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China Healthcare

Proprietary Survey: Accelerated AI use in drug R&D — a new era

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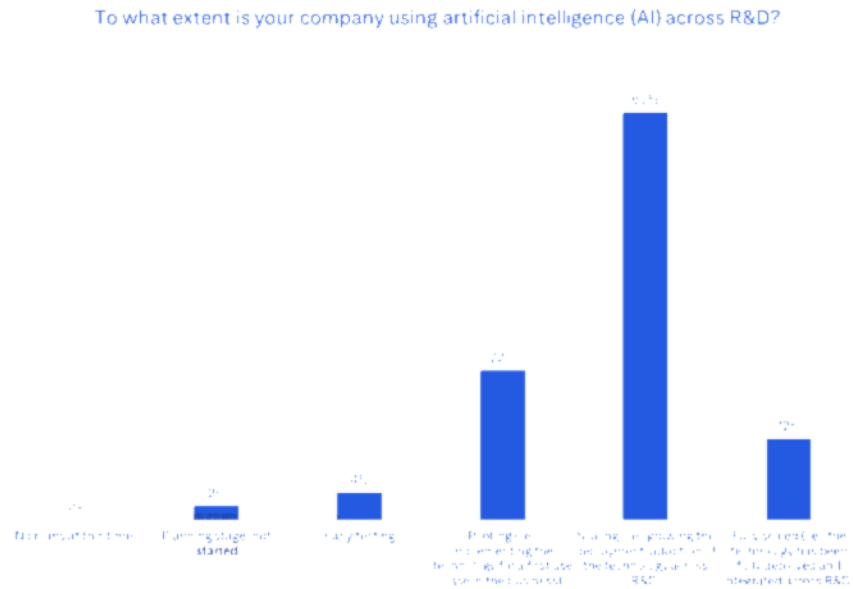
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CITI'S TAKE

We conducted a survey with 50 executives who have responsibility for technology application in pharmaceuticals' R&D in the US in June 2026. The survey result confirms AI adoption is now mainstream within pharmaceuticals, with decisive focus on early-stage discovery. While the majority expect moderate POS improvement for AIDD, we think the more Ph2 POC, Ph3 or even market approvals of AI developed drugs can increase people's confidence. Spending momentum is unambiguously strong, as a large portion of firms anticipate double-digit budget increases over the next 12 months. We believe the key competitive advantages are superior algorithms and proprietary data, and ultimate platform validation will require tangible outcomes like an approved drug or demonstrably faster candidate nomination.

Figure 1. To what extent is your company using artificial intelligence (AI) across R&D?



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See Appendix A-1 for Analyst Certification, Important Disclosures and Research Analyst Affiliations.

Proprietary Survey of global AI use in drug R&D

We conducted a survey with 50 executives who have responsibility for technology application in pharmaceuticals' R&D. The survey was conducted in the US in June 2026. Research Innovation Lab was engaged to perform research for this report.

Conclusions

We found AI adoption in drug R&D was now mainstream, and most applications focused on early-stage drug discovery. We believe AI's advantage in clinical trials and manufacturing will gradually emerge as well. Algorithm remains the top factor when pharma/ biotech cooperate with external AI partners, suggesting preference on the AI platform itself rather than purely asset-focused. While only 24% of the respondents expect significant improvement in success probability for AI-discovered or optimized assets and 56% expect moderate improvement, we think the more Ph2 POC, Ph3 or even market approvals of AI developed drugs can increase people's confidence. AIDD spending momentum is unambiguously strong, with the majority expecting double-digit budget increases over the next 12 months. The principal friction remains data trust, suggesting proprietary internal data is the most derisked.

High-level survey takeaways

- **AI adoption in pharma R&D is now mainstream, not emerging.** With 72% of respondents already scaling or fully scaling AI across R&D, and zero companies reporting no plans to adopt, the question is no longer whether to deploy AI but how fast and how broadly. The focus has shifted decisively upstream — protein structure prediction, lead optimization, and target identification are the areas of greatest current activity, reflecting the maturity of foundational AI tools like AlphaFold and related platforms.

- **Expectations for impact are high but calibrated.** The modal view (56%) is that AI will deliver *moderate* improvement in drug success probability — not a wholesale revolution. Only 24% expect *significant* improvement, suggesting that while executives are genuinely optimistic, they are not naïve about the complexities of biology. The 38% who believe AI will *fundamentally change* drug development remain a minority, and 34% acknowledge that human biology, clinical judgment, and execution will remain bottlenecks. This is consistent with the observation that cost reduction expectations are meaningful (64% expect >11% cost savings) but rarely .

