BERNSTEIN
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US Biopharmaceuticals

US Biopharma: AI in Drug Discovery - separating the hype from the real goals & progress



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We write this note in response to recent claims that AI will cure all diseases (& soon). We spend time articulating the real goals (POS) and the bottlenecks to this extremely ambitious statement, while helping to provide an aggregated view of where progress is being made - deals & investments in large pharma, as well as the leading public AI biotech players.

Progress will be meaningfully constrained by knowledge, culture & pragmatic bottlenecks. Even if AI improves target identification and molecule design, innovation remains constrained by trade-offs between being AI-native, proprietary data moats & cultural constraints. Beyond this - disease biology, clinical trials, healthcare funding, and system-wide capacity limitations are less likely to be "solved" with the application of AI.

We concur that the biggest prize is better decisions, not just faster decisions. A modest improvement in pipeline probabilty of success creates substantially more economic value than comparable reductions in time or cost. The long-term value of AI is more likely to come from identifying more differentiated assets, going after the hardest scientific problems and avoiding failures than simply accelerating existing workflows.

AI's impact on probability of success will depend on the problems being pursued. If AI is primarily applied to well-understood diseases, success rates may initially inflate the perceived value of AI. Conversely, if AI expands the industry's ability to pursue poorly understood or previously intractable diseases, aggregate success rates may remain low even while value creation meaningfully increases.

More AI may require more wet-lab science, not less. The largest opportunities for innovation returns appear to lie in areas where biological understanding is incomplete and relevant training data are scarce. In our view, progress against these "harder problems" will likely require substantial investment in generating new experimental data. AI and wet-lab biology are likely to scale together rather than substitute for one another - one more wet-lab experiment is far cheaper than a late-stage failure.

Among pharma, Lilly, Roche (covered by Smith) and Amgen appear furthest advanced, albeit in different ways. Lilly has built the broadest external partnership network, Roche combines scale partnerships with substantial compute infrastructure, while Amgen's strategy is more internally focused around proprietary data, foundation models and deCODE genetics. Although we'd caution that this is an outside in view, with "quality" and integration internally hard to assess, until we begin to see more outputs than the operational speed comments to date.

AI is already producing a meaningful development pipeline. We identify roughly 70 active AI-originated programs (predominantly residing within the top AI-native biotechs), with most of the pivotal proofs of burden to come over the next 3-5y.

BERNSTEIN TICKER TABLE

Ticker	Rating	Cur	25 Aug 2026 Closing Price	Price Target	TTM Rel. Perf.	Adjusted EPS Cur	2025A	2026E	2027E	Adjusted P/E (x) 2025A	2026E	2027E
ABBV (AbbVie)	M	USD	265.79	230.00	8.3%	USD	9.98	14.22	16.02	26.6	18.7	16.6
AMGN (Amgen)	M	USD	442.24	345.00	33.5%	USD	21.85	22.59	23.16	20.2	19.6	19.1
BMY (Bristol-Myers Squibb)	M	USD	67.92	61.00	24.6%	USD	6.15	7.05	6.53	11.0	9.6	10.4
LLY (Eli Lilly)	O	USD	1,233.66	1,385.00	48.4%	USD	24.20	36.64	48.92	51.0	33.7	25.2
GILD (Gilead)	O	USD	148.77	160.00	10.4%	USD	8.15	(0.56)	10.04	18.3	(267.1)	14.8
MRK (Merck)	M	USD	156.45	105.00	64.9%	USD	8.97	2.75	9.11	17.4	57.0	17.2
MRNA (Moderna)	M	USD	158.83	45.00	523.0%	USD	(7.27)	(8.33)	(3.97)	(21.8)	(19.1)	(40.0)
PFE (Pfizer)	M	USD	28.57	29.00	(4.6)%	USD	3.23	2.99	2.83	8.9	9.6	10.1
SPX			7,677.28									

O - Outperform, M - Market-Perform, U - Underperform, NR - Not Rated, CS - Coverage Suspended

Source: Bloomberg, Bernstein estimates and analysis.

INVESTMENT IMPLICATIONS

We rate LLY, GILD Outperform, we rate BMY, PFE, MRK, ABBV, AMGN, MRNA Market-Perform

DETAILS

THE HYPE

We are hearing increasingly bullish statements from AI-first technology companies about the potential for AI to transform drug discovery and ultimately help address a broad range of diseases (Exhibit 1). Beyond enthusiasm for the technology itself, the prominence of this "cure" narrative may also reflect its appeal as a broadly positive and socially beneficial vision for AI, particularly at a time when the technology is also prompting concerns around workforce disruption and other societal impacts.

Whatever the motivation behind these claims, large pharmaceutical companies are not ceding the conversation to technology firms. While pharma's commentary remains characteristically more measured, mentions of AI continue to rise on earnings calls, reaching a record 29 mentions across our coverage universe in Q2 (Exhibit 2, Exhibit 3).

However, comments from pharma CEOs and management teams remain focused on concrete operational and R&D metrics rather than the more expansive ambitions articulated by technology companies. Selected examples include:

> From Amgen (Q1 26): "..*Antibody lead optimization has accelerated by 50% from contributions both to lead discovery and lead optimization...*" "..*we have designed and implemented a proprietary site selection model that improves clinical trial enrollment... up to three fold improvement in enrollment rates*" "...*production line clearance time at one of our manufacturing sites from 30minutes to 2minutes per batch run*"
>
> From Pfizer (Annual reports): "...*supercomputing, AI and virtual in silico screening accelerate our scientfic research by reducing computational times by 80-90%*" "... *our digital operations center and AI powered manufacturing processes are increasing throughput by 20 percent*"
>
> From Bristol (Q1 '26): "...*we've set a target to reach lead molecule identification approximately 50% faster while applying greater rigor so that only the most differentiated molecules advance*" "*in late development we are using AI to compress timelines & enhance quality oversight.... over time, we expect these efforts to deliver a 30% reduction in cycle times versus just a few years ago*"

EXHIBIT 1: **There are big claims on curing disease coming from the AI players**

"I think one day **maybe we can cure all disease** with the help of AI.... maybe **within the next decade or so**, I don't see why not"

Demis Hassabis
(CEO Google DeepMind & Isomorphic, 2025)

"I think it **will actually be possible to cure most human disease in 5-10 years**, as crazy as it may sound to ordinary people and frankly to biologists as well (I used to be one!)"

Dario Amodei
(CEO of Anthropic, 2026)

Source: Commentary from AI leaders - X

EXHIBIT 2: **Ai is getting increasing airtime during our coverages' earnings calls**

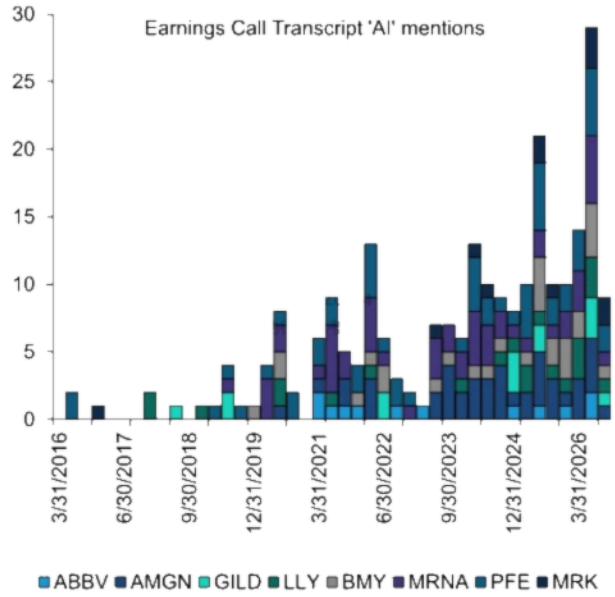


EXHIBIT 3: **Who talks the talk on AI? 'AI' mentions on company transcripts**

Quarter	ABBV	AMGN	GILD	LLY	BMY	MRNA	PFE	MRK	Total
Q1 2021	2	1	0	0	0	1	2	0	6
Q2 2021	1	0	0	1	0	5	2	0	9
Q3 2021	1	2	0	0	0	2	0	0	5
Q4 2021	1	0	0	0	1	0	2	0	4
Q1 2022	0	3	0	1	1	4	4	0	13
Q2 2022	0	0	2	0	2	1	1	0	6
Q3 2022	1	0	0	0	0	0	2	0	3
Q4 2022	0	0	0	0	0	1	1	0	2
Q1 2023	1	0	0	0	0	0	0	0	1
Q2 2023	0	2	0	0	1	3	0	1	7
Q3 2023	0	4	0	0	1	2	0	0	7
Q4 2023	0	2	0	1	0	2	1	0	6
Q1 2024	0	3	0	0	1	4	4	1	13
Q2 2024	0	3	0	0	1	3	2	1	10
Q3 2024	0	4						0	9
Q4 2024	1	1	3	1	0	1	1	0	8
Q1 2025	0	2	0	2	1	1	4	0	10
Q2 2025	1	4	2	1	4	2	5	2	21
Q3 2025	0	3	0	1	2	1	2	1	10
Q4 2025	1	1	0	1	3	2	2	0	10
Q1 2026	0	3	0	3	2	3	3	0	14
Q2 2026	2	4	3	3	4	5	5	3	29
Q3 2026	0	1	1	1	1	1	2	2	9
Company Totals	**12**	**44**	**14**	**22**	**29**	**52**	**56**	**12**	**241**

Source: AlphaSense, Bernstein analysis

Source: AlphaSense, Bernstein analysis

EXHIBIT 4: **Lilly & Amgen were the first to appoint a dedicated CAIO**

Ticker	Company	Dedicated CAIO?	Executive	Title	CAIO appointment
LLY	Eli Lilly	Yes	Thomas J. Fuchs	**Chief AI Officer**	Oct-24
PFE	Pfizer	Yes	Jeremy Forman	**Chief AI, Data & Analytics Officer**	Jan-26
MRK	Merck & Co.	Yes	Bart Gourley	**Chief AI Officer**	Aug-26
AMGN	Amgen	Yes/No	James Bradner	**EVP, R&D, AI and Data**	Apr-26
BMY	Bristol Myers Squibb	No	Greg Meyers	EVP, Chief Digital & Technology Officer	n/a
ABBV	AbbVie	No	Sarah H. Nam	VP, AI Strategy and Partnerships	n/a
GILD	Gilead Sciences	No	Nghi Ho	Head of Data & AI Platform	n/a
MRNA	Moderna	No	Tracey Franklin	Chief People & Digital Technology Officer	n/a

BMS Chief Digital & Technology officer Greg Meyers, likely has oversight over AI, but currently not a dedicated 'CAIO'. Similarly AMGN EVP, R&D - Jay Bradner - also wears the AI hat. David Reese previously held EVP of AI from 2023 (after R&D) until his retirement this year.
Source: Bernstein analysis

THE CHALLENGES

While the narrative emerging from frontier AI companies increasingly centers on the possibility of "curing all diseases," the path from computational advances to widespread patient impact remains constrained by a series of bottlenecks that extend well beyond model performance. As shown in Exhibit 5, challenges exist at every stage of the biopharmaceutical innovation process, from understanding disease biology and designing interventions through to generating clinical evidence and ultimately delivering treatments to patients. AI may materially improve individual steps of subsets of each challenge within this chain, but solving one bottleneck does not eliminate the others.

The earliest constraint remains our limited understanding of human biology. Despite significant scientific progress, much of the proteome remains only partially characterized, the majority of diseases still lack approved disease-modifying therapies, and many conditions do not have robust laboratory models (despite continued innovation). Disease biology is also inherently complex, often involving multiple organ systems, environmental influences, aging, and interacting molecular pathways. AI may help identify patterns within these vast datasets, but the quality of insights remains bounded by the quality and completeness of the underlying biological knowledge base & the complexity of how this shows-up within the whole-body .

