Biotechnology

YA2024: Could 2024 be the year of SMid bio recovery? Themes, catalysts, and picks

Industry Overview

Key themes for SMid Biotech in 2024

In 2023, we highlighted that bearish sentiment continued, driven by negative high-profile binary events and a tight macroeconomic backdrop, and we continued to see a limited number of IPOs. However, 2023 ended with positive momentum late in the year led by a string of M&A deals highlighting big pharma's continued focus on acquiring commercial and late-stage assets. We think the trend could continue in 2024, helping to offset what was for most of 2023 a less than stellar year for biotech. In our view, a more favorable macro environment, with BofA US economists anticipating a soft landing and disinflation with rate cuts throughout the year, could also help propel the biotech sector. While we expect continued improvement in conditions for SMid biotechs in 2024, we think a full recovery could still take some time and we might not see clearer signs of recovery until 2H24/2025. We think access to the capital markets will remain selective, as risk-off sentiment continues to prevail.

Key 2024 catalysts in our coverage

Key late-stage 2024 catalysts in our coverage universe (Exhibit 7) include: ACAD: ph 3 readout in NSS (early 1Q24); ALNY: ph 3 data in ATTR-CM (early 2024) and KARDIA-2 ph 2 data in hypertension (early 2024); ANNX: ph 3 data in GBS (1H24); RARE: ph 3 data in GSD1a (1H24), Stage 1 data in Wilson's disease (1H24) and ph 1/2 data in Angelman syndrome (1H24); ARVN: ph 2 data in ER+/HER2- mBC (2H24); ASND: ph 3 data in achondroplasia (2H24); NBIX: ph 2 data in schizophrenia (2H24); APLS: ph 3 data in IC-MGPN (3Q24); and PRTA: ph 3 data in AL amyloidosis (2024). Additionally, we anticipate several new drug launches in 2024 (Exhibit 6) including ASND's TransCon PTH in HPT (PDUFA: May 14th), SRPT's Elevidys in DMD label expansion (PDUFA: likely mid-2024), and ARGX's regulatory decision and potential launch for Vyvgart Hytrulo in CIDP (2024).

Our Top Picks for 2024

Our top mid-cap picks for 2024 are SRPT, ARGX and RARE. **ARGX** (Argenx): We are bullish on the commercial opportunity in gMG and CIDP, which we think is now undervalued following two negative ph 3 readouts. We think POC readouts in 2024 could catalyze additional upside and de-risk the potential in additional indications. We maintain our Buy with $552 PO. **SRPT** (Sarepta)**:** The company submitted the efficacy supplement to expand the Elevidys label to all DMD patients, which if approved could add significant upside to our estimates. We are positive on the potential for label expansion and await the decision in 1H24. We maintain our Buy with $164 PO. **RARE** (Ultragenyx): We continue to be encouraged by the performance of the company's commercial franchise and look forward to several catalysts in 2024 (e.g., Angelman, OI). We highlight that the company maintains focus on high unmet need indications with several late-stage readouts planned for 2024 that if positive could provide substantial upside to the current valuation. We maintain our Buy with $84 PO. **MRUS** (Merus) is our top small-cap pick for 2024. We are bullish on the commercial opportunity for petosemtamab in HNSCC given large unmet need. We highlight the company is planning to present initial ph 1/2 in 1L HNSCC in combination with pembrolizumab in 1H24, which we see as a key catalyst for the company given the large commercial opportunity in 1L HNSCC. MRUS is also initiating a ph 3 trial in 2L+ HNSCC in mid-24 based on encouraging efficacy in this setting.

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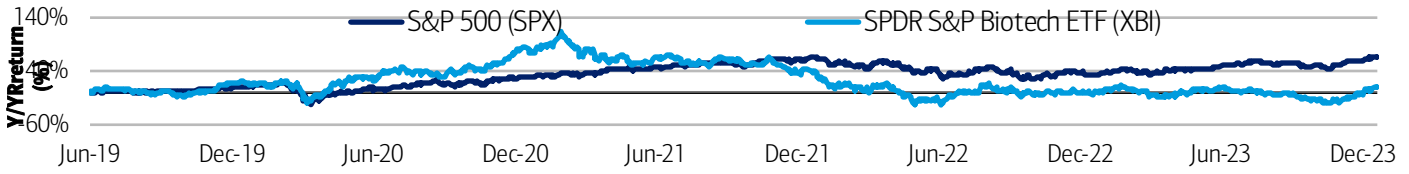
See pages 13-14 for definitions of abbreviations and terminology used in the report.

Investment Summary

Exhibit 1: Biotech sector continued to underperform relative to the SP500 in 2023
XBI remains down for its all-time high in February 2021



Source: BofA Global Research; Bloomberg as of 12/31/23

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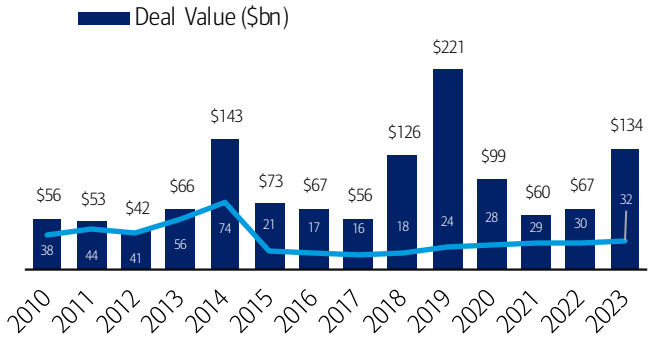
Exhibit 2: M&A activity continued from 2H22 into 2023
2023 saw continued M&A activity with high-value deals



Source: BofA Global Research; Bloomberg; transaction size >$200mn

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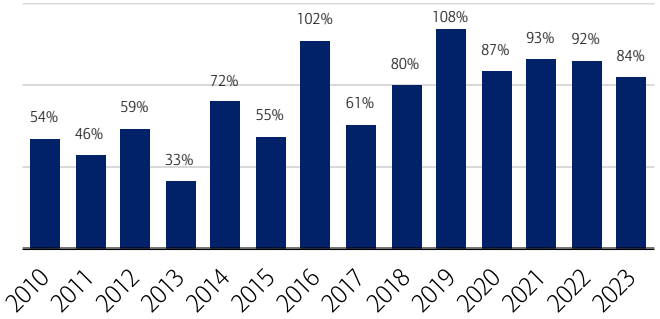
Exhibit 3: SMid bio premiums continue to remain high
Scarcity of high-quality targets will likely keep premiums high



Source: BofA Global Research; Bloomberg; transaction size >$200mn

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Exhibit 4: Large pharma key patent losses in the next 5 years
Patent losses likely to keep large pharma motivated for deals

Company	Drug	2023E WW Sales ($mn)	LOE (US)
Johnson & Johnson	Xarelto	2,501	2024
Amgen	Aranesp	1,370	2024
Lilly	Jardiance	2,705	2025
Amgen	Prolia	4,013	2025
Amgen	Xgeva	2,104	2025
Bristol Myers Squibb	Pomalyst/Imnovid	3,396	2025
Bristol Myers Squibb	Yervoy	2,267	2025
Bristol Myers Squibb	Revlimin	5,998	2026
Merck	Januvia/Janumet	3258	2026
Merck	Bridion	1,860	2026
Novartis	Cosentyx	4,948	2026
Regeneron	Eylea	9,456	2026
Johnson & Johnson	Stelara	10, 689	2026
Amgen	Krypolis	1,411	2027
Bristol Myers Squibb	Eliquis	12,174	2027
Pfizer	Ibrance	1,618	2027
AbbVie	Imbruvica	3,536	2028
Merck	Gardasil	8,952	2028
Merck	Keytruda	24,522	2028
Bristol Myers Squibb	Opdivo	9,027	2028
Lilly	Trulicity	7,276	2029

LOE: Loss of Exclusivity
Source: BofA Global Research, Visible Alpha

Exhibit 5: Only 11 biotech IPOs priced in 2023
IPO markets remain limited to high-quality companies

