Americas Healthcare: Biotechnology: Takeaways from our lunch with Endocrinologist on key launches, recent data

We hosted a lunch with an adult endocrinologist, Dr. Aren Skolnick (~350 monthly patients under care), where we discussed a broad range of endocrine conditions including: hypoparathyroidism, Congenital Adrenal Hyperplasia, Post-bariatric Hypoglycemia, Prader-Willi syndrome, Hypothalamic Obesity, achondroplasia, acromegaly, and Graves' disease/Thyroid Eye disease. Across indications, the physician is using novel therapies in a handful of patients noting good experience to-date with Yorvipath, Crenessity, and Vykat in particular, despite insurance/reimbursement hurdles which he cited are an issue across high price point rare disease therapies that his office is navigating, often with significant support from manufacturers. With respect to development stage candidates, the doctor sees i) potential for atulmenant to be differentiated via convenience/mechanism of action in CAH (particularly for patients not well managed on Crenessity), ii) recent setmelanotide data in PWS as unprecedented with respect to weight loss, and compelling on quality of life endpoints, iii) significant unmet need in PBH that could be addressed by avexitide (with a 50% absolute reduction in L2/L3 events the bar for clinical meaningfulness), and iv) encouraging evidence of clinical activity with canvuparatide, noting responder analyses in clinical trials do not reflect real-world treatment practice.

Please see within for additional details.

Corinne Johnson
+1(917)343-1445 |
corinne.johnson@gs.com
Goldman Sachs & Co. LLC

Paul Choi
+1(212)902-5217 | paul.k.choi@gs.com
Goldman Sachs & Co. LLC

Richard Law, Ph.D.
+1(212)357-6054 | richard.law@gs.com
Goldman Sachs & Co. LLC

Daniel Ni, Ph.D.
+1(212)902-2365 | daniel.ni@gs.com
Goldman Sachs & Co. LLC

Kevin Strang, Ph.D.
+1(212)357-7227 |
kevin.strang@gs.com
Goldman Sachs & Co. LLC

Jane Wu, Ph.D.
+1(212)357-0180 | jane.wu@gs.com
Goldman Sachs & Co. LLC

Erik Wong
+1(212)357-9964 | erik.wong@gs.com
Goldman Sachs & Co. LLC

Anupam Srivastava
+1(332)245-7980 |
anupam.srivastava@gs.com
Goldman Sachs India SPL

Key takeaways

Hypoparathyroidism (ASND, MBX)

Weekly-dosing is preferable, but real-world adoption is dictated by the comprehensive data profile.

- The KOL manages roughly ten HPT patients in his clinic, of which half of the patients were well managed and five patients were currently treated with Yorvipath.
- The doctor noted patients who have escalated to Yorvipath don't mind the daily injection frequency, and were overall satisfied to taper off the supplements and were still able to sustain blood calcium levels.
- Yorvipath were initially prescribed in the severe and poorly managed patients

(have hypocalcemia events in regular basis/ kidney issues) or are hospitalized, and is now moving towards use in the moderately controlled population.

KOL sees a 50% response rate threshold for the weekly-injectables.

- On the recent MBX once-weekly canvuparatide 52-week data update that showed a decline in responder rate to 57% vs. 79% at 26 weeks (see note), the KOL noted Yorvipath still stands as the gold standard in terms of treatment (recall, Yorvipath Ph3 data demonstrated stable efficacy of c.80% over 26-52 weeks). However, the KOL sees a 50% response rate as a reasonable trade-off threshold for a weekly-injectable, and noted that response criteria in clinical studies which limit PRN use do not reflect real-world treatment practice and thus should be evaluated in the context of the totality of clinical benefit.
- Canvuparatide is most likely to capture patients who are stable on daily dosing and want a less-frequent dosing interval. Additionally, he might start new patients who otherwise wouldn't tolerate daily injections. Ahead, he wants to monitor if the efficacy in longer follow-ups sustains.
- With respect to pricing, the KOL thinks canvuparatide could be priced at a premium, though expects some payor hurdles.

