatumumab)	239	173	270%
Cosentyx (secukinumab)	1,275	100	12%
KISQALI (ribociclib)	308	83	43%
zolgensma	379	64	26%
SCEMBLIX (asciminib)	31	31	nm
ILARIS (canakinumab)	275	28	20%
Tafinlar + Mekinist	452	27	13%
PROMACTA (eltrombopag)	534	21	10%
LEQVIO	22	20	nm
MAYZENT (siponimod) tablets	85	16	29%
PLUVICTO	10	10	nm

Constant currencies (cc) is a non-IFRS measure; explanation of non-IFRS measures can be found on page 47 of Condensed Interim Financial Report. Unless otherwise noted, all growth rates refer to same period in PY
nm – not meaningful 1. Innovative Medicines division

… reinforcing our confidence in mid-term growth outlook

C E Z K K L ▶ **32% of IM sales growing 31% (Q2)**

Q2 sales

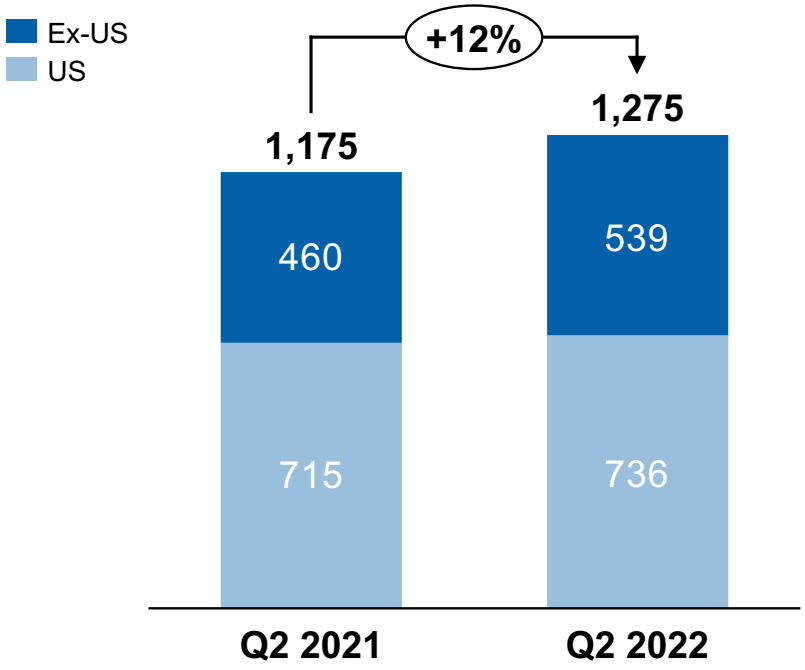
Cosentyx®	Entresto®	zolgensma®	KISQALI®	Kesimpta®	LEQVIO®
USD 1.3 bn	USD 1.1 bn	USD 0.4 bn	USD 0.3 bn	USD 0.2 bn	nm
+12%	+33%	+26%	+43%	+270%	nm
Peak sales **USD >7bn**	Peak sales **USD >5bn**	Peak sales **multi-bn**[1]	Peak sales **multi-bn**	Peak sales **multi-bn**	Peak sales **multi-bn**
US LoE 2029+	US LoE 2025-2036	US LoE 2031+	US LoE 2031+	US LoE 2031+	US LoE 2036+

nm – not meaningful LoE – Loss of exclusivity All growth rates in constant currencies (cc). US LoEs are estimated based on relevant patents; further extensions possible. 1. Including Zolgensma® IT.

Cosentyx® double digit demand-driven growth in Q2

Sales evolution

USD m, % cc



Maintaining double-digit growth outlook for FY2022

- Steady volume growth across US, EU and China
- Confidence in clinical profile; **>700k patients across 5 indications**
- **GRAPPA PsA guidelines** highlight Cosentyx unique benefit in **axial manifestations** and proven efficacy of IL17 across all 6 domains[1]

Confident in USD 7bn+ peak sales

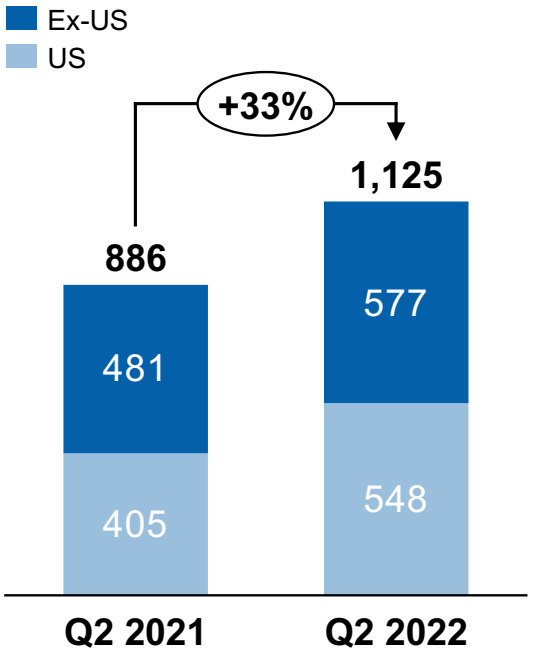
- Continued demand-led growth WW
- Life cycle management - Q2 progress:
  - JPsA/ ERA pediatric approvals in EU
  - HS submitted in EU, US anticipated H2
  - axSpA IV study (INVIGORATE 2) positive readout
  - PsA IV US submission anticipated H2

WW – Worldwide HS – Hidradenitis Suppurativa JPsA – Juvenile Psoriatic Arthritis ERA – Enthesitis related arthritis PsA – Psoriatic Arthritis axSpA – axial Spondyloarthritis IV – Intra venous GRAPPA – Group for Research and Assessment of Psoriasis and Psoriatic Arthritis 1. Coates et al. Nat Rev Rheumatol (2022)

Entresto® +33% cc, growing strongly across geographies

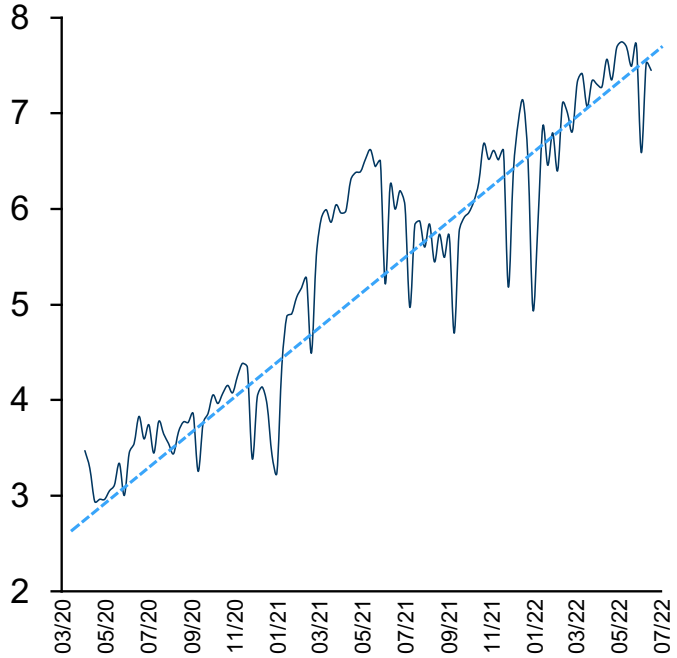
Sales evolution

USD m, % cc



US weekly NBRx[1]

New-to-brand prescriptions (000)



Strong quarter performance

- Worldwide >7m patients treated, US >1m TRx
- US growing in hospitals, cardiology, primary care[1]
- Europe strong demand growth
- Asia HTN driving growth

Confident in future growth

- Only 1/3 of addressable HF population treated in G7[2]
- Strong profile in clinical and RW settings in HF[3,4]
- Guidelines drive 1st choice in HFrEF and expand support in HFpEF w/LVEF < normal[5]
- HTN: high unmet need in Asia[6]

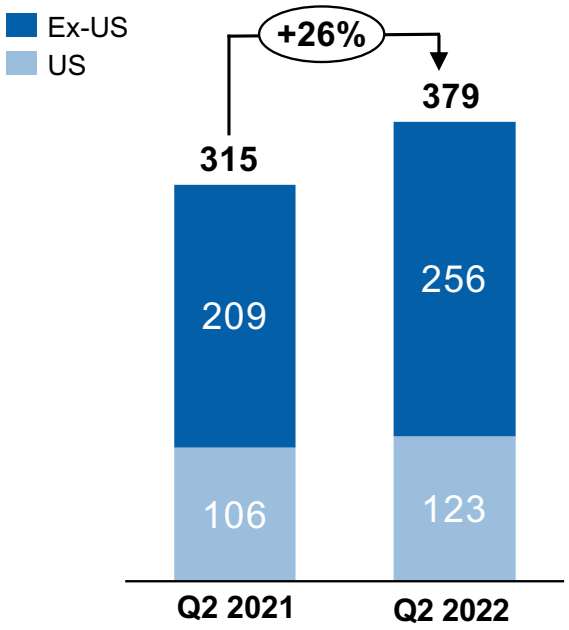
See last slide for references NBRx – New-to-brand Prescriptions HFrEF – heart failure with reduced ejection fraction HFpEF – heart failure with preserved ejection fraction HTN – Hypertension LVEF – left ventricular ejection fraction TRx – Total Prescriptions RW – Real world

Zolgensma® grows +26% in Q2 driven by strong ex-US growth

Continued geographic expansion as the foundational therapy for SMA

Sales evolution

USD m, % cc



Q2 highlights

- 2300+ patients now treated worldwide; treatment of choice for SMA type 1 newborns[1]
- Recent reimbursement decisions in Australia, Switzerland and Greece
- NC multi-product manufacturing facility achieved FDA & EMA commercial licensure approval

Future growth drivers

- Increase uptake worldwide, now approved in 43 countries to-date
- Newborn screening: 97% in US and 30% in EU
- OAV101 IT data[1]: STEER currently enrolling; STRENGTH to start in 2H22

Nature Medicine publication: transformational benefit in pre-symptomatic SMA

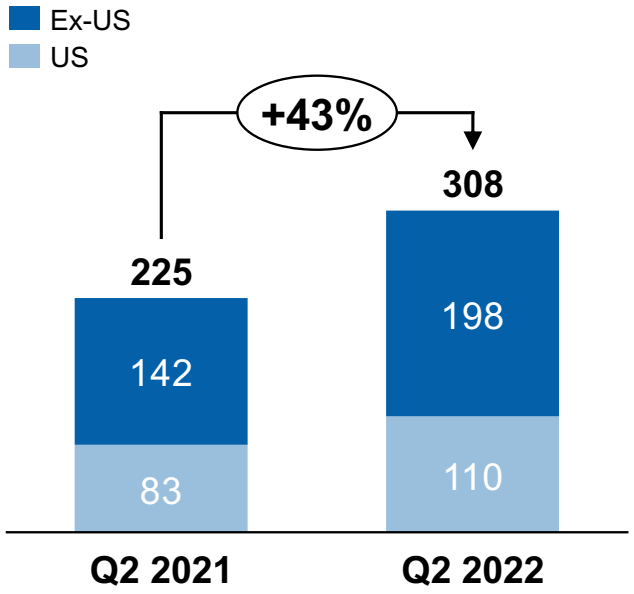
- Age-appropriate development for most patients when used pre-symptomatically in 3-copy SMA; 14/15 patients walking alone, 11 of them within normal developmental window

NC – North Carolina SMA – Spinal muscular atrophy 1. Source: Symphony Anonymous Patient Level Data

Kisqali® delivers double-digit growth across all regions

Sales evolution

USD m, % cc



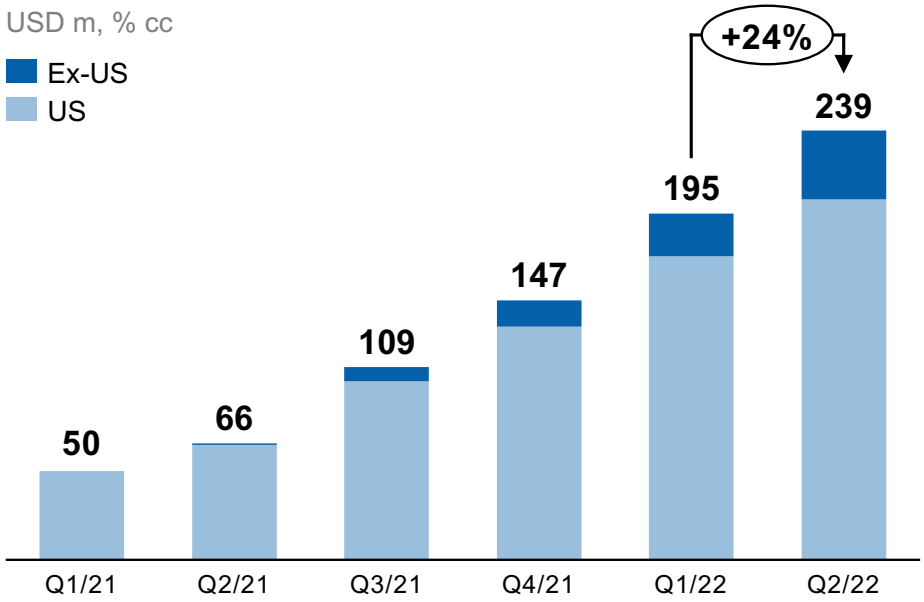
- Strong growth +43%: US +33%, ex-US +49%
- Increasing traction in mBC based on clinical data
- Kisqali® continues to be the only CDK 4/6 inhibitor with statistically significant OS benefit across three Ph3 trials, while improving / maintaining quality of life, following latest ASCO 2022 update
- NATALEE adjuvant study primary analysis expected 2023

mBC – Metastatic breast cancer OS – Overall survival

Strong Kesimpta® launch continues, outperforming market

Sales evolution

USD m, % cc



Launch acceleration continues

- Increasing real-world experience with >20k patients treated WW
- US demand +18% QoQ, >3,200 adopters since launch
- **NBRx +42%** YoY vs. US NBRx market -12%[1]

Strengthening differentiation and benefit/risk profile

- New extension phase data: 8/10 patients treated continuously with Kesimpta® had no evidence of disease activity (NEDA-3)[2]
- Fast initiation within 6 days for 80% patients[3]
- 77% of patients remain on therapy at 12 months[4]

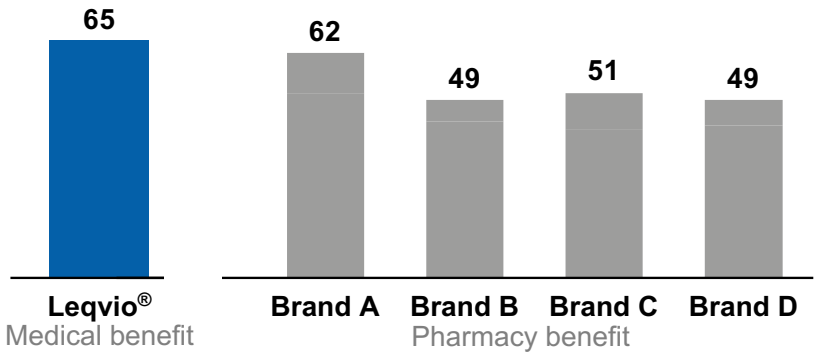
See last slide for references WW – worldwide NBRx – New to brand Prescription NEDA – No Evidence of Disease Activity

Leqvio® US launch – laying the foundation in 2022

Expect continued steady ramp in H2

Access

Current % coverage aligned to label[1,2]



65% coverage at-or-near label within 6 months; already higher vs. competition

New permanent J-code[3] to increase reimbursement confidence

Affordability

- 2/3 of patients with zero co-pay, including Medicare Part B patients with supplemental insurance

Working through practice logistics and administration

- Increasing number of unique locations ordering Leqvio® to >700[4]
- Expanding depth;>55% of customers having placed repeat order[4]
- Growing usage of Leqvio® Service Center to >2100 HCPs, >3900 patients[5]

1. Includes step edits through Gx Statin / or ezetimibe 2. Data source: MMIT as of July 2022 3. J1306, effective July 1 4. Compared to Q1 2022. Based on sales data, data on file. 5. Based on service center data, data on file.
*LEQVIO® is administered initially, again at 3 months, and then once every 6 months

Pluvicto™ US launch progressing, preparing for further expansion

US launch progressing

- Manufacturing issues remediated; commercial and clinical supply resumed in June
- Permanent A code granted in July, effective in October
- More than 50% of insured lives covered (across Medicare, Medicaid and private payers)
- >100 target RLT sites operational; ~40 sites have completed orders

Preparing for further expansion

- Additional Ph3 studies in earlier settings on track (pre-taxane mCRPC and mHSPC)
- Manufacturing scale-up ongoing (new Indianapolis facility, expansion in Ivrea & Millburn), increasing capacity
- Significant investment in logistics to support access for a broader number of patients

RLT – Radioligand therapy mCRPC – metastatic castration-resistant prostate cancer mHSPC – Metastatic hormone-sensitive prostate cancer

Scemblix® continues strong US uptake and achieves important ex-US regulatory milestones in Q2