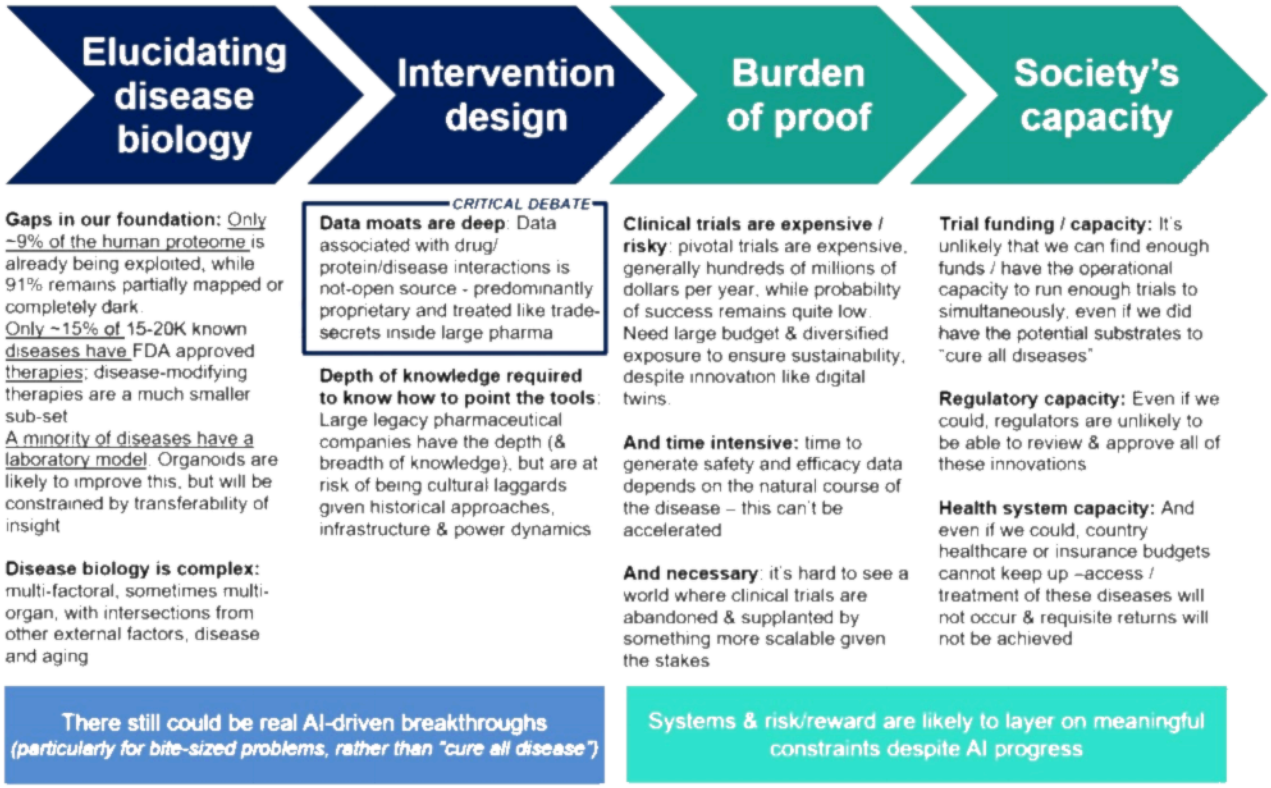
Even where biological understanding exists, translating insights into viable therapeutic interventions requires specialized expertise, proprietary datasets, and decades of accumulated institutional knowledge. Drug discovery data are among the most closely guarded assets within the pharmaceutical industry, creating significant data moats that may not be easily replicated by technology companies alone. As a reminder, while LLM have become ubiquitous, this can be partially attributed to the plethora of training language available from the internet, no such open-source data source exists for equivalent discovery data. Knowing where to apply AI tools effectively often requires deep domain expertise in chemistry, biology, translational medicine, clinical development, and regulatory science (asking the right questions / areas to apply the AI, is more than half of the battle). In our view, this argues for continued collaboration between AI innovators and established pharmaceutical companies, rather than any disruption of the incumbent players, but the incumbent players need to be careful of the risk of becoming cultural laggards. For AI-native biotechs, they are built in an image distinct from this laggard risk & may counterbalance the breadth & depth of the large-pharma, by zooming into unique zones of specialization.

Perhaps the most important constraint is that biology ultimately needs to be tested in humans. Clinical trials remain expensive, time consuming, and inherently risky, with safety and efficacy data requiring observation over real-world biological time as a disease progresses. While AI may improve trial design, site selection, patient identification, and operational efficiency, it cannot compress the natural history of disease progression or eliminate the need for evidentiary standards required by regulators, physicians, and patients. As a result, the burden of proof is likely to remain a major gating factor for therapeutic innovation regardless of advances in AI.

Finally, even if AI dramatically increases the number of viable drug candidates entering development, healthcare systems are unlikely to have unlimited capacity to absorb them. Funding constraints, clinical trial infrastructure, regulatory review resources, manufacturing capacity, healthcare workforce limitations, and payer budgets all represent practical constraints on how quickly innovation can translate into population-level benefit.

While we remain optimistic that AI can drive meaningful breakthroughs, particularly in targeted and well-defined problems, we believe the broader healthcare ecosystem will continue to layer on important constraints that make the vision of rapidly "curing all diseases" substantially more challenging than current AI rhetoric may imply.

EXHIBIT 5: **Bottlenecks on the path to commercialization are likely to limit progress against the goals of "curing all disease"**



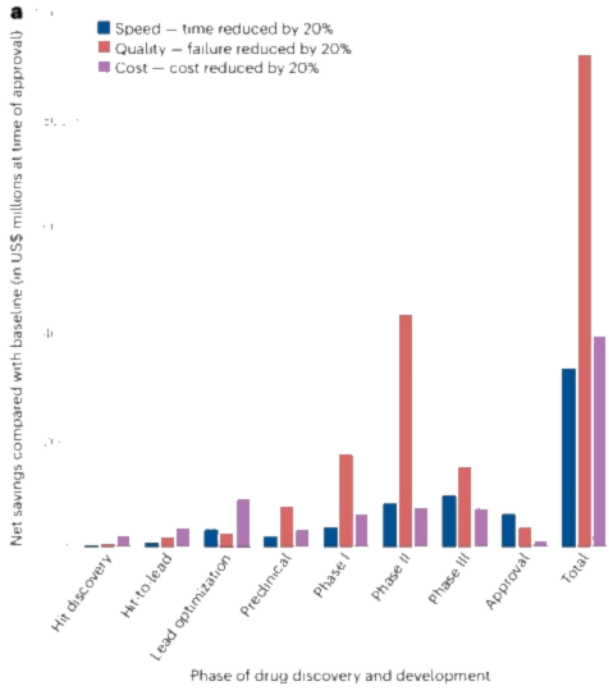
Source: Scientific literature, Bernstein analysis

THE POTENTIAL

While many of the KPIs are ambitions refer to speed goals, the economic case for AI in drug development may be less about making the existing system run faster and more about improving decision quality. As the mathematical calculation of the thought experiment in Exhibit 6 illustrates, a 20% improvement in quality, measured as a reduction in development failures (or higher POS), creates far more value than comparable gains in speed or cost, concentrated in late development. Given the industry's inherently low success rates, avoiding bad projects and identifying better ones is often worth more than simply accelerating timelines.

That said, translating AI advances into a single estimate of development savings may prove difficult. The impact on probability of success is likely to vary significantly depending on the underlying problem being addressed (Exhibit 7). As with the application of a new modality, initial AI discovery achievements are most likely evident in established disease areas through better molecule design and development optimization (i.e. derisk the challenge with known-biology), but we expect the larger opportunity will come from AI enabling companies to pursue new interventions where biology remains poorly understood and traditional approaches have struggled (the intractable & undruggable). While these programs may continue to exhibit lower success rates, they also carry the greatest potential value creation, perhaps masking the impact of AI when assessing aggregate changes to POS in the industry. We are proponents of the idea that more AI-supported drug discovery and development will involve more wet-lab research, given the importance of generating data that is largely absent for these hardest problems.

EXHIBIT 6: **Improvements against probability of success are likely to lead to the largest improvements in R&D returns**



Source: Scientific literature - Bender et al, Nature, Aug '26

EXHIBIT 7: **Impact of AI on clinical POS is highly dependent on the mix of problems that AI drugs are trying to solve - it will be hard to simply quantify the "savings"**

HARDEST PROBLEMS	Currently poorly understood with no symptomatic or disease modifying interventions identified	AI may enable us to "crack" problems that were previously impossible	POS may be lower than current averages, but commercial opportunity remains high (& if specialized knowledge / data / models are required), then competition diversifies across different "hard innovation problems"
	Somewhere in between. E.g., new target or modality for well-understood biology	AI may enable faster development / cleaner optimization of the new modality or target	POS is medium, commercial opportunity may be limited by competition
EASIEST PROBLEMS	Well established disease, with drug approved for same mechanism of action	AI may enable design of a me-better (E.g., cleaner TI, longer dosing interval)	POS is high, commercial opportunity tends to be lower, but will vary

Source: Bernstein analysis

HOW IS AI BEING DEPLOYED IN DRUG DISCOVERY/DEVELOPMENT?

While there is real value to come from applying AI to support efficiencies in operations across pharmaceutical companies, we don't think investors will change their thesis on the pharma industry or an individual company on account of those cost savings. Answer-changing value can come from improving innovation & the potential for future revenues, thus we focus on drug discovery and development.

Drug discovery is known for being long and expensive. Industry studies estimate that the clinical development time for a typical innovative drug is roughly 10 years and the all-in cost (including failures) runs to more than $2B per approved drug. In recent years, with the emergence of foundational models like AlphaFold and a broader wave of generative and agentic AI tools, AI has been showing promise in drug discovery and development.

A PRIMER – DRUG DISCOVERY PROCESS AND WHERE AI PLAYS

Drug discovery and development conventionally splits into four phases: Discovery (target identification, hit identification, lead optimization), Preclinical (in vitro/in vivo testing, ADMET, PK/PD, animal models), Clinical (Phase 1–3), and Approval (NDA/BLA, FDA review, labeling). Total elapsed time from target hypothesis to commercial launch is typically 10–15 years; total cost-per-approved-drug including failures runs ~$2–3B. AI has been deployed across all four phases, but the depth of penetration and the strength of evidence is uneven across the chain.

EXHIBIT 8: **The drug development pipeline and areas of AI intervention**

R&D stage	Target identification	Hit discovery	Lead optimization	Preclinical development	Clinical development	Approval & post-market
Core question	*What biology should we target?*	*What binds or modulates it?*	*Can it become a drug?*	*Will it work safely/effectively in vivo?*	*Right drug, dose and patient?*	*How does it perform in practice?*
Main tasks	Disease biology Target discovery Target validation Biomarker hypothesis	Hit finding Virtual screening Binding / activity confirmation Novel scaffold search	Potency and selectivity ADME / PK optimization Safety risk reduction Candidate nomination	In vivo efficacy DMPK and toxicology Dose / exposure translation CMC and formulation	Trial design and recruitment Dose selection Patient stratification Safety and efficacy assessment	Regulatory review Launch evidence Pharmacovigilance Real-world effectiveness
AI-enabled applications	• Multi-omics and literature mining • Genetics / causal inference • Knowledge graphs • Cell-image and phenotypic analysis • Disease endotyping • Target and biomarker prioritization	• Protein structure and pocket prediction • Ultra-large virtual screening • Ligand–target interaction prediction • Active learning for hit selection • Generative hit design • Drug repurposing	• QSAR / QSPR property prediction • Multiparameter optimization • Generative molecular design • Off-target and toxicity prediction • Retrosynthesis / route planning • Automated Design–Make–Test–Learn	• ADME / PK and human exposure prediction • Safety and toxicology risk ranking • Digital pathology and omics analysis • Translational biomarker discovery • Formulation / process optimization • Preclinical-to-clinical translation	• Biomarker-led patient selection • Protocol and cohort design • Site and patient recruitment • Trial monitoring and data quality • Outcome / success prediction • LLM-enabled document workflows	• Adverse-event signal detection • Real-world evidence analysis • Benefit–risk assessment • Underdiagnosed patient finding • Label-expansion evidence • Medical / regulatory automation
Current maturity	EMERGING Target identification is high-value but biology is conditional and causal validation is difficult	ESTABLISHED Virtual screening and hit prioritization are routinely used, with prospective examples	ESTABLISHED Property prediction and AI-assisted design are embedded in many medicinal chemistry workflows	DEVELOPING Useful for risk ranking and translation, but human predictivity remains a major constraint	DEVELOPING Trial operations and stratification are active areas; robust evidence of improved success is limited	ESTABLISHED Safety surveillance, document processing and real-world analytics are increasingly operational.

Key takeaway: AI is best understood today as a decision-support and automation layer around scientists, not a standalone end-to-end drug discovery engine.

Source: Bender et al., Nature Reviews Drug Discovery (2026); Pitt et al., Journal of Medicinal Chemistry (2025); Bernstein analysis. Illustrative and non-exhaustive.

Discovery — where AI's measurable footprint is concentrated

Companies including Insilico Medicine, Recursion, Verge Genomics, and BenevolentAI use multi-modal AI platforms (omics, knowledge graphs, phenotypic imaging) to nominate disease-causal targets. Insilico's PandaOmics platform was used to identify TNIK as a target for idiopathic pulmonary fibrosis, a target that had been historically pursued in oncology but not previously prosecuted in fibrosis. This mechanism produced Rentosertib (INS018-055) which successfully advanced to Phase 3. Hit identification and lead optimization is the most mature application: physics-based methods such as Schrödinger's FEP + (free energy perturbation) and generative chemistry tools have been in production deployment at multiple covered pharma names for several years. Pfizer disclosed in 2021 that virtual screening enabled a 5–10× acceleration in computational chemistry on the Paxlovid program, reducing overall computational time by 80–90% and helping fast-track development. Similar AI-assisted screening underpins Schrödinger's MALT1 (SGR-1505) and Wee1 (SGR-3515) programs, and Iambic's IAM1363 HER2 inhibitor.