Congenital Adrenal Hyperplasia (NBIX, CRNX)
Positive experience with Crenessity, atumelnant could address unmet need via differentiated mechanism of action

- Our expert is treating around 20 CAH patients and has been using Crenessity in three of his female patients to better control high androgen levels. Use has been limited thus far based on patient symptom burden (including Cushingoid symptoms), while some patients do not have the classic form of CAH and others have not been to the office since Crenessity's launch (1-2x visits per year is standard). The three patients on Crenessity have been able to lower their GC usage while achieving lower weight and glucose levels. Reimbursement has been manageable, with NBIX helpful in navigating through documentation and prior authorization requirements, and it usually only takes 3-4 weeks for payers to approve patients for Crenessity.
- The physician found the recent 2-year update on bone effects for Crenessity to be useful since younger patients are still accruing their peak bone mass and can further support use in these patients. The cardiometabolic benefits were already expected. However, the doctor noted that the 2x daily dosing requirement for Crenessity and lack of impact on androgen (stabilization vs. reductions observed) are limitations of the medication. These drawbacks could incentivize the expert to use atumelnant when it is approved due to its once daily oral dosing and the potential to lower A4 levels to below the upper limit of normal (ULN) based on its differentiated MC2R antagonist mechanism, particularly among treatment naïve patients and those who are symptomatic or not well controlled on Crenessity. The expert mentioned that two of his three patients on Crenessity could potentially benefit from switching to atumelnant, but acknowledged this is a small sample size.
- With respect to liver tox findings previously observed with atumelnant, the physician

is not concerned given the incidence is low and cases seem mild. However, if future results suggest that LFT levels exceed 3x ULN this could present a reason for concern.

Post-Bariatric Surgery Hypoglycemia (AMLX)
Significant unmet need in PBH population, estimated at 15-20% of patients and reflected in patient demand for new therapeutic options

- The physician characterized this as a very high unmet need population, noting patient engagement among the highest across his practice with respect to patients seeking new and better treatment options and frustration with current standard of care. He noted that standard of care options like diazoxide do not work well, and come with significant quality of life burden; while he has tried GLP-1 agonists (predicated on slowing gastric emptying), these do not work particularly well and a significant portion of patients require new options.
- Of ~30 patients under his care, the doctor noted ~40% are not well managed with dietary modifications or existing therapy and at least 15-20% are having regular, severe, hypoglycemia events. The latter population would be the most obvious candidates for treatment initiation on approval of avexitide, and we note that this aligns closely with our own estimates that ~30K patients would form the initial addressable market (relative to 160K patient prevalence).
- Ahead of Ph3 data, the KOL noted a 50% absolute reduction in Level 2/Level 3 events would be compelling with respect to efficacy, which compares to assumptions underpinning trial design of a 35% placebo-adjusted improvement and expectations for ~50% placebo response.
- While the physician anticipates documentation will be required for insurance coverage of avexitide, if approved for PBH, he does not see this as a meaningful hurdle for treatment adoption noting classification of PBH vs. other forms of hypoglycemia is already standard practice.
- In addition to PBH, the KOL sees some promise in the use of avexitide or another GLP-1 antagonist for the treatment of other forms of hypoglycemia.

Prader-Willi Syndrome (NBIX, CRNX, RYTM)
Enthusiasm for both Vykat and setmelanotide in this very difficult to treat patient population

- The physician is currently using Vykat in a handful of patients with plans to inform his broader population of the new option, noting his experience to-date reflects improvement in patient and especially caregiver quality of life. The latter is of particular importance to him, and will inform plans to expand use of this agent over time. With respect to safety, while the doctor is monitoring for edema/hyperglycemia, and may restrict the drug from patients at risk of these effects, he has not observed significant side effects to-date. Insurance reimbursement has been a moderate hurdle to treatment adoption.
- Regarding recent data from RYTM in PWS, the physician commented that weight loss

results were unprecedented relative to this difficult to treat and highly metabolic resistant population, noting GLP-1s in the population may deliver 1-3% weight loss over a year. Moreover, benefit on HCQT was described as impressive, and consistent with his experience using Vykat, the doctor sees these quality of life endpoints as particularly important for the population of patients with PWS.