Strong early launch uptake

- ☑ $31m Q2 sales driven by patients with resistance/intolerance to other TKIs
- ☑ 44% 3L+ new patient share[1]
- ☑ 16% NBRx share across CML lines of treatment[1]

Confident in future growth

- 1L WW Ph3 study enrolling ahead of plan
- CHMP positive opinion and rollout ongoing across ex-US markets

1. Source: IQVIA Market Sizing “Source of Business”, “Product Summary” reports, June 2022

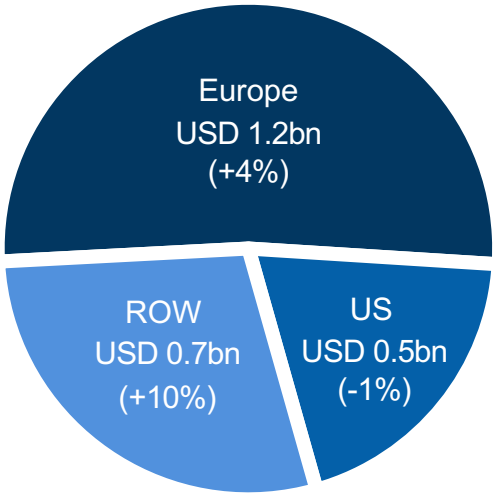
Sandoz raises FY guidance as performance continues to strengthen

benefitting from return towards normal business dynamics

Q2 sales

% cc

Accelerating leadership in Europe



Double-digit growth RoW

Stabilizing in US

Q2 sales Retail +4%, Biopharma + 11%

Q2 Core OpInc -4%

2022 FY guidance increased to

- Sales to grow low single digit
- Core OpInc to be broadly in line with PY

Solid base for growth 2023 and beyond, mainly biosimilars

- Targeting USD 80bn originator sales (2030)
- Strong pipeline of 15+ biosimilar assets
- EMA file acceptance for adalimumab HCF and natalizumab

Selectively pursuing small molecule opportunities

Strategic review of Sandoz continues to progress, update expected at latest by end 2022

HCF – High concentration formulation

Broad pipeline of novel medicines continued to progress in Q2

Hematology | Solid tumors | Immunology | Neuroscience | Cardiovascular

Approvals

Tabrecta®	EU: adv. non-small cell lung cancer
Tafinlar®+ Mekinist®	US: tumor-agnostic for BRAF V600E solid tumors
Jakavi®	EU: acute and chronic GvHD
Kymriah®	US and EU: r/r follicular lymphoma
Beovu®	US and JP: diabetic macular edema
Cosentyx®	EU: JPsA & ERA

Designations and milestones

Scemblix®	EU positive CHMP for CML 3L
pelacarsen	Ph3 – HORIZON recruitment completed
JDQ443	Ph3 – 2/3L NSCLC initiated

Readouts and publications

icenticaftor	Ph2 – COPD[1]
sabatolimab	Ph2 – HR-MDS STIMULUS MDS-1[2]
Cosentyx®	Ph3 – axSpA IV INVIGORATE
Cosentyx®	Ph2 – lichen planus PRELUDE[3]

Submissions

Cosentyx®	EU: hidradenitis suppurativa
adalimumab *Biosimilar*	EU

Exiting development projects: COPD, general asthma

CSJ117	Decision to partner
icenticaftor	Decision to partner

Selected milestones 1. Ph2b DRF demonstrated dose response across multiple endpoints, study results presentation end 2022 2. Submission will be based on Ph3 results 3. Data analysis on-going

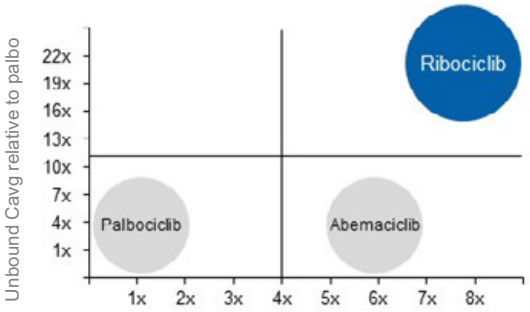
Kisqali® is the only CDK4/6i with consistent OS benefit seen across all three Ph3 trials

Kisqali® Ph3 OS results in 1L mBC

		Median OS
MONALEESA-2		
Risk reduction	24%	**63.9** months[1]
MONALEESA-7		
Risk reduction	24%	**58.6** months[2]
MONALEESA-3		
Risk reduction	33%	**67.6** months[3]

- **Longest median OS** benefit ever published[4]
- **Same OS benefit** regardless of menopausal status, hormone therapy partner, or dose modifications[5]
- Maintains clinical benefit even after prior CDK4/6i use[6]

Kisqali® unique in inhibiting CDK4 8x more than CDK6[7-10]

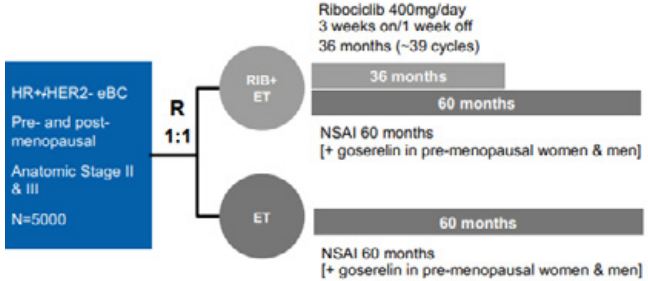


CDK4:CDK6 inhibition from a cellular assay

- At clinically relevant doses, **Kisqali® provides greater CDK4 inhibition** in vivo than competitors
- Higher unbound C_{avg} means **more drug available** to act on tumor cells[7-10]

NATALEE adjuvant study on track

NATALEE study design



- **Fully enrolled** as of April 2021
- **Primary analysis** planned at 500 iDFS events, expected in 2023
- Interim analyses at 70% and 85%

See last slide for other references 1. In months vs. vs 51.4, P value: 0.008. Reference: Hortobagyi, GN et al., 2022 2. vs 51.8. Reference: Lu, YS et al., 2022 3. vs 51.4. Reference: Neven, P et al., 2022 4. for HR+/HER2- mBC

2022 events[1] (expected)

NME Lead

✓ Achieved ✕ Missed

Regulatory decisions	H1	Pluvicto™ mCRPC (US ✓ /EU)
	H1	Vijoice® PROS (US ✓)
	H2	Scemblix® 3L CML (JP ✓ /EU)
	H2	tislelizumab ESCC 2L (US)[10]
	H1/H2	Jakavi® acute & chronic GVHD (EU ✓ /JP)
	H1/H2	Kymriah® r/r follicular lymphoma (US ✓ /EU ✓ /JP)
	H1/H2	Beovu® DME (US ✓ /EU ✓ /JP ✓)
Submissions	H1	ensovibep COVID-19 (US ✓)
	H1/H2	Cosentyx® HS (EU ✓ /US)
	H1/H2	tislelizumab NSCLC (EU ✓ /US x[2])
	H2	tislelizumab 1L Nasopharyngeal cancer (US)
	H2	Cosentyx® Psoriatic Arthritis IV (US)
Submissions-enabling readouts	H2	canakinumab NSCLC Ph3 CANOPY A
	H2	iptacopan PNH Ph3 APPLY-PNH
	H2	Pluvicto™ pre-taxane mCRPC Ph3 PSMAfore[3]

Other readouts	H1	sabatolimab HR-MDS Ph2 ✓[4]
	H1	Cosentyx® Lichen planus Ph2 PRELUDE[5]
	H1	Cosentyx® axSpA IV Ph3 INVIGORATE-1 ✓
	H1	icenticaftor COPD Ph2b ✓[6]
	H2	UNR844 presbyopia Ph2 READER
Ph3/pivotal study starts	H1	Cosentyx® peripheral SpA x[7]
	H1	OAV101 SMA IT STEER ✓
	H1	ensovibep COVID-19 (EMPATHY Part B) x[8]
	H2	JDQ443 NSCLC mono ✓
	H2	ianalumab Sjögren's Syndrome
	H2	ianalumab Lupus Nephritis
	H2	ociperlimab solid tumors
	H2	Pluvicto™ nmCRPC
	H2	YTB323 2L DLBCL[9]
	H2	OAV101 SMA IT Ph3b STRENGTH

Note: Kisqali® NATALEE Ph3 readout removed (2023 event as shared at Q1 2023) 1. Selected. 2. No US submission planned at this time for monotherapy in NSCLC following FDA feedback. 3. Could move to early 2023. 4. Submission will be based on Ph3 results. 5. Ph2 data analysis ongoing. 6. Ph2b DRF demonstrated dose response across multiple endpoints, study results presentation end 2022. Out-licensing planned. 7. Strategy update. 8. No definite start date for the IV Phase 3 clinical trial can be provided at this time. 9. Development strategy being updated 10. FDA deferred action pending completion of required inspections

Harry Kirsch

Chief Financial Officer

Financial review and 2022 guidance

Solid Q2 resulting in strong H1 performance

Group[1] USD million	Q2 2022	Change vs. PY % USD	Change vs. PY % cc	H1 2022	Change vs. PY % USD	Change vs. PY % cc
Net Sales	12,781	-1	5	25,312	0	5
Core Operating Income	4,270	-2	5	8,353	1	7
Operating Income	2,228	-36	-30	5,080	-14	-7
Net Income	1,695	-41	-34	3,914	-21	-14
Growth ex. prior year Roche income		*-36*	*-29*		*-12*	*-4*
Core EPS (USD)	1.56	-6	1	3.02	-5	2
Growth ex. prior year Roche income		*2*	*10*		*4*	*11*
EPS (USD)	0.77	-40	-33	1.77	-20	-12
Growth ex. prior year Roche income		*-35*	*-27*		*-11*	*-3*
Free Cash Flow	3,304	-22		4,224	-28	
Growth ex. prior year Roche dividend		*-22*			*-20*	

1. Core results, constant currencies and free cash flow are non-IFRS measures. Further details regarding non-IFRS measures can be found starting on page 47 of the Condensed Financial Report. A reconciliation of 2021 IFRS results and non-IFRS measures core results and free cash flow to exclude the impacts of the 2021 divestment of our Roche investment can be found on page 55 of the Condensed Interim Financial Report. The free cash flow impact represents the dividend received in Q1 2021 from Roche in relation to the distribution of its 2020 net income.

Continuing core margin improvements for Group, IM and Sandoz in H1

	Q2 2022				H1 2022			
	Net sales change vs. PY[1] (in % cc)	Core operating income change vs. PY[1] (in % cc)	Core margin[1] (%)	Core margin[1] change vs. PY (%pts cc)	Net sales[1] change vs. PY (in % cc)	Core operating[1] income change vs. PY (in % cc)	Core margin[1] (%)	Core margin[1] change vs. PY (%pts cc)
Innovative Medicines	5	6	37.2	0.5	5	6	36.6	0.3
Sandoz	5	-4	20.4	-1.9	6	10	21.6	0.7
Group	5	5	33.4	0.1	5	7	33.0	0.6

1. Constant currencies (cc), core results are non-IFRS measures. An explanation of non-IFRS measures can be found on page 47 of the Condensed Interim Financial Report .

2022 full year guidance

Expected, barring unforeseen events; growth vs. PY in cc

Innovative Medicines	Sales to **grow mid single digit** Core OpInc to **grow mid to high single digit, ahead of sales**
Sandoz	Sales to **grow low single digit** (revised upwards from broadly in line) Core OpInc to **be broadly in line with prior year** (revised upwards from to decline low to mid single digit)
Group	**Sales to grow mid single digit** **Core OpInc to grow mid single digit**

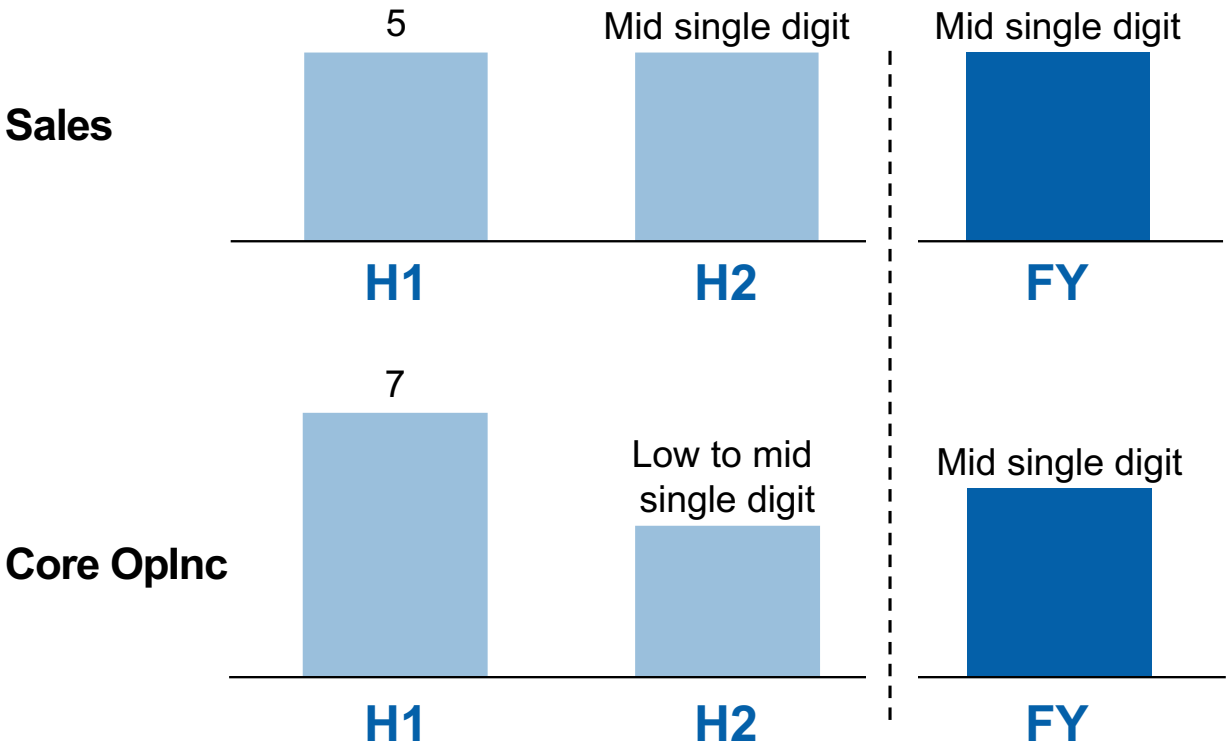
Key assumptions

- Our guidance assumes that we see a continuing return to normal global healthcare systems, including prescription dynamics, and that no Gilenya® and no Sandostatin® LAR generics enter in the US.
- In June 2022, an appeals court held the Gilenya US dosing regimen patent invalid. Novartis plans to petition the appeals court for further review to uphold validity of the dosing regimen patent. There is no generic competition in the US at this time. In Q2, Gilenya US sales were USD 332m, US sales have been steadily declining due to competitive pressures.