	# of IPOs	Total Raise ($mn)	Median Perf (YTD)	Median Perf (1-Day)	Avg Perf (YTD)	Avg Perf (1-Day)
2023	11	$2,762	(15.9%)	7.5%	3.4%	15.2%
2022	10	$1,557	(35.4%)	5.0%	7.2%	5.6%
2021	79	$15,288	(76.6.0%)	10.3%	(55.1%)	20.9%
2020	73	$14,525	(61.8%)	26.4%	(37.8%)	37.0%
2019	39	$4,755	(80.6%)	6.2%	63.4%	11.0%

Source: BofA Global Research; Bloomberg as of 12/31/23; IPO size >$50mn

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Key Themes for 2024

IPO markets may try for comeback but 2025 may be more robust

Following record levels of primary issuance in 2020 (73 deals) and 2021 (79 deals), we continued to see limited IPOs in 2023 with only 11 biotech IPOs with >$50mn raised, collectively raising ~$2.8bn (Exhibit 5). We highlight that despite collectively raising a higher amount than 2022 IPOs (~$1.6bn), which we think reflects growing interest from investors in biotech IPOs, the number of IPOs remained significantly below the levels of 2020-2021. We note the median performance of 2023 IPOs by the end of the year was -15.9% compared to -4.7% for 2022 IPOs by the end of 2022. We highlight the underwhelming performance of the 2023 IPO class could continue to drive caution among investors in the sector following some key disappointing data readouts. While we expected some signs of recovery in 2023, we highlight the continued XBI underperformance (Exhibit 1) and mixed performance from 2020-2022 IPOs, as well as a negative economic backdrop as key contributors to the continued slowdown in IPO markets in 2023. Relative to 2021 and 2020 IPOs, 2022 and 2023 IPOs have performed better on average, which we think can be attributed to a more selective issuance market and screening for companies with a combination of de-risked or late-stage development program(s), proven management teams, or high (>50%) levels of insider support.

Soft landing in 2024 could propel Biotech IPOs

Given that the health of IPO markets is highly correlated to investors' appetite for risk-taking, we did not expect a significant recovery in the biotech IPO market in 2023 given the broader sentiment focusing on a potential recession. As we head into 2024, we think sentiment is more positive, with BofA US economics team forecasting an even softer landing in 2024 following signs of inflation deceleration in 2023 and easing economic policies with several rate cuts expected in 2024. We think this could create the set-up for a potential recovery in biotech IPOs likely in 2H24 or 2025. In our view, the recovery will not mirror blistering pace of IPOs in 2020 and 2021, but we are more likely to see a high degree of discipline and focus on higher quality stories. From our experience, qualities of successful IPOs/issuers are strong management teams with ability to message well, platform technologies (e.g., gene editing, gene therapy, ASOs, etc.) or de-risked/late-stage assets with blockbuster potential, focus on undermet need with defined patient populations (e.g., oncology, rare diseases), and availability of clinical data that may help validate mechanism of action.

We note that high quality companies and companies with positive catalyst outcomes should continue to be able to tap capital markets for secondary issuances, which we saw in 2023. Additionally, we think private placements and non-dilutive financings such as royalty will remain attractive for companies in 2024.

M&A momentum likely to continue in 2024

Following an uptick in deal activity in 2H22, we continued to see strong momentum throughout 2023 with a total of $133bn in transactions in 2023 compared to ~$67bn in 2022. We note that while Pfizer's acquisition of Seagen (~$41bn) was a big driver, 2022 also saw large transactions (>$10bn) highlighting increased M&A activity throughout 2023. We saw strong momentum around the end of the year with several deals announced in the last few weeks and we expect M&A momentum will continue into 2024. We think focus will remain on commercial or late-stage companies, while deal activity for earlier-stage companies will revolve around partnerships or licensing agreements.

In our view, while we may not see 2019 levels of deal values anytime soon, appetite for bolt-on acquisitions among big pharma companies remains strong, particularly for commercial or late-stage targets. We highlight several key drivers of biotech deal

activity including the following:

- **Blockbusters patent cliff**: Big pharma facing end of length of exclusivity (LOE) for multiple assets in the next five years (Exhibit 4). As such, they should continue to replenish portfolios through acquisitions.

- **Strong balance sheets:** Large pharma balance sheets have never been stronger, with a record amount of firepower. Senior executives from most large pharma have continued to highlight M&A as their top priority for capital allocation. We saw several high-profile acquisitions in 2023 aiming to acquire platform companies with blockbuster potential and we expect this trend to continue in 2024.

- **Reduced access to capital:** The macro backdrop forced several SMid-cap biotechs to implement belt tightening through cost cutting and portfolio optimization throughout 2023. In our view, despite an easing macro backdrop heading into 2024, access to capital will likely remain challenging for early-stage companies and may increase desirability among SMid-caps to seek exits through sale.

- **Easing FTC:** While US Federal Trade Commission (FTC) was a significant headwind for M&A activity due to heavy scrutiny of high-profile transactions, we think that signs of easing FTC scrutiny for biopharma transactions in 2023 signaled a more open environment for large acquisitions. However, we note this remains a concern and FTC challenges to M&A deals are still expected.

Challenges to increased deal activity include the following:

- **Scarcity of de-risked assets:** De-risked assets continue to dominate M&A with early-stage deals leaning toward partnerships. As such, scarcity of commercial and late-stage targets with blockbuster assets should continue to demand high buyout premiums for those that fit the criteria, potentially keeping would-be buyers on the sidelines.

- **Disconnect in valuation expectations:** Quality commercial or late-stage targets may continue to have high internal valuation expectations and may prefer to seek non-dilutive capital until de-risking or more favorable capital markets vs. exiting at lower valuations.

Overall, we expect deal making in biotech to continue in 2024 and think that investors could benefit from holding high quality, commercial or late-stage companies.

Key 2024 Launches and Catalysts

In 2023, there were several product launches in our coverage companies including Syfovre in geographic atrophy (GA), Daybue in Rett syndrome, Ingrezza in chorea associated with Huntington's disease, Zurzuvae in postpartum depression, Elevidys in Duchenne muscular dystrophy (DMD), and Pombiliti + Opfolda in late-onset Pompe disease (LOPD). Below we highlight expected 2024 launches in our coverage universe.

Exhibit 6: Potential new product launches in our coverage
We highlight new potential product launches in 2023 from our coverage

Ticker	Asset	Indication	PDUFA/Regulatory decision date
APLS	Syfovre	Geographic atrophy	CHMP opinion (Jan 22-25) – Final EC decision if appeal needed (early July)
ASND	TransCon PTH	Hypoparathyroidism	May 14th
NBIX	Ingrezza (sprinkle formulation)	Tardive dyskinesia	April 30th
PTCT	Sepiapterin	phenylketonuria	Submit MAA to EMA in 1H24
SRPT	Elevidys (SRP-9001)	Duchenne muscular dystrophy (label expansion)	Likely mid-2024
ARGX	Vyvgart Hytrulo	Chronic Inflammatory Demyelinating Polyneuropathy	2024 (priority review)

Abbreviations: CHMP: Committee for Medicinal products for human use, EMA: European Medicines Agency, MAA: marketing authorization application, PDUFA: prescription drug user fee act

Exhibit 6: Potential new product launches in our coverage
We highlight new potential product launches in 2023 from our coverage

Ticker	Asset	Indication	PDUFA/Regulatory decision date

Source: BofA Research

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Additionally, we highlight below key 2024 catalysts with potentially stock-moving events in our coverage:

Exhibit 7: Potential stock-moving 2024 catalysts in our coverage
We highlight key 2023 data readouts in our coverage