- To that end, he would hope to see benefit on HCQT prioritized in registrational studies, though effect on both weight and quality of life endpoints would be a best case scenario (noting Vykat does not improve weight). In a registrational study evaluating weight changes, the doctor noted most patients reach stable (but elevated) weight in their late 20s/early 30s, and he would not anticipate significant weight gain in those age groups (when considering potential placebo performance).
- If reimbursed by insurance, the physician would find combination use of setmelanotide with Vykat as compelling given distinct mechanisms of action.

Hypothalamic Obesity (RYTM)

- The physician has not yet prescribed Imcivree for HO, noting patients are seen only 1-2x per year, but plans to put ~20% of patients on therapy near-term based on their weight/refractoriness to therapy and comorbidities. Given this is an adult population, the physician noted that GLP-1 reimbursement is relatively straightforward and provides up to 15% weight loss in some patients.

Thyroid Eye Disease / Graves' Disease (VRDN, ROIV/IMVT)

- We touched briefly on Graves' disease, where the physician noted ~25% of his patients are not well-controlled on anti-thyroid medications and another portion are controlled but cannot get off of ATDs, with both likely to be candidates for advanced therapies in the indication like FcRns or IgG degraders. He would anticipate a mix of chronic use and intermittent treatment with these agents, similar to current practice with ATDs.

Achondroplasia (ASND, BBIO, BMRN, TYRA)
Oral options could meaningfully expand treatment for achondroplasia

- The KOL manages ten pediatric ACH patients, which are a mix of hereditary and de novo cases. Two of his patients are currently on Voxzogo. With respect to limited adoption to-date, he sees daily injections as a huge burden in pediatric care, and thinks weekly Yuviwel could bring more patients in for treatment. Oral drugs would be a good fit for ACH when introduced (such as infigratinib and dabogratinib), and note that some patients might be deferring treatment for the orals to launch.
- The KOL noted families are sometimes hesitant to start new medications, but thinks the practice will add 3 patients on infigratinib vs 3-4 on injections out of the 10 patients in his care.
- FGFR3 biology: The KOL cares about the hyperphosphatemia associated with FGFR effects. That said, he thinks it is manageable and overall not a clinical deterrent to getting on therapy. While early, the KOL thinks dabogratinib could be comparable or slight better than infigratinib in a pivotal study given greater selectivity for FGFR3.

Acromegaly (CRNX)

Palsonify used in 10% patients but half may qualify, fasting could be challenging to manage

- Our expert is treating around 20-25 acromegaly patients and has been using Palsonify for 2-3 of these patients. The limited usage is due to short time since approval, payers requiring step edits through 2-3 drugs due to Palsonify's high list price, and availability of oral Mycapssa since 2020. The expert's practice has a specialized pituitary center which is why he is able to treat more acromegaly patients. Compared to CAH, acromegaly has many effective treatment options.
- Palsonify's 1-hour post-dose fasting requirement is somewhat problematic since many patients have transphenoidal resection and 80% of these patients have thyroid deficiencies that require Synthroid treatment that also have fasting requirements. The various fasting requirements from these treatments are challenging to manage for patients. However, the expert will increase use in the future and 10 of his patients could qualify for Palsonify.

Disclosure Appendix

Reg AC

We, Corinne Johnson, Paul Choi, Richard Law, Ph.D., Daniel Ni, Ph.D., Kevin Strang, Ph.D., Jane Wu, Ph.D., Erik Wong and Anupam Srivastava, hereby certify that all of the views expressed in this report accurately reflect our personal views about the subject company or companies and its or their securities. We also certify that no part of our compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed in this report.

Unless otherwise stated, the individuals listed on the cover page of this report are analysts in Goldman Sachs' Global Investment Research division.

Contributing Authors: Corinne Johnson Goldman Sachs & Co. LLC, Paul Choi Goldman Sachs & Co. LLC, Richard Law, Ph.D. Goldman Sachs & Co. LLC, Daniel Ni, Ph.D. Goldman Sachs & Co. LLC, Kevin Strang, Ph.D. Goldman Sachs & Co. LLC, Jane Wu, Ph.D. Goldman Sachs & Co. LLC, Erik Wong Goldman Sachs & Co. LLC, Anupam Srivastava Goldman Sachs India SPL.