H2 2022 Core OpInc expected to grow slightly slower than H1 mainly due to higher prior year base in Sandoz

Group growth vs. PY

%pts, cc



Items to be monitored in H2 2022

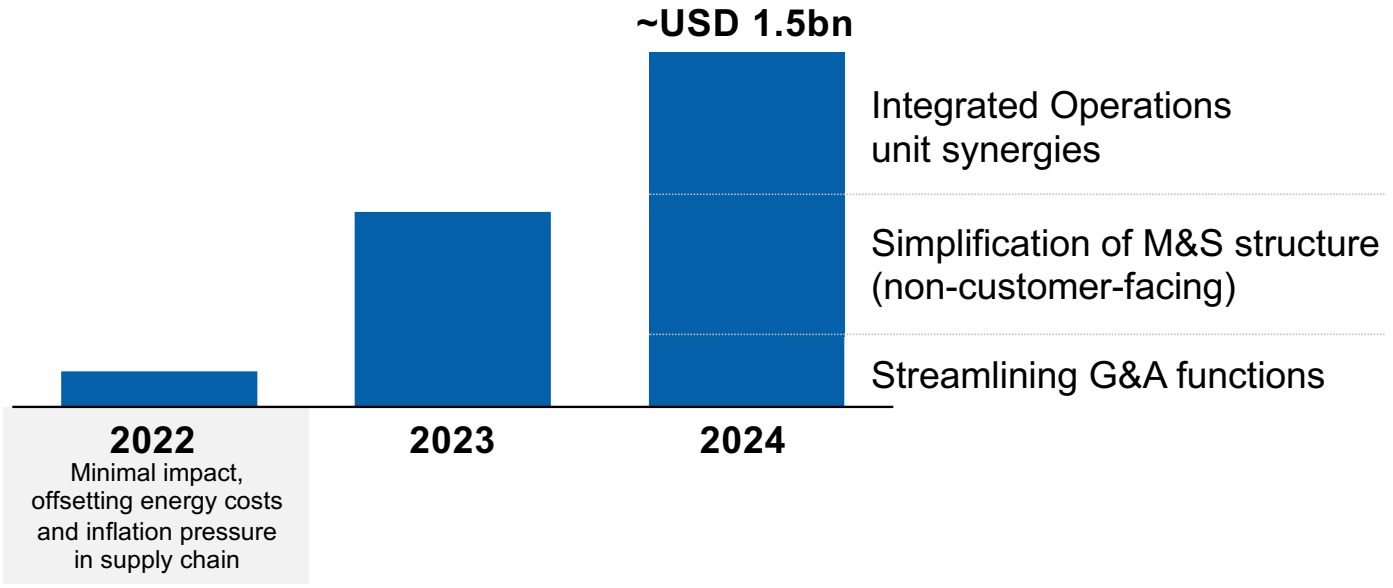
- Impact of inflation and utilities costs particularly on Sandoz portfolio
- China lockdowns

H1 2022 Core OpInc growth benefiting from low prior year base in Sandoz

Our guidance assumes that we see a continuing return to normal global healthcare systems, including prescription dynamics, and that no Gilenya® and no Sandostatin®LAR generics enter in the US

Simplified organizational model: SG&A savings estimate increased to ~USD 1.5bn fully embedded by 2024

Estimated annual savings
Illustrative



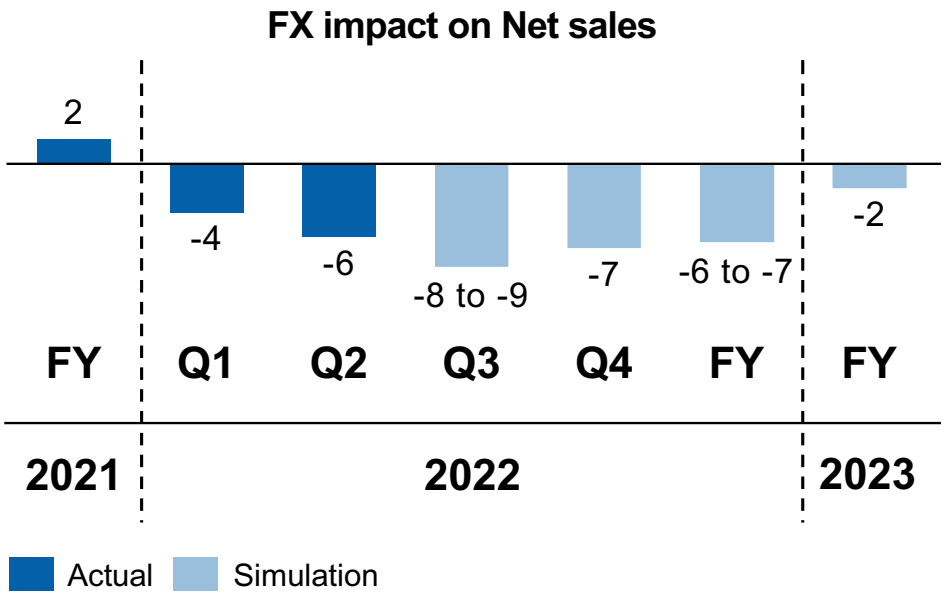
One-time restructuring cost now estimated at 1 to 1.2x annual structural savings

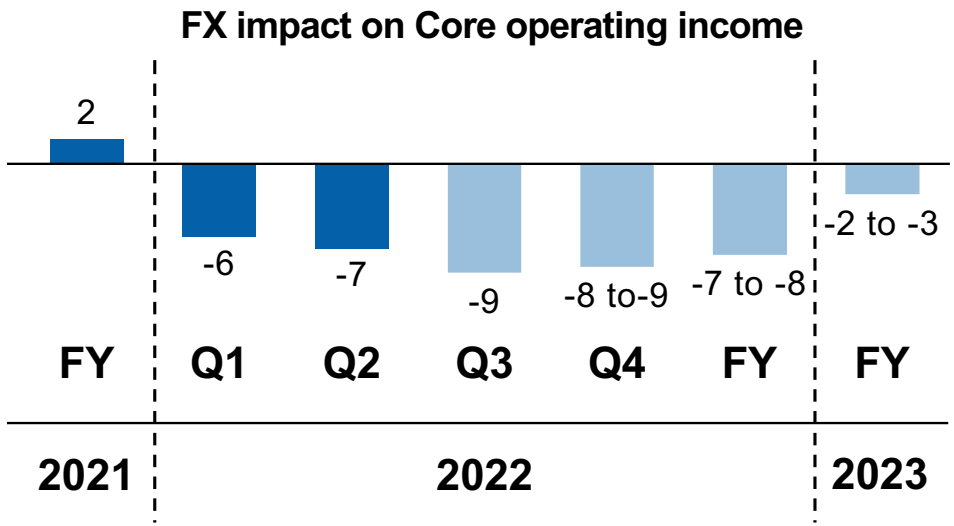
The savings will contribute to achieving mid-long term IM core margins in the low 40's and investing in our pipeline

Expected currency impact for full year 2022 and 2023

Currency impact vs. PY

%pts, assuming mid-July exchange rates prevail in 2022 and 2023





We remain disciplined and shareholder-focused in our capital allocation

H1 2022 updates

Investing in the business

Investments in organic business

USD 4.5bn R&D[1]

USD 0.5bn capital investments

Value-creating bolt-ons

USD 0.9bn

Returning to shareholders

Growing annual dividend in CHF

USD 7.5bn paid out

Share buybacks

USD 9.4bn to be executed

USD 5.6bn completed of the USD 15bn

1. Core R&D actuals 2022

Vas Narasimhan

Chief Executive Officer

Solid Q2 contributing to a strong H1 with launches, growth momentum, innovation and announced restructuring on track

Top 2022 priorities for Novartis

1 **Successful launches:** Leqvio (laying the foundation for buy & bill), Kesimpta, Pluvicto, Scemblix

2 **Maintain growth momentum:** 

3 **Progress pipeline**: 20+ assets with significant sales potential, approval by 2026, on track

4 **Optimize portfolio:** Sandoz review, update end 2022; disciplined business development

5 **Deliver returns:** Continue productivity initiatives. New organizational model being implemented

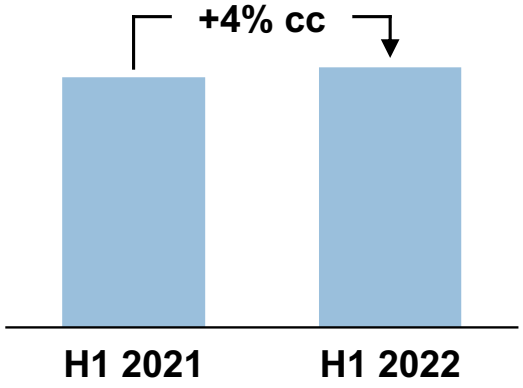
6 **Reinforce foundations**: Culture to drive performance, data science to drive value, ESG leadership

Appendix

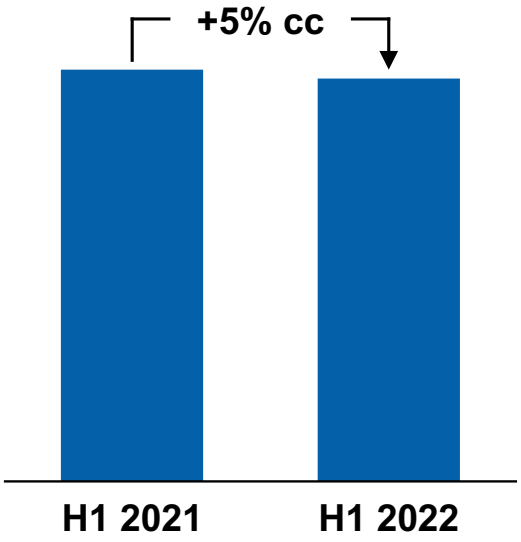
H1 Innovative Medicines (IM) sales grew across US and ex-US, driven by our in-market growth drivers

IM sales USD 20.6bn (+5% cc)

US | H1 2022 USD 7.6bn

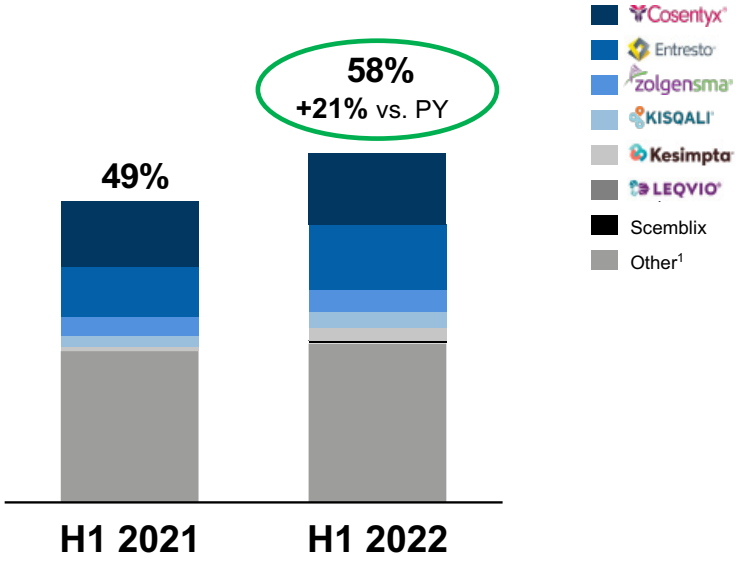


Ex-US | H1 2022 USD 13.1bn



Growth drivers +21% cc, 58% of IM sales

H1 2022 USD 11.9bn



All % growth relate to cc unless otherwise stated 1. Includes Promacta®, Taf-Mek®, Jakavi®, Ilaris®, Kymriah®, Xiidra®, Lutathera®, Mayzent®, Piqray®, Aimovig®, Xolair®, Beovu®, Adakveo®, Tabrecta®, Enerzair®, Atectura® , Luxturna®, Pluvicto™

Strong H1 performance of Entresto®, Kesimpta®, Cosentyx®, Kisqali®, Zolgensma® and launching Leqvio®...

H1 sales[1]

	Sales USD million	Growth vs. PY USD million	Growth vs. PY cc
Entresto	2,218	543	37%
Kesimpta (ofatumumab)	434	318	280%
Cosentyx (secukinumab)	2,434	206	12%
KISQALI (ribociclib)	547	127	36%
zolgensma	742	108	22%
ILARIS (canakinumab)	560	57	19%
SCEMBLIX (asciminib)	56	56	nm
PROMACTA (eltrombopag)	1,025	49	10%
MAYZENT (siponimod) tablets	164	40	37%
Tafinlar + Mekinist	855	37	10%
LEQVIO	36	33	nm
Xolair (omalizumab)	720	30	14%

Constant currencies (cc) is a non-IFRS measure; explanation of non-IFRS measures can be found on page 47 of Condensed Interim Financial Report. Unless otherwise noted, all growth rates refer to same period in PY
nm – not meaningful 1. Innovative Medicines division

… reinforcing our confidence in mid-term growth outlook

H1 sales

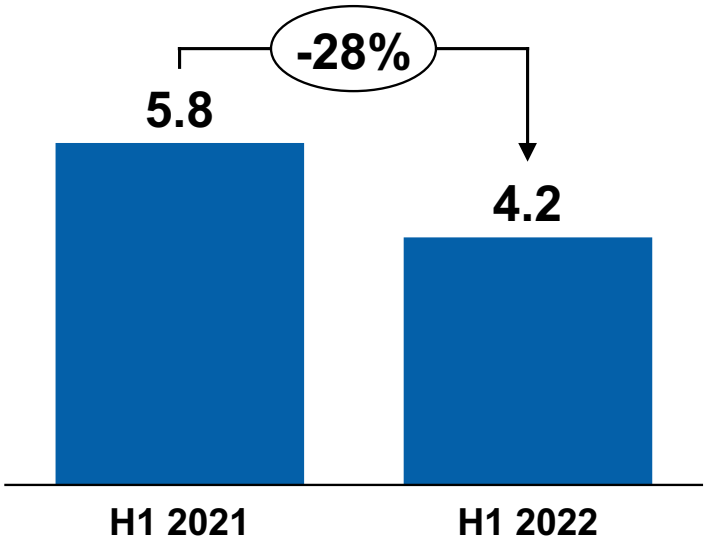
Cosentyx®	Entresto®	zolgensma®	KISQALI®	Kesimpta®	LEQVIO®
USD 2.4 bn	USD 2.2 bn	USD 0.7 bn	USD 0.5 bn	USD 0.4 bn	nm
+12%	+37%	+22%	+36%	280%	nm
Peak sales **USD >7bn**	Peak sales **USD >5bn**	Peak sales **multi-bn**[1]	Peak sales **multi-bn**	Peak sales **multi-bn**	Peak sales **multi-bn**
US LoE 2029+	US LoE 2025-2036	US LoE 2031+	US LoE 2031+	US LoE 2031+	US LoE 2036+

nm – not meaningful. All growth rates in constant currencies (cc). US LoEs are estimated based on relevant patents; further extensions possible. 1. Including Zolgensma® IT.

H1 2022 free cash flow decreased to USD 4.2bn

Group free cash flow[1]

USD bn, % USD

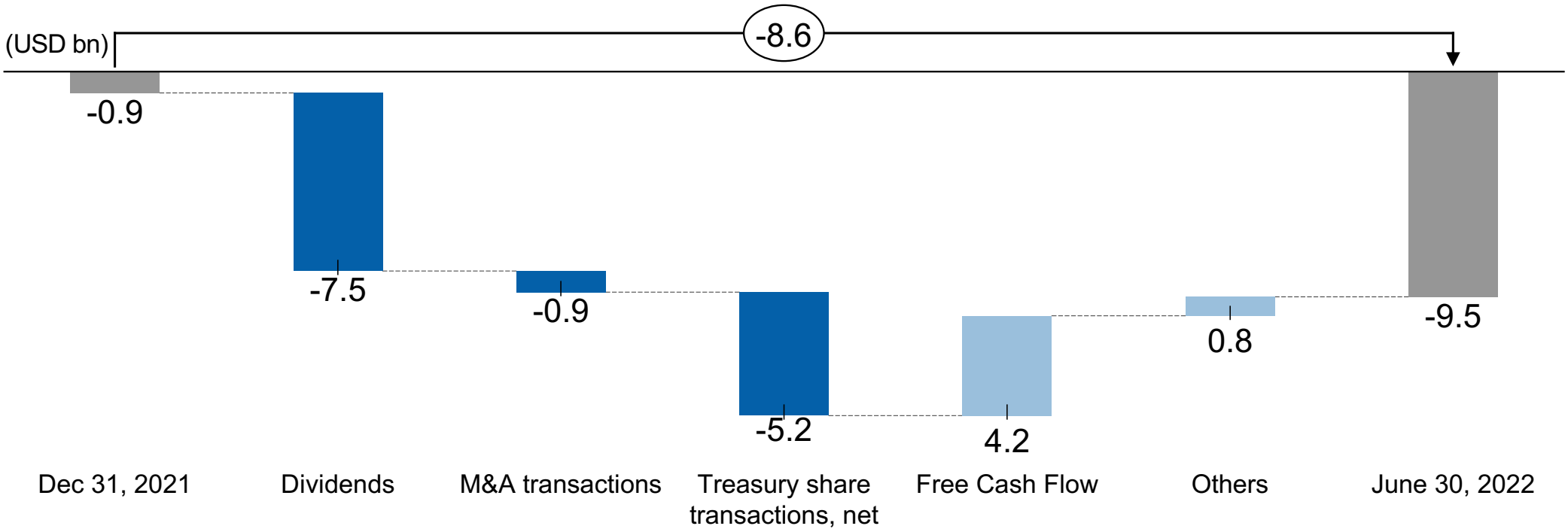


Key drivers vs. PY

- − Lower divestment proceeds
- − Unfavorable working capital
- − Lower dividends from associated companies (PY Roche cash inflow of USD 0.5bn)
- \+ Favorable hedging results

1. Free cash flow is a non-IFRS measure. An explanation of non-IFRS measures can be found on page 47 of the Condensed Interim Financial Report.

Net debt increased by USD 8.6bn mainly due to the annual dividend payment and share buybacks



Confident in future growth driven by our strength and depth in cardio-renal, immunology, neuroscience...