Ticker	Asset	Catalyst	Timing
ASND	TransCon PTH	Launch in Germany	Jan '24
PTCT	Translarna	Final CHMP decision on Translarna conditional approval in EU; EC ratification expected 67-days after final decision	Jan '24
DNLI	DNL788	completion of Ph 2 HIMALAYA study in ALS	Feb '24
FDMT	4D-150	Interim ph 2 data in wAMD	Feb '24
ACAD	Pimavanserin	Topline data readout for ph 3 ADVANCE-2 study in negative symptoms of schizophrenia	Early 1Q24
ACHL	ATL001	Ph 1/2a study update in NSCLC and melanoma	1Q24
ARGX	Efgartigimod	POC data in post-COVID-19 postural orthostatic tachycardia syndrome	1Q24
FDMT	4D-710	Update on ph 1/2 trial in cystic fibrosis lung disease	1Q24
INZY	INZ-701	Topline ph 1/2 data in ENPP1/ABCC6 deficient adults	1Q24
ALNY	Zilebesiran	Topline ph 2 KARDIA-2 results in hypertension	Early '24
ALNY	Vutisiran	Topline ph 3 HELIOS-B results in ATTR-CM	Early '24
ANNX	ANX005 IV	Ph 2a data in ALS	Early '24
ANNX	ANX005 IV	Ph 3 data in GBS	1H24
ARGX	Efgartigimod	POC data in Sjorgen's syndrome	1H24
MRUS	Petosemtamab	Ph 1/2 update in 1L HNSCC	1H24
NBIX	Efmody	Ph 2 data in adrenal insufficiency and CAH	1H24
RARE	DTX401	Ph 3 data in GSD1a	1H24
RARE	UX701	Stage 1 data in Wilson's disease	1H24
RARE	GTX-102	Ph 1/2 dose expansion data in Angelman syndrome	1H24
PEPG	PGN-EDO51	Ph 2 data in DMD	Mid-2024
SAGE	SAGE-324	Ph 2b KINETIC-2 data in essential tremors	Mid-2024
ARVN	ARV-471	Ph 2 VERITAC-2 data in ER+/HER2- mBC	2H24
ASND	TransCon CNP	Topline ph 3 ApproaCH data in achondroplasia	2H24
ASND	TransCon TLR7/8	Ph 2 data in ST	2H24
ASND	TransCon IL-2	Topline/interim ph 2 data in ST	2H24
NBIX	NBI-1117568	Ph 2 data in schizophrenia	2H24
NBIX	Luvadaxistat	Ph 2 data in cognitive impairment associated with schizophrenia	2H24
RYTM	Setmelanotide	Ph 2 DAYBREAK Stage 2 data	2H24
APLS	Pegcetacoplan	Ph 3 topline data in IC-MGPN	3Q24
FULC	Losmapimod	Ph 3 data in facioscapulohumeral muscular dystrophy	4Q24
ARGX	Vyvgart Hytrulo	Launch in CIDP	2024
ARGX	ARGX-117	Topline ph 2 ARDA results in MMN	2024
FDMT	4D-150	Initial ph 2 dose confirmation data in DME	2024
MRUS	Petosemtamab	Data update from dose finding study in 2L+ HNSCC2024	2024
PEPG	PGN-EDODM1	Initial ph 1 FREEDOM-DM1 results in DM1	2024
PRTA	Birtamimab	Topline ph 3 AFFIRM-AL readout in ALA	2024
PRTA	PRX004	Topline ph 2 data in ATTR-CM	2024
BNTX	BNT122 + pembro	Ph 2 data in 1L melanoma	2024/25

Abbreviations: ABCC6: ATP binding cassette subfamily C member 6, ALA: AL amyloidosis, ALS: amyotrophic lateral sclerosis, ATTR-CM: transthyretin amyloid cardiomyopathy, CAH: congenital adrenal hyperplasia, CHMP: committee for medicinal products for human use, CIDP: Chronic Inflammatory Demyelinating Polyneuropathy, DM1: myotonic dystrophy 1, DMD: Duchenne muscular dystrophy, DME: diabetic macular edema, EC: European Commission, ENPP1: ectonucleotide pyrophosphatase/phosphodiesterase 1, ER: estrogen receptor, GBS: Guillain-Barre syndrome, GSD1a: glycogen storage disease 1a, HER2: human epidermal growth factor receptor 2, HNSCC: head and neck squamous cell carcinoma, HSCT-TMA: hematopoietic stem cell transplant-associated-thrombotic microangiopathy, IC-MGPN: immune complex membranoproliferative glomerulonephritis, MDD: major depressive disorder, MMN: multifocal motor neuropathy, NSCLC: non-small cell lung cancer, OI: osteogenesis imperfecta, ph: phase, POC: proof of concept, POTS: postural tachycardia syndrome, ST: solid tumors, wAMD: wet age-related macular degeneration

Source: BofA Global Research

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Our Top Picks for 2024

Argenx (ARGX, Buy, $552 PO)

Argenx (ARGX) is one of our 2024 top picks. We remain bullish on the commercial opportunity for Vyvgart (efgartigimod IV) and Vyvgart Hytrulo (efgartigimod SC) in generalized myasthenia gravis (gMG), following an strong launch that has continued to show good momentum almost two years after approval. We also view Vyv's second indication, chronic inflammatory demyelinating polyneuropathy (CIDP), as a highly attractive commercial opportunity following positive results from the ADHERE study. Management had commented they planned to submit the supplemental biologics license application (sBLA) using its priority review voucher (PRV) by YE23 with a regulatory decision and potential launch expected in 2024. We currently model gMG peak sales of $4.7bn contributing $303/sh to our PO and risk-adjusted CIDP peak sales of $3.2bn (LoS: 85%) contributing $157/sh to our PO. In our view, despite the negative results from ADVANCE-SC in ITP and ADDRESS in PV, which resulted in the recent sell-off, the company's fundamentals remain strong and we think the current valuation does not fully reflect the large commercial opportunity in gMG and CIDP. We also highlight that the company has several proof-of-concept readouts in 2024 that could provide additional upside.

gMG and CIDP represent attractive commercial opportunities

Argenx is focused on becoming a market leader in autoimmune diseases. The company secured approval for its first commercial product, Vyvgart (efgartigimod), a first-in-class novel therapy targeting FcRn (neonatal fragment crystallizable receptor) in December 2021 for gMG. Vyvgart has continued to beat Street expectations since the launch and the company has reported >$1.2bn in sales so far. We estimate FY23 sales of $1.2bn and FY24 sales of $1.5bn. Management has highlighted the continued geographic expansion of Vyvgart and moving into earlier lines of treatment in gMG will be key drivers of growth, but they expect more moderate growth. In addition to gMG, the company reported positive results from the ADHERE trial evaluating Vyvgart Hytrulo in CIDP (see our CIDP deep dive). The company had commented they planned to submit the sBLA application around FY23 with a regulatory decision in 2024 with priority review. The company estimates ~16K addressable CIDP patients in the US and our key opinion leaders (KOLs) have noted high unmet need given 30-40% of patients fail on current standard of care. We see CIDP as an attractive commercial opportunity but note the launch dynamics will likely be different from gMG given intravenous immunoglobulin (IVIg) therapy is approved in this indication. We model $3.2bn in risk-adjusted peak sales in CIDP under an 85% LoS assuming 30% peak penetration. We note that our KOLs have noted that with time their use of Vyvgart Hytrulo could increase and move ahead of IVIg as they become comfortable with it given a more convenient dosing with subcutaneous administration. In our view, the approval in CIDP would offer upside to our current estimates in 2024.

Several POC readouts could provide clinical validation in new indications

ARGX is also continuing development of efgartigimod, which they see as a pipeline in a product, in several additional autoimmune disorders. Following the recent negative outcomes from ADVANCE-SC in ITP and ADDRESS in PV, the company has commented they are carefully evaluating all their ongoing programs and noted they plan to gather proof-of-concept data for all additional indications before moving to registrational trials. We note that given the company is developing efgartigimod in ~13 indications, some setbacks are expected, but we think the highly positive data in gMG and CIDP are supportive of the efficacy of efgartigimod in autoimmune diseases and support further development in additional indications. The company plans to report proof of concept data in post-COVID Postural orthostatic tachycardia syndrome (PC-POTS) in 1Q24, which they estimate has >500K addressable patients in the US. Topline data for the phase 2 RHO trial in Sjogren's syndrome is expected in 1H24. ARGX estimates ~330K addressable Sjogren's patients in the US. Additionally, the Go/No Go decision for

efgartigimod in myositis in expected in 2H24. The company is also pursuing thyroid eye disease (TED). We think positive readouts from these trials in 2024 could provide additional upside and de-risk development of efgartigimod in additional indications and further support its broad potential in autoimmune diseases.