Unless otherwise stated, the individuals listed in the Contributing Authors disclosure of this report are analysts in Goldman Sachs' Global Investment Research division.

GS Factor Profile

The Goldman Sachs Factor Profile provides investment context for a stock by comparing key attributes to the market (i.e. our universe of rated stocks) and its sector peers. The four key attributes depicted are: Growth, Financial Returns, Multiple (e.g. valuation) and Integrated (a composite of Growth, Financial Returns and Multiple). Growth, Financial Returns and Multiple are calculated by using normalized ranks for specific metrics for each stock. The normalized ranks for the metrics are then averaged and converted into percentiles for the relevant attribute. The precise calculation of each metric may vary depending on the fiscal year, industry and region, but the standard approach is as follows:

Growth is based on a stock's forward-looking sales growth, EBITDA growth and EPS growth (for financial stocks, only EPS and sales growth), with a higher percentile indicating a higher growth company. **Financial Returns** is based on a stock's forward-looking ROE, ROCE and CROCI (for financial stocks, only ROE), with a higher percentile indicating a company with higher financial returns. **Multiple** is based on a stock's forward-looking P/E, P/B, price/dividend (P/D), EV/EBITDA, EV/FCF and EV/Debt Adjusted Cash Flow (DACF) (for financial stocks, only P/E, P/B and P/D), with a higher percentile indicating a stock trading at a higher multiple. The **Integrated** percentile is calculated as the average of the Growth percentile, Financial Returns percentile and (100% - Multiple percentile).

Financial Returns and Multiple use the Goldman Sachs analyst forecasts at the fiscal year-end at least three quarters in the future. Growth uses inputs for the fiscal year at least seven quarters in the future compared with the year at least three quarters in the future (on a per-share basis for all metrics).

For a more detailed description of how we calculate the GS Factor Profile, please contact your GS representative.

M&A Rank

Across our global coverage, we examine stocks using an M&A framework, considering both qualitative factors and quantitative factors (which may vary across sectors and regions) to incorporate the potential that certain companies could be acquired. We then assign a M&A rank as a means of scoring companies under our rated coverage from 1 to 3, with 1 representing high (30%-50%) probability of the company becoming an acquisition target, 2 representing medium (15%-30%) probability and 3 representing low (0%-15%) probability. For companies ranked 1 or 2, in line with our standard departmental guidelines we incorporate an M&A component into our target price. M&A rank of 3 is considered immaterial and therefore does not factor into our price target, and may or may not be discussed in research.

Quantum

Quantum is Goldman Sachs' proprietary database providing access to detailed financial statement histories, forecasts and ratios. It can be used for in-depth analysis of a single company, or to make comparisons between companies in different sectors and markets.

Disclosures

Distribution of ratings/investment banking relationships

Goldman Sachs Investment Research global Equity coverage universe

	Rating Distribution			Investment Banking Relationships		
	Buy	Hold	Sell	Buy	Hold	Sell
Global	50%	34%	16%	65%	60%	45%

As of April 1, 2026, Goldman Sachs Global Investment Research had investment ratings on 3,074 equity securities. Goldman Sachs assigns stocks as Buys and Sells on various regional Investment Lists; stocks not so assigned are deemed Neutral. Such assignments equate to Buy, Hold and Sell for the purposes of the above disclosure required by the FINRA Rules. See 'Ratings, Coverage universe and related definitions' below. The Investment Banking Relationships chart reflects the percentage of subject companies within each rating category for whom Goldman Sachs has provided investment banking services within the previous twelve months.

Regulatory disclosures

Disclosures required by United States laws and regulations

See company-specific regulatory disclosures above for any of the following disclosures required as to companies referred to in this report: manager or co-manager in a pending transaction; 1% or other ownership; compensation for certain services; types of client relationships; managed/co-managed public offerings in prior periods; directorships; for equity securities, market making and/or specialist role. Goldman Sachs trades or may trade as a principal in debt securities (or in related derivatives) of issuers discussed in this report.