Selected assets, nearly all with exclusivity into 2030+

New for Q2

Cardio-Renal

Asset	Indication	Peak Sales	Next Milestone/ Status	Submission
Leqvio®	CVRR-LDLC	●●●	Ph3 ORION-4 and VICTORION-2-PREVENT ongoing	2026+
			Primary prevention initiation	-
Iptacopan[1]	IgAN	●●●	Ph3 APPLAUSE-IgAN ongoing	2023[2]
	C3G		Ph3 APPEAR-C3G ongoing	2023
	iMN		Ph2b ongoing	2026+
Pelacarsen	CVRR-Lp(a)	●●●	Ph3 Lp(a)HORIZON recruitment completed	2025

Neuroscience

Asset	Indication	Peak Sales	Next Milestone/ Status	Submission
Zolgensma®	SMA IT	●●●	Ph3 STEER initiated	2025
Branaplam	Huntington's disease	●●●	Ph2b VIBRANT-HD ongoing	2026+
Remibrutinib[1]	Multiple sclerosis	●●●	Ph3 REMODEL-1 and -2 ongoing	2025
DLX313 (UCB0599)	Parkinson's disease	●●●	Ph2 ongoing	2026+

Unprobabilized peak sales (USD): ● <1bn ●● 1-2bn ●●● >2bn

Immunology

Asset	Indication	Peak Sales	Next Milestone/ Status	Submission
Cosentyx®	HS	●●●	EU submission completed; US submission planned in H2 2022	2022
	GCA		Ph3 ongoing	2025
	Lupus Nephritis		Ph3 SELUNE ongoing	2026+
	Lichen Planus		Ph2b PRELUDE data analysis ongoing	2025
Ligelizumab	Food allergy	●●●	Ph3 ongoing	2025
Remibrutinib[1]	CSU	●●●	Ph3 REMIX-1 and -2 ongoing	2024
	Other indications being explored			
Ianalumab	Sjögren's	●●●	Ph3 start in 2022	2026+
	SLE		Ph2a ongoing	2026+
	Autoimmune hepatitis		Ph2b ongoing	2026+
	Lupus Nephritis		Ph3 start in 2022	2026+
Iscalimab	Sjögren's	●●	Ph2b ongoing	2026+
	Liver Tx		Ph2b ongoing	2026+
	HS		Ph2a ongoing	2026+

'Bold Bets' | LNA043 (osteoarthritis: Ph2b ongoing), QBW251 (COPD: Ph2b DRF demonstrated dose response across multiple endpoints, study results presentation end 2022)[3], SAF312 (COSP: Ph2b ongoing), UNR844 (presbyopia: Ph2b readout H2 2022)

1. Peak sales potential based on all studied indications 2. Based on 9 months UPCR readout (US accelerated approval) 3. Out-licensing planned

… and strength and depth in oncology

Selected assets, nearly all with exclusivity into 2030+

New for Q2

Solid Tumors

Asset	Indication	Peak Sales	Next Milestone/ Status	Submission
Kisqali®	HR+/HER2- BC (adj)	●●●	Ph3 NATALEE readout event-driven, expected 2023	2023
Canakinumab	NSCLC adjuvant	●●	Ph3 CANOPY-A readout in 2022	2023
Pluvicto™	mCRPC post-taxane	●●●	US approved	-
	mCRPC pre-taxane		Ph3 PSMAfore readout event-driven, end 2022[1]	2023
	mHSPC		Ph3 PSMAddition ongoing	2024
JDQ443 KRAS inhibitor	2/3L NSCLC (mono)	●●●	Ph3 started	2024
	NSCLC (combo)		Ph2 ongoing	2026+
TNO155 SHP2 inhibitor	Solid tumors: multiple combinations being explored in ongoing trials			
Tislelizumab[2]	2L esophageal cancer	●●	Submitted in EU	-
	NSCLC		Submitted in EU	-
			No US submission planned at this time for monotherapy in NSCLC following FDA feedback	
	Other indications		Ongoing trials	-
Ociperlimab[2] TIGIT mab	NSCLC	●●●	Ph3 ongoing[3]	
	Other indications		Ongoing trials[3]; additional Ph3 study initiation H2 2022	

Hematology

Asset	Indication	Peak Sales	Next Milestone/ Status	Submission
Scemblix® (asciminib)	CML 3L	●●●	EU CHMP opinion	-
	CML 1L		Ph3 ongoing	2025
Iptacopan[2]	PNH	●●●	Readout in 2022	2023
	aHUS		Ph3 ongoing	2025
Sabatolimab	HR-MDS	●●●	Ph2 STIMULUS-MDS-1 readout; Ph3 STIMULUS-MDS-2 ongoing	2024
	AML		Ph2 STIMULUS-AML-1 ongoing	2026+
YTB323 CD19 CAR-T	Non-Hodgkin's Lymphoma	●●●	Ph3 start 2022[4]	2025[4]
PHE885 BCMA CART-T	Multiple myeloma	●	Ph2 initiated	2025

Unprobabilized peak sales (USD): ● <1bn ●● 1-2bn ●●● >2bn

'Bold Bets' | NIS793 (1L mPDAC: Ph3 ongoing, 1L metastatic colorectal cancer: Ph2 ongoing)

1. Could move to early 2023. 2. Peak sales potential based on all studied indications; Novartis territories. 3. Active trials are being conducted by BeiGene, option deal. 4. Development strategy being updated

Our pipeline projects at a glance

	Phase 1/2	Phase 3	Registration	Total
Innovative medicines	98	47	4	149
Solid Tumors	22	18	2	42
Hematology	19	7	0	26
Immunology	25	7	1	33
Neuroscience	6	5	0	11
Cardio-renal	6	6	0	12
Others	20	4	1	25
Ophthalmology	*5*	*1*	*0*	*6*
Respiratory & Allergy	*6*	*2*	*0*	*8*
Global Health	*9*	*1*	*1*	*11*
Biosimilars	0	2	0	2
Total	**98**	**49**	**4**	**151**

Novartis pipeline in Phase 1

29 lead indications

Lead indication

Solid tumors

Code	Name	Mechanism	Indication(s)
AAA603	^{177}Lu-NeoB	Radioligand therapy target GRPR	Multiple solid tumors
AAA817	Ac-PSMA-617	Radioligand therapy target PSMA	Metastatic castration-resistant prostate cancer
ADPT01	ADPT01	-	Colorectal cancer (combos)
DFF332	DFF332	HIF2A inhibitor	Renal cell carcinoma
DKY709	DKY709 + spartalizumab	Novel immunomodulatory agent	Cancers
IAG933	IAG933	-	Mesothelioma
JDQ443	JDQ443	KRAS Inhibitor	KRAS G12C mutated solid tumors
KAZ954	KAZ954	-	Solid tumors
NIS793	NIS793, spartalizumab	TGFB inhibitor	Solid tumors
NIZ985	NIZ985, spartalizumab	IL-15 agonist	Solid tumors
NZV930	NZV930, spartalizumab, NIR178	CD73 antagonist	Solid tumors
TNO155	TNO155	SHP2 inhibitor	Solid tumors (combo)
VPM087	gevokizumab	IL-1 beta antagonist	Colorectal cancer, 1st line
WNT974	WNT974 + spartalizumab	Porcupine inhibitor	Solid tumors

Immunology

Code	Name	Mechanism	Indication(s)
FIA586	FIA586	-	Non-alcoholic steatohepatitis (NASH)
MHS552	MHS552	-	Autoimmune indications
MHV370	MHV370	-	Systemic lupus erythematosus
NGI226	NGI226	-	Tendinopathy

Neuroscience

Code	Name	Mechanism	Indication(s)
NIO752	NIO752	Tau antagonist	Progressive supranuclear palsy

Hematology

Code	Name	Mechanism	Indication(s)
ADPT03	ADPT03	BCL11A	Sickle cell anemia
HDM201	HDM201 (combos)	MDM2 inhibitor	Haematological malignancy
JBH492	JBH492	-	Haematological malignancy
JEZ567	JEZ567	CD123 CAR-T	Acute myeloid leukaemia
MAK683	MAK683	EED inhibitor	Cancers
MBG453	sabatolimab	TIM3 antagonist	Low risk myelodysplastic syndrome
MIK665	MIK665	MCL1 inhibitor	Acute myeloid leukaemia (combo)
VAY736	ianalumab + ibrutinib	BAFF-R inhibitor	Haematological malignancy (combo)
VOB560	VOB560	-	Cancers
WVT078	WVT078	-	Multiple myeloma
YTB323	YTB323	CD19 CAR-T	DLBCL and adult ALL

Cardio-renal

Code	Name	Mechanism	Indication(s)
XXB750	XXB750	-	Cardiovascular diseases

Others

Code	Name	Mechanism	Indication(s)
Global Health			
EDI048	EDI048	CpPI(4)K inhibitor	Cryptosporidiosis
EYU688	EYU688	NS4B inhibitor	Dengue
KAF156	ganaplacide	-	Malaria prophylaxis
INE963	INE963	-	Malaria, uncomplicated
Respiratory & Allergy			
LTP001	LTP001	-	Respiratory diseases
NCJ424	NCJ424	-	Respiratory diseases
Ophthalmology			
MHU650	MHU650	-	Diabetic eye diseases

Novartis pipeline in Phase 2

27 lead indications

Lead indication

Solid Tumors

Code	Name	Mechanism	Indication(s)
AAA601	Lutathera®	Radioligand therapy target SSTR	GEPNET, pediatrics
			1L ES-SCLC
			Glioblastoma
DRB436	Tafinlar® + Mekinist®	BRAF inhibitor + MEK inhibitor	HGG/LGG, pediatrics
JDQ443	JDQ443	KRAS inhibitor	NSCLC (combo)
NIR178	NIR178, spartalizumab	Ad2AR inhibitor, PD1 inhibitor	Cancers
NIS793	NIS793	TGFB inhibitor	1L metastatic colorectal cancer
TNO155	TNO155	SHP2 inhibitor	Solid tumors (single agent)

Immunology

Code	Name	Mechanism	Indication(s)		
AIN457	Cosentyx®	IL17A inhibitor	Lichen planus		
CFZ533	iscalimab	CD40 inhibitor	Sjögren's	Liver Tx	Hidradenitis suppurativa
CMK389	CMK389	IL-18 inhibitor	Atopic dermatitis		
DFV890	DFV890	NLRP3 inhibitor	Osteoarthritis		
			Familial cold auto-inflammatory syndrome		
LNA043	LNA043	ANGPTL3 agonist	Knee osteoarthritis		
			Osteoarthritis (combos)		
LOU064	remibrutinib	BTK inhibitor	Sjögren's		
LRX712	LRX712	-	Osteoarthritis		
LYS006	LYS006	Anti-inflammatory	Acne	Colitis ulcerative	Hidradenitis suppurativa
MAS825	MAS825	-	NLRC4-GOF indications		Hidradenitis suppurativa
MHV370	MHV370	-	Sjögren's		Mixed connective tissue disease
VAY736	ianalumab	BAFF-R inhibitor	Sjögren's		Autoimmune hepatitis
			Systemic lupus erythematosus		

Neuroscience

Code	Name	Mechanism	Indication(s)
ADPT06	ADPT06	-	Cognitive impairment
BLZ945	sotuletinib	CSF-1R inhibitor	Amyotrophic lateral sclerosis
DLX313	DLX313 (UCB0599)	Alpha-synuclein Inhibitor	Parkinson's disease
LMI070	branaplam	mRNA splicing modulator	Huntington's disease
MIJ821	MIJ821	NR2B negative allosteric modulator	Major depressive disorder with acute suicidal ideation or behavior

1. Gyroscope acquisition

Hematology

Code	Name	Mechanism	Indication(s)	
ABL001	Scemblix®	BCR-ABL inhibitor	Chronic myeloid leukemia, 2L, pediatrics	
INC424	Jakavi®	JAK1/2 inhibitor	Acute GVHD, pediatrics	Chronic GVHD, pediatrics
LNP023	iptacopan	CFB inhibitor	Immune thrombocytopenia	
MBG453	sabatolimab	TIM3 antagonist	Unfit acute myeloid leukaemia	
			Acute myeloid leukaemia, maintenance	
PHE885	PHE885	BCMA cell therapy	4L multiple myeloma	
PKC412	Rydapt®	Multi-targeted kinase inhibitor	Acute myeloid leukemia, pediatrics	

Cardio-renal

Code	Name	Mechanism	Indication(s)	
CFZ533	iscalimab	CD40 inhibitor	Lupus nephritis	Type 1 diabetes mellitus
HSY244	HSY244	-	Atrial fibrillation	
LNP023	iptacopan	CFB inhibitor	Membranous nephropathy	
MBL949	MBL949	-	Obesity related diseases	

Others

Code	Name	Mechanism	Indication(s)	
Global Health				
KAE609	cipargamin	PfATP4 inhibitor	Malaria, severe	Malaria, uncomplicated
KAF156	ganaplacide	-	Malaria, uncomplicated	
LXE408	LXE408	Proteasome inhibitor	Visceral leishmaniasis	
SEG101	Adakveo®	P-selectin inhibitor	Sickle cell disease, pediatrics	
Respiratory & Allergy				
CMK389	CMK389	IL-18 inhibitor	Pulmonary sarcoidosis	
QBW251	icenticaftor	CFTR potentiator	Chronic obstructive pulmonary disease	Bronchiectasis
QMF149	Atectura®	Combo	Asthma, pediatrics	
Ophthalmology				
LKA651	LKA651	EPO inhibitor	Diabetic retinopathy	
PPY988[1]	PPY988	Gene therapy	Geographic atrophy	
SAF312	libvatrep	TRPV1 antagonist	Chronic ocular surface pain	
UNR844	UNR844	Reduction of disulfide bonds	Presbyopia	

NOVARTIS | Reimagining Medicine

Novartis pipeline in Phase 3

8 lead indications

Lead indication

Solid Tumors

Code	Name	Mechanism	Indication(s)		
AAA617	Pluvicto®	Radioligand therapy target PSMA	mCRPC, pre-taxane		
			Metastatic hormone sensitive prostate cancer (mHSPC)		
AAA601[1]	Lutathera®	Radioligand therapy target SSTR	Gastroenteropancreatic neuroendocrine tumors, 1st line in G2/3 tumors (GEP-NET 1L G3)		
ACZ885	canakinumab	IL-1b inhibitor	NSCLC, adjuvant		
BYL719	Piqray®	PI3Kα inhibitor	HER2+ adv BC	Triple negative breast cancer	Ovarian cancer
JDQ443	JDQ443	KRAS inhibitor	2/3L Non-small cell lung cancer		
LEE011	Kisqali®	CDK4 Inhibitor	HR+/HER2- BC (adj)		
NIS793	NIS793	TGFB1 inhibitor	1L Metastatic pancreatic ductal adenocarcinoma		
VDT482	Tislelizumab	PD1 inhibitor	1L Nasopharyngeal Carcinoma	Adj/Neo adj. NSCLC	
			1L ESCC	1L Gastric cancer	
			1L Hepatocellular Carcinoma	Localized ESCC	
			1L Urothelial Cell Carcinoma	1L Small Cell Lung Cancer	

Immunology

Code	Name	Mechanism	Indication(s)
AIN457	Cosentyx®	IL17A inhibitor	Lupus Nephritis
			Psoriatic arthritis (IV formulation)
			Axial SpA (IV formulation)
			Giant cell arteritis
LOU064	remibrutinib	BTK inhibitor	Chronic spontaneous urticaria
QGE031	ligelizumab	IgE inhibitor	Food allergy
VAY736	ianalumab	BAFF-R inhibitor	Lupus Nephritis[3]

Neuroscience

Code	Name	Mechanism	Indication(s)
AMG334	Aimovig®	CGRPR antagonist	Migraine, pediatrics
BAF312	Mayzent®	S1P1,5 receptor modulator	Multiple sclerosis, pediatrics
LOU064	remibrutinib	BTK inhibitor	Multiple sclerosis
OAV101	AVXS-101	SMN1 gene replacement therapy	SMA IT administration
OMB157	Kesimpta®	CD20 Antagonist	Multiple sclerosis, pediatrics

Hematology

Code	Name	Mechanism	Indication(s)
ABL001	Scemblix®	BCR-ABL inhibitor	Chronic myeloid leukemia, 1st line
CTL019	Kymriah®	CD19 CAR-T	1L high risk acute lymphocytic leukaemia, pediatrics & young adults
ETB115	Promacta®	Thrombopoietin receptor (TPO-R) agonist	Radiation sickness syndrome
LNP023	iptacopan	CFB inhibitor	Paroxysmal nocturnal haemoglobinuria
			Atypical haemolytic uraemic syndrome
MBG453	sabatolimab	TIM3 antagonist	Myelodysplastic syndrome
YTB323	YTB323	CD19 CAR-T	2L Diffuse large B-cell lymphoma[4]

Cardio-renal

Code	Name	Mechanism	Indication(s)	
KJX839	Leqvio®	siRNA (regulation of LDL-C)	CVRR-LDLC	Hyperlipidemia, pediatrics
LCZ696	Entresto®	Angiotensin receptor/neprilysin inhibitor	Congestive heart failure, pediatrics[2]	
LNP023	iptacopan	CFB inhibitor	IgA nephropathy	
			C3 glomerulopathy	
TQJ230	Pelacarsen	ASO targeting Lp(a)	Secondary prevention of cardiovascular events in patients with elevated levels of lipoprotein (a) (CVRR-Lp(a))	

Others

Code	Name	Mechanism	Indication(s)	
Global Health				
COA566	Coartem®	-	Malaria, uncomplicated (<5kg patients)	
Respiratory & Allergy				
IGE025	Xolair®	IgE inhibitor	Food allergy	Auto-injector
Ophthalmology				
RTH258	Beovu®	VEGF inhibitor	Diabetic retinopathy	

Biosimilars

Code	Name	Mechanism	Indication(s)
GP2411	denosumab	anti RANKL mAb	Osteoporosis (same as originator)
SOK583	aflibercept	VEGF inhibitor	Ophthalmology indication (as originator)