Initial clinical validation for second asset, empasiprubart, expected in 2024

ARGX is also focusing on advancing its pipeline which includes empasiprubart (ARGX-117), a C2 inhibitor, and ARGX-119, a muscle specific kinase (MuSK) agonist. The company plans to report topline phase 2 data for empasiprubart in multifocal motor neuropathy, MMN, in 2024 following a positive recommendation from the Independent Data Monitoring Committee to continue the phase 2 trial and open a second cohort based on safety and early signs of efficacy. The trial is expected to enroll 48 patients across two cohorts to help inform the phase 3 dose selection. Positive data would provide initial clinical validation for empasiprubart and could offer additional upside to our estimates. ARGX-119 is being evaluated in a phase 1 study in healthy volunteers and the company has plans to initiate a phase 1b study to assess potential efficacy in congenital myasthenic syndrome and amyotrophic lateral sclerosis patients.

Ultragenyx (RARE, Buy, $84 PO)

Ultragenyx is one of our top picks for 2024. We continue to be encouraged by performance of the company's rare disease commercial franchise and see high potential for future upside given RARE has multiple shots on goal with several late-stage pipeline programs expected to read out data next year including: (1) phase 2 update for GTX-102 in Angelman syndrome (AS) in 1H24 (likely early 2Q24); (2) phase 2 update for setrusumab in osteogenesis imperfecta (OI) in 202; (3) interim Stage 1 data for UX701 in Wilson disease (WD) in 1H24; and (4) preliminary phase 3 data for DTX401 in glycogen storage disease type Ia (GSD1a) in 1H24. We view 2024 as an important catalyst year for RARE given several late-stage pipeline readouts that will help determine potential commercial opportunity. We maintain our Buy rating with $84 PO as the company looks to bring their next phase of pipeline assets to market.

Commercial profitability expected by 2026

RARE is a market leader in developing rare disease products having brought four products to market since their IPO in 2014. The company's commercial portfolio includes Crysvita for X-linked hypophosphatemia (XLH) and tumor-induced osteomalacia (TIO), Mepsevii for mucopolysaccharidosis type VII (MPS VII), Dojolvi for long-chain fatty acid oxidation disorders (LC-FAOD) and Evkeeza for homozygous familial hypercholesterolemia (HoFH). Management guided to $425-450mn in total product revenue for 2023 and expects to become commercially profitable in 2026 based on pipeline expectations and current commercial growth rates. On pipeline, RARE is advancing multiple programs in the clinic evaluating different drug modalities across a broad range of rare disease therapeutic areas. In addition to the four later-stage programs reading out next year, the company has multiple other programs in clinical development including UX053 in GSDIII, DTX301 in ornithine transcarbamylase (OTC) deficiency, UX111 in Sanfilippo syndrome, and DTX201 in hemophilia A.

Comprehensive Angelman Syndrome update in 1H24

AS is a neurogenetic disorder caused by the loss of expression of the UBE3A gene with a 1:15K live birth incidence. RARE's asset, GTX-102, is an antisense oligonucleotide (ASO) designed to activate the UBE3A gene and is currently being studied in an ongoing phase 1/2 study. The program has seen several roadblocks with a previous clinical hold in 2020 (resolved in 2021) due to the emergence of a treatment-related adverse event at the highest studied dose. Although progress since then has been slow with RARE only recently harmonizing their US and ex-US protocols (mid-2023), we highlight RARE is the leader in the AS development space with recent competitor, Roche, opting to discontinue their rugonersen development program based on lacking efficacy. At an Analyst Day in October 2023, the company reported interim phase 2 data highlighting

improvements across multiple AS clinical domains (as compared to natural history data) as well as real-world videos of patients before and after treatment displaying significant improvements in basic skills. Management guides to presenting a more comprehensive update in 1H24 (likely early 2Q) on ~60 patients. Additionally, RARE continues to actively engage with regulators on a design of a pivotal phase 3 study. We are encouraged by the program's current status and view 2024 as an important year as RARE looks to capitalize on their first-to-market path. Based on current timelines, we assume a launch in 2026 and estimate peak risk-adjusted sales of $616mn (30% likelihood-of-success). GTX-102 contributes $19/sh to our PO. We also highlight focus on readouts from key competitors Ionis Pharmaceuticals (IONS; covered by BofA Global Research analyst Greg Harrison), which will have phase 1/2 data for ION582 (UBE3A ASO) in mid-2024, and Neuren Pharmaceuticals, which will have phase 2 data for NNZ-2953 (synthetic analog of neurotrophic peptide cyclic glycine proline) in 3Q24.

Attractive commercial opportunity in OI given no approved therapies

Setrusumab is an anti-sclerostin monoclonal antibody currently being investigated in an ongoing phase 3 study for OI. OI is a rare bone disorder (~1:20K live births) typically caused by mutations in the type 1 collagen genes resulting in bone fragility and skeletal deformities leading to high fracture rates. Currently, there are no FDA-approved therapies with standard of care involving the use of off-label bisphosphonates, which have minimal efficacy. RARE recently presented phase 2 data showing rapid increases in lumbar spine bone mineral density (BMD) of 14.2% after six months of treatment that correlated with a reduced annualized fracture rate of 67% as compared to 0% for placebo. RARE KOLs were impressed with the data, noting increases of BMD of that magnitude are not normally seen at such an early timepoint with bisphosphonates. Management guides to presenting additional phase 2 data in 2024. We are encouraged by the positive phase 2 data that we think could readthrough positively to the phase 3 primary endpoint of annualized fracture rate reduction. We highlight setrusumab as a major contributor to our current $1bn pipeline value. We plan to survey KOLs in the coming months to gain a better understanding of the OI opportunity before breaking out standalone value for the program.

Several late-stage readouts expected for gene therapy pipeline in 2024

RARE has an expansive gene therapy portfolio with four programs currently in the clinic: DTX401 for GSD1a; UX701 for WD; DTX301 for OTC deficiency; and UX111 for Sanfilippo syndrome. We highlight that all four programs are entering spaces with high unmet need where current standard of care primarily involves changes to a patient's diet. On current timelines, management guides to phase 3 data for DTX401 in 1H24, Stage 1 data for UX701 in 1H24, and to initiate the last phase 3 patient for DTX301 in 1H24. Additionally, RARE continues to engage with regulators on a potential accelerated approval path for UX111 in Sanfilippo syndrome. We note we break out standalone value for DTX401 (contributes $22/sh to our PO) and DTX301 (contributes $19/sh) and include UX701 and UX111 in our $1bn pipeline value plug. We are encouraged by RARE's focus on high unmet need indications for gene therapies, especially considering the FDA announced a commitment to utilizing regulatory flexibility to accelerate gene therapy approval timelines.

Sarepta (SRPT, Buy, $164)

SRPT is one of our 2024 top picks. We are bullish on the commercial opportunity for Elevidys (SPR-9001), the company's gene therapy Duchenne muscular dystrophy (DMD), which received accelerated approved in four- to five-year-old patients in June. SRPT is now looking to obtain full approval and a label expansion to include all DMD patients based on the results of the phase 3 EMBARK trial and the totality of data supporting the benefit of Elevidys to DMD patients. The company submitted the efficacy supplement to support the label expansion and expects the review could take up to six months but has highlighted FDA is committed to a prompt review. They noted the application included a label expansion request to all DMD patients regardless of age or ambulatory status. The

company reported $69.1mn in sales in the first quarter of launch beating Street expectations. We think the strong initial uptake is reflective of the high unmet need and strong demand. While EMABRK failed to meet the primary endpoint of North Star Ambulatory Assessment (NSAA), we are confident that the benefit in the secondary timed functional endpoints in all age groups could support label expansion and would provide additional upside to our estimates. We currently model Elevidys risk-adjusted peak sales of $2.4bn (US/EU LoS: 75%/60%) contributing $77/sh to our PO.