Preclinical — AI may compresses preclinical process timelines, but whether AI-supported preclinical work produces molecules with better clinical-stage outcomes remains unproven.

In silico ADMET prediction may be the most mature preclinical AI application. Players include Schrödinger (LiveDesign with built-in ADMET predictors), Simulations Plus (GastroPlus PBPK; ADMET Predictor), Iambic (NeuralPLexer3), and internal ML models at most major pharma — routinely scoring molecules pre-synthesis for CYP-450 metabolism, hERG cardiotoxicity, solubility, and oral bioavailability. Published benchmarks for ML-based ADMET reach ~80–85% accuracy on common endpoints.

The structural shift is the FDA's New Approach Methods (NAMs) trajectory. The FDA Modernization Act 2.0 (Dec 2022) removed the legal requirement for animal testing prior to IND, and the FDA's April 2025 roadmap explicitly seeks to phase out animal testing for monoclonal antibodies in favor of AI-based toxicity prediction, organ-chips, and organoid models. Monoclonal antibodies are the leading edge — their high target-specificity makes them well-suited to human-cell-based testing, and Lilly and Roche are among the named pharma adopters of organ-chip and AI-augmented non-animal methods for mAb preclinical work.

Clinical and Approval — research productivity impact is hard to quantify, but positive signals in trial/approval submission efficiency

In the clinical development phases (Phase 1–3), AI is showing up in adaptive dose-finding algorithms, AI-driven patient stratification (notably oncology biomarker discovery — AZ × BostonGene, BMY × Tempus), continuous safety monitoring, NLP for EHR eligibility screening, and dropout prediction. Amgen disclosed in Q1 2026 that their proprietary site selection model improved clinical trial enrollment up to threefold. BMS adopted Faro's AI-enabled digital protocol platform in March 2026 to automate trial protocol drafting. At the Approval stage, LLM-assisted regulatory writing, automated CMC & labeling cross-checks, and real-world evidence pipelines has the potential to be deployed across all major regulatory affairs functions.

FRONTIER AI PLAYERS MOVING INTO DRUG DISCOVERY

Frontier AI players (OpenAI, Anthropic, Alphabet) are moving into drug discovery in different ways. The key strategic divide is whether the company ultimately remains an enabling layer for drug developers or begins to capture drug economics directly. OpenAI mainly provides AI tools to pharma and biotech companies; Alphabet has gone further by building Isomorphic Labs, a dedicated AI-drug discovery company; Anthropic is between the two and has recently started testing its own drug programs since acquiring Coefficient Bio (Exhibit 9).

OpenAI is focused on enabling drug developers. GPT-Rosalind is a life science reasoning model designed to help scientists with tasks such as reviewing biological evidence, analyzing data, generating hypotheses, and planning experiments. OpenAI works with companies including Amgen, Novo Nordisk (covered by Smith), and Moderna, but doesn't have its own drug pipeline.

Anthropic is beginning to do some drug discovery itself. In Apr 2026, it acquired Coefficient Bio, a small AI biotech company in drug discovery and biological research, for a reported $400M in stock (Fierce Biotech link). In Jun 2026, Anthropic announced it would begin running a small number of early-stage drug programs, partly to gain first-hand experience applying Claude in real drug discovery work (STAT link). It has not yet disclosed a drug pipeline or an AI drug discovery product yet, but has signalled it intends to prioritize neglected diseases where biology is well understood, yet the commercial opportunity is limited.

Alphabet has made the largest direct move into drug development. Alphabet created Isomorphic Labs in 2021 following DeepMind's AlphaFold work. Isomorphic is a separate drug discovery company that uses AI to design medicines with its drug design engine IsoDDE. Isomorphic has partnerships with Lilly, Novartis (covered by Smith) and JNJ (covered by Lee Hambright). Isomorphic raised $2.1B in May 2026 to scale its platform and advance its pipeline toward the clinic (Company PR).

The frontier AI product landscape shows a similar pattern (Exhibit 10): **OpenAI and Anthropic mainly offer AI tools that help scientists to conduct research**, through GPT-Rosalind and Claude Science. **Alphabet has the broadest product stack**, spanning AI as scientist (Gemini for Science), AI as scientific instrument (AlphaFold, AlphaGenome, TxGemma), and AI as drug discoverer (IsoDDE).

From both business model and capability perspectives, Alphabet is the most advanced example today of a frontier AI company moving beyond enabling biopharma toward participating directly in drug creation, and Anthropic is an emerging hybrid.

EXHIBIT 9: **How frontier AI labs are entering drug discovery: OpenAI enables drug developers; Alphabet builds an AI-native drug company (Isomorphic Labs); Anthropic is in betweeen and starting to own drug programs**

Frontier AI lab	OpenAI	Anthropic	Alphabet
Core model	GPT	Claude	Gemini
Dedicated drug development company	No	No	Isomorphic Labs (Alphabet subsidiary)
Does drug discovery?	Yes (Through research collaborations)	Yes (Starting to own drug programs, announced on 06/30/2026)	Yes (extensively via Isomorphic)
Owns drug pipeline?	No	Yes (Starting to)	Yes
Intent to become drug developer?	Not currently	Possibly (Announced plans to run drug programs)	Yes
Dedicated drug design engine	No	No	IsoDDE
Relevant biotech acquisition		Coefficient Bio ($400M, Apr 2026): AI in drug discovery and biological research	
Major pharma/biotech relationships	Amgen, Novo Nordisk, Moderna, Retro, Ginkgo	BMS, Sanofi, Genmab	Lilly, Novartis, J&J (all via Isomorphic)
Monetization today	AI models	AI models	AI models + Isomorphic discovery partnerships/ milestones/ royalties
Strategic direction	Enable drug developers	Enable drug developers; **selectively enter drug discovery**	Enable drug developers; **build an AI-native drug company**

Source: Company websites, Anthropic announcing entering drug discovery (cnbc link), Anthropic announcing entering drug discover (STAT link), Bernstein analysis

EXHIBIT 10: **Frontier AI products relevant to drug discovery: Alphabet has the most comprehensive product suite, covering product categories of AI for scientist, AI as scientific instrument, and AI as drug discoverer**

Product category		OpenAI	ANTHROPIC	Alphabet (DeepMind + Isomorphic Labs)		
AI for scientist (Help the scientist to reason, analyze, and hypothesize)	**Product**	**GPT-Rosalind**	**Claude Science**	**Gemini for Science**		
	What it is	Life science reasoning model	AI scientific workbench	Science reasoning model		
AI as scientific instrument (Answer specific technical questions)	**Product**			**AlphaFold**	**AlphaGenome**	**TxGemma**
	What it is			Biomolecular structure and interaction model	Genomic-function prediction model	Prediction model of therapeutics' properties
AI as drug discoverer (Actually design the drug)	**Product**			**IsoDDE**		
	What it is			AI drug design engine		

Source: Company websites, Bernstein analysis

HOW ARE PHARMA PARTNERING & INVESTING IN THIS TECHNOLOGY & THEIR MOATS?

The key question is no longer whether large pharma is using AI in drug discovery, but **how each company is assembling the required capabilities**. Across the 15 companies in our analysis, we identify 183 drug-discovery partnerships, but the strategies differ materially: Lilly and Roche appear to have built the broadest external portfolios; Novo Nordisk and Sanofi are concentrating activity in their core therapeutic areas; and Amgen and Moderna appear to place greater weight on internal models and infrastructure. Compute is also emerging as a point of differentiation, although competing claims to the industry's "largest" or "most powerful" system are difficult to compare given differences in ownership, architecture and scope. Definitions and as a result headline economics on the partnerships are noisy. Upfront and potential deal values are often dominated by acquisitions, asset licensing or clinical-stage transactions in which AI capability is bundled into broader consideration. For example Lilly's $3.2bn Morphic acquisition - MORF-057 was developed using Schrodinger's platform, which is physics-based not pure-AI/ML -, AstraZeneca's CSPC agreements and Roche's $700m Nurix transaction. We therefore

view **deal count, therapeutic focus and the balance between external partnerships, internal models and compute infrastructure** as more useful indicators of strategy than aggregate "biobucks." On that basis, the sector is not converging on a single model: companies are pursuing distinct combinations of techbio partnerships, frontier-model access and proprietary infrastructure, with several notable gaps even among the largest players.

ELI LILLY (LLY): 25 DEALS, 2019–2026

Lilly has the broadest external discovery portfolio in the group and is the only company with more than 20 qualifying deals that we can identify. Its strategy spans both platform-level access and individual discovery programs. Major relationships include **Insilico Medicine**, with $115m upfront and up to $2.75bn across three agreements since 2023; **Profluent**, with up to $2.25bn for site-specific recombinases; and **Repertoire Immune Medicines**, with $85m upfront and up to $1.84bn. Other counterparties include Superluminal, Nimbus through two agreements, Creyon Bio, Verge Genomics, Genesis Therapeutics, Atomwise, Schrödinger, XtalPi and Ailux, Chai Discovery, insitro through two agreements, Absci and BigHat. Reported upfront consideration totals $3.56B, but $3.2B reflects the Morphic acquisition. Excluding Morphic, **Lilly has disclosed $353m of upfront consideration across its other 24 deals**. Fourteen of the 25 partnerships have no specified therapeutic area; cardiometabolic disease is the largest disclosed concentration, with four. Beyond techbio partnerships, Lilly has relationships with **OpenAI and Isomorphic Labs** and **operates LillyPod alongside an NVIDIA-based Co-Innovation AI Lab** to develop . Overall, Lilly combines the sector's broadest external partnership book with one of the most substantial disclosed internal compute investments.

ROCHE (ROG): 20 DEALS, 2017–2026

Roche (covered by Smith) **has the second-largest partnership portfolio and one of the clearest therapeutic concentrations.** Eight of its 20 deals are in oncology and four are in neuroscience, while only three have no disclosed therapeutic area. The largest discovery relationship is **Recursion Pharmaceuticals**, with $150m upfront and up to $12bn. Other meaningful partnerships include Orionis Biosciences for molecular glues ($105m upfront and up to $2bn), Manifold Bio for blood-brain-barrier shuttles ($55m and up to $2bn), Caris Life Sciences ($25m and up to $1.13bn), two Dyno Therapeutics AAV capsid-design agreements, and Repertoire Immune Medicines ($35m and up to $765m). Roche reports $1,906m of upfront consideration, but **$1.45bn comes from two transactions that are not discovery-stage collaborations**: the $700m Nurix clinical co-development agreement and the $750m PathAI digital-pathology transaction. Roche also has the largest disclosed on-premises GPU deployment in our dataset. Its 2023 Genentech "lab-in-the-loop" collaboration was expanded in March 2026 into a hybrid AI factory that Roche describes as the industry's largest announced. Anthropic provides an additional relationship at the enterprise-model and research-workflow layer.

ASTRAZENECA (AZN): 19 DEALS, 2019–2026

AstraZeneca (covered by Smith) **has a broad but economically concentrated external portfolio.** Six of its 19 deals are in oncology and four are in cardiometabolic and renal disease. Three agreements with **CSPC Pharmaceutical Group** account for $1,340m of AstraZeneca's $1,397m disclosed upfront consideration and $25.6bn of its $27.4bn aggregate potential value. These transactions predominantly involve asset rights, with CSPC's AI molecular-design capability included but not separately valued. Excluding CSPC, disclosed economics are relatively modest. Named transactions include Verge Genomics ($42m upfront and up to $840m), Algen Biotechnologies (up to $555m), Absci (up to $247m) and Tempus AI with Pathos AI (up to $200m). Additional platform relationships with undisclosed economics include Nabla Bio, SandboxAQ, Turbine.ai, Schrödinger, Modella AI, Immunai, BenevolentAI and DeepMatter. AstraZeneca has the broadest compute footprint by number of disclosed initiatives, including Cambridge-1, the Swedish AI Factory consortium and its IonQ quantum collaboration. It also has an enterprise relationship with Anthropic.