The following are additional required disclosures: **Ownership and material conflicts of interest:** Goldman Sachs policy prohibits its analysts, professionals reporting to analysts and members of their households from owning securities of any company in the analyst's area of coverage. **Analyst compensation:** Analysts are paid in part based on the profitability of Goldman Sachs, which includes investment banking revenues. **Analyst as officer or director:** Goldman Sachs policy generally prohibits its analysts, persons reporting to analysts or members of their households from serving as an officer, director or advisor of any company in the analyst's area of coverage. **Non-U.S. Analysts:** Non-U.S. analysts may not be associated persons of Goldman Sachs & Co. LLC and therefore may not be subject to FINRA Rule 2241 or FINRA Rule 2242 restrictions on communications with a subject company, public appearances and trading in securities covered by the analysts.

Distribution of ratings: See the distribution of ratings disclosure above. **Price chart:** See the price chart, with changes of ratings and price targets in prior periods, above, or, if electronic format or if with respect to multiple companies which are the subject of this report, on the Goldman Sachs website at https://www.gs.com/research/hedge.html.

Additional disclosures required under the laws and regulations of jurisdictions other than the United States

The following disclosures are those required by the jurisdiction indicated, except to the extent already made above pursuant to United States laws and regulations. **Australia:** Goldman Sachs Australia Pty Ltd and its affiliates are not authorised deposit-taking institutions (as that term is defined in the Banking Act 1959 (Cth)) in Australia and do not provide banking services, nor carry on a banking business, in Australia. This research, and any access to it, is intended only for "wholesale clients" within the meaning of the Australian Corporations Act, unless otherwise agreed by Goldman Sachs. In producing research reports, members of Global Investment Research of Goldman Sachs Australia may attend site visits and other meetings hosted by the companies and other entities which are the subject of its research reports. In some instances the costs of such site visits or meetings may be met in part or in whole by the issuers concerned if Goldman Sachs Australia considers it is appropriate and reasonable in the specific circumstances relating to the site visit or meeting. To the extent that the contents of this document contains any financial product advice, it is general advice only and has been prepared by Goldman Sachs without taking into account a client's objectives, financial situation or needs. A client should, before acting on any such advice, consider the appropriateness of the advice having regard to the client's own objectives, financial situation and needs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests and a copy of Goldman Sachs' Australian Sell-Side Research Independence Policy Statement are available at: https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html. **Brazil:** Disclosure information in relation to CVM Resolution n. 20 is available at https://www.gs.com/worldwide/brazil/area/gir/index.html. Where applicable, the Brazil-registered analyst primarily responsible for the content of this research report, as defined in Article 20 of CVM Resolution n. 20, is the first author named at the beginning of this report, unless indicated otherwise at the end of the text. **Canada:** This information is being provided to you for information purposes only and is not, and under no circumstances should be construed as, an advertisement, offering or solicitation by Goldman Sachs & Co. LLC for purchasers of securities in Canada to trade in any Canadian security. Goldman Sachs & Co. LLC is not registered as a dealer in any jurisdiction in Canada under applicable Canadian securities laws and generally is not permitted to trade in Canadian securities and may be prohibited from selling certain securities and products in certain jurisdictions in Canada. If you wish to trade in any Canadian securities or other products in Canada please contact Goldman Sachs Canada Inc., an affiliate of The Goldman Sachs Group Inc., or another registered Canadian dealer. **Hong Kong:** Further information on the securities of covered companies referred to in this research may be obtained on request from Goldman Sachs (Asia) L.L.C. **India:** Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (India) Securities Private Limited, Research Analyst - SEBI Registration Number INH000001493, 10th Floor, Ascent-Worli, Sudam Kalu Ahire Marg, Worli, Mumbai-400 025, India, Corporate Identity Number U74140MH2006FTC160634, Phone +91 22 6616 9000, Fax +91 22 6616 9001. Goldman Sachs may beneficially own 1% or more of the securities (as such term is defined in clause 2 (h) the Indian Securities Contracts (Regulation) Act, 1956) of the subject company or companies referred to in this research report. Investment in securities market are subject to market risks. Read all the related documents carefully before investing. Registration granted by SEBI and certification from NISM in no way guarantee performance of the intermediary or provide any assurance of returns to investors. Goldman Sachs (India) Securities Private Limited compliance officer and investor grievance contact details can be found at: https://www.goldmansachs.com/worldwide/india/documents/Grievance-Redressal-and-Escalation-Matrix.pdf, and a copy of the annual audit compliance report can be found at this link: https://publishing.gs.com/content/site/india-annual-compliance-report.html. **Japan:** See below. **Korea:** This research, and any access to it, is intended only for "professional investors" within the meaning of the Financial Services and Capital Markets Act, unless otherwise agreed by Goldman Sachs. Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (Asia) L.L.C., Seoul Branch. **New Zealand:** Goldman Sachs New Zealand Limited and its affiliates are neither "registered banks" nor "deposit takers" (as defined in the Reserve Bank of New Zealand Act 1989) in New Zealand. This research, and any access to it, is intended for "wholesale clients" (as defined in the Financial Advisers Act 2008) unless otherwise agreed by Goldman Sachs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests is available at: https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html. **Russia:** Research reports distributed in the Russian Federation are not advertising as defined in the Russian legislation, but are information and analysis not having product promotion as their main purpose and do not provide appraisal within the meaning of the Russian legislation on appraisal activity. Research reports do not constitute a personalized investment recommendation as defined in Russian laws and regulations, are not addressed to a specific client, and are prepared without analyzing the financial circumstances, investment profiles or risk profiles of clients. Goldman Sachs assumes no responsibility for any investment decisions that may be taken by a client or any other person based on this research report. **Singapore:** Goldman Sachs (Singapore) Pte. (Company Number: 198602165W), which is regulated by the Monetary Authority of Singapore, accepts legal responsibility for this research, and should be contacted with respect to any matters arising from, or in connection with, this research. **Taiwan:** This material is for reference only and must not be reprinted without permission. Investors should carefully consider their own investment risk. Investment results are the responsibility of the individual investor. **United Kingdom:** Persons who would be categorized as retail clients in the United Kingdom, as such term is defined in the rules of the Financial Conduct Authority, should read this research in conjunction with prior Goldman Sachs research on the covered companies referred to herein and should refer to the risk warnings that have been sent to them by Goldman Sachs International. A copy of these risks warnings, and a glossary of certain financial terms used in this report, are available from Goldman Sachs International on request.