1. ^{177}Lu-dotatate in US 2. Approved in US 3. Ph3 initiating 4. Ph3 to be initiated pending strategy update

Novartis pipeline in registration

2 lead indications

Lead indication

Solid Tumors

Code	Name	Mechanism	Indication(s)
VDT482	tislelizumab	PD1 inhibitor	2L ESCC
			Non-small cell lung cancer

Others

Code	Name	Mechanism	Indication(s)
Global Health			
SKO136	ensovibep	Multi-specific DARPin	Corona virus infection

Immunology

Code	Name	Mechanism	Indication(s)
AIN457	Cosentyx®	IL17A inhibitor	Hidradenitis suppurativa

Novartis submission schedule

New Molecular Entities: Lead and supplementary indications

LEAD INDICATIONS

2022

- **ensovibep** — Lead
  SKO136
  COVID19

2023

- **iptacopan** — Lead
  LNP023
  PNH

2024

- **JDQ443** — Lead
  JDQ443
  2/3L NSCLC (mono)
- **sabatolimab** — Lead
  MBG453
  HR-MDS
- **remibrutinib** — Lead
  LOU064
  CSU
- **UNR844** — Lead
  Presbyopia

2025

- **icenticaftor**[3] — Lead
  QBW251
  COPD
- **ligelizumab** — Lead
  QGE031
  Food allergy
- **NIS793** — Lead
  1L Pancreatic cancer
- **pelacarsen** — Lead
  TQJ230
  CVRR-Lp(a)
- **YTB323**[1] — Lead
  2L Diffuse large B-cell lymphoma

≥2026

- **^{177}Lu-NeoB** — Lead
  AAA603
  Multiple Solid Tumors
- **branaplam** — Lead
  LMI070
  Huntington's disease
- **cipargamin** — Lead
  KAE609
  Malaria severe
- **ganaplacide** — Lead
  KAF156
  Malaria uncomplicated
- **gevokizumab** — Lead
  VPM087
  1st line CRC
- **iscalimab** — Lead
  CFZ533
  Sjögren's syndrome
- **ianalumab** — Lead
  VAY736
  Sjögren's syndrome
- **libvatrep** — Lead
  SAF312
  COSP
- **LNA043** — Lead
  Knee osteoarthritis
- **LXE408** — Lead
  Visceral leishmaniasis
- **MIJ821** — Lead
  Acute depression
- **PPY988**[2] — Lead
  Geographic atrophy
- **TNO155** — Lead
  Solid tumors

NEW INDICATIONS

- **tislelizumab** — LCM
  VDT482
  1L Nasopharyngeal Carcinoma
- **tislelizumab** — LCM
  VDT482
  NSCLC
- **Pluvicto** — LCM
  AAA617
  mCRPC, Pre-taxane
- **iptacopan** — LCM
  LNP023
  C3G
- **iptacopan** — LCM
  LNP023
  IgAN
- **tislelizumab** — LCM
  VDT482
  1L Gastric Cancer
- **tislelizumab** — LCM
  VDT482
  1L ESCC
- **tislelizumab** — LCM
  VDT482
  Localized ESCC
- **tislelizumab** — LCM
  VDT482
  1L Hepatocellular Carcinoma
- **Pluvicto** — LCM
  AAA617
  mHSPC
- **tislelizumab** — LCM
  VDT482
  1L Small Cell Lung Cancer
- **Scemblix** — LCM
  ABL001
  CML 1L
- **iptacopan** — LCM
  LNP023
  aHUS
- **remibrutinib** — LCM
  LOU064
  Multiple sclerosis
- **cipargamin** — LCM
  KAE609
  Malaria uncomplicated
- **JDQ443** — LCM
  JDQ443
  NSCLC (combo)
- **ianalumab** — LCM
  VAY736
  AIH
- **ianalumab** — LCM
  VAY736
  Lupus Nephritis
- **ianalumab** — LCM
  VAY736
  SLE
- **iscalimab** — LCM
  CFZ533
  Liver Tx
- **iptacopan** — LCM
  LNP023
  iMN
- **sabatolimab** — LCM
  MBG453
  Unfit AML
- **Scemblix** — LCM
  ABL001
  CML, 2L, pediatrics
- **remibrutinib** — LCM
  LOU064
  Sjögren's syndrome
- **tislelizumab** — LCM
  VDT482
  Adj/Neo adj NSCLC
- **tislelizumab** — LCM
  VDT482
  1L Urothelial Cell Carcinoma

1. Development strategy being updated 2. Gyroscope acquisition 3. Out-licensing planned

Novartis submission schedule

Supplementary indications for existing brands

2022

- **Cosentyx** LCM
  secukinumab, AIN457
  PsA IV
- **Cosentyx** LCM
  secukinumab, AIN457
  Hidradenitis suppurativa
- **Entresto EU**[1] LCM
  sacubitril/valsartan, LCZ696
  Pediatric CHF
- **Tafinlar + Mekinist** LCM
  dabrafenib + trametinib, DRB436
  HGG/LGG - Pediatrics
- **Xolair** LCM
  omalizumab, IGE025
  Auto-injector

2023

- **canakinumab** LCM
  ACZ885
  Adjuvant NSCLC
- **Cosentyx** LCM
  secukinumab, AIN457
  axSpA IV
- **denosumab** BioS
  GP2411
  anti RANKL mAb
- **Kisqali** LCM
  ribociclib, LEE011
  HR+/HER2- BC (adj)
- **Lutathera** LCM
  ^{177}Lu-oxodotreotide[2]
  GEP-NET 1L G3
- **Piqray** LCM
  alpelisib, BYL719
  Ovarian cancer
- **Xolair** LCM
  omalizumab, IGE025
  Food allergy

2024

- **aflibercept** BioS
  SOK583
  Neovascular age-related macular degeneration
- **Adakveo** LCM
  SEG101
  Sickle cell disease, pediatrics
- **Coartem** LCM
  artemether + lumefantrine, COA566
  Malaria uncompl., formula for <5kg
- **Jakavi** LCM
  ruxolitinib, INC424
  Pediatrics Acute GVHD
- **Jakavi** LCM
  ruxolitinib, INC424
  Pediatrics Chronic GVHD

2025

- **Beovu** LCM
  brolucizumab, RTH258
  Diabetic retinopathy
- **Cosentyx** LCM
  secukinumab, AIN457
  GCA
- **Cosentyx** LCM
  secukinumab, AIN457
  Lichen Planus
- **Leqvio** LCM
  KJX839
  Ped Hyoerlipidemia
- **Piqray** LCM
  alpelisib, BYL719
  HER2+ adv BC
- **Promacta** LCM
  eltrombopag, ETB115
  Radiation sickness syndrome
- **Zolgensma** LCM
  AVXS-101 OAV101
  SMA IT

≥2026

- **Atectura** LCM
  indacaterol + mometasone, QMF149
  Asthma, pediatrics
- **Aimovig** LCM
  erenumab, AMG334
  Pediatric Migraine
- **Cosentyx** LCM
  secukinumab, AIN457
  Lupus Nephritis
- **Kesimpta**[3] LCM
  ofatumumab
  Multiple sclerosis, pediatrics
- **Kymriah** LCM
  tisagenlecleucel, CTL019
  1L high risk ALL, pediatrics & young adults
- **Leqvio** LCM
  KJX839
  CVRR-LDLC
- **Mayzent**[3] LCM
  siponimod, BAF312
  Multiple sclerosis, pediatrics
- **Piqray** LCM
  alpelisib, BYL719
  TNBC
- **Rydapt** LCM
  midostaurin, PKC412
  Acute myeloid leukemia, pediatrics

1. Approved in US. 2. 177Lu-dotatate in US. 3. Kesimpta and Mayzent: pediatric study in multiple sclerosis run in conjunction (NEOS).

Clinical Trials Update

Includes selected ongoing or recently concluded global trials of Novartis development programs/products which are in confirmatory development or marketed (typically Phase 2b or later).

For further information on all Novartis clinical trials, please visit: www.novartisclinicaltrials.com

Oncology

canakinumab - IL-1beta inhibitor

NCT03447769 CANOPY-A (CACZ885T2301)

Indication	Adjuvant NSCLC
Phase	Phase 3
Patients	1500
Primary Outcome Measures	Disease free survival (primary), overall survival (key secondary)
Arms Intervention	Canakinumab 200mg q3w sc for 18 cycles Placebo q3w sc for 18 cycles
Target Patients	Patients with: High–risk NSCLC (AJCC/UICC v.8 stage II-IIIA and IIIB (T>5cm N2)) after complete resection and standard of care adjuvant cisplatin-based chemotherapy All histologies
Read-out Milestone(s)	2022
Publication	Shells submitted to ESMO, Sep '22, for both CANOPY-A (ACZ885T) and CANOPY-N (ACZ885V) trials

iptacopan - CFB inhibitor

NCT04558918 APPLY-PNH (CLNP023C12302)

Indication	Paroxysmal nocturnal haemoglobinuria
Phase	Phase 3
Patients	91
Primary Outcome Measures	Percentage of participants achieving a sustained increase in hemoglobin levels of ≥ 2 g/dL in the absence of red blood cell transfusions Percentage of participants achieving sustained hemoglobin levels ≥ 12 g/dL in the absence of red blood cell transfusions
Arms Intervention	Arm 1: Drug: LNP023, taken orally b.i.d. dosage supplied: 200 mg dosage form: hard gelatin capsule Route of Administration: Oral Arm 2: Drug: Eculizumab, administered as intravenous infusion every 2 weeks as per the stable regimen, the maintenance dose is a fixed dose. Dosage supplied: 300 mg/30mL Dosage form: Concentrate solution for infusion Drug: Ravulizumab, administered as intravenous infusion every 8 weeks, the maintenance dose is based on body weight. Dosage Supplied: 300 mg/30mL Dosage form: Concentrate solution for infusion
Target Patients	Adult patients with PNH and residual anemia, despite treatment with an intravenous Anti-C5 antibody
Read-out Milestone(s)	Primary 2022
Publication	Risitano AM, et al. Abstract accepted at the European Hematology Association (EHA 2021) congress (study design abstract; accepted for publication only)

iptacopan - CFB inhibitor

NCT04820530 APPOINT-PNH (CLNP023C12301)

Indication	Paroxysmal nocturnal haemoglobinuria
Phase	Phase 3
Patients	40
Primary Outcome Measures	Proportion of participants achieving a sustained increase from baseline in hemoglobin levels of ≥ 2 g/dL assessed , in the absence of red blood cell transfusions
Arms Intervention	Iptacopan (LNP023), taken orally b.i.d. (dosage supplied: 200mg)
Target Patients	PNH patients who are naive to complement inhibitor therapy, including anti-C5 antibody
Read-out Milestone(s)	2023
Publication	Peffault de Latour R, et al. Abstract accepted at the European Hematology Association (EHA 2021) congress (study design abstract; accepted for publication only)

iptacopan - CFB inhibitor

NCT04889430 APPELHUS (CLNP023F12301)

Indication	Atypical haemolytic uraemic syndrome
Phase	Phase 3
Patients	50
Primary Outcome Measures	Percentage of participants with complete TMA response without the use of PE/PI and anti-C5 antibody
Arms Intervention	Single arm open-label with 50 adult patients receiving 200mg oral twice daily doses of iptacopan
Target Patients	Adult patients with aHUS who are treatment naive to complement inhibitor therapy (including anti-C5 antibody)
Read-out Milestone(s)	2024
Publication	TBD

Jakavi® - JAK1/2 inhibitor

NCT03491215 REACH4 (CINC424F12201)

Indication	Acute graft versus host disease
Phase	Phase 2
Patients	45
Primary Outcome Measures	Measurement of PK parameters Overall Response Rate (ORR)
Arms Intervention	Ruxolitinib
Target Patients	Pediatric patients with grade II-IV acute graft vs. host disease after allogeneic hematopoietic stem cell transplantation
Read-out Milestone(s)	2023
Publication	TBD

Jakavi® - JAK1/2 inhibitor

NCT03774082 REACH5 (CINC424G12201)

Indication	Chronic graft versus host disease
Phase	Phase 2
Patients	45
Primary Outcome Measures	Overall Response Rate (ORR)
Arms Intervention	Ruxolitinib 5mg tablets / pediatric formulation
Target Patients	Pediatric subjects with moderate and severe chronic Graft vs. Host disease after allogeneic stem cell transplantation
Read-out Milestone(s)	2023
Publication	TBD

JDQ443 - KRAS inhibitor

NCT05132075 KontRASt-02 (CJDQ443B12301)	
Indication	Non-small cell lung cancer, 2/3L
Phase	Phase 3
Patients	360
Primary Outcome Measures	Progression free survival (PFS)
Arms Intervention	Arm 1 Experimental: JDQ443 Arm 2 Active Comparator: Participant will be treated with docetaxel following local guidelines as per standard of care and product labels
Target Patients	Patients with advanced non-small cell lung cancer (NSCLC) harboring a KRAS G12C mutation who have been previously treated with a platinum-based chemotherapy and immune checkpoint inhibitor therapy either in sequence or in combination.
Read-out Milestone(s)	2024
Publication	NA

Kisqali® - CDK4/6 inhibitor

NCT03701334 NATALEE (CLEE011O12301C)

Indication	Adjuvant treatment of hormone receptor (HR)-positive, HER2-negative, early breast cancer (EBC)
Phase	Phase 3
Patients	5101
Primary Outcome Measures	Invasive Disease-Free Survival for using STEEP criteria (Standardized Definitions for Efficacy End Points in adjuvant breast cancer trials)
Arms Intervention	Ribociclib + endocrine therapy Endocrine therapy
Target Patients	Pre and postmenopausal women and men with HR-positive, HER2-negative EBC, after adequate surgical resection, who are eligible for adjuvant endocrine therapy
Read-out Milestone(s)	2023
Publication	TBD

Kymriah® - CD19 CAR-T

NCT03876769 CASSIOPEIA (CCTL019G2201J)	
Indication	1st line high risk acute lymphoblastic leukemia (ALL)
Phase	Phase 2
Patients	140
Primary Outcome Measures	Disease Free Survival (DFS)
Arms Intervention	Single-arm study of tisagenlecleucel
Target Patients	Pediatric and young adult patients with 1st line high risk ALL
Read-out Milestone(s)	2025
Publication	TBD

NIS793 - TGFβ1 inhibitor

NCT04935359 daNIS-2 (CNIS793B12301)

Indication	1L metastatic pancreatic ductal Adenocarcinoma
Phase	Phase 3
Patients	501
Primary Outcome Measures	Safety run-in part: Percentage of participants with dose limiting toxicities (DLTs) during the first cycle (4 weeks) of treatment Randomized part: Overall survival (OS)
Arms Intervention	Safety run-in part: NIS793+gemcitabine+nab-paclitaxel Randomized portion of the study: Arm 1: NIS793+gemcitabine+nab-paclitaxel Arm 2: placebo+gemcitabine+nab-paclitaxel
Target Patients	Patients with Metastatic Pancreatic Ductal Adenocarcinoma (mPDAC), first line treatment
Read-out Milestone(s)	Primary: 2024
Publication	NA

Piqray® - PI3K-alpha inhibitor

NCT04208178 EPIK-B2 (CBYL719G12301)	
Indication	HER-2 positive breast cancer
Phase	Phase 3
Patients	511
Primary Outcome Measures	Progression-free survival (PFS)
Arms Intervention	Alpelisib + trastuzumab + pertuzumab Trastuzumab + pertuzumab
Target Patients	Patients with HER2-positive advanced breast cancer with a PIK3CA mutation
Read-out Milestone(s)	2025
Publication	TBD

Piqray® - PI3K-alpha inhibitor

NCT04251533 EPIK-B3 (CBYL719H12301)	
Indication	Triple negative breast cancer
Phase	Phase 3
Patients	566
Primary Outcome Measures	Progression-free Survival (PFS) for patients with PIK3CA mutant status
Arms Intervention	Alpelisib 300 mg + nab-paclitaxel 100 mg/m² Placebo + nab-paclitaxel 100 mg/m²
Target Patients	Patients with advanced triple negative breast cancer with either Phosphoinositide-3-kinase Catalytic Subunit Alpha (PIK3CA) mutation or Phosphatase and Tensin Homolog Protein (PTEN) loss without PIK3CA mutation
Read-out Milestone(s)	2025
Publication	TBD

Piqray® - PI3K-alpha inhibitor

NCT04729387	EPIK-O (CBYL719K12301)
Indication	Ovarian Cancer
Phase	Phase 3
Patients	358
Primary Outcome Measures	Progression Free Survival (PFS) based on Blinded Independent Review Committee (BIRC) assessment using RECIST 1.1 criteria
Arms Intervention	Arm 1 Experimental: Alpelisib+olaparib: Alpelisib 200 mg orally once daily and olaparib 200 mg orally twice daily on a continuous dosing schedule Arm 2 Active Comparator: Paclitaxel or PLD. Investigator's choice of one of 2 single agent cytotoxic chemotherapies: Paclitaxel 80 mg/m2 intravenously weekly or Pegylated liposomal Doxorubicin (PLD) 40-50 mg/m2 (physician discretion) intravenously every 28 days.
Target Patients	Patients with platinum resistant or refractory high-grade serous ovarian cancer, with no germline BRCA mutation detected
Read-out Milestone(s)	2023
Publication	TBD