Sarepta is a market leader in DMD therapies

SRPT is a market leader in developing and bringing DMD therapies to market. The company's commercial portfolio includes three exon-skipping products – Exondys 51 for DMD patients with exon 51 mutation; Vyondys 53 for patients with exon 53 mutation; and Amondys 45 for patients with exon 45 mutation. SRPT's exon-skipping franchise is estimated to bring roughly $925mn in revenue in 2023. However, only a subset of patients with specific mutations is eligible to receive exon-skipping therapies. In our view, Elevidys could be the first disease-modifying treatment in DMD with potential to address the majority of DMD patients, representing a highly attractive commercial opportunity. We estimate Elevidys revenues of $100mn in the first six months of launch in 2023.

Timed functional tests support clinical benefit from Elevidys

The phase 3 EMBARK trial enrolled 125 DMD patients ages four- to seven-year-olds. At the topline readout, the company reported the trial missed the primary endpoint of NSAA total score at week 52 with a 0.65-point placebo-adjusted difference (p=0.24). Despite missing the primary endpoint, analysis of pre-specified functional secondary endpoints including time to rise (-0.64s, p=0.0025) and 10-meter walk test (-0.42s, p=0.0048) suggested functional benefit to patients treated with Elevidys. Importantly, further subgroup analysis suggested this benefit was seen in the four- to five-year-old and six- to seven-year-old subgroups, which had been a major topic of discussion given previous trials failed to show benefit in older patients. Management has reiterated their confidence in the potential for a label expansion, which they have commented they expect to be a non-age restricted label (inclusive of non-ambulatory patients: ~50%), based on the totality of data. The company has noted that they met with FDA leadership following the EMBARK topline readout to discuss the application and noted support from FDA in the submission of the application for a label expansion. The company expects the review could take up to six months.

Management has commented that a non-age restricted label expansion would expand the addressable patient population to ~80% of DMD patients excluding patients with pre-existing immunity (~14%) and patients with certain ineligible mutations (~5%). The company is currently exploring options to treat patients with pre-existing immunity, which could expand the addressable patient population to ~95% of DMD patients. In our view, label expansion is likely based on the timed functional endpoints suggesting benefit to patients, high unmet need in DMD, and positive feedback from FDA leadership in support of the submission. We highlight that Agamree (vamorolone), a synthetic corticosteroid, was recently approved in the US for DMD based on timed functional endpoints (pre-specified as primary). Management has commented that they estimate 400-500 DMD patients are diagnosed each year. While we are confident in the potential for label expansion, we think another advisory committee is not out of the question, which could cause temporary volatility, given the high profile of the regulatory review process so far.

Broad label expansion could represent additional upside to our estimates

We currently model 35% peak penetration for Elevidys and 75% LoS in the US. Elevidys contributes $77/sh to our PO. We think that expansion to non-ambulatory patients (~50%) at this point is unlikely given there is no clinical data in this patient population and the ENVISION trial evaluating SRP-9001 in non-ambulatory patients is underway. In our view, label expansion to all ambulatory patients is the most likely scenario but we

think there could be different outcomes to the review process. In this case, assuming 35% peak penetration and 100% US approval, Elevidys would contribute $99/sh. We think that withdrawal of the approval in four- to five-year-old patients is unlikely given the clinical evidence supporting efficacy in this age group and the high demand and unmet need so far in the first few months after the approval. We note that in this case assuming a label restricted to four- to five-year olds, there would be a steady revenue stream from new patients being diagnosed and treated each year. Assuming 10% peak penetration (~$1bn in peak sales), Elevidys would contribute $52/sh to our PO. We note that in this case, we expect the exon-skipping franchise would likely also be a longer-term driver of revenues, as we currently assume cannibalization from a significant proportion of patients receiving Elevidys. If a non-age restricted label inclusive of all non-ambulatory patients were approved, we think there could be significant upside to our estimates. Under a 60% peak penetration, Elevidys would contribute $111/sh to our valuation.

LGMD franchise could be next leg of growth for SRPT

SRPT is also expanding their gene therapy platform to other forms of muscular dystrophy. The company has ongoing trials in different types of limb-girdle muscular dystrophy (LGMD), which we see as the next leg of growth, including JOURNEY, a natural history study, VOYAGENE, a phase 1 trial in LGMD type 2E, and NAVIGENE, a phase trial in LGMD type 2B. We expect the company will begin to focus on development of the LGMD portfolio, which could potentially be a larger market opportunity than DMD. We currently model $2.6bn in risk-adjusted peak sales contributing $36/sh to our valuation and see this program as relatively more de-risked than DMD as they can express full-length protein with their LGMD gene therapy programs.

Merus (MRUS, Buy, $38)

Merus is our small-cap top pick for 2024. We are bullish on the commercial opportunity for petosemtamab in head and neck squamous cell carcinoma (HNSCC) given the high unmet need in the 2L+ setting and opportunity for better efficacy in the 1L. The company plans to initiate a phase 3 trial evaluating peto' as monotherapy in 2L+ HNSCC in mid-24 with potential for accelerated approval based on FDA feedback and expects to report phase 1/2 data in 1L in combination with pembrolizumab (Keytruda) in 1H24. We currently model risk-adjusted peak sales of $742mn for peto' in 2L+ HNSCC (LoS: 50%) and $703mn for peto' in 1L HNSCC (LoS: 30%). Peto' contributes $23/sh to our PO. We think positive phase 1/2 data in 1L HNSCC, which we think is the biggest commercial opportunity, could be a key catalyst for the company in 2024 and could provide additional upside to our estimates.

MRUS is advancing a platform of bispecifics in several oncology indications

MRUS is developing a platform of multi-specific antibodies with potential in several oncology indications. The company's lead asset is petosemtamab, an EGFR (epidermal growth factor receptor) and LGR5 (leucine-rich repeat-containing G protein-coupled receptor 5) targeting bispecific being evaluated in HNSCC. HNSCC is a large commercial opportunity with ~900K new cases each year in the US and ~79K patients with recurrent or metastatic disease receiving 1L treatment and ~38K patients being treated in the 2L+ setting in major markets (US, EU5 and Japan). MRUS is also developing zenocutuzumab, a HER2/HER3 (human epidermal growth factor receptor 2/3)-targeting bispecific, in NRG1+ (heregulin) cancers. The company expects to have sufficient data to support biologics license application (BLA) submissions in NRG1+ non-small cell lung cancer and pancreatic ductal adenocarcinoma in 1H24 but has noted that a commercial partnership will be essential given the limited addressable patient population. Other assets in the pipeline include MCLA-129, an EGFR/cMet bispecific, and MCLA-145, a CD137/PD-L1 bispecific.

Phase 3 trial in 2L+ HNSCC initiating in mid-24 with potential accelerated approval

Current standard of care in the 1L involves pembrolizumab-based regimens; however, 2L+ treatments are highly fragmented, and the overall efficacy is very low with overall response rates (ORR) of ~4-14%. Phase 1/2 data from peto' in 2L+ HNSCC showed an ORR of 37% (16/43 patients) including 15 partial responses and one complete response with a median time to response of 1.8 months and media progression free survival of 5.6 months, which suggests a significant improvement over current 2L+ agents. Based on these results, MRUS plans to initiate a phase 3 trial in 2L+ HNSCC in mid-24 and use ORR as an endpoint to pursue accelerated approval based on FDA feedback. The company is currently running a dose finding study with ~40 patients to evaluate the 1,100mg and 1,500mg doses and inform the dose used in the phase 3 trial and other potential trials. Data from this study is expected in 2024. Importantly, this phase 3 trial will also serve as the confirmatory trial to support full approval once overall survival data has matured. We are encouraged by these early signs of superior clinical efficacy in the 2L+ HNSCC setting and the potential for accelerated approval in this indication.