European Union and United Kingdom: Disclosure information in relation to Article 6 (2) of the European Commission Delegated Regulation (EU) (2016/958) supplementing Regulation (EU) No 596/2014 of the European Parliament and of the Council (including as that Delegated Regulation is implemented into United Kingdom domestic law and regulation following the United Kingdom's departure from the European Union and the European Economic Area) with regard to regulatory technical standards for the technical arrangements for objective presentation of investment recommendations or other information recommending or suggesting an investment strategy and for disclosure of particular interests or indications of conflicts of interest is available at https://www.gs.com/disclosures/europeanpolicy.html which states the European Policy for Managing Conflicts of Interest in Connection with Investment Research.

Japan: Goldman Sachs Japan Co., Ltd. is a Financial Instrument Dealer registered with the Kanto Financial Bureau under registration number Kinsho 69, and a member of Japan Securities Dealers Association, Financial Futures Association of Japan Type II Financial Instruments Firms Association, and Investment Management Association of Japan. Sales and purchase of equities are subject to commission pre-determined with clients plus consumption tax. See company-specific disclosures as to any applicable disclosures required by Japanese stock exchanges, the Japanese Securities Dealers Association or the Japanese Securities Finance Company.

Ratings, coverage universe and related definitions

Buy (B), Neutral (N), Sell (S) Analysts recommend stocks as Buys or Sells for inclusion on various regional Investment Lists. Being assigned a Buy or Sell on an Investment List is determined by a stock's total return potential relative to its coverage universe. Any stock not assigned as a Buy or a Sell on an Investment List with an active rating (i.e., a stock that is not Rating Suspended, Not Rated, Early-Stage Biotech, Coverage Suspended or Not Covered), is deemed Neutral. Each region manages Regional Conviction Lists, which are selected from Buy rated stocks on the respective region's Investment Lists and represent investment recommendations focused on the size of the total return potential and/or the likelihood of the realization of the return across their respective areas of coverage. The addition or removal of stocks from such Conviction Lists are managed by the Investment Review Committee or other designated committee in each respective region and do not represent a change in the analysts' investment rating for such stocks.