SANOFI (SAN): 17 DEALS, 2019–2026

Sanofi (covered by Smith) **is differentiated by an immunology-led portfolio, in contrast with the oncology weighting seen across many peers.** Six of its 17 deals are in immunology and inflammation, compared with three in oncology. Targeted protein degradation is a central theme. Key partnerships include Nurix ($55m upfront and up to $2.5bn), Kymera ($150m and up to $2.15bn) and VantAI, inherited through Blueprint Medicines, with up to $1.67bn. Sanofi also has a major Exscientia collaboration, now part of Recursion, with $100m upfront and up to $5.2bn; three Earendil Labs agreements, including upfront payments of $160m and $125m; and relationships with Insilico, BioMap, Atomwise, Aqemia, LabGenius, Enveda and Owkin. Total disclosed upfront consideration is $842m. The portfolio has produced a named clinical asset: **SAR448272 / NX-3911**, an oral STAT6 degrader originating from Nurix's DEL-AI platform. Phase 1 initiation triggered a $10m milestone in August 2026. Sanofi has relationships with OpenAI and Formation Bio, Anthropic, and Baidu's LinearDesign for mRNA sequence design.

However, it has no dedicated compute or chipmaker relationship in our dataset.

BRISTOL MYERS SQUIBB (BMY): 17 DEALS, 2016–2026

Bristol combines a long-running, oncology-weighted partnership portfolio with substantial owned compute infrastructure. Seven of its 17 deals are in oncology, and the portfolio dates back to 2016. Disclosed upfront consideration is $280m against an aggregate potential value of $10.8bn. The economics are concentrated in Evotec ($200m upfront and up to $5bn) and Schrödinger ($55m and up to $2.7bn). Other significant partnerships include insitro, with up to $2bn; VantAI, with up to $674m; and AI Proteins, with up to $400m. Undisclosed platform relationships include Chai Discovery, Terray, CHARM Therapeutics, BigHat, Nabla Bio, Menten AI, Immatics, PsychoGenics and Oxford BioTherapeutics. BMS is one of two companies in the dataset with an AI-linked molecule dosed in the clinic. **BMS-986506**, a CELMoD agent for advanced clear cell renal cell carcinoma, entered Phase 1 in March 2026 and triggered a $10m milestone to Evotec. BMS owns a DGX SuperPOD and has announced a second cluster comprising eight DGX Vera Rubin NVL72 systems for January 2027. Anthropic supplies its enterprise-model layer.

JOHNSON & JOHNSON (JNJ): 14 DEALS, 2016–2026

J&J (covered by Hambright) **has a broad portfolio but unusually limited economic disclosure.** Its entire $785m of disclosed upfront consideration comes from a single 2026 agreement with Sail Biomedicines, which has an aggregate potential value of $3.37bn and focuses on AI-enabled in vivo CAR-T design. The other 13 partnerships have little disclosed economics. Counterparties include XtalPi and Ailux Biologics, Odyssey Therapeutics, Insilico, Iktos, BigHat, Cradle Bio, VantAI, nference, Intelligent OMICS, BenevolentAI and A2i, the Atomwise and FutuRx joint venture. Seven of J&J's 14 deals have no disclosed therapeutic area. Oncology accounts for three, while neuroscience and immunology account for two each. J&J also has a foundation-model relationship with Isomorphic Labs. Its two NVIDIA partnerships are focused on **MedTech rather than drug discovery**, including connected operating-room infrastructure and surgical-robotics simulation.

PFIZER (PFE): 14 DEALS, 2016–2026

Pfizer has the most platform-oriented portfolio in the group. Nine of its 14 collaborations are portfolio-wide rather than tied to a single disease area; only two are specifically focused on oncology. Disclosed upfront consideration totals $137m against a $5.4bn aggregate potential value. The principal transactions are Nurix ($60m upfront and up to $3.4bn), Cartography Biosciences ($65m and up to $850m) and PostEra ($12m and up to $610m). Other disclosed potential values include Ginkgo Bioworks at $331m, CytoReason at $110m and AbCellera at $90m. More recent additions are primarily at the tooling layer, including Chai Discovery, Boltz, Chemical.AI for retrosynthesis, Iktos and Gordian Biotechnology for target discovery. Pfizer's foundation-model record is older than peers', consisting of two IBM Watson collaborations dating from 2016. We identify no dedicated compute or chipmaker relationship.

GSK (GSK): 13 DEALS, 2017–2026

GSK's (covered by Smith) **partnership count is meaningful, but disclosed economics provide only a partial view of the portfolio.** Reported upfront consideration totals $210m and disclosed aggregate potential value is approximately $0.8bn, the lowest stated ceiling among companies with double-digit deal counts. This primarily reflects limited disclosure rather than evidence that the underlying partnerships are smaller. Named economics include Vesalius Therapeutics ($80m upfront and up to $650m), Noetik ($50m), Relation Therapeutics ($45m), Muna Therapeutics ($35.2m), Elsie Biotechnologies ($50m) and Ochre Bio ($37.5m). The portfolio is relatively diversified by therapeutic area, including three oncology, two respiratory and two neuroscience agreements. GSK also participates in the Atlas Consortium for protein and antibody engineering and has a framework agreement with Flagship Pioneering. On compute, GSK was a founding partner of Cambridge-1 and acquired a Cerebras CS-1 in late 2020, subsequently publishing epigenomic language-model work using CS-1 and CS-2. **GSK has no disclosed frontier-model or AI-lab relationship**, making it the only company with a double-digit discovery portfolio but no such partnership.

ABBVIE (ABBV): 10 DEALS, 2018–2026

AbbVie has a relatively compact portfolio with unusually well-distributed disclosed economics. Its ten deals include $347m of upfront consideration, with no single transaction dominating the total. The largest upfront is Nimble Therapeutics at $210m, with up to $288m in total potential value. Other major partnerships include Gilgamesh Pharmaceuticals ($65m upfront and up to $1.2bn), Anima Biotech ($42m and up to $582m), BigHat ($30m and up to $325m) and Neomorph, with up to $1.64bn for molecular-glue degraders. Therapeutic exposure is relatively balanced, with three oncology, two neuroscience and two immunology deals. Only two partnerships have no disclosed therapeutic area. Recent additions include antibody-platform relationships with Alloy Therapeutics and Etcembly through DJS Antibodies, as well as participation in the Apheris / OpenFold3

protein-structure consortium. AbbVie has an Anthropic relationship and operates Cerebras CS-2 hardware deployed in 2022, alongside earlier Intel Xeon optimisation work.

NOVO NORDISK (NOVO): 10 DEALS, 2022–2026

Novo (covered by Smith) **has the youngest and most therapeutically concentrated partnership portfolio in the group.** No qualifying deal predates 2022, and seven of its ten relationships are in cardiometabolic and renal disease. Two are in rare and genetic disease and one is in neuroscience. Every Novo partnership has a stated therapeutic area, a level of disclosure matched only by Moderna, which has a much smaller portfolio. Economics are led by Septerna ($195m upfront and up to $2.2bn) and Valo Health ($60m and up to $4.6bn). Other potential values include Vivtex at $2.1bn, Life Edit Therapeutics at $1.92bn, Deep Apple at $812m, NanoVation at $600m, Cellarity at $532m and Gensaic at $354m. Total disclosed upfront consideration is $255m. Novo has relationships with both OpenAI and Anthropic. Claude provides the model layer behind NovoScribe. Novo accesses the Gefion supercomputer through a Novo Nordisk Foundation-operated facility, making the company a customer rather than the infrastructure owner.

NOVARTIS (NOVN): 9 DEALS, 2019–2026

Novartis (covered by Smith) **has a smaller partnership portfolio, but individual upfront payments are comparatively large.** Six of its nine deals disclose upfront consideration, and each is at least $55m. Total disclosed upfront consideration is $640m. Molecular-glue degradation is the principal strategic theme. Novartis entered two Monte Rosa Therapeutics agreements, with $150m upfront and up to $2.25bn in 2024, followed by $120m upfront and up to $5.7bn in 2025. Other partnerships include Schrödinger ($150m upfront and up to $2.27bn), Unnatural Products ($100m and up to $1.7bn), Generate:Biomedicines ($65m and up to $1bn) and Relation Therapeutics ($55m and up to $1.7bn). Economics for its AbCellera and BenevolentAI relationships are undisclosed. The mix is relatively balanced, including two immunology and two oncology partnerships and one each in respiratory and cardiometabolic disease. Novartis has a foundation-model relationship with Isomorphic Labs but **no dedicated compute or chipmaker relationship in our dataset**. That said, Novartis CEO, Vas Narasimhan is also a board member of Anthropic, and as such the company's ties to the AI-world are inherently advantaged.

MERCK & CO (MRK): 9 DEALS, 2016–2026

Merck has the lowest disclosed upfront consideration in the group, at $28m across nine partnerships. Its $5.1bn aggregate potential value is almost entirely milestone based. The largest disclosed transaction is Quotient Therapeutics, with $20m upfront and up to $2.2bn for somatic-genomics target discovery. Other partnerships include Infinimmune, with up to $838m; Absci, with up to $610m; Evaxion Biotech, with $7.5m upfront and up to $592m; Protillion Biosciences, with up to $510m; and Variational AI, with up to $349m. Economics for XtalPi, AbCellera and BigHat are undisclosed. Merck's portfolio is weighted toward antibodies and biologics, and six of the nine deals have no specified therapeutic area. Unlike several peers, Merck's model strategy is primarily internal. Its disclosed models include KERMT for ADMET prediction and the companion genomics model TEDDY. Merck has no disclosed foundation-model or frontier-AI-lab partnership. Its NVIDIA relationship covers infrastructure and multi-GPU optimisation, but we identify no named supercomputer or DGX SuperPOD purchase.

GILEAD (GILD): 7 DEALS, 2019–2025

Gilead has a relatively small, oncology-weighted portfolio, with no qualifying discovery partnership recorded after June 2025. Three of the seven relationships are in oncology. Disclosed upfront consideration totals $155m. The principal transactions are Nurix ($45m upfront and up to $2.35bn), insitro ($15m and up to $1bn), Kymera ($40m and up to $85m), Genesis Therapeutics ($35m) and Cartography Biosciences ($20m). Economics for AbCellera and Terray are undisclosed. Gilead is one of the few companies with a named AI-originated molecule in clinical development. **GS-6791 / NX-0479**, an IRAK4 degrader originating from Nurix's DEL-AI platform, cleared for IND in April 2025 and remained in an ongoing Phase 1 healthy-volunteer study as of Nurix's July 2026 update. Gilead has an AWS cloud-infrastructure agreement, but **no dedicated compute record or foundation-model relationship in our dataset**.

AMGEN (AMGN): 5 DEALS, 2020–2026

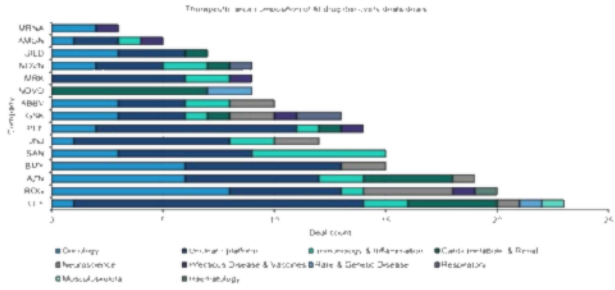
Amgen has the second-smallest external discovery portfolio, but a comparatively differentiated internal AI and compute position. Its five partnerships are heavily weighted toward protein design. Generate:Biomedicines is the anchor and the only partnership with a disclosed upfront payment, at $50m against an aggregate potential value of $1.9bn. Other counterparties include DISCO Pharmaceuticals, with up to $618m for machine-learning-enabled cell-surface proteomics, as well as PostEra, BigHat and Adaptive Biotechnologies. Two of the five deals have no specified therapeutic area. Amgen operates the Freyja on-premises DGX SuperPOD alongside NVIDIA DGX Cloud on AWS. The company trained five antibody-specific language models using proprietary antibody data in this environment. Amgen also has two OpenAI agreements. The

more recent includes a biology-specific foundation model and agentic tools intended for medicinal chemistry, genomics and wet-lab workflows. Whilst not an AI drug discovery company per se, Amgen's data layer is differentiated by its acquisition of deCODE genetics (Reykjavik, Iceland) for $415 million in 2012. This gives Amgen an industry-leading population-genomics engine - built on large-scale whole-genome sequencing and genotyping of the Icelandic population plus growing international/ multi-omics collaborations - that identifies and validates disease-linked genetic variants (e.g., PCSK9) to prioritize and de-risk drug targets, refine clinical trial patient selection, and boost R&D productivity across Amgen's pipeline.