Pluvicto® - Radioligand therapy target PSMA

NCT04689828 PSMAfore (CAAA617B12302)

Indication	Metastatic castration-resistant prostate cancer, pre-taxane
Phase	Phase 3
Patients	450
Primary Outcome Measures	Radiographic Progression Free Survival (rPFS)
Arms Intervention	Arm 1: Participants will receive 7.4 GBq (200 mCi) +/- 10% 177Lu-PSMA-617 once every 6 weeks for 6 cycles. Best supportive care, including ADT may be used Arm 2: For participants randomized to the ARDT arm, the change of ARDT treatment will be administered per the physician's orders. Best supportive care, including ADT may be used
Target Patients	mCRPC patients that were previously treated with an alternate ARDT and not exposed to a taxane-containing regimen in the CRPC or mHSPC settings
Read-out Milestone(s)	Primary Analysis: 2022 Final Analysis: 2025
Publication	TBD

Pluvicto® - Radioligand therapy target PSMA

NCT04720157 PSMAddition (CAAA617C12301)

Indication	Metastatic hormone sensitive prostate cancer
Phase	Phase 3
Patients	1126
Primary Outcome Measures	Radiographic Progression Free Survival (rPFS)
Arms Intervention	Arm 1: 177Lu-PSMA-617 Participant will receive 7.4 GBq (+/- 10%) 177Lu-PSMA-617, once every 6 weeks for a planned 6 cycles, in addition to the Standard of Care (SOC); ARDT +ADT is considered as SOC and treatment will be administered per the physician's order Arm 2: For participants randomized to Standard of Care arm, ARDT +ADT is considered as SOC and treatment will be administered per the physician's order
Target Patients	Patients with metastatic Hormone Sensitive Prostate Cancer (mHSPC)
Read-out Milestone(s)	Primary Analysis: 2024
Publication	TBD

Promacta® - Thrombopoetin receptor agonist

NCT03025698 (CETB115E2201)	
Indication	Refractory or relapsed severe aplastic anemia
Phase	Phase 2
Patients	51
Primary Outcome Measures	PK of eltrombopag at steady state in pediatric patients with SAA
Arms Intervention	Eltrombopag 12.5, 25, 50, 75 mg FCT & 25 mg pFOS Arm A: relapsed/refractory SAA or recurrent AA following IST for SAA: hATG/cyclosporine + eltrombopag or cyclosporine + eltrombopag Arm B: previously untreated SAA: hATG/cyclosporine + eltrombopag
Target Patients	Pediatric patients from age 1 <18 years with relapsed/refractory SAA or recurrent AA after IST or previously untreated SAA
Read-out Milestone(s)	Primary CSR: 2022 Final CSR: 2025
Publication	TBD

Promacta® - Thrombopoetin receptor agonist

NCT03988608 (CETB115E2202)	
Indication	Refractory or relapsed severe aplastic anemia
Phase	Phase 2
Patients	20
Primary Outcome Measures	Hematologic response rate rate up to 26 weeks of treatment
Arms Intervention	Eltrombopag 25 mg film-coated tablets
Target Patients	Chinese patients with refractory or relapsed severe aplastic anemia
Read-out Milestone(s)	Primary CSR: 2021 Interim CSR: 2022 Final CSR:2025
Publication	TBD

Rydapt® - Multi-targeted kinase inhibitor

NCT03591510 (CPKC412A2218)	
Indication	Acute myeloid leukemia, pediatrics
Phase	Phase 2
Patients	20
Primary Outcome Measures	Occurrence of dose limiting toxicities Safety and Tolerability
Arms Intervention	Chemotherapy followed by Midostaurin
Target Patients	Newly diagnosed pediatric patients with FLT3 mutated acute myeloid leukemia (AML)
Read-out Milestone(s)	2026
Publication	TBD

sabatolimab - TIM3 antagonist

NCT03946670 STIMULUS MDS-1 (CMBG453B12201)

Indication	Myelodysplastic syndrome
Phase	Phase 2
Patients	120
Primary Outcome Measures	Complete Remission (CR) rate and Progression Free Survival (PFS)
Arms Intervention	Experimental: Sabatolimab (MBG453) + hypomethylating agents Placebo comparator: Placebo + hypomethylating agents
Target Patients	Adult subjects with intermediate, high or very high risk Myelodysplastic Syndrome (MDS) as per IPSS-R criteria
Read-out Milestone(s)	2022 ClinicalTrial.gov dates for reference: Primary Completion: 29-Apr-2022; Secondary Completion: 10-Aug-2024
Publication	

sabatolimab - TIM3 antagonist

NCT04266301 STIMULUS-MDS2 (CMBG453B12301)

Indication	Unfit acute myeloid leukaemia
Phase	Phase 3
Patients	500
Primary Outcome Measures	Overall survival
Arms Intervention	Sabatolimab 800 mg + azacitidine 75 mg/m2 Sabatolimab 800 mg + azacitidine 75 mg/m2 + placebo
Target Patients	Patients with intermediate, high or very high risk Myelodysplastic Syndrome (MDS) as Per IPSS-R, or Chronic Myelomonocytic Leukemia-2 (CMML-2)
Read-out Milestone(s)	2024
Publication	TBD

sabatolimab - TIM3 antagonist

NCT04150029 STIMULUS-AML1 (CMBG453C12201)	
Indication	Unfit acute myeloid leukaemia
Phase	Phase 2
Patients	86
Primary Outcome Measures	Incidence of dose limiting toxicities (Safety run-in patients only) Percentage of subjects achieving complete remission (CR)
Arms Intervention	Single arm safety and efficacy study of sabatolimab in combination with azacitidine and venetoclax
Target Patients	Newly diagnosed adult AML patients who are not suitable for treatment with intensive chemotherapy
Read-out Milestone(s)	2023
Publication	TBD

Scemblix® - BCR-ABL inhibitor

NCT04971226 ASC4FIRST (CABL001J12301)	
Indication	Chronic myeloid leukemia, 1st line
Phase	Phase 3
Patients	402
Primary Outcome Measures	Major Molecular Response (MMR) at week 48
Arms Intervention	Arm 1: asciminib 80 mg QD Arm 2: Investigator selected TKI including one of the below treatments: - Imatinib 400 mg QD - Nilotinib 300 mg BID - Dasatinib 100 mg QD - Bosutinib 400 mg QD
Target Patients	Patients with newly diagnosed philadelphia chromosome positive chronic myelogenous leukemia in chronic phase
Read-out Milestone(s)	2024
Publication	TBD

Tabrecta® - Met inhibitor

NCT04427072 (CINC280A2301)	
Indication	Non-small cell lung cancer
Phase	Phase 3
Patients	90
Primary Outcome Measures	Progression free survival (PFS) per blinded independent review committee (BIRC) using RECIST v1.1
Arms Intervention	Arm 1: 400mg of capmatinib tablets administered orally twice daily Arm 2: Docetaxel 75 mg/m2 by intravenous infusion every 21 days
Target Patients	Previously Treated Patients With EGFR wt, ALK Negative, Locally Advanced or Metastatic (Stage IIIB/IIIC or IV) NSCLC Harboring MET Exon 14 Skipping Mutation (METΔex14).
Read-out Milestone(s)	Primary 2022 Final: 2024
Publication	TBD

TNO155 - SHP2 inhibitor

NCT03114319 (CTNO155X2101)

Indication	Solid tumors (single agent)
Phase	Phase 1
Patients	255
Primary Outcome Measures	Number of participants with adverse events Number of participants with dose limiting toxicities
Arms Intervention	Drug: TNO155 Drug: TNO155 in combination with EGF816 (nazartinib)
Target Patients	Adult patients with advanced solid tumors in selected indications
Read-out Milestone(s)	2023
Publication	TBD

TNO155 - SHP2 inhibitor

NCT04000529 (CTNO155B12101)

Indication	Solid tumors (combo)
Phase	Phase 1
Patients	126
Primary Outcome Measures	Incidence of dose limiting toxicities (DLTs) during the first cycle of combination treatment during the dose escalation part Incidence and severity of adverse events (AEs) and serious adverse events (SAEs) as per CTCAE v5.0, by treatment Dose tolerability
Arms Intervention	TNO155 and Spartalizumab (PDR001) TNO155 and Ribociclib (LEE011)
Target Patients	Patients with advanced malignancies
Read-out Milestone(s)	2022
Publication	TBD

Immunology

Cosentyx® - IL-17A inhibitor

NCT04930094 (CAIN457R12301)	
Indication	Giant cell arteritis
Phase	Phase 3
Patients	348
Primary Outcome Measures	Number of participants with sustained remission
Arms Intervention	Experimental: Secukinumab 300 mg Placebo Comparator: Placebo
Target Patients	Patients with Giant Cell Arteritis (GCA)
Read-out Milestone(s)	Primary 2025 Final 2026
Publication	TBD

Cosentyx® - IL-17A inhibitor

NCT04156620 INVIGORATE-1 (CAIN457P12301)	
Indication	Axial spondyloarthritis
Phase	Phase 3
Patients	500
Primary Outcome Measures	The proportion of subjects achieving an ASAS40 (Assessment of SpondyloArthritis International Society criteria) response
Arms Intervention	Secukinumab intravenous (i.v.) regimen Placebo intravenous (i.v.) regimen
Target Patients	Patients with active axial spondyloarthritis
Read-out Milestone(s)	Primary (week 16): April 2022 (actual); Final: 2023
Publication	2023

Cosentyx® - IL-17A inhibitor

NCT04181762 SELUNE (CAIN457Q12301)

Indication	Lupus Nephritis
Phase	Phase 3
Patients	460
Primary Outcome Measures	Proportion of subjects achieving protocol-defined CRR
Arms Intervention	Secukinumab 300 mg s.c. Placebo s.c.
Target Patients	Patients with active lupus nephritis (ISN/RPS Class III or IV, with or without co-existing class V features)
Read-out Milestone(s)	2026
Publication	2026

Cosentyx® - IL-17A inhibitor

NCT04209205 INVIGORATE-2 (CAIN457P12302)

Indication	Psoriatic Arthritis (PsA)
Phase	Phase 3
Patients	380
Primary Outcome Measures	The proportion of subjects achieving American College of Rheumatology 50 (ACR50) response criteria
Arms Intervention	Secukinumab intravenous (i.v.) regimen Placebo intravenous (i.v.) regimen
Target Patients	Patients with active psoriatic arthritis (PsA) despite current or previous NSAID, DMARD and/or anti-TNF therapy
Read-out Milestone(s)	Sept 2021 (actual)
Publication	2023

Cosentyx® - IL-17A inhibitor

NCT04300296 PRELUDE (CAIN457S12201)	
Indication	Lichen Planus
Phase	Phase 2
Patients	108
Primary Outcome Measures	Proportion of patients achieving Investigator's Global Assessment (IGA 0/1) score at 16 weeks +30% delta vs placebo
Arms Intervention	Secukinumab 300 mg s.c. Placebo s.c.
Target Patients	Adult patients with biopsy-proven lichen planus not adequately controlled by topical therapies
Read-out Milestone(s)	2022 (Data analysis on-going)
Publication	TBD

ianalumab - BAFF-R inhibitor

NCT03217422 AMBER (CVAY736B2201)	
Indication	Autoimmune hepatitis
Phase	Phase 2
Patients	80
Primary Outcome Measures	Alanine aminotransferase (ALT) normalization
Arms Intervention	VAY736 Placebo control with conversion to active VAY736
Target Patients	Autoimmune hepatitis patients with incomplete response or intolerant to standard treatment of care
Read-out Milestone(s)	2026
Publication	TBD

iscalimab - CD40 inhibitor

NCT03781414 CONTRAIL I (CCFZ533A2202)

Indication	Liver transplantation
Phase	Phase 2
Patients	128
Primary Outcome Measures	Proportion of patients with composite event (BPAR, Graft Loss or Death) over 12 months
Arms Intervention	Control/Standard of Care: TAC + MMF + Corticosteroids CFZ533 dose A + MMF + Corticosteroids CFZ533 dose B + MMF + Corticosteroids
Target Patients	Liver transplant recipients
Read-out Milestone(s)	2023
Publication	2023

NCT03905525 TWINSS (CCFZ533B2201)

Indication	Sjögren's syndrome
Phase	Phase 2
Patients	260
Primary Outcome Measures	Change in EULAR Sjögren's syndrome Disease Activity Index (ESSDAI) score and EULAR Sjögren's syndrome Patient Reported Index (ESSPRI) score
Arms Intervention	Three dose arms of CFZ533 Placebo
Target Patients	Patients with Sjögren's syndrome
Read-out Milestone(s)	2022
Publication	TBD

ligelizumab- IgE Inhibitor

NCT04984876 (CQGE031G12301)	
Indication	Food Allergy
Phase	Phase 3
Patients	486
Primary Outcome Measures	Proportion of participants who can tolerate a single dose of ≥ 600 mg (1044 mg cumulative tolerated dose) of peanut protein without dose-limiting symptoms at Week 12
Arms Intervention	Arm 1: ligelizumab 240 mg subcutaneous injection for 52 weeks Arm 2: ligelizumab 120 mg subcutaneous injection for 52 weeks Arm 3: Placebo subcutaneous injection for first 8 weeks and ligelizumab 120 mg subcutaneous injection for 44 weeks Arm 4: Placebo 16 weeks and ligelizumab 120 mg/240 mg subcutaneous injection for 36 weeks Arm 5: Placebo subcutaneous injection for first 8 weeks and ligelizumab 240 mg subcutaneous injection for 44 weeks
Target Patients	Participants with a medically confirmed diagnosis of IgE-mediated peanut allergy
Read-out Milestone(s)	2025
Publication	TBD

LNA043 - ANGPTL3 agonist

NCT04864392 ONWARDS (CLNA043A12202)	
Indication	Knee osteoarthritis
Phase	Phase 2
Patients	550
Primary Outcome Measures	Change from baseline in the cartilage thickness of the medial compartment of the knee as assessed by imaging
Arms Intervention	LNA043 injection to the knee with dosing regimen A LNA043 injection to the knee with dosing regimen B LNA043 injection to the knee with dosing regimen C LNA043 injection to the knee with dosing regimen D Placebo injection to the knee
Target Patients	Patients with Symptomatic knee osteoarthritis
Read-out Milestone(s)	Primary 2024
Publication	TBD

remibrutinib - BTK inhibitor

NCT04109313 (CLOU064A2201E1)	
Indication	Chronic spontaneous urticaria (CSU)
Phase	Phase 2
Patients	250
Primary Outcome Measures	Long-term safety and tolerability
Arms Intervention	Selected dose of LOU064 taken orally twice a day (morning and evening) from day 1 to week 52
Target Patients	Patients with CSU who have participated in preceding studies with LOU064
Read-out Milestone(s)	H2 2022
Publication	Primary 2023

remibrutinib - BTK inhibitor

NCT05030311 REMIX-1 (CLOU064A2301)

Indication	Chronic spontaneous urticaria
Phase	Phase 3
Patients	450
Primary Outcome Measures	Change from baseline in UAS7 (Scenario 1 with UAS7 as primary efficacy endpoint)
Arms Intervention	Arm 1: LOU064 (blinded) LOU064 (blinded) taken orally for 24 weeks, followed by LOU064 (open-label) taken orally open label for 28 weeks. Randomized in a 2:1 ratio (arm 1:arm 2). Arm 2: LOU064 placebo (blinded) LOU064 placebo (blinded) taken orally for 24 weeks, followed by LOU064 (open-label) taken orally for 28 weeks. Randomized in a 2:1 ratio (arm 1:arm 2).
Target Patients	Adult Chronic Spontaneous Urticaria (CSU) patients inadequately controlled by H1-antihistamines
Read-out Milestone(s)	2024
Publication	TBD

remibrutinib - BTK inhibitor

NCT05032157 REMIX-2 (CLOU064A2302)

Indication	Chronic spontaneous urticaria
Phase	Phase 3
Patients	450
Primary Outcome Measures	1. Change from baseline in UAS7 (Scenario 1 with UAS7 as primary efficacy endpoint) 2. Absolute change in ISS7 an absolute change in HSS7 (Scenario 2 with ISS7 and HSS7 as co-primary efficacy endpoints)
Arms Intervention	Arm 1: LOU064 (blinded) LOU064A (blinded) taken orally b.i.d. for 24 weeks, followed by LOU064 (open-label) taken orally open label for 28 weeks. Randomised in 2:1 ratio (active vs placebo) Arm 2: LOU064 placebo (blinded) LOU064A placebo (blinded) taken orally for 24 weeks, followed by LOU064 (open-label) taken orally open label for 28 weeks. Randomised in 2:1 ratio (active vs placebo)
Target Patients	Adult participants suffering from chronic spontaneous urticaria (CSU) inadequately controlled by H1-antihistamines in comparison to placebo
Read-out Milestone(s)	2024
Publication	TBD

Ophthalmology

Beovu® - Anti-VEGF

NCT04005352 TALON (CRTH258A2303)