Total return potential represents the upside or downside differential between the current share price and the price target, including all paid or anticipated dividends, expected during the time horizon associated with the price target. Price targets are required for all covered stocks. The total return potential, price target and associated time horizon are stated in each report adding or reiterating an Investment List membership.

Coverage Universe: A list of all stocks in each coverage universe is available by primary analyst, stock and coverage universe at https://www.gs.com/research/hedge.html.

Not Rated (NR). The investment rating, target price and earnings estimates (where relevant) are removed pursuant to Goldman Sachs policy when Goldman Sachs is acting in an advisory capacity in a merger or in a strategic transaction involving this company, when there are legal, regulatory or policy constraints due to Goldman Sachs' involvement in a transaction, and in certain other circumstances. **Early-Stage Biotech (ES).** An investment rating and a target price are not assigned pursuant to Goldman Sachs policy when this company has neither a drug, treatment or medical device that has passed a Phase II clinical trial nor a license to distribute a post-Phase II drug, treatment or medical device. **Rating Suspended (RS).** Goldman Sachs Research has suspended the investment rating and price target for this stock, because there is not a sufficient fundamental basis for determining an investment rating or target price. The previous investment rating and target price, if any, are no longer in effect for this stock and should not be relied upon. **Coverage Suspended (CS).** Goldman Sachs has suspended coverage of this company. **Not Covered (NC).** Goldman Sachs does not cover this company.

Global product; distributing entities

Goldman Sachs Global Investment Research produces and distributes research products for clients of Goldman Sachs on a global basis. Analysts based in Goldman Sachs offices around the world produce research on industries and companies, and research on macroeconomics, currencies, commodities and portfolio strategy. This research is disseminated in Australia by Goldman Sachs Australia Pty Ltd (ABN 21 006 797 897); in Brazil by Goldman Sachs do Brasil Corretora de Títulos e Valores Mobiliários S.A.; Public Communication Channel Goldman Sachs Brazil: 0800 727 5764 and / or contatogoldmanbrasil@gs.com. Available Weekdays (except holidays), from 9am to 6pm. Canal de Comunicação com o Público Goldman Sachs Brasil: 0800 727 5764 e/ou contatogoldmanbrasil@gs.com. Horário de funcionamento: segunda-feira à sexta-feira (exceto feriados), das 9h às 18h; in Canada by Goldman Sachs & Co. LLC; in Hong Kong by Goldman Sachs (Asia) L.L.C.; in India by Goldman Sachs (India) Securities Private Ltd.; in Japan by Goldman Sachs Japan Co., Ltd.; in the Republic of Korea by Goldman Sachs (Asia) L.L.C., Seoul Branch; in New Zealand by Goldman Sachs New Zealand Limited; in Russia by OOO Goldman Sachs; in Singapore by Goldman Sachs (Singapore) Pte. (Company Number: 198602165W); and in the United States of America by Goldman Sachs & Co. LLC. Goldman Sachs International has approved this research in connection with its distribution in the United Kingdom.

Goldman Sachs International ("GSI"), authorised by the Prudential Regulation Authority ("PRA") and regulated by the Financial Conduct Authority ("FCA") and the PRA, has approved this research in connection with its distribution in the United Kingdom.

European Economic Area: Goldman Sachs Bank Europe SE ("GSBE") is a credit institution incorporated in Germany and, within the Single Supervisory Mechanism, subject to direct prudential supervision by the European Central Bank and in other respects supervised by German Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, BaFin) and Deutsche Bundesbank and disseminates research within the European Economic Area.

General disclosures

This research is for our clients only. Other than disclosures relating to Goldman Sachs, this research is based on current public information that we consider reliable, but we do not represent it is accurate or complete, and it should not be relied on as such. The information, opinions, estimates and forecasts contained herein are as of the date hereof and are subject to change without prior notification. We seek to update our research as appropriate, but various regulations may prevent us from doing so. Other than certain industry reports published on a periodic basis, the large majority of reports are published at irregular intervals as appropriate in the analyst's judgment.