MODERNA (MRNA): 3 DEALS, 2021–2023

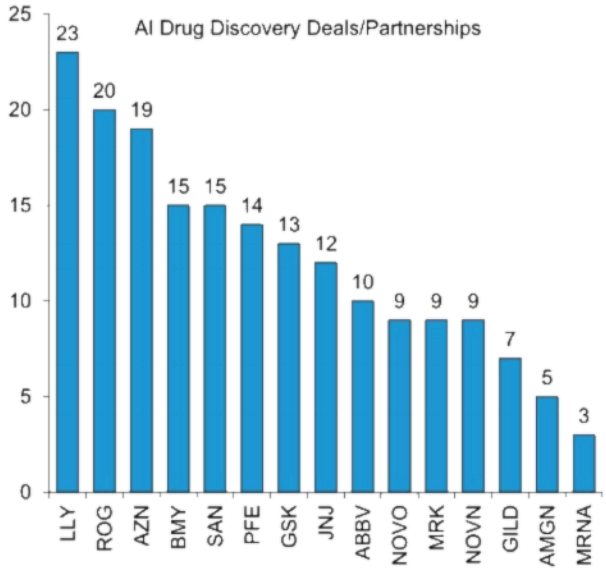
Moderna has the smallest external discovery portfolio and is the only company with no qualifying agreement recorded after 2023. All three partnerships have a specified therapeutic area: two in oncology and one in infectious disease and vaccines. Immatics accounts for all $120m of disclosed upfront consideration and the full $1.82bn aggregate potential value. The collaboration combines Moderna's mRNA platform with Immatics' TCR bispecifics, XPRESIDENT target-discovery platform and XCUBE bioinformatics capabilities. The partnership has produced a clinical combination: anzu-cel, or **IMA203**, with **mRNA-4203**, for which the first patient was dosed in the third quarter of 2025. Moderna's other two external discovery relationships, with AbCellera for mRNA-encoded antibodies and Personalis for individualised neoantigen therapy, have no disclosed economics. Moderna's broader AI strategy is more internally oriented. It has two OpenAI agreements supporting mChat and the Lucy platform, an IBM quantum collaboration, and NVIDIA CUDA-Q work with Yale.

EXHIBIT 11: **Lilly leads the way, with a TA-agonstic, platform slant on its AI deals**



Source: Bernstein analysis of press releases, company materials, press articles

EXHIBIT 12: **There is a dispersion in the number of AI deals across US and EU Pharma names**



Source: Bernstein analysis of press releases, company materials, press articles

本报告来源于“慧博投研”，请勿外传!

EXHIBIT 13: **Summary of large pharma partnerships with AI biotechs, model partners, compute investments, cloud infrastructure & data assets**

Company	Region	Techbio deals	Techbio period	Therapeutic areas (# - deal count)	Techbio / AI drug discovery	Foundation models & AI labs	Compute & chips	Cloud / hyperscaler	Data assets
LLY Eli Lilly	US	23	2019-2026	Cardiometabolic & Renal (4) Immunology & Inflammation (2) Musculoskeletal (1) Neuroscience (1) Oncology (1) Rare & Genetic Disease (1) Unclear - platform (13)	(1) Atomwise | 2019-09-03 | ($560m) (2) Verge Genomics | 2021-07-08 | $25m +$69.8m Neuroscience - restructured (3) Generate Therapeutics | 2022-05-03 | $28m ($67.5m) (4) Schrodinger | 2022-10-06 | ($425m) Undisclosed - phys-ML (5) Nimbus Therapeutics | 2022-10-11 | $496m | Cardiometabolic & Renal - physics (6) Insilico Medicine | 2023 - restructured (7) XtalPi | 2023-05 ($250m) (8) Morphic Holding (Morphic Therapeutic) | 2024-07-08 $3.2bn-$3.2bn) Immunology & Inflammation - IN CLINIC - physics (9) Insitro | 2024-10-09 Cardiometabolic & Renal (10) BigHat Biosciences | 2025-04-17 | Platform - cross portfolio (11) Creyon Bio | 2025-04-29 $13m ($19m) Undisclosed (12) Juvena Therapeutics | 2025-06-11 | ($650m) Musculoskeletal (13) Superlumina Medicines | 2025-06-14 | ($1.3bn) | Cardiometabolic & Renal (14) La Roche-Posay | 2025-09-04 | Oncology (15) Lenabs | 2025-09-08 (16) Prelia Biologics | 2025-09-23 Undisclosed (17) Aaka (XtalPi subsidiary) | 2025-11-05 | $345m (18) Insilico Medicine | 2025-11-10 ~$100m) (19) Nentus Therapeutics | 2026-01-06 $55m ($1.3bn) | Cardiometabolic & Renal - physics (20) Chai Discovery | 2026-01-08 (21) Repertoire Immune Medicines | 2026-01-29 $85m ($1.8bn) | Immunology & Inflammation (22) Insilico Medicine | 2026-03-29 | $115m ($2.8bn Platform - cross portfolio (23) Profluent | 2026-04-28 ($2.2bn) | Rare & Genetic Disease				
ROG Roche	EU	20	2017-2026	Oncology (8) Neuroscience (4) Haematology (1) Immunology & Inflammation (1) Infectious Disease & Vaccines (1) Unclear - platform (5)	(1) Warp Drive Bio (platform - also acquired by Ginkgo Bioworks 2017-10 ($387m)) | Infectious Disease & Vaccines (2) Exscientia (now integrated into Recursion 2019-01-08 | ~$67m) Undisclosed (3) ITOS/*ECS | 2020-05-29 | Undisclosed (4) Reverie Labs | 2020-07 Oncology (5) Dyno Therapeutics 2020-10-14 ($227m) Neuroscience - restructured (6) Genesis Therapeutics 2020-10-19 | Platform - cross-portfolio (7) PathAI 2021-10-*5 | Oncology - restructured (8) Recursion Pharmaceuticals 2021-12 | $50m ($125m) Neuroscience (9) Chroma Biosciences | 2023-09-20 Oncology (10) Dyno Therapeutics | 2024-10-24 | $50m-$1.1bn) Neuroscience (11) Oxford BioTherapeutics | 2025-03-19 | $150m Oncology (12) Repertoire Immune Medicines 2025-04-21 $15m ($765m) | Immunology & Inflammation (13) Chroma Biosciences | 2025-05 $115m (>$2bn) Oncology (14) Genmab (via Chugai Pharmaceutical) | 2025-07-17 ($250m) (15) Manifold Bio (via Weinstein Medicine) | 2025-10-30 | Oncology (16) Manifold Bio | 2025-11-03 | $55m-$2bn Neuroscience (17) Cami Therapeutics | 2025-12-16 | $25m $1.1bn Oncology (18) MatrixAI 2026-05-07 $750m $1.1bn Oncology (19) Nura Therapeutics 2026-06-08 | $700m 3.2.3bn Haematology (20) Phylo (Biomia | an agentic AI platform) 2026-06-04 | Undisclosed	(1) Isomorphic Labs 2024-01-07 Isomorphic Labs first pharma partnership (announced same day as Novartis deal, (2) OpenAI | 2024-06-25 | Goal is "custom, purpose-built" generative AI technologies to invent novel antimicrobials against drug-resistant	(1) NVIDIA | 2025-10-28 | LilyPod: NVIDIA DGX SuperPOD with ~1,016 Blackwell Ultra GPUs in Indianapolis (2) NVIDIA | 2026-01-12 | Co-Innovation AI Lab on NVIDIA Vera Rubin architecture and BioNeMo, South San Francisco	Unclear	(1) Evidation Health 2019-08-08 (2) LillyTune Lab | 2025-09-09
AZN AstraZeneca	EU	19	2019-2026	Oncology (5) Cardiometabolic & Renal (4) Immunology & Inflammation (2) Neuroscience (1) Unclear - platform (5)	(1) BenevolentAI | 2019-04-3C | $15m | Cardiometabolic & Renal (2) Schrodinger | 2019-09-04 - phys/ML (3) DeepMatter | 2019-12-09 (4) Genome Biologics 2020-12-10 Cardiometabolic & Renal (5) SandboxAQ (AQBioSim biopharma molecular simulation division) 2023-05-22 (6) Verge Genomics | 2023-09-08 | $42m ($640m) | Neuroscience (7) Absci 2023-12 | ($247m) | Oncology (8) Immunai 2024 | Oncology (9) Nabla Bio | 2024-05-14 (10) Owkin 2024-10-04 | Oncology (11) Tempus AI and Pathos AI 2025-04-23 ($200m) | Oncology (12) CSPC Pharmaceutical Group (AI-enabled oral small-molecule research: immunology/chronic disease.) | 2025-06-12 $110m, $5.3bn | Immunology & Inflammation (13) Sutro Bio | 2025-07-30 | Platform - cross portfolio (14) Algen Biotechnologies 2025-10-06 | ~$555m) Immunology & Inflammation (15) Tortoise ai 2025-10-09 | Oncology (16) Modella AI 2026-01-13 | Oncology (17) CSPC Pharmaceutical Group: obesity - type 2 diabetes AI driver peptide design + LiquidGel 2026-01-30 $1.2bn ($18.5bn) Cardiometabolic & Renal (18) Owkin_K Pro platform | 2026-05-13 (19) CSPC Pharmaceutical Group: siRNA kidney disease discovery 2026-07-01 $1bn ($1.4bn) Cardiometabolic & Renal	(1) Anthropic Claude for Life Sciences Claude for Healthcare | 2026-07 - frontier general-purpose LLM | Claude- applied to scientific literature review, patient selection, clinical documentation and regulatory work	(1) NVIDIA | 2020-07-01 | Cambridge-1 (founding partner, shared UK national resource, folded into NVIDIA DGX Cloud 2023) - restructured (2) NVIDIA - University of Florida (Health, 2021-04-12 | No dedicated hardware named - NVIDIA compute for MegaMolBART training; (3) NVIDIA (Swedish AI factory consortium: Ericsson, Saab, SEB, Wallenberg Investments) | 2025-05-24 - Two NVIDIA DGX SuperPODs or GB300 Grace Blackwell (4) IonQ (with AWS and NVIDIA; 2025-06-09 | IonQ Forte quantum system with NVIDIA CUDA-Q and AWS	(1) AION Labs (venture studio with Merck & Co, Pfizer, Teva, Israel Biotech Fund, Ami3 Ventures) AWS: R&D engine BioMed X | 2019 (2) Microsoft (with Inceptive) | 2019-09-10 (3) Microsoft Azure (Azure OpenAI Service, Azure AI Foundry, Microsoft Fabric) | 2023-01 (4) Amazon Web Services (Development Assistant, Bedrock Agents) | 2024-11	(1) Tempus AI 2021-11-19 (2) Alliance for Genome Discovery (Nashville Biosciences) | 2023-07-18 (3) SOPHiA GENETICS 2025-08-05 (4) Illumina (Billion Cell Atlas alliance with Merck & Co, Eli Lilly, Formation Bio) | 2026-01 (5) Evinova (Astrazeneca and Thirdrove data integration) | 2026-02-26 (6) Roche Diagnostics Asia Pacific | 2026-05-18 (7) Helix 2026-07-07
BMY Bristol Myers Squibb	US	15	2016-2026	Oncology (6) Neuroscience (2) Unclear - platform (7)	(1) PathAI 2016 Oncology (2) Exscientia | 2018 | $200m ($5bn) Oncology IN CLINIC (3) Exscientia (via Celgene pre-acquisition) | 2019-03-25 $45m Oncology restructured (4) PsycheGenerics (SmartCube platform) | 2020-07-28 Neuroscience (5) nference | 2020-10-28 | ($49m) Neuroscience (6) Schrodinger 2020-*1-21 | $55m ($76m) | Oncology - restructured - phys/ML (7) CHARM Therapeutics | 2021-03-23 - Undisclosed (8) Terray Therapeutics 2021-12-14 Platform - cross-portfolio (9) VantAI | 2021-12-11 - $67.5m | Oncology (10) Nabla Bio | 2024-05-14 (11) Mentor AI | 2024-10-28 (12) AI Proteins 2024-12-03 | $439m | Platform - cross-portfolio (13) Oxford BioTherapeutics 2025-04-09 Oncology (14) Schrodinger | 2026-06-05 Undisclosed - phys/ML (15) Dyno Discovery 2026-08-10 Platform - cross-portfolio	(1) Anthropic Claude for Life Sciences Claude for Healthcare | 2026-07 - frontier general-purpose LLM - agentic AI	(1) NVIDIA 2024-01 Owned NVIDIA DGX SuperPOD (Equinix-hosted, Mark III integration, July 2026, second cluster of its DGX Vera Rubin NVL72 live January 2027	(1) Microsoft 2026-**-22	(1) IMIDomics | 2016 (2) Concerto HealthAI (now CorrectAI) 2019-03-26 (3) Tempus AI 2019-11-04 (4) Illumina Nashville Biosciences Alliance for genome discovery 2024-07-08 (5) Medidata (Dassault Systèmes) 2025-11-07 (6) Tempus AI 2026-05-14
SAN Sanofi	EU	15	2017-2026	Immunology & Inflammation (6) Oncology (3) Unclear - platform (6)	(1) Nura Therapeutics | 2019-12 $55m ($2.5bn) | Immunology & Inflammation - IN CLINIC (2) Kymera Therapeutics | 2020-07 | $150m ($2.1bn) | Immunology & Inflammation (3) LabGenius (Therapeutics) | 2021 | Undisclosed - restructured (4) Owkin 2021-11-16 | $140m ($270m) | Oncology - restructured (5) Exscientia (subsequently merged into Recursion Pharmaceuticals, Nov 2024) 2022-01-07 $190m ($5.2bn) | Oncology (6) VantAI (inherited via Blueprint Medicines) | 2022-02-10 | $1.7bn (7) Atomwise 2022-08-17 $26m ($5bn) | Immunology & Inflammation (8) Insilico Medicine | 2022-**-08 | $21.5m-$1.2bn | Oncology (9) BioMap | 2023-10-10 $10m ,$1bn | Undisclosed (10) Aganna | 2023-12-05 ~$140m) Platform - cross portfolio (11) Hoxo 2024-11-12 (12) Earendil Labs | 2025-04-17 | $125m $1.(bn) | Immunology & Inflammation (13) LabGenius Therapeutics | 2025-12-04 Immunology & Inflammation (14) Larendi Labs 2026-01-05 | $160m ($2.6bn) Immunology & Inflammation (15) Owkin | 2026-06-05 | Undisclosed	(1) Baidu LinearDesign | 2021-11 | mRNA sequence design algorithm (2) OpenAI / Formation Bio | 2024-05-21 | Positioned by Sanofi as part of its ambition to be "first biopharma company powered by AI at scale." No named (3) Anthropic - Claude for Life Sciences | 2025-10 | enterprise LLM - regulatory writing, literature synthesis		(1) Google (Google Cloud); - Healthcare Innovation Lab 2019-06 (2) Amazon Web Services (AWS); 2023	(1) Aetion 2019-11-20 (2) CytoReason 2021-06-17 (3) Evidation Health 2022-01-10 (4) IQVIA (Project ARTEMIS) 2023-06 (5) Medidata (Dassault Systèmes) 2025-10-23 (6) Snowflake, Elementum AI | 2026-05-27
JNJ Johnson & Johnson	US	12	2016-2026	Oncology (1) Immunology & Inflammation (2) Neuroscience (2) Unclear - platform (7)	(1) Refley (with AI) 2019-11-08 - Immunology & Inflammation (2) Aitia 2019-04-29 (3) Atomwise 2019-05-13 (4) Insilico Medicine 2021-11-** | Neuroscience (5) VantAI | 2022-04-13 (6) XtalPi | 2022-10-27 (7) Intelligent DMICS Ltd | ~$3.08m** | Oncology (8) Odyssey Therapeutics 2024-04-04 (9) BigHat Biosciences 2024-06-24 Neuroscience (10) Aitia Bioscience, advisor of XtalPi | 2024-10-17 (11) Sail Biomedicines | 2026-07-28 $785m $3.4bn | Immunology & Inflammation (12) Cradle (bio) Undated	(1) Isomorphic Labs 2026-01-20 Cross-modality small molecules, antibodies, peptides, molecular glues	(1) NVIDIA 2024-03-18 | NVIDIA's cutting-edge computing and Helixscan edge AI (MedTech - powered JJM; (2) NVIDIA 2025-10-28 | NVIDIA Isaac for Healthcare and Omniverse (MedTech robotics simulation)	(1) Microsoft Azure | 2022-01-12	(1) CorrectAI (formerly Concerto HealthAI) | 2020-01-13 (2) Datavant 2020-09-09 (3) Tempus AI 2020-**-** (4) Komodo Health 2021-**-** (5) Databricks, DASH | 2022-04-25
PFE Pfizer	US	14	2016-2026	Oncology (2) Cardiometabolic & Renal (1) Immunology & Inflammation (1) Infectious Disease & Vaccines (1) Unclear - platform (9)	(1) Schrodinger 2016-01-11 Platform - cross-portfolio - phys/ML (2) AbCellera Biologics | 2017-01-05 | ($90m) - Platform / cross portfolio (3) XtalPi 2018-05 Platform - cross portfolio (4) CytoReason 2018-01-01 | ($110m) | Immunology & Inflammation (5) Insilico Medicine | 2020-01-14 | Platform - cross-portfolio (6) PostEra | 2020-12-07 | $12m ($61.8m) Infectious Disease & Vaccines (7) Iktos 2021-03-02 Platform - cross-portfolio (8) Nura Therapeutics 2023-08-07 $60m ($2.4bn) Oncology (9) Ginkgo Bioworks | 2023-09-27 | ($331m) Platform - cross-portfolio (10) Chemical AI | 2025-05 | Platform - cross-portfolio (11) Cartography Biosciences 2026-01-06 | $65m ($450m, | Oncology (12) Baltz PBC 2026-01-08 Platform - cross-portfolio (13) Gordian Bio Gordian Biotechnology | 2026-01-08 | Cardiometabolic & Renal (14) Chai Discovery | 2026-06-02 Platform - cross-portfolio	(1) IBM Watson Health - Parkinson's remote monitoring; BlueSky Project | 2016-04-07 | Seismic and ML-based remote monitoring system (BlueSky Project) intended to track disease progression and inform... (2) IBM Watson for Drug Discovery 2016-12 Used Watson's ML/NLP to mine ~25M Medline abstracts, 1M+ journal articles, and 4M patents for target and	(1) none found)	(1) Amazon Web Services (Pfizer-Amazon Collaboration Team - PACT) | 2021 (2) Google Cloud (AlphaFold 2 - Target and Lead Identification Suite) 2023-05-16	(1) Flatiron Health (Roche-owned) 2014 (2) 23andMe | 2015-01-12 (3) Foundation Medicine (Roche-Genentech-owned) 2018-01-16 (4) Saama Technologies | 2020-02-18 (5) Truveta | 2022-06-27 (6) Tempus AI 2023