Interim phase 1/2 for peto' in 1L HNSCC could be key catalyst in 2024

MRUS is also enrolling patients into a single-arm phase 1/2 trial evaluating 1,500mg of peto' in combination with pembrolizumab in untreated advanced PD-L1+ HNSCC. The company has commented the combination has been well-tolerated so far in the initial patients dosed in the study and they expect to report interim and efficacy data in 1H24. We highlight that results from the KEYNOTE-048 study evaluating pembrolizumab monotherapy/plus chemotherapy vs chemotherapy plus cetuximab did not show benefit in ORR or PFS but demonstrated benefit in overall survival benefit in 1L PD-L1+ HNSCC. We think that initial data suggesting potential improvements in ORR could support further development in 1L HNSCC. We note that Bicara Therapeutics (private) reported phase 1b data for BCA101 (EGFR/TGF-β bispecific) in combination with pembrolizumab in 1L PD-L1+ HNSCC showing 46% ORR in the overall population and 57% ORR in HPV- (human papilloma virus negative) patients, which we think could be used as a comparator for efficacy. Additionally, management has commented that based on their interactions with FDA they expect accelerated approval using ORR in 1L HNSCC could be feasible. The company has noted that results from the phase 1/2 trial could support initiation of a registration-directed trial in 1L HNSCC. Peto' in 1L HNSCC currently contributes $7/sh to our PO under a 30% likelihood of success (LoS) but we think interim clinical data validating the potential efficacy in 1L HNSCC would warrant a higher LoS. Under a 50% LoS for peto' in 1L HNSCC, the program would contribute $16/sh to our valuation.

Zeno' could be ready for filing in 1H24 but commercial partner needed

Zeno' has demonstrated promising efficacy in NRG1+ cancers with a favorable safety profile. In NSCLC, the ORR was 34% in 64 evaluable patients with a median duration of response of 12.9 months. In PDAC, the ORR was 44% in 38 evaluable patients with a median duration of response of 9.1 months. However, the prevalence of NRG1+ mutations in different cancer types is ~0.3-0.5%. While the company expects to have sufficient data to file BLA submissions in NSCLC and PDAC in 1H24, management has reiterated that a commercial partner would be needed to commercialize zeno' in this patient population. The company has commented they are actively looking for partners, likely a large pharma with an existing oncology commercial infrastructure. MRUS also recently reported initial data for MCLA-129 (see our Dec 5 note), which raised questions on the future of the program. Zeno' and MCLA-129 as well as other early-stage programs are currently part of our $800mn pipeline value; we think updates on the commercial opportunity for zeno' could provide additional upside.

Abbreviations

1L: First-line
2L: Second-line
ABCC6: ATP binding cassette subfamily C member 6
ALA: AL Amyloidosis
ALS: Amyotrophic lateral sclerosis
AS: Angelman syndrome
ATTR-CM: Transthyretin amyloid cardiomyopathy
BLA: Biologics license application
BMD: Bone mineral density
CAH: Congenital adrenal hyperplasia
CHMP: Committee for medicinal products for human use
CIDP: Chronic Inflammatory Demyelinating Polyneuropathy
cMET: Mesenchymal epithelial transition factor
DM1: Myotonic dystrophy 1
DMD: Duchenne Muscular Dystrophy
DME: Diabetic macular edema
EC: European Commission
EGFR: Epidermal growth factor receptor
EMA: European Medicines Agency
ENPP1: Ectonucleotide pyrophosphatase/ phosphodiesterase 1
ER: Estrogen Receptor
FcRn: Neonatal fragment crystallizable receptor
FTC: Federal Trade Commission
GA: Geographic Atrophy
GBS: Guillain-Barre Syndrome
gMG: Generalized Myasthenia Gravis
GSD1a: Glycogen storage disease type 1a
HoFH: Homozygous familial hypercholesterolemia
HNSCC: Head and Neck Squamous Cell Carcinoma
HSCT-TMA: Hematopoietic stem cell transplant-associated-thrombotic microangiopathy
HPT: Hypoparathyroidism
HPV: Human papillomavirus
HER2/ HER3: Human Epidermal Growth Factor 2/3
IC-MGPN: Immune Complex Membranoproliferative Glomerulonephritis
IPO: Initial Public Offering
IVIg: Intravenous immunoglobulin
KOL: Key opinion leader
LC-FAOD: Long-chain fatty acid oxidation disorders
LGMD: Limb-girdle muscular dystrophy
LGR5: Leucine-rich repeat-containing G protein-coupled receptor 5
LOE: Loss/ Length of Exclusivity
LOPD: Late-onset Pompe Disease
LoS: Likelihood of success
M&A: Mergers and Acquisitions
MAA: Marketing Authorization Application
mBC: Metastatic Breast Cancer
MDD: Major depressive disorder
MMN: Multifocal motor neuropathy
MPS VII: Mucopolysaccharidosis type VII
MuSK: Muscle specific kinase
NRG1: Neuregulin 1
NSAA: North Star Ambulatory Assessment
NSCLC: Non-small cell lung cancer
NSOS: Negative Symptoms of Schizophrenia
OI: Osteogenesis imperfecta
ORR: Overall response rate
OTC: Ornithine transcarbamylase
PC-POTS: Post-COVID postural tachycardia syndrome
Ph: Phase
PD-L1: Programmed cell death ligand 1

POC: Proof-of-concept
POTS: Postural tachycardia syndrome
PDUFA: Prescription Drug User Fee Act
PRV: Priority review voucher
sBLA: Supplemental biologics license application
ST: Solid tumors
TED: Thyroid eye disease
TIO: Tumor-induced osteomalacia
wAMD: Wet age-related macular degeneration
WD: Wilson disease
XBI: SPDR S&P Biotech ETF
XLH: X-linked hypophosphatemia

Exhibit 8: Stocks mentioned
Prices and ratings for stocks mentioned in this report

BofA Ticker	Bloomberg ticker	Company name	Price	Rating
ARGX	ARGX US	Argenx	US$ 381	C-1-9
MRUS	MRUS US	Merus	US$ 28.62	C-1-9
SRPT	SRPT US	Sarepta	US$ 96.21	C-1-9
RARE	RARE US	Ultragenyx Pharm	US$ 48.17	C-1-9

Source: BofA Global Research

BofA GLOBAL RESEARCH

Price objective basis & risk

Argenx SE (ARGX)

Our price objective of $552 is based on our DCF-derived model with valuations assigned for efgartigimod in Myasthenia Gravis ($304), Immune Thrombocytopenia ($5), and Chronic Inflammatory Demyelinating Polyneuropathy ($157), pipeline and corporate expenses ($35) and cash. We assign 9% WACC for MG, 10% for ITP, and CIDP. Our DCF valuation is based on estimates out to 2038. We assume peak penetrations of 10%-35% in US depending on the indication.

Upside risks to our PO are (1) better-than-expected efficacy in efgartigimod indications, (2) faster-than-anticipated timeline to approval, (3) additional indications advancing in clinical development, (4) positive data from its partnerships, and (5) higher-than-expected pricing at launch.

Downside risks to our PO are (1) competitors have better-than-expected efficacy, (2) failure to achieve clinically meaningful results in ongoing studies, and (3) unexpected safety events in ongoing trials.

Merus (MRUS)

Our $38 PO is based on a probability adjusted net present value analysis. Our valuation consists of $16/sh for petosemtamab in 2L+ head and neck squamous cell cancer (HNSCC) and $7/sh for peto' in 1L HNSCC. The remainder of our valuation comes from pipeline ($8/sh) and cash ($7/sh). Our discounted cash flow (DCF)-based model goes out to 2040. We assume 11% WACC for peto in 2L+, 13% in 1L and 14% for pipeline expenses, and assume no terminal value

Upside risks to our PO are 1) positive clinical data for lead programs, 2) potential for accelerated approval in 2L+ HNSCC and potentially 1L, 3) successful partnership for commercialization of zenocutuzumab, and 4) better-than-expected market penetration.

Downside risks to our PO are 1) negative results from upcoming clinical data readouts, 2) unexpected safety signals from lead assets, 3) failure to obtain accelerated approval in HNSCC, 4) failure to partner zenocutuzumab, and 5) lower than expected commercial uptake.