Indication	Neovascular Age-related Macular Degeneration (nAMD)
Phase	Phase 3B
Patients	739
Primary Outcome Measures	Average change in Best-corrected visual acuity Distribution of the last interval with no disease activity (in a Treat-to-Control regimen)
Arms Intervention	Arm 1: Brolucizumab 6 mg intravitreal injection Arm 2: Aflibercept 2 mg intravitreal injection
Target Patients	Patients with Neovascular Age-related Macular Degeneration (nAMD) who have not previously received anti-VEGF (vascular endothelial growth factor) treatment
Read-out Milestone(s)	2022
Publication	TBD

Beovu® - Anti-VEGF

NCT04047472 HOBBY (CRTH258A2307)

Indication	Macular degeneration
Phase	Phase 3
Patients	494
Primary Outcome Measures	Change from baseline in best-corrected visual acuity (BCVA) at week 48
Arms Intervention	Brolucizumab (RTH258) 6 mg/50 µL Aflibercept 2 mg/50 µL
Target Patients	Chinese patients with neovascular age-related macular degeneration
Read-out Milestone(s)	2024
Publication	TBD

Beovu® - VEGF inhibitor

NCT04058067 KINGLET (CRTH258B2304)	
Indication	Diabetic macular edema
Phase	Phase 3
Patients	263
Primary Outcome Measures	Change in best-corrected visual acuity (BCVA)
Arms Intervention	Brolucizumab (RTH258) 6 mg/50 µL Aflibercept 2 mg/50 µL
Target Patients	Chinese patients with visual impairment due to diabetic macular edema
Read-out Milestone(s)	2023
Publication	Publication planned for 2024

Beovu® - VEGF Inhibitor

NCT04278417 (CRTH258D2301)	
Indication	Diabetic retinopathy
Phase	Phase 3
Patients	706
Primary Outcome Measures	Change from Baseline in BCVA
Arms Intervention	Arm1: RTH258 (brolucizumab) 6 mg/50uL Arm2: Panretinal photocoagulation laser initial treatment followed with additional PRP treatment as needed
Target Patients	Patients with proliferative diabetic retinopathy
Read-out Milestone(s)	2024
Publication	TBD

libvatrep - TRPV1 antagonist

NCT04630158 SAHARA (CSAF312B12201)	
Indication	Chronic ocular surface pain
Phase	Phase 2
Patients	150
Primary Outcome Measures	Change in mean pain severity Visual Analog Scale
Arms Intervention	Placebo Comparator: SAF312 Placebo. Randomized to a 1:1:1 topical eye drops, twice daily Experimental: SAF312 dose 1. Randomized to a 1:1:1 topical eye drops, twice daily Experimental: SAF312 dose 2. Randomized to a 1:1:1 topical eye drops, twice daily
Target Patients	Subjects with CICP persisting at least for 4 months after refractive surgery and chronicity confirmed during the observational period.
Read-out Milestone(s)	2023
Publication	2023

UNR844 - Reduction of disulfide bonds

NCT04806503 READER (CUNR844A2022)

Indication	Presbyopia
Phase	Phase 2B
Patients	225
Primary Outcome Measures	Characterize the dose response relationship among UNR844 doses 0 mg/mL, 5 mg/mL, 13.3 mg/mL, 23 mg/mL and 30 mg/mL dosed twice-daily after Month 3 of dosing. Change from baseline in Binocular distance-corrected near visual acuity at 40 cm at Month 3.
Arms Intervention	1:1 randomization - UNR844 0 mg/mL, 5 mg/mL, 13.3 mg/mL, 23 mg/mL and 30 mg/mL dosed twice-daily for three months
Target Patients	Presbyopic participants aged 45 to 55 years
Read-out Milestone(s)	2022: Primary endpoint- when all patients have completed the 3 months treatment period 2023: Final analysis -Study completion (all patients have completed 9 months pots treatment period)
Publication	H1-2023

Neuroscience

LMI070 - mRNA splicing modulator

NCT05111249 VIBRANT-HD (CLMI070C12203)	
Indication	Huntington`s disease
Phase	Phase 2B
Patients	75
Primary Outcome Measures	1. Reduction (%) of mHTT protein in cerebrospinal fluid (CSF) 2. Number of treatment emergent adverse events and serious adverse events
Arms Intervention	Arm 1: Experimental; Branaplam 56 mg oral solution once weekly Arm 2: Experimental; Branaplam 112 mg oral solution once weekly Arm 3: Experimental; (C) Branaplam 154 mg oral solution once weekly, OR (X) Branaplam 84 mg oral solution once weekly OR (Y) Branaplam 28 mg oral solution once weekly Arm 4: Placebo; Matching placebo oral solution once weekly
Target Patients	Participants with early manifest Huntington's Disease
Read-out Milestone(s)	2025
Publication	TBD

LOU064 - BTK inhibitor

NCT05147220 REMODEL-1 (CLOU064C12301)

Indication	Multiple sclerosis
Phase	Phase 3
Patients	800
Primary Outcome Measures	Annualized relapse rate (ARR) of confirmed relapses [Core Part]. ARR is the average number of confirmed MS relapses in a year
Arms Intervention	Arm 1: Experimental; Remibrutinib - Core (Remibrutinib tablet and matching placebo of teriflunomide capsule) Arm 2: Active Comparator; Teriflunomide - Core (Teriflunomide capsule and matching placebo remibrutinib tablet) Arm 3: Experimental; Remibrutinib - Extension (Participants on remibrutinib in Core will continue on remibrutinib tablet) Arm 4: Experimental; Remibrutinib - Extension (on teriflunomide in Core) (Participants on teriflunomide in Core will switch to remibrutinib tablet)
Target Patients	Patients with relapsing Multiple Sclerosis
Read-out Milestone(s)	Estimated primary completion 2025 Estimated study completion 2029
Publication	TBD

LOU064 - BTK inhibitor

NCT05156281 REMODEL-2 (CLOU064C12302)

Indication	Multiple sclerosis
Phase	Phase 3
Patients	800
Primary Outcome Measures	Annualized relapse rate (ARR) of confirmed relapses
Arms Intervention	Arm 1: Experimental; Remibrutinib - Core Remibrutinib tablet and matching placebo of teriflunomide capsule Arm 2: Active Comparator; Teriflunomide - Core Teriflunomide capsule and matching placebo remibrutinib tablet Arm 3: Experimental: Remibrutinib - Extension Participants on remibrutinib in Core will continue on remibrutinib tablet Arm 4: Experimental: Remibrutinib - Extension (on teriflunomide in Core) Participants on teriflunomide in Core will switch to remibrutinib tablet
Target Patients	Patients with relapsing Multiple Sclerosis
Read-out Milestone(s)	Estimated primary completion 2025 Estimated study completion 2029
Publication	TBD

Mayzent® - S1P1,5 receptor modulator

NCT04926818 NEOS (CBAF312D2301)	
Indication	Multiple sclerosis, pediatrics
Phase	Phase 3
Patients	180
Primary Outcome Measures	Annualized relapse rate (ARR) in target pediatric participants
Arms Intervention	Arm 1: Experimental ofatumumab - 20 mg injection/ placebo Arm 2: Experimental siponimod - 0.5 mg, 1 mg or 2 mg/ placebo Arm 3: Active Comparator fingolimod - 0.5 mg or 0.25 mg/ placebo
Target Patients	Children/adolescent patients aged 10-17 years old with Multiple Sclerosis (MS). The targeted enrollment is 180 participants with multiple sclerosis which will include at least 5 participants with body weight (BW) ≤40 kg and at least 5 participants with age 10 to 12 years in each of the ofatumumab and siponimod arms. There is a minimum 6 month follow up period for all participants (core and extension). Total duration of the study could be up to 7 years.
Read-out Milestone(s)	2026
Publication	TBD

MIJ821 - NR2B negative allosteric modulator (NAM)

NCT04722666 (CMIJ821A12201)

Indication	Major depressiv disorder with acute suicidal ideation or behavior
Phase	Phase 2
Patients	195
Primary Outcome Measures	Change from baseline to 24 hours in the total score of the Montgomery Åsberg Depression Rating Scale (MADRS)
Arms Intervention	MIJ821 (mg/kg) very low dose for 40 minutes IV infusion on Day 1, Day 15 and Day 29 MIJ821 (mg/kg) low dose for 40 minutes IV infusion on Day 1, Day 15 and Day 29 MIJ821 (mg/kg) high dose for 40 minutes IV infusion on Day 1, Day 15 and Day 29 MIJ821 (mg/kg) very high dose for 40 minutes IV infusion on Day 1, Day 15 and Day 29 Placebo 40 minutes IV infusion of 0.9% sodium chloride on Day 1, Day 15 and Day 29 MIJ821 (mg/kg) high dose for 40 minutes IV infusion on Day 1 followed by Placebo 40 minutes IV infusion of 0.9% sodium chloride on Day 15 and Day 29 MIJ821 (mg/kg) very high dose for 40 minutes IV infusion on Day 1 followed by Placebo 40 minutes IV infusion of 0.9% sodium chloride on Day 15 and Day 29
Target Patients	Participants who have suicidal ideation with intent
Read-out Milestone(s)	2023
Publication	TBD

Zolgensma® - SMN1 gene replacement therapy

NCT05089656 STEER (COAV101B12301)

Indication	Spinal muscular atrophy (IT administration)
Phase	Phase 3
Patients	125
Primary Outcome Measures	1. Change from baseline in Hammersmith functional motor scale - Expanded (HFMSE) total score at the end of follow-up period 1 in treated patients compared to sham controls in the ≥ 2 to < 18 years age group
Arms Intervention	Arm 1: Experimental OAV101. Administered as a single, one-time intrathecal dose Arm 2: Sham Comparator: Sham control. A skin prick in the lumbar region without any medication.
Target Patients	Patients Type 2 Spinal Muscular Atrophy (SMA) who are ≥ 2 to < 18 years of age, treatment naive, sitting, and never ambulatory
Read-out Milestone(s)	2024
Publication	TBD

Respiratory Disease

ecleralimab - TSLP inhibitor

NCT04410523 (CCSJ117A12201C)	
Indication	Asthma
Phase	Phase 2
Patients	625
Primary Outcome Measures	Pre-dose FEV1 (Forced Expiratory Volume in 1 second) change from baseline after 12 weeks of treatment. Average change from baseline in pre-dose FEV1 at week 8 & week 12
Arms Intervention	CSJ117 0.5mg CSJ117 1mg CSJ117 2 mg CSJ117 4 mg CSJ117 8 mg Placebo
Target Patients	Asthma patients on background medium or high ICS plus LABA therapy
Read-out Milestone(s)	2023
Publication	Primary publications planned for 2024

icenticaftor - CFTR potentiator

NCT04072887 (CQBW251B2201)	
Indication	Chronic obstructive pulmonary disease
Phase	Phase 2
Patients	956
Primary Outcome Measures	Trough FEV1 (Forced Expiratory Volume in 1 second) change from baseline after 12 weeks of treatment
Arms Intervention	QBW251 450 mg QBW251 300 mg QBW251 150 mg QBW251 75 mg QBW251 25 mg Placebo
Target Patients	COPD patients on background triple inhaled therapy (LABA / LAMA / ICS)
Read-out Milestone(s)	Q2-2022 (actual)
Publication	Primary publications planned H2 2022

Cardio-Renal

Entresto® - Angiotensin receptor/neprilysin inhibitor

NCT02678312 PANORAMA HF (CLCZ696B2319)	
Indication	Heart failure in pediatric patients
Phase	Phase 3
Patients	377
Primary Outcome Measures	Part 1: Pharmacodynamics and pharmacokinetics of sacubitril/valsartan LCZ696 analytes Part 2: Efficacy and safety compared with enalapril
Arms Intervention	Part 1: Sacubitril/valsartan 0.8 mg/kg or 3.1 mg/kg or both; 0.4 mg/kg or 1.6 mg/kg or both (single doses). Part 2: enalapril/placebo 0.2 mg/kg bid (ped. formulation 1mg/ml) and adult formulation (2.5, 5, 10 mg bid); Sacubitril/valsartan (LCZ696)/placebo: Ped. formulation granules (12.5, 31.25 mg in capsules); liquid formulation (1mg/ml and 4mg/ml concentration) and adult formulation (50, 100, 200 mg bid)
Target Patients	Pediatric patients from 1 month to < 18 years of age with heart failure due to systemic left ventricle systolic dysfunction
Read-out Milestone(s)	H1-2022; (Analysis of 110 pts from Part 2 formed the basis for pediatric submission in Apr-2019 and approval by the US FDA in Oct-2019 for the treatment of symptomatic HF with systemic left ventricular systolic dysfunction in children aged 1 year and older)
Publication	TBD

Entresto® - Angiotensin receptor/neprilysin inhibitor

NCT02884206 PERSPECTIVE (CLCZ696B2320)	
Indication	Heart failure
Phase	Phase 3
Patients	592
Primary Outcome Measures	Change from baseline in the CogState Global Cognitive Composite Score (GCCS)
Arms Intervention	Sacubitril/valsartan 50, 100, and 200 mg bid with placebo of valsartan Valsartan 40, 80, and 160 mg bid tablets with placebo for sacubitril/valsartan
Target Patients	Patients with chronic heart failure with preserved ejection fraction
Read-out Milestone(s)	2023
Publication	TBD

Entresto® - Angiotensin receptor/neprilysin inhibitor

NCT03785405 (CLCZ696B2319E1 – extension study)	
Indication	Heart failure in pediatric patients
Phase	Phase 3
Patients	240
Primary Outcome Measures	Number of participants with Adverse Events (AEs) and Serious Adverse Events (SAEs)
Arms Intervention	Single arm, open label sacubitril/valsartan (pediatric formulation granules (12.5, 31.25 mg in capsules); liquid formulation (1mg/ml and 4mg/ml concentration) and adult formulation (50, 100, 200 mg bid))
Target Patients	Pediatric patients with heart failure due to systemic left ventricle systolic dysfunction who have completed study CLCZ696B2319
Read-out Milestone(s)	2023
Publication	TBD

iptacopan - CFB inhibitor

NCT03955445 (CLNP023B12001B)

Indication	C3 glomerulopathy (C3G)
Phase	Phase 2
Patients	27 patients from ongoing Ph2 (sample size from Ph3 pending HA discussions Q1 2021), total patients for this study will increase
Primary Outcome Measures	Characterize the effect of LNP023 treatment on a composite renal response endpoint at 9 months (1. a stable or improved eGFR and, 2. a reduction in proteinuria and 3. an increase in C3 compared to the CLNP023X2202 baseline visit)
Arms Intervention	Open-label LNP023 200mg bid
Target Patients	Patients with C3 glomerulopathy
Read-out Milestone(s)	2025
Publication	Wong et al 2021 Nephrology, Dialysis and Transplantation Vol. 36, Suppl. 1: eGFR trajectory

iptacopan - CFB inhibitor

NCT04154787 (CLNP023D12201)

Indication	Idiopathic membranous nephropathy (iMN)
Phase	Phase 2
Patients	72
Primary Outcome Measures	Change from baseline of UPCR derived from 24hr urine collections at Baseline and Week 24
Arms Intervention	LNP023 low dose LNP023 high dose Rituximab
Target Patients	Patients with biopsy proven iMN who are at high risk of disease progression defined on the basis of antibody anti-PLA2R titre and proteinuria
Read-out Milestone(s)	2023
Publication	TBD

iptacopan - CFB inhibitor

NCT04578834 APPLAUSE-IgAN (CLNP023A2301)

Indication	IgA nephropathy
Phase	Phase 3
Patients	450
Primary Outcome Measures	Ratio to baseline in urine protein to creatinine ratio (sampled from 24h urine collection) at 9 months Annualized total estimated Glomerular Filtration Rate (eGFR) slope estimated over 24 months
Arms Intervention	Arm 1 - LNP023 200mg BID Arm 2 - Placebo BID
Target Patients	Primary IgA Nephropathy patients
Read-out Milestone(s)	2023 (primary endpoint for US initial submission, 9 months UPCR) 2025 (24 months)
Publication	Perkovic et al. 2021, Nephrology Dialysis Transplantation, Vol. 36, Suppl. 1: Study Design Wong et al. 2021, Nephrology Dialysis Transplantation, Vol. 36, Suppl. 1: IPTACOPAN (LNP023): A NOVEL ORAL COMPLEMENT ALTERNATIVE PATHWAY FACTOR B INHIBITOR SAFELY AND EFFECTIVELY STABILISES EGFR IN C3 GLOMERULOPATHY

iptacopan - CFB inhibitor

NCT04817618 APPEAR-C3G (CLNP023B12301)

Indication	C3 glomerulopathy
Phase	Phase 3
Patients	68
Primary Outcome Measures	Log-transformed ratio to baseline in UPCR (sampled from a 24 hour urine collection)
Arms Intervention	Experimental: iptacopan 200mg b.i.d. Placebo Comparator: Placebo to iptacopan 200mg b.i.d.
Target Patients	Patients with native C3G
Read-out Milestone(s)	2023
Publication	TBD