Source: Bernstein analysis of press releases, company materials, press articles

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EXHIBIT 14: **Summary of large pharma partnerships with AI biotechs, model partners, compute investments, cloud infrastructure & data assets (Part 2)**

Company	Region	Techbio deals	Techbio period	Therapeutic areas (# - deal count)	Techbio / AI drug discovery	Foundation models & AI labs	Compute & chips	Cloud / hyperscaler	Data assets
GSK GSK	EU	13	2017-2026	Oncology - 1) Neuroscience - 2) Respiratory - 2) Cardiometabolic & Renal - 1) Immunology & Inflammation - 1) Infectious Disease & Vaccines - 1) Unclear platform - 3)	(1) Exscientia | 2017-07-05 | $43m | Respiratory (2) Insilico Medicine | 2017-08 (3) Cloud Pharmaceuticals | 2018-05-10 (4) PathAI | 2020-06-05 | Oncology (5) Flow Biotechnologies | 2023-07 | ($50m) | Infectious Disease & Vaccines (6) Ochre Bio | 2024-06-12 | ($37.5m) | Cardiometabolic & Renal (7) Vesalius Therapeutics | 2024-11-12 | $80m ($650m) | Neuroscience (8) Muna Therapeutics | 2024-12 | $35.2m Neuroscience (9) Relation Therapeutics | 2024-12-10 | $45m Immunology & Inflammation (10) Flagship Pioneering (ProFound Therapeutics, Quotient Therapeutics) | 2025-11-25 | Respiratory (11) Oxford Bio Therapeutics | 2025-12-10 | Oncology (12) Noetik | 2026-01-08 | $50m | Oncology (13) Atlas Consortium - A-Alpha Bio, Biotz, Cradle, Dyno Therapeutics | 2026-02-22	(1) none found -	(1) NVIDIA | 2021-10 - Cambridge-1 (founding partner, shared UK national resource, folded into NVIDIA DGX Cloud) - instrument (2) Cerebras Systems - 2021 - Cerebras CS-1 (Q4 2020 purchase - and CS-2, CS-3 is vendor-claimed only	(1) none found -	(1) Tempus AI - 2020-06 | $70m - $75m+ (2) 23andMe | 2023-10-30 | $20m ($20m+) (3) Nuha | 2024-01-17
AbbVie AbbVie	US	11	2015-2026	Oncology - 3) Immunology & Inflammation - 2) Neuroscience - 2) Unclear platform - 3)	(1) Schrödinger - 2013-12-14 - phys/ML (2) Cerevel Therapeutics - AbbVie subsidiary since August 2024 | 2020-07-27 - Neuroscience (3) Aviva Biotech - 2021-11 - to $42m $58.0m - Oncology (4) BioNTec Biosciences | 2023-12-05 | $50m ($325m - Oncology (5) Gilgamesh Pharmaceuticals - 2024-05-13 - $65m ($126m) | Neuroscience (6) Nimble Therapeutics | 2024-12-13 - $213m ($288m+) | Immunology & Inflammation (7) Neomorph - 2025-01-23 | ($3 cbn - Oncology (8) Aphelis - OpenBCI consortium with Johnson & Johnson, Bristol Myers Squibb, Takeda, Abbvie | 2025-03-27 (9) Exemplify - vs DLS Antibodies, AbbVie subsidiary - 2025-05-12 | Immunology & Inflammation (10) Alloy Therapeutics | 2026-01-12 - Platform - cross portfolio	(1) Anthropic - 2025-11-24 - General-purpose and life-sciences-tuned LLM (Claude)	(1) Intel - 2020-12-15 - Intel Xeon CPUs, oneAPI, oneDNN, software optimization, node-level hardware - (2) Cerebras Systems | 2022-05-05 - Cerebras CS-2	(1) Amazon Web Services - 2025-11-06	(1) Genomics England - Wave 4 | 2017-01-05 (2) Alliance for Genomic Discovery - Human Pangenome Reference Consortium - with Amgen, AstraZeneca, Bayer, Merck & Co. and later Bristol Myers Squibb, GSK, Novo Nordisk | 2021-07-19 (3) CorrectAll and Cairn Life Sciences - 2024-07-09
NOVO Novo Nordisk	EU	9	2022-2026	Cardiometabolic & Renal (7) Rare & Genetic Disease (2)	(1) Ginkgo Bioworks - 2022-06-08 | Cardiometabolic & Renal (2) Life Edit Therapeutics (EmeraMed) | 2023-05 ($~9bn) Rare & Genetic Disease (3) Valo Health | 2023-09 - $60m ($4.5bn) - Cardiometabolic & Renal (4) Cellarity | 2024-01-04 - ($532m) - Cardiometabolic & Renal (5) NanoValor Therapeutics | 2024-09-17 - $600m+ | Rare & Genetic Disease (6) Gensaic | 2025-03-03 | ($354m) | Cardiometabolic & Renal (7) Septerna | 2025-05-14 | $195m ($2.2bn - Cardiometabolic & Renal (8) Deep Apple Therapeutics | 2025-06-11 | ($812m+) | Cardiometabolic & Renal (9) Vivtex Corporation - 2026-02-25 | ($2.1bn) | Cardiometabolic & Renal	(1) Anthropic - 2025 - Claude models (Claude 1.5, Claude Code) as core intelligence for NovoScribe and related builds (2) OpenAI - 2026-04-14 - Pilot programs across R&D, manufacturing and commercial launched 2026	(1) NVIDIA | 2025-06-11 | NVIDIA BioNeMo, NVMolNeMo microservices and Omniverse, on GefionDGX compute access (2) NVIDIA - Manifold Bio protein-design research consortium (Proteina-Complexa) - 2026-03 | No dedicated hardware named - Proteina-Complexa protein-design consortium	(1) Microsoft | 2022-09-12 (2) Amazon Web Services (Bedrock) | 2024 (3) Amazon Web Services | 2026-08-18	(1) Variant Bio - 2025-01-07 - $50m+ (2) Genomics plc (Genomics_ai) | 2025-05 (3) 111 - 2026-08-04
MRK Merck & Co.	US	9	2019-2026	Immunology & Inflammation - 2) Infectious Disease & Vaccines - 1) Unclear platform (6 -	(1) AbCellera | 2018-11-27 (2) Absci - 2022-01-07 - $40.0m+ (3) Digital Biosciences - 2022-11-29 (4) AlphaMab | 2021-08-24 (5) Evaxion Biotech | 2023-09 - $75m-$592m+ - Infectious Disease & Vaccines (6) Variational AI - 2025-09-23 - $36.0m+ (7) Curebot Therapeutics - 2026-01-28 - $20m ($2.2bn, Immunology & Inflammation (8) Inflammarun | 2026-03-31 | ($436m) (9) Protilon Biosciences - 2026-06-16 - $510m+ | Immunology & Inflammation	(1) none found -	(1) NVIDIA - 2025-12-11 | No named system - NVIDIA multi-GPU infrastructure and optimization only	(1) Amazon Web Services | Accenture - 2021 (2) Google Cloud | 2026-04-22 - ($1bn+)	(1) Saama Technologies | 2022-08-15 (2) Alliance for Genomic Discovery (Illumina, Nashville Biosciences) | 2023-07-18 (3) Atropos Health - 2025-11-10 (4) Illumina Billion Cell Atlas - 2026-01-13 (5) Tempus AI | 2026-04-3
NOVN Novartis	EU	9	2019-2026	Immunology & Inflammation - 2) Oncology - 2) Cardiometabolic & Renal - 1) Respiratory - 1) Unclear platform (3	(1) AbCellera Biologics | 2019-02-14 (2) BioNovelgenAI | 2019-09-06 - Oncology (3) Deciphex - 2024-04-23 (4) Generate Biomedicines | 2024-09-24 | $65m ($1bn) | Undisclosed (5) Monte Rosa Therapeutics - 2024-10-28 - $150m ($2.2bn) | Immunology & Inflammation (6) Schrödinger - 2024-11-12 - $150m ($2.3bn) | Oncology, phys/ML (7) Monte Rosa Therapeutics (second agreement) | 2025-09-15 - $120m (~$6.7bn) | Immunology & Inflammation (8) Relation Therapeutics | 2025-12-09 - $55m - $1.7bn) - Respiratory (9) Unnatural Products | 2026-02-18 | $100m - $1.7bn) | Cardiometabolic & Renal	(1) Isomorphic Labs - 2024-01-07 - small molecule	(1) none found -	(1) Microsoft | 2019-10-01 (2) Amazon Web Services (AWS) - 2019-12-04 - restructured (3) Amazon Web Services (AWS) - Accenture | 2025-12-15	(1) Certara - 2023-04-03 - phys/ML
GILD Gilead	US	7	2019-2026	Oncology - 3) Cardiometabolic & Renal - 1) Unclear platform - 3)	(1) Insitro - 2019-04-16 - $15m ($18m) | Cardiometabolic & Renal (2) AbCellera Biologics - 2019-06-12 (3) Nuna Therapeutics | 2019-06-19 - $45m - $2.4bn+ - IN CLINIC (4) Cartography Biosciences - 2024-05-27 - $29m - Oncology (5) Genesis Therapeutics - 2024-09-13 | $35m | Oncology (6) Tenaya Therapeutics - 2024-12-17 | Undisclosed (7) Kyverna Therapeutics | 2025-06-25 - $40m+ ($1bn+) | Oncology	(1) none found -	(1) - none found -	(1) Amazon Web Services (AWS) - 2021-11-24	(1) Tempus AI - 2026-04-14
AMGN Amgen	US	6	2018-2026	Immunology & Inflammation - 1) Infectious Disease & Vaccines - 1) Oncology - 1) Unclear platform (2)	(1) BigHat Biosciences - 2020 (2) Adaptive Biotechnologies - 2020-04-02 - Infectious Disease & Vaccines (3) Generate Biomedicines | 2022-01-06 - $54m ($1.9bn) | Immunology & Inflammation (4) PreEra | 2021-11-16 (5) DISCO Pharmaceuticals | 2026-01-07 | $618m - Oncology	(1) OpenAI | 2025-08 | general-purpose LLM - enterprise productivity (2) OpenAI | 2026-04-17 - bio-specific foundation model with agentic tools for medicinal chemistry, genomics, and lab workflows	(1) NVIDIA | 2024-01-30 | Freyja - on-prem NVIDIA DGX SuperPOD - plus NVIDIA DGX Cloud on AWS	(1) Amazon Web Services - 2023-11-28 (2) Microsoft - 2024-05	(1) Databricks | 2022-03-22 (2) Alliance for Genomic Discovery (Nashville Biosciences/Illumina consortium - also incl. AbbVie, AstraZeneca, Bayer, Bristol Myers Squibb, GSK, Merck & Co. [disambiguated: MRK, not Merck KGaA], Novo Nordisk, Regeneron) - 2023-07-18
MRNA Moderna	US	3	2021-2023	Oncology - 2) Infectious Disease & Vaccines - 1)	(1) AbCellera Biologics - 2021-09-15 | Infectious Disease & Vaccines (2) Personalis - 2023-02 - Oncology (3) mRNAiics N.V. - 2023-09-11 - $12.0m ($13.4bn) | Oncology - IN CLINIC	(1) IBM - 2023-04-26 - 2024 joint Moderna-IBM Research team published a variational quantum algorithm (VQA) - now about using up to 48	(2) OpenAI - 2023-05 | BCG + internal adoption of mChat within months of May 2023 launch (3) OpenAI - 2026-06-25 - Company states [q]uantum closed-loop autonomous experimental cycles (no human intervention between cycles) testing	(1) NVIDIA (with Yale University) - 2024-10-04 - NVIDIA CUDA-Q platform (GPU-accelerated quantum simulation	(1) Amazon Web Services - 2023-08-05	(1) Tempus AI - 2023-10-23