- **The biggest perceived value of AI currently lies in early-stage discovery, not late-stage development.** Target identification/validation (70%), lead optimization (54%), and hit identification/screening (54%) are where executives most expect improved success rates. In contrast, Phase III success rate improvement is expected by only 10%, which needs to be proved. This is logically consistent — AI's strongest current capabilities lie in pattern recognition across molecular biology and chemistry, not in the complex human physiological variability that governs late-stage clinical outcomes.

- **Shortening discovery timelines is the primary commercial motivation for external AI partnerships.** 68% of respondents cite timeline acceleration as the top reason to partner externally, ahead of accessing novel biology (52%) or cost reduction (42%). This implies that the financial case for AI is being made primarily on speed-to-IND and speed-to-candidate, which should serve as a

useful framework for evaluating the commercial attractiveness of external AI drug discovery platforms.

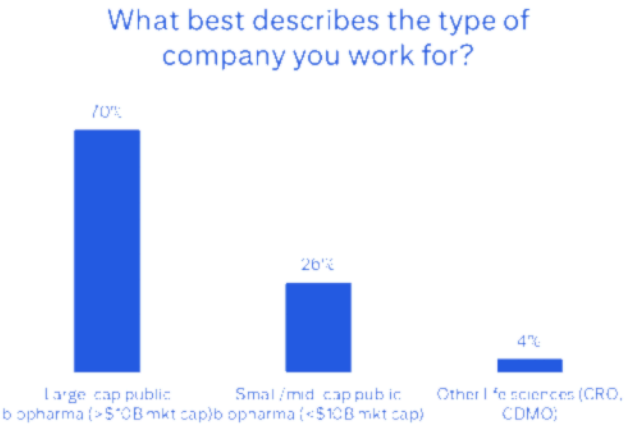
- **Data ownership and security are the central anxiety around AI vendor partnerships.** Data security/compliance tops vendor selection criteria at 70%, and respondents show notable caution about allowing AI partners to retrain general models on proprietary collaboration data — 36% would only permit it within restricted fields and 14% would refuse entirely. This suggests that despite high engagement (84% have worked with or evaluated external AI companies), trust and IP concerns remain a meaningful friction point in commercializing AI platforms.

- **Spending momentum is strong and accelerating.** No respondents expect meaningful spending cuts, while the majority anticipate 10–50% budget increases over the next 12 months. Combined with already-substantial spending levels (26% of respondents have spent over US$50M in the past year), this signals a sustained investment cycle that should benefit AI platform companies, infrastructure providers, and specialized vendors across the drug discovery value chain.

Sample Profile

The survey sample skews heavily toward large-cap public biopharma, with all respondents headquartered in the United States and serving as solo or joint decision-makers in their company's R&D technology strategy. Specifically, **70%** of respondents work at large-cap public biopharma (>$10B market cap), 26% small/mid-cap biotech (<$10B market cap), and 4% at other life science companies (CRO, CDMO). In terms of job function, **100% have an R&D role**, followed by Operations (30%), IT (22%), Manufacturing (16%), Marketing (6%), Sales (4%), and Other (4%). All company headquarters are located in the **United States**, and all respondents describe their role as a **solo or joint decision-maker** in their company's R&D technology strategy and implementation.

Figure 2. What best describes the type of company you work for?



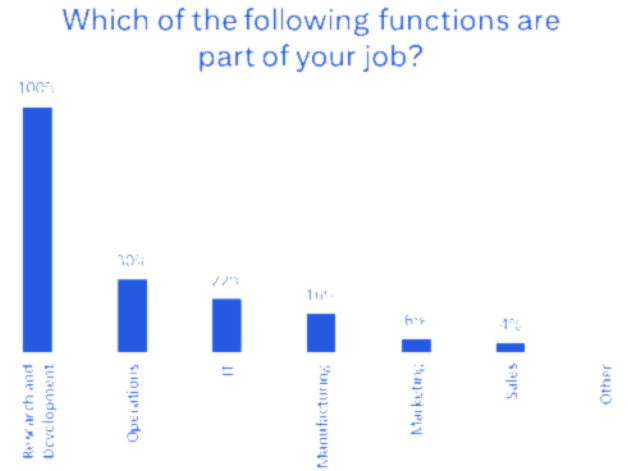
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Figure 3. Where are the headquarters of your company located?



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Figure 4. Which of the following functions are part of your job?



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Figure 5. Which of the below statements best describes your role in your company's R&D's technology strategy and implementation?