Leqvio® - siRNA (regulation of LDL-C)

NCT05030428 VICTORION-2P (CKJX839B12302)	
Indication	Secondary prevention of cardiovascular events in patients with elevated levels of LDL-C
Phase	Phase 3
Patients	15000
Primary Outcome Measures	1. Time to First Occurrence of 3P-MACE (3-Point Major Adverse Cardiovascular Events)
Arms Intervention	Arm 1: Experimental Inclisiran sodium, Subcutaneous injection Arm 2: Placebo Comparator, Placebo Subcutaneous injection
Target Patients	Participants with established cardiovascular disease (CVD)
Read-out Milestone(s)	2027
Publication	TBD

Leqvio® - siRNA (regulation of LDL-C)

NCT03060577 ORION-3 (CKJX839A12201E1)

Indication	Hypercholesterolemia inc. Atherosclerotic Cardiovascular Disease (ASCVD) and ASCVD risk equivalents Heterozygous Familial Hypercholesterolaemia (HeFH)
Phase	Phase 2
Patients	382 participants
Primary Outcome Measures	Percentage Change in LDL-C at Day 210 Compared to Day 1 of the ORION_1 Study (Inclisiran Arm)
Arms Intervention	Group 1 - Every 180 days until Day 720, an additional dose on Day 810, then back to every 180 days dosing until end of study
Target Patients	ASCVD or ASCVD-risk equivalents (symptomatic atherosclerosis, Type 2 diabetes, familial hypercholesterolemia)
Read-out Milestone(s)	Q1-2022 (actual)
Publication	TBD

Leqvio® - siRNA (regulation of LDL-C)

NCT03705234 ORION-4 (CKJX839B12301)

Indication	Hypercholesterolemia inc. Heterozygous Familial Hypercholesterolaemia (HeFH)
Phase	Phase 3
Patients	15000
Primary Outcome Measures	A composite of major adverse cardiovascular events, defined as: Coronary heart disease (CHD) death; Myocardial infarction; Fatal or non-fatal ischaemic stroke; or Urgent coronary revascularization procedure
Arms Intervention	Arm 1: every 6 month treatment Inclisiran sodium 300mg (given by subcutaneous injection on the day of randomization, at 3 months and then every 6-months) for a planned median duration of about 5 years Arm 2: matching placebo (given bysubcutaneous injection on the day of randomization, at 3 months and then every 6-months) for a planned median duration of about 5 years.
Target Patients	Patient population with mean baseline LDL-C ≥ 100mg/dL
Read-out Milestone(s)	2026
Publication	TBD

Leqvio® - siRNA (regulation of LDL-C)

NCT03814187 ORION-8 (CKJX839A12305B)

Indication	Hypercholesterolemia inc. Heterozygous Familial Hypercholesterolaemia (HeFH) and Homozygous Familial Hypercholesterolemia (HoFH)
Phase	Phase 3
Patients	3275
Primary Outcome Measures	Proportion of subjects achieving prespecified low density lipoprotein cholesterol (LDL-C) targets at end of study Safety and tolerability profile of long term use of inclisiran
Arms Intervention	Inclisiran sodium 300mg on Day 90 and every 180 days for a planned duration of 3 years
Target Patients	Patients with HeFH or pre-existing atherosclerotic cardiovascular disease (ASCVD) on background statin +/- ezetimibe therapy and risk equivalents (patients from ORION 3, 9, 10 & 11 studies)
Read-out Milestone(s)	2023
Publication	TBD

Leqvio® - siRNA (regulation of LDL-C)

NCT03851705 ORION-5 (CKJX839A12302)

Indication	Hypercholesterolemia inc. Homozygous Familial Hypercholesterolemia (HoFH)
Phase	Phase 3
Patients	56
Primary Outcome Measures	LDL-C reduction at Day 150 Changes in PCSK9, other lipids and lipoproteins
Arms Intervention	Part 1: inclisiran sodium 300mg or placebo on Day 1 and Day 90 Part 2: inclisiran sodium 300mg on Day 180 for patients who were randomized to the placebo group only, inclisiran sodium 300mg on Day 270 and then every 6 months for a planned duration of 2 years for all patients
Target Patients	Patients with HoFH with background statin +/- ezetimibe therapy
Read-out Milestone(s)	Q1-2022 (actual)
Publication	TBD

Leqvio® - siRNA (regulation of LDL-C)

NCT04652726 ORION-16 (CKJX839C12301)

Indication	Hyperlipidemia, pediatrics
Phase	Phase 3
Patients	150
Primary Outcome Measures	Percentage (%) change in low-density lipoprotein cholesterol (LDL-C) from baseline to Day 330
Arms Intervention	Group 1: Inclisiran sodium 300mg on Days 1, 90, 270, placebo on Day 360, inclisiran sodium 300mg on Days 450 and 630 Group 2: Placebo on Days 1, 90, 270, inclisiran sodium 300mg on Days 360, 450 and 630.
Target Patients	Adolescents (12 to less than 18 years) with heterozygous familial hypercholesterolemia (HeFH) and elevated low density lipoprotein cholesterol (LDL-C)
Read-out Milestone(s)	2025
Publication	TBD

Leqvio® - siRNA (regulation of LDL-C)

NCT04659863 ORION-13 (CKJX839C12302)

Indication	Hyperlipidemia, pediatrics
Phase	Phase 3
Patients	12
Primary Outcome Measures	Percentage (%) change in low-density lipoprotein cholesterol (LDL-C) from baseline to day 330
Arms Intervention	Group 1: Inclisiran sodium 300mg on Days 1, 90, 270, placebo on Day 360, inclisiran sodium 300mg on Days 450 and 630. Group 2: Placebo on Days 1, 90, 270, inclisiran sodium 300mg on Days 360, 450 and 630.
Target Patients	Adolescents (12 to less than 18 years) with homozygous familial hypercholesterolemia (HoFH) and elevated low density lipoprotein cholesterol (LDL-C)
Read-out Milestone(s)	2025
Publication	TBD

pelacarsen - ASO targeting Lp(a)

NCT04023552 Lp(a)HORIZON (CTQJ230A12301)	
Indication	Cardiovascular risk reduction
Phase	Phase 3
Patients	8350
Primary Outcome Measures	Time to the first occurrence of MACE (cardiovascular death, non-fatal MI, non-fatal stroke and urgent coronary re-vascularization)
Arms Intervention	TQJ230 80 mg injected monthly subcutaneously or matched placebo
Target Patients	Patients with a history of Myocardial infarction or Ischemic Stroke, or a clinically significant symptomatic Peripheral Artery Disease, and Lp(a) ≥ 70 mg/dL
Read-out Milestone(s)	2025
Publication	TBD

Global Health

Adakveo® - P-selectin inhibitor

NCT03474965 SOLACE-Kids (CSEG101B2201)	
Indication	Sickle cell disease, pediatrics
Phase	Phase 2
Patients	100
Primary Outcome Measures	PK/PD and safety of SEG101 at 5 mg/kg
Arms Intervention	SEG101 (crizanlizumab) at a dose of 5 mg/kg by IV infusion ± Hydroxyurea/Hydroxycarbamide
Target Patients	Pediatric SCD patients with VOC
Read-out Milestone(s)	H2-2021 (pediatric patients ≥12 year old) 2024 (pediatric patients <12 year old)
Publication	1. Matthew M. Heeney, David C. Rees, Mariane de Montalembert, Isaac Odame, R. Clark Brown, Yasser Wali, Thu Thuy Nguyen, Du Lam, Raquel Merino Herranz, Julie Kanter; Study Design and Initial Baseline Characteristics in Solace-Kids: Crizanlizumab in Pediatric Patients with Sickle Cell Disease. Blood 2020; 136 (Supplement 1): 22–24. doi: https://doi.org/10.1182/blood-2020-137081 2. Matthew M. Heeney, David C. Rees, Mariane De Montalembert, Isaac Odame, R. Clark Clark Brown, Yasser Wali, Thu Thuy Nguyen, Du Lam, Nadege Pfender, Julie Kanter; Initial Safety and Efficacy Results from the Phase II, Multicenter, Open-Label Solace-Kids Trial of Crizanlizumab in Adolescents with Sickle Cell Disease (SCD). Blood 2021; 138 (Supplement 1): 12. doi: https://doi.org/10.1182/blood-2021-144730

artemether + lumefantrine - PGH-1

NCT04300309 CALINA (CCOA566B2307)

Indication	Malaria, uncomplicated (<5kg patients)
Phase	Phase 3
Patients	44
Primary Outcome Measures	Artemether Cmax
Arms Intervention	Experimental: artemether lumefantrine (2.5 mg:30 mg) artemether lumefantrine (2.5 mg:30 mg) bid over 3 days, from 1-4 tablets per dose
Target Patients	Infants and Neonates <5 kg body weight with acute uncomplicated plasmodium falciparum malaria
Read-out Milestone(s)	Primary outcome measure: 2023
Publication	TBD

ganaplacide - Imidazolopiperazines derivative

NCT04546633 KALUMI (CKAF156A2203)

Indication	Malaria, uncomplicated
Phase	Phase 2
Patients	292
Primary Outcome Measures	PCR-corrected and uncorrected Adequate Clinical and Parasitological Response (ACPR)
Arms Intervention	KAF156 and LUM-SDF QD (once daily) for 2 days in fasted condition KAF156 and LUM-SDF QD (once daily) for 2 days in fed condition
Target Patients	Patients 6 months to < 18 years old" instead of 12 to <18 years old, which just applies to a run-in cohort, based on inclusion criteria
Read-out Milestone(s)	2023
Publication	TBD

ganaplacide - Imidazolopiperazines derivative

NCT04675931 KARISMA (CKAE609B12201)

Indication	Malaria, severe
Phase	Phase 2
Patients	252
Primary Outcome Measures	Percentage of participants achieving at least 90% reduction in Plasmodium falciparum (P. falciparum) at 12 hours [Time Frame: Day 1 (12 Hours)]
Arms Intervention	Arm 1: experimental, IV KAE609 Dose regimen 1 Arm 2: experimental, IV KAE609 Dose regimen 2 Arm 3: experimental, IV KAE609 Dose regimen 3 Arm 4: active comparator, IV Artesunate Arm 5: Coartem, Standard of care
Target Patients	Patients with severe Malaria
Read-out Milestone(s)	2024
Publication	TBD

Biosimilars

aflibercept - VEGF inhibitor

NCT04864834 Mylight (CSOK583A12301)

Indication	Ophthalmology indication (as originator)
Phase	Phase 3
Patients	460
Primary Outcome Measures	Best-corrected visual acuity (BCVA) will be assessed using the ETDRS testing charts at an initial distance of 4 meters. The change from baseline in BCVA in letters is defined as difference between BCVA score between week 8 and baseline
Arms Intervention	Arm 1 Biological: SOK583A1 (40 mg/mL) Arm 2 Biological: Eylea EU (40 mg/mL)
Target Patients	Patients with neovascular age-related macular degeneration
Read-out Milestone(s)	2023
Publication	tbd

denosumab - anti RANKL mAb

NCT03974100 (CGP24112301)	
Indication	Osteoporosis (same as originator)
Phase	Phase 3
Patients	522
Primary Outcome Measures	Percent change from baseline (%CfB) in lumbar spine Bone Mineral Density
Arms Intervention	GP2411 60 mg /mL subcutaneous injection every 6 months Prolia® 60 mg /mL subcutaneous injection every 6 months
Target Patients	Postmenopausal women with osteoporosis
Read-out Milestone(s)	2022
Publication	Study data publications expected for 2024 and beyond. The overall study design will be published at WCO and ECTS congresses 2020.

Abbreviations

aBC	Advanced breast cancer
AD	Atopic Dermatitis
Adj.	Adjuvant
AIH	Autoimmune hepatitis
aHUS	atypical Hemolytic Uremic Syndrome
ALL	Acute lymphoblastic leukemia
ALS	Amyotrophic lateral sclerosis
AMI	Acute myocardial infarction
AML	Acute myeloid leukemia
aNHL	Agressive non-Hodgkin's lymphoma
AS H2H	Ankylosing spondylitis head-to-head study versus adalimumab
BC	Breast cancer
C3G	C3 glomerulopathy
CCF	Congestive cardiac failure
CINDU	Chronic inducible urticaria
CLL	Chronic lymphocytic leukemia
CML	Chronic myeloid leukemia
CRC	Colorectal cancer
COPD	Chronic obstructive pulmonary disease
COSP	Chronic ocular surface pain
CRSwNP	Severe chronic rhinosinusitis with nasal polyps
CSU	Chronic spontaneous urticaria
CVRR-Lp(a)	Secondary prevention of cardiovascular events in patients with elevated levels of lipoprotein (a)
CVRR-LDLC	Secondary prevention of cardiovascular events in patients with elevated levels of LDLC
DME	Diabetic macular edema
DLBCL	Diffuse large B-cell lymphoma refractory
ESCC	Esophageal squamous-cell carcinoma
FL	Follicular lymphoma
GCA	Giant cell arteritis
GVHD	Graft-versus-host disease
HCC	Hepatocellular carcinoma
HD	Huntington's disease
HFpEF	Chronic heart failure with preserved ejection fraction
HF-rEF	Chronic heart failure with reduced ejection fraction
HNSCC	Head and neck squamous cell carcinoma
HS	Hidradenitis suppurativa
IA	Interim analysis
IgAN	IgA nephropathy
iMN	Membranous nephropathy
IPF	Idiopathic pulmonary fibrosis
JIA	Juvenile idiopathic arthritis
jPsA/ERA	Juvenile psoriatic arthritis / enthesitis-related arthritis
LVEF	Left ventricular ejection fraction
mCRPC	Metastatic castration-resistant prostate cancer
MDR	Multi-drug resistant
MDS	Myelodysplastic syndrome
MS	Multiple sclerosis
NASH	Non-alcoholic steatohepatitis
nHCM	Non-obstructive hypertrophic cardiomyopathy
nr-axSpA	Non-radiographic axial spondyloarthritis
NSCLC	Non-small cell lung cancer
PEF	Preserved ejection fraction
PedPsO	Pediatric psoriasis
PNH	Paroxysmal nocturnal haemoglobinuria
PsA	Psoriatic arthritis
PROS	PIK3CA related overgrowth spectrum
RA	Rheumatoid arthritis
rMS	Relapsing multiple sclerosis
RVO	Retinal vein occlusion
SAA	Severe aplastic anemia
SLE	Systemic lupus erythematosus
SMA Type 1	Spinal muscular atrophy (IV formulation)
SMA Type 2/3	Spinal muscular atrophy (IT formulation)
SpA	Spondyloarthritis
SPMS	Secondary progressive multiple sclerosis
TNBC	Triple negative breast cancer
T1DM	Type 1 Diabetes mellitus

References

Entresto®	
1	IQVIA National Prescription Audit as of June'22
2	Eligible patients defined as prevalent HFrEF patients within each market's label. G7: US, CA, JP, DE, FR, IT, UK
3	Zhang et al., ESC Heart Failure 2020; 7: 3841
4	Proudfoot et al., Int J Cardiol. 2021; 331:164
5	Including, but not limited to, the recent 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure (Heidenreich et al., J Am Coll Cardiol. 2022)
6	Approved indications differ by geography. Examples include "indicated to reduce the risk of cardiovascular death and hospitalization for HF in adult patients with CHF. Benefits are most clearly evident in patients with LVEF below normal." (US) HFrEF (EU) HFrEF and HTN (China and JP).

Kesimpta®	
1	Kesimpta NBRx based on IQVIA NPA; Market based on adjusted IQVIA NPA/NSP, and Kesimpta SP+AC
2	vs. 5/10 who switched to Kesimpta from teriflunomide. Data from ALITHIOS extension study. Kappos et al. European Journal of Neurology (2022)
3	Time to Bridge (Launch US Aug'20 to May'22)
4	Persistency at 12 months for Q2'21 cohort (Data matured end of Q2'22)

Kisqali® is the only CDK4/6i with consistent OS benefit seen across all three Ph3 trials	
1	Hortobagyi, GN et al., N Engl J Med 2022; 386:942-950
2	Lu, YS et al., Clin Cancer Res 2022; 28 (5): 851–859
3	Neven, P et al., Annals of Onc 2022; 33: S194-S223
5	Based on an analysis of MONALEESA-2, -3 and -7
6	Based on the MAINTAIN IIT, Patients who received Kisqali and changed their ET in 2L had PFS twice as long as patients who only changed their ET
7	Yu Q, Sicinska E, Geng Y, et al. Requirement for CDK4 kinase function in breast cancer. Cancer Cell. 2006;9(1):23-32
8	An H-X, Beckmann MW, Reifenberger G, Bender HG, Niederacher D. Gene amplification and overexpression of CDK4 in sporadic breast carcinomas is associated with high tumor cell proliferation. Am JPathol. 1999;154(1):113-118
9	Kim S, Tiedt R, Loo A, et al. The potent and selective cyclin-dependent kinases 4 and 6 inhibitor ribociclib (LEE011) is a versatile combination partner in preclinical cancer models. Oncotarget. 2018;9(81):35226-35240;(suppl)