Source: Bernstein analysis of press releases, company materials, press articles

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AI BIOTECHS - HOW AI IS USED DRUG DISCOVERY AND DEVELOPMENT, AND THE EVIDENCE THAT IT CREATES VALUE

AI can be used across five steps of drug R&D (Exhibit 8)**, but its clearest use today is finding and improving drug molecules.** The five use cases are **target identification** (what biology to drug), **hit discovery** (find or create a starting molecule), **lead optimization** (improve potency, selectivity and other drug properties), **preclinical development** (predict or improve PK, safety and translation before human trials), and **clinical development** (improve patient selection, trial design or enrollment). Among public AI biotechs, hit discovery and lead optimization are by far the most common and established applications (Exhibit 15).

Most AI biotechs are concentrated in hit discovery and lead optimization, but they get there in very different ways. Generate and Absci generate new protein or antibody sequences; AbCellera uses computation to search large experimentally generated antibody datasets; Schrödinger uses physics-based calculations to predict which small molecules are worth making; and Relay models protein motion to identify and optimize differentiated small molecules. Recursion and Insilico have broader ambitions. Recursion is not just a target-identification platform: legacy Recursion is strongest in cell-imaging-driven biology and target discovery, while legacy Exscientia added AI-based hit discovery and lead optimization through generative chemistry and automated synthesis. The combined Recursion platform now spans target discovery, molecular design and selected clinical-development applications.

Wet-lab dependence varies based on whether experiments generate the data that power the model or mainly validate computational predictions. Recursion, Generate, Absci and AbCellera have **very high** wet-lab dependence because large-scale proprietary experiments are central to either training the AI or discovering candidates—cell imaging and multi-omics for Recursion, measured protein properties for Generate, antibody interaction data for Absci, and high-throughput antibody screening for AbCellera. Insilico and Relay are **high** because experimental data are important for validating targets or anchoring structural models, but the computational engines also rely heavily on external or modeled data. Schrödinger is **low** because its physics-based platform is designed to predict molecular behavior computationally and reduce the amount of wet-lab testing required.

Clinical assets are the most important test of whether these AI approaches actually create better drugs (Exhibit 16). Insilico's rentosertib is one of the clearest end-to-end examples, with AI contributing to both target selection and molecule design. Generate's GB-0895 tests whether AI-designed protein properties can translate into differentiated dosing; Relay's zovegalisib tests whether modeling protein motion can improve selectivity and therapeutic window; and AbCellera's ABCL635 tests whether its discovery platform can successfully drug a difficult GPCR target with an antibody. Recursion, Absci and Schrödinger provide earlier clinical tests of their respective biology-discovery, generative-antibody and physics-based design approaches. Big Pharma partnerships provide additional external validation, but for investors the more important proof is whether these AI-derived advantages show up in human efficacy, safety or convenience.

(All of these public AI biotech companies are not covered at Bernstein.)

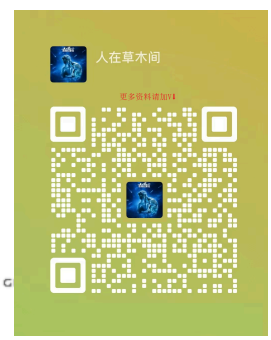


EXHIBIT 15: **How AI biotechs apply AI across drug discovery: Core problems to solve, 5 primary AI uses, wet-lab data use**

Company	What problem is AI trying to solve?	Primary use cases of AI in drug discovery and development					Wet-lab intensity	Wet-lab data / role
		Target identification	Lead generation	Lead optimization	Preclinical development	Clinical development		
Recursion	Learn disease biology from how cells respond to perturbations, then find treatments	✓	✓	✓	✓	✓	Very High	Cell imaging + multi-omics after genetic/drug perturbations; core proprietary AI training data
Insilico	Find disease targets and design drugs from end to end	✓	✓	✓	✓	✓	High	Cell assays, CRISPR, imaging and sequencing; mainly validates AI-selected targets and molecules
Generate	Design proteins with the drug properties you want		✓	✓			Very High	Protein binding, function and structure measurements; feeds back into generative models
Absci	Design antibodies with desired binding and drug properties		✓	✓			Very High	Large-scale antibody binding and developability data; directly trains generative models
AbCellera	Search very large antibody repertoires to find rare, high-quality antibodies		✓	✓			Very High	Single-cell antibody screening, sequencing and functional assays; wet lab drives candidate discovery
Schrödinger	Predict which small molecules are worth making before making them		✓	✓			Low	Limited proprietary wet-lab data; experimental binding/activity mainly validates computational predictions
Relay	Design drugs by understanding how proteins move		✓	✓			High	Protein structures + biophysical/compound data; anchors protein-motion simulations and drug design

Source: Company reports, Bernstein analysis

EXHIBIT 16: **Evidence of AI value: How AI contributed to the clinical assets; selective big pharma deals**

Company	Core modality	Therapeutic focus	Most advanced AI-linked asset	Stage	What AI/platform contributed	Big Pharma deals
Recursion	Small molecules	Oncology, rare disease	**REC-4881** / MEK1/2 — FAP	Ph 2	Found the therapeutic indication; molecule itself was not de novo AI-generated	Roche/Genentech, Bayer, Sanofi
Insilico	Small molecules	Fibrosis, oncology, I&I	**Rentosertib** / TNIK — IPF	Ph 3	End-to-end AI case: AI identified TNIK as the target and generative AI designed/optimized the molecule	Lilly, Sanofi
Generate	Engineered proteins / antibodies	I&I, oncology	**GB-0895** / TSLP — severe asthma	Ph 3	AI-engineered the antibody properties	Amgen, Novartis
Absci	Antibodies	Dermatology, women's health, I&I, oncology	**ABS-201** / PRLR — androgenetic alopecia	Ph 1/2a	AI designed/optimized the antibody	AstraZeneca, Merck
AbCellera	Antibodies / multispecifics	Women's health, I&I, oncology	**ABCL635** / NK3R — menopausal VMS	Positive Ph 2	AI/computation supports high-throughput antibody search and optimization rather than de novo drug generation	Lilly, Vertex , AbbVie
Schrödinger	Small molecules	Oncology, I&I, neurology	**SGR-1505** / MALT1	Ph 1	Physics-based computational design predicted binding and optimized compounds before synthesis	Novartis, BMS
Relay	Small molecules	Precision oncology, genetic disease	**Zovegalisib (RLY-2608)** / PI3Kα — HR+/HER2– breast cancer	Ph 3	AI identified a differnetiated way to inhibit PI3Kα by exploiting protein motion	

Source: Company reports, Bernstein analysis

AI-DISCOVERED DRUG RESULTS TO DATE

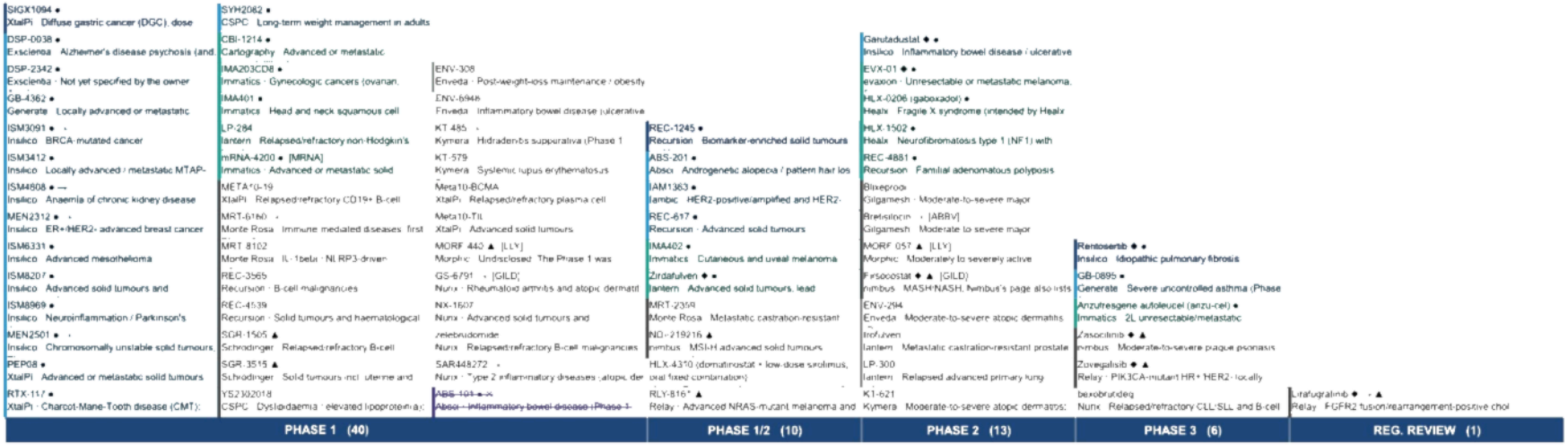
What constitutes an 'AI-discovered' drug means different things to different people. The range runs from AI repurposing of existing approved drugs (low-novelty, high-feasibility), to AI-assisted lead optimization on a known target (moderate-novelty), to AI-driven target identification plus AI-designed molecule on a previously-unprosecuted target (highest-novelty). Both the bull and bear cases for AI in drug discovery depend, in part, on which definition you accept. In 2026, we already see a few examples of AI drug success versus failure that span the spectrum.