Sarepta Therapeutics (SRPT)

Our $164 PO is based on a probability-adjusted net present value (NPV) analysis that includes $19/share for Exondys, $8/share for Vyondys, $22/share for Amondys, $77/share for micro-dystrophin gene therapy, $36/share for LGMD assets. The remainder of our valuation comes from pipeline and cash. Our discounted cash flow (DCF) analysis assumes sales out to 2035, with weighted average cost of capital (WACC) of 9-13%.

Upside risks to our PO are 1) better-than-expected market uptake from its exon skipping assets, 2) SRP-9001 US label expansion, and 3) EU approval of SRP-9001 and other assets.

Downside risks to our PO are 1) failure and delay in approval for exon skipping assets, 2) unexpected safety or durability findings in gene therapy programs, 3) other micro dystrophin competitors, and 4) higher-than-expected royalty payments.

Ultragenyx Pharmaceuticals (RARE)
Our DCF-derived PO of $84 for RARE consists of $11/share for Dojolvi in LC-FAOD, $20/share for Crysvita in XLH and TIO, $0.5/share for Mepsevii in MPS7, $15/share for Angelman, $42/share for gene therapy assets and the remainder for cash and RARE's pipeline. We use a 9% WACC for approved products, 11-12% for clinical-stage products, such as gene therapy programs.

Upside risks to our price objective are: 1) better than expected uptake for its approved products, 2) positive data for clinical stage assets, and 3) accelerated approval for its drug candidates.

Downside risks are: 1) low penetration into rare disease populations, 2) negative data for clinical stage assets, 3) unexpected safety risks associated with clinical stage drug candidates, 4) unexpected generic competition.

Analyst Certification

I, Tazeen Ahmad, hereby certify that the views expressed in this research report accurately reflect my personal views about the subject securities and issuers. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or view expressed in this research report.

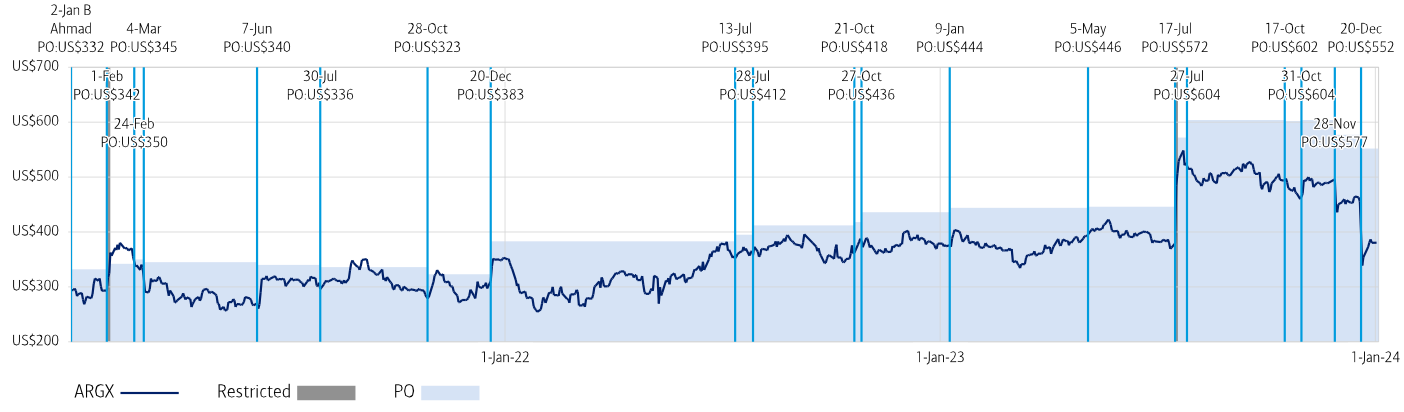
US - Biotechnology Coverage Cluster

Investment rating	Company	BofA Ticker	Bloomberg symbol	Analyst
BUY				
	4D Molecular Therapeutics, Inc.	FDMT	FDMT US	Tazeen Ahmad
	Alnylam Pharmaceuticals	ALNY	ALNY US	Tazeen Ahmad
	Amicus Therapeutics	FOLD	FOLD US	Tazeen Ahmad
	Annexon Biosciences	ANNX	ANNX US	Tazeen Ahmad
	Apellis Pharmaceuticals	APLS	APLS US	Tazeen Ahmad
	Argenx SE	ARGX	ARGX US	Tazeen Ahmad
	Arvinas	ARVN	ARVN US	Tazeen Ahmad
	Ascendis Pharma	ASND	ASND US	Tazeen Ahmad
	Biocryst Pharmaceuticals Inc	BCRX	BCRX US	Tazeen Ahmad
	BioNTech	BNTX	BNTX US	Tazeen Ahmad
	Denali Therapeutics	DNLI	DNLI US	Tazeen Ahmad
	Inozyme Pharma, Inc.	INZY	INZY US	Tazeen Ahmad
	Merus	MRUS	MRUS US	Tazeen Ahmad
	Neurocrine Biosciences	NBIX	NBIX US	Tazeen Ahmad
	PepGen Inc	PEPG	PEPG US	Tazeen Ahmad
	Prothena Corporation	PRTA	PRTA US	Tazeen Ahmad
	Rhythm Pharmaceuticals	RYTM	RYTM US	Tazeen Ahmad
	Sarepta Therapeutics	SRPT	SRPT US	Tazeen Ahmad
	Ultragenyx Pharmaceuticals	RARE	RARE US	Tazeen Ahmad
NEUTRAL				
	Acadia Pharmaceuticals	ACAD	ACAD US	Tazeen Ahmad
	Cyteir Therapeutics	CYT	CYT US	Tazeen Ahmad
	Incyte Corporation	INCY	INCY US	Tazeen Ahmad
	SAGE Therapeutics	SAGE	SAGE US	Tazeen Ahmad
UNDERPERFORM				
	Achilles Therapeutics	ACHL	ACHL US	Tazeen Ahmad
	Fate Therapeutics	FATE	FATE US	Tazeen Ahmad
	Fulcrum Therapeutics	FULC	FULC US	Tazeen Ahmad
	Pharvaris	PHVS	PHVS US	Tazeen Ahmad
	PTC Therapeutics	PTCT	PTCT US	Tazeen Ahmad

Disclosures

Important Disclosures

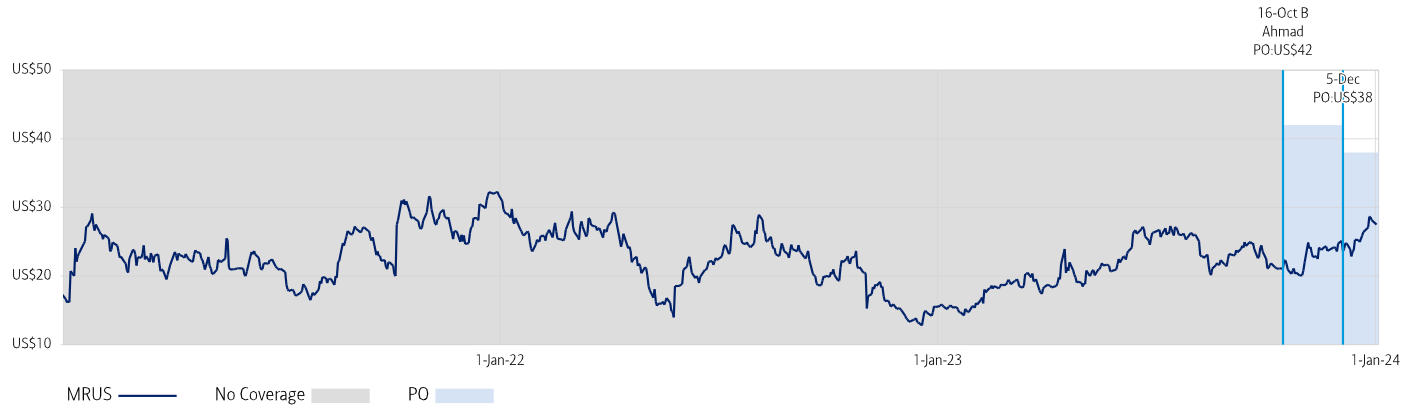
Argenx (ARGX) Price Chart



B: Buy, N: Neutral, U: Underperform, PO: Price Objective, NA: No longer valid, NR: No Rating

The Investment Opinion System is contained at the end of the report under the heading "Fundamental Equity Opinion Key". Dark grey shading indicates the security is restricted with the opinion suspended. Medium grey shading indicates the security is under review with the opinion withdrawn. Light grey shading indicates the security is not covered. Chart is current as of a date no more than one trading day prior to the date of the report.