Goldman Sachs conducts a global full-service, integrated investment banking, investment management, and brokerage business. We have investment banking and other business relationships with a substantial percentage of the companies covered by Global Investment Research. Goldman Sachs & Co. LLC, the United States broker dealer, is a member of SIPC (https://www.sipc.org).

Our salespeople, traders, and other professionals may provide oral or written market commentary or trading strategies to our clients and principal trading desks that reflect opinions that are contrary to the opinions expressed in this research. Our asset management area, principal trading desks and investing businesses may make investment decisions that are inconsistent with the recommendations or views expressed in this research.

The analysts named in this report may have from time to time discussed with our clients, including Goldman Sachs salespersons and traders, or may discuss in this report, trading strategies that reference catalysts or events that may have a near-term impact on the market price of the equity securities discussed in this report, which impact may be directionally counter to the analyst's published price target expectations for such stocks. Any such trading strategies are distinct from and do not affect the analyst's fundamental equity rating for such stocks, which rating reflects a stock's return potential relative to its coverage universe as described herein.

We and our affiliates, officers, directors, and employees will from time to time have long or short positions in, act as principal in, and buy or sell, the securities or derivatives, if any, referred to in this research, unless otherwise prohibited by regulation or Goldman Sachs policy.

The views attributed to third party presenters at Goldman Sachs arranged conferences, including individuals from other parts of Goldman Sachs, do not necessarily reflect those of Global Investment Research and are not an official view of Goldman Sachs.

Any third party referenced herein, including any salespeople, traders and other professionals or members of their household, may have positions in the products mentioned that are inconsistent with the views expressed by analysts named in this report.

This research is not an offer to sell or the solicitation of an offer to buy any security in any jurisdiction where such an offer or solicitation would be illegal. It does not constitute a personal recommendation or take into account the particular investment objectives, financial situations, or needs of individual clients. Clients should consider whether any advice or recommendation in this research is suitable for their particular circumstances and, if appropriate, seek professional advice, including tax advice. The price and value of investments referred to in this research and the income from them may fluctuate. Past performance is not a guide to future performance, future returns are not guaranteed, and a loss of original capital may occur. Fluctuations in exchange rates could have adverse effects on the value or price of, or income derived from, certain investments.

Certain transactions, including those involving futures, options, and other derivatives, give rise to substantial risk and are not suit
Investors should review current options and futures disclosure documents which are available from Goldman Sachs sales represe
https://www.theocc.com/about/publications/character-risks.jsp and https://www.goldmansachs.com/disclosures/cftc_fcm_dis
costs may be significant in option strategies calling for multiple purchase and sales of options such as spreads. Supporting docum
supplied upon request.

Differing Levels of Service provided by Global Investment Research: The level and types of services provided to you by Goldm
Investment Research may vary as compared to that provided to internal and other external clients of GS, depending on various fa
individual preferences as to the frequency and manner of receiving communication, your risk profile and investment focus and pe

marketwide, sector specific, long term, short term), the size and scope of your overall client relationship with GS, and legal and regulatory constraints. As an example, certain clients may request to receive notifications when research on specific securities is published, and certain clients may request that specific data underlying analysts' fundamental analysis available on our internal client websites be delivered to them electronically through data feeds or otherwise. No change to an analyst's fundamental research views (e.g., ratings, price targets, or material changes to earnings estimates for equity securities), will be communicated to any client prior to inclusion of such information in a research report broadly disseminated through electronic publication to our internal client websites or through other means, as necessary, to all clients who are entitled to receive such reports.

All research reports are disseminated and available to all clients simultaneously through electronic publication to our internal client websites. Not all research content is redistributed to our clients or available to third-party aggregators, nor is Goldman Sachs responsible for the redistribution of our research by third party aggregators. For research, models or other data related to one or more securities, markets or asset classes (including related services) that may be available to you, please contact your GS representative or go to https://research.gs.com.

Disclosure information is also available at https://www.gs.com/research/hedge.html or from Research Compliance, 200 West Street, New York, NY 10282.