Given the range of definitions, and the reduced visibility for private entities pipelines or phase 1 assets, aggregation of this pipeline is somewhat challenged. We identify ~70 AI-originated active programs, particularly concentrated in the public companies detailed in the section above. This pipeline size is comparable to the 82 molecules identified in 2024 by Jayatunga et al.' (some of which have been discontinued), while another publication claimed to identify ~170 AI-discovered programs in 2025.

While this AI-originated pipeline remains a relatively small proportion of overall industry R&D activity, the breadth of indications and modalities suggests AI is increasingly beginning to be more broadly used as a practical drug discovery tool. The key question for investors is likely no longer whether AI can generate clinical candidates, but whether these programs can deliver meaningfully higher development success rates & more innovative & differentiated therapeutics than conventional approaches.

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EXHIBIT 17: **AI-Originated Drug Pipeline - Active Programs Only**

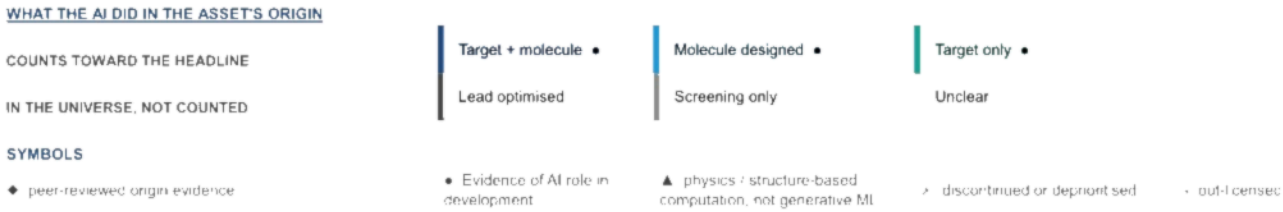


1. ▲ marker. Schrödinger, Morphic, Relay and Nimbus use physics-based or structure-based computation with machine learning layered on rather than generative ML, and are shown in the universe but excluded from the headline count. The distinction matters because the same definition would pull in a large share of conventional pharma's internal computational chemistry.2. Rentosertib phase status. The 320-patient Phase III (NCT07687459) was registered on 7 July 2026 but listed as not yet recruiting, with an estimated start date of 30 August 2026. Shown in Phase 3 as registered rather than enrolling.3. Repurposed molecules. Healx HLX-0206 (gaboxadol), HLX-4310 (domatinostat plus sirolimus) and Recursion REC-4881 are pre-existing molecules where the AI contribution is indication or combination selection, coded target only.4. Absci ABS-101. Interim Phase 1 data showed extended half-life versus first-generation anti-TL1A programmes, but Absci is seeking an out-licensing partner rather

Source: Bernstein analysis of press releases, company materials, press articles, clinicaltrials.gov

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EXHIBIT 18: **AI Pipeline Chart Legend**



Source: Bernstein analysis

ZASOCITINIB (NIMBUS/TAKEDA)

Arguably the first AI-enabled approval candidate, but not the strongest test of modern AI drug discovery (back to the "easiest problems" in Exhibit 7

Zasocitinib (formerly NDI-034858) is an oral allosteric TYK2 inhibitor for plaque psoriasis originally discovered by Nimbus Therapeutics using Schrödinger's physics-based computational chemistry platform. Takeda acquired the asset in 2022 in a transaction worth up to ~$6bn. Following positive Phase 3 data in psoriasis, zasocitinib is on track for a potential filing in FY2026 and could become the first FDA-approved drug to emerge from an AI-enabled discovery process.

However, the program comes with two important qualifiers. First, the asset is better characterized as a success in lead optimization than target discovery. TYK2 was already a well-validated mechanism by the time Nimbus entered the field, with Bristol Myers Squibb's deucravacitinib providing substantial biological and clinical validation. Second, the underlying approach relied primarily on physics-based molecular modeling rather than the deep-learning and generative AI approaches that have come to define the post-AlphaFold era. While undoubtedly a computational discovery success, some investors may debate whether it represents the type of AI-driven breakthrough currently envisioned.

The timeline for discovery / development is also worth noting. Nimbus selected TYK2 as a target more than a decade ago, with the program requiring roughly eight to ten years to progress from target selection to clinical testing. This is longer, not shorter, than typical industry benchmarks for discovery timelines. Notably, zasocitinib is currently the only clear Phase 3 success within the AI-originated cohort, but it is also one of the longest-duration development stories.

Rentosertib (Insilico)

Perhaps a closer approximation of the modern AI drug discovery potential

Rentosertib (INS018_055) is arguably a closer fit with what investors typically mean when discussing AI-native drug discovery. Insilico Medicine used its PandaOmics platform to identify TNIK as a potential target in idiopathic pulmonary fibrosis, a disease area where the target had not previously been clinically pursued. The company subsequently applied its Chemistry42 generative AI platform to design the molecule, creating an end-to-end discovery workflow that incorporated AI at both the target identification and molecule design stages.

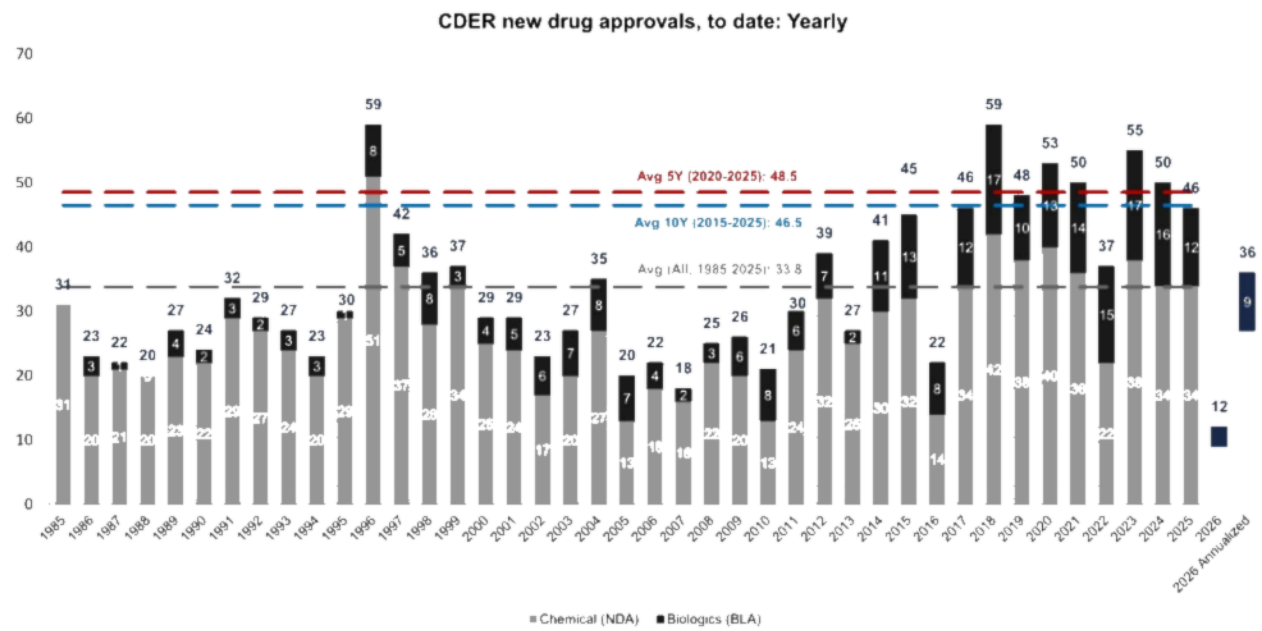
The program also highlights the potential for AI to compress early discovery timelines. Insilico has reported approximately 18 months from target hypothesis to preclinical candidate, substantially faster and less expensive than traditional industry benchmarks. While these claims remain difficult to independently verify, they illustrate the type of productivity gains frequently cited by AI-first drug discovery companies.

Importantly, however, rentosertib has not yet answered the question that matters most: whether AI can improve clinical success rates. Positive Phase 2a data in IPF provide an encouraging proof-of-concept, but the more decisive test comes with the Phase 3 (PCD not expected until Oct 2029). As one of the first truly AI-native programs to advance into late-stage development, rentosertib's eventual outcome may represent one of the most important data points in determining whether AI changes the economics of drug discovery or simply the process by which new molecules are generated.

INDUSTRY-LEVEL DATA – HAS AI MOVED THE NEEDLE YET?

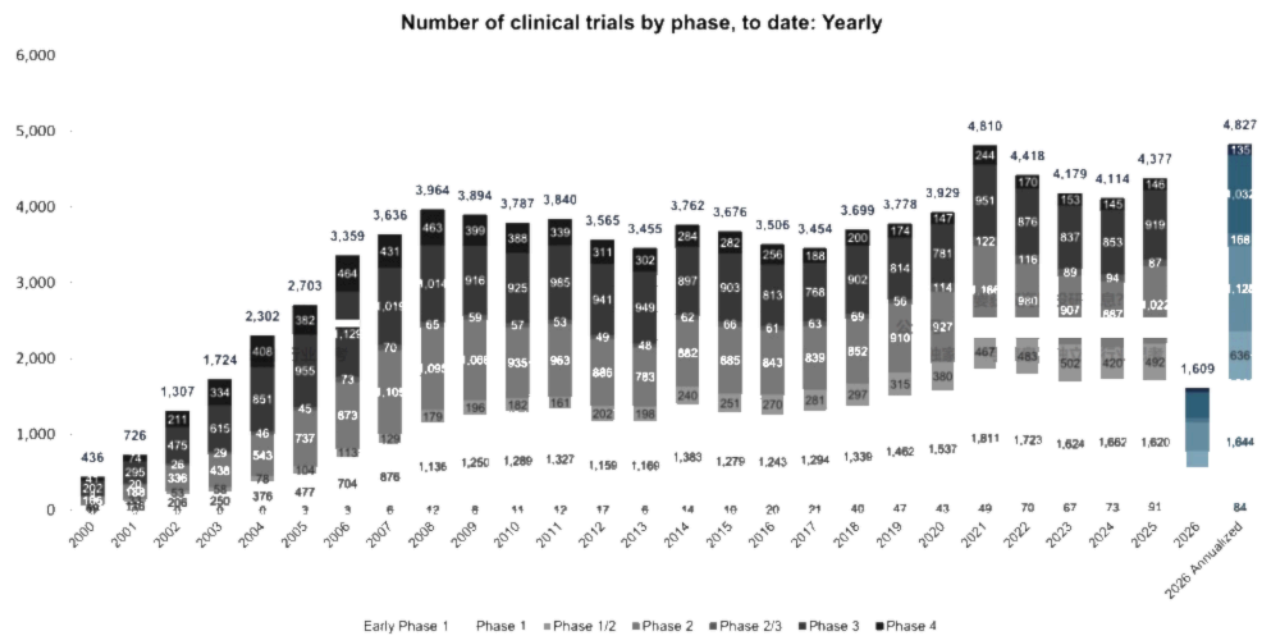
FDA approvals have been running well above the long-run average — the 5-year average (2020–2025) of 48.5/yr is up roughly 43% versus the 1985–2025 average of 33.8/yr. Some of this reflects general regulatory modernization, the rise of biologics, and the accumulation of pipeline depth from R&D investment over the past two decades. However, AI has not yet visibly accelerated the trajectory above the existing elevated baseline & we don't expect to see this becoming evident soon, given the scale of the AI-originated pipeline, as well as noise in aggregated data.

EXHIBIT 19: **CDER New Drug Approvals – Increasing approval productivity in recent years, yet hard to attribute to AI**



Data cut of as of 4/30/2026
Source: FDA, Bernstein analysis and estimates

EXHIBIT 20: **Clinical Trials by Phase Over Time**



Source: CT.gov, Bernstein analysis