Merus (MRUS) Price Chart



B: Buy, N: Neutral, U: Underperform, PO: Price Objective, NA: No longer valid, NR: No Rating

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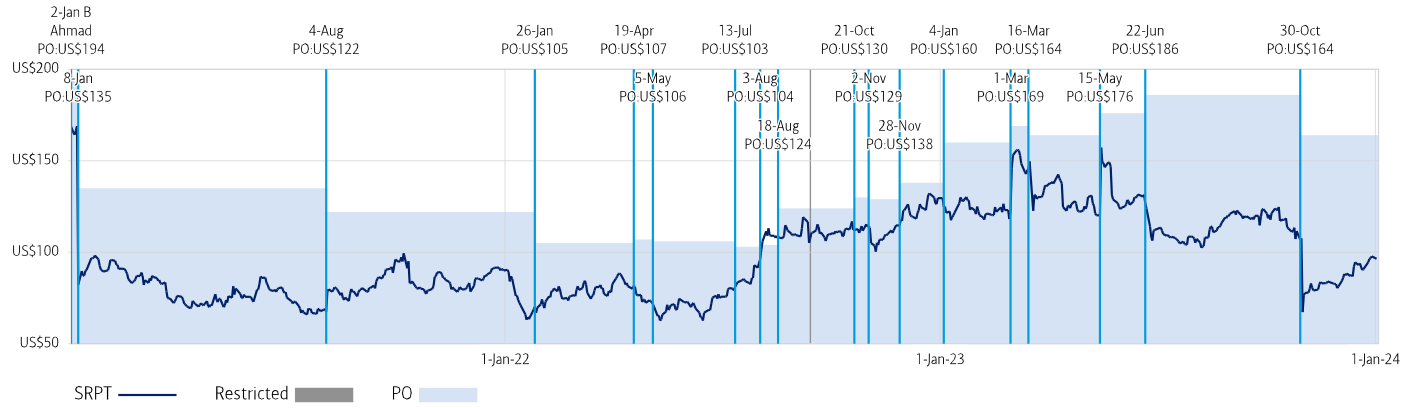
Sarepta (SRPT) Price Chart



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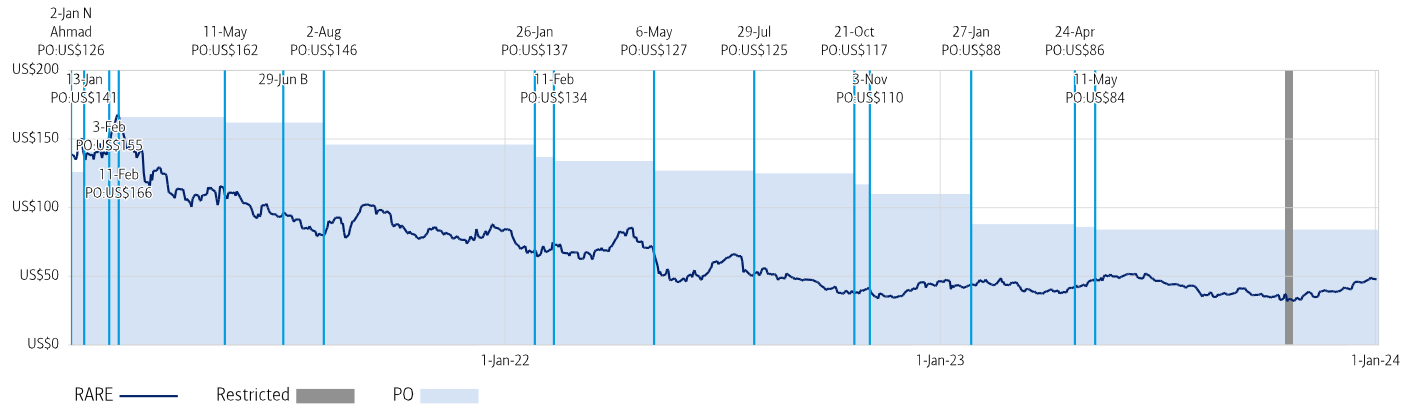
Ultragenyx Pharm (RARE) Price Chart



B: Buy, N: Neutral, U: Underperform, PO: Price Objective, NA: No longer valid, NR: No Rating

The Investment Opinion System is contained at the end of the report under the heading "Fundamental Equity Opinion Key". Dark grey shading indicates the security is restricted with the opinion suspended. Medium grey shading indicates the security is under review with the opinion withdrawn. Light grey shading indicates the security is not covered. Chart is current as of a date no more than one trading day prior to the date of the report.

Equity Investment Rating Distribution: Health Care Group (as of 31 Dec 2023)

Coverage Universe	Count	Percent	Inv. Banking Relationships [R1]	Count	Percent
Buy	234	60.94%	Buy	115	49.15%
Hold	80	20.83%	Hold	36	45.00%
Sell	70	18.23%	Sell	29	41.43%

Equity Investment Rating Distribution: Global Group (as of 31 Dec 2023)

Coverage Universe	Count	Percent	Inv. Banking Relationships [R1]	Count	Percent
Buy	1895	53.62%	Buy	1083	57.15%
Hold	832	23.54%	Hold	454	54.57%
Sell	807	22.84%	Sell	383	47.46%

[R1] Issuers that were investment banking clients of BofA Securities or one of its affiliates within the past 12 months. For purposes of this Investment Rating Distribution, the coverage universe includes only stocks. A stock rated Neutral is included as a Hold, and a stock rated Underperform is included as a Sell.

FUNDAMENTAL EQUITY OPINION KEY: Opinions include a Volatility Risk Rating, an Investment Rating and an Income Rating. VOLATILITY RISK RATINGS, indicators of potential price fluctuation, are: A - Low, B - Medium and C - High. INVESTMENT RATINGS reflect the analyst's assessment of both a stock's absolute total return potential as well as its attractiveness for investment relative to other stocks within its Coverage Cluster (defined below). Our investment ratings are: 1 - Buy stocks are expected to have a total return of at least 10% and are the most attractive stocks in the coverage cluster; 2 - Neutral stocks are expected to remain flat or increase in value and are less attractive than Buy rated stocks and 3 - Underperform stocks are the least attractive stocks in a coverage cluster. An investment rating of 6 (No Rating) indicates that a stock is no longer trading on the basis of fundamentals. Analysts assign investment ratings considering, among other things, the 0-12 month total return expectation for a stock and the firm's guidelines for ratings dispersions (shown in the table below). The current price objective for a stock should be referenced to better understand the total return expectation at any given time. The price objective reflects the analyst's view of the potential price appreciation (depreciation).

Investment rating	Total return expectation (within 12-month period of date of initial rating)	Ratings dispersion guidelines for coverage cluster[R2]
Buy	≥ 10%	≤ 70%
Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

[R2]Ratings dispersions may vary from time to time where BofA Global Research believes it better reflects the investment prospects of stocks in a Coverage Cluster.

INCOME RATINGS, indicators of potential cash dividends, are: 7 - same/higher (dividend considered to be secure), 8 - same/lower (dividend not considered to be secure) and 9 - pays no cash dividend. *Coverage Cluster* is comprised of stocks covered by a single analyst or two or more analysts sharing a common industry, sector, region or other classification(s). A stock's coverage cluster is included in the most recent BofA Global Research report referencing the stock.

Price Charts for the securities referenced in this research report are available on the Price Charts website, or call 1-800-MERRILL to have them mailed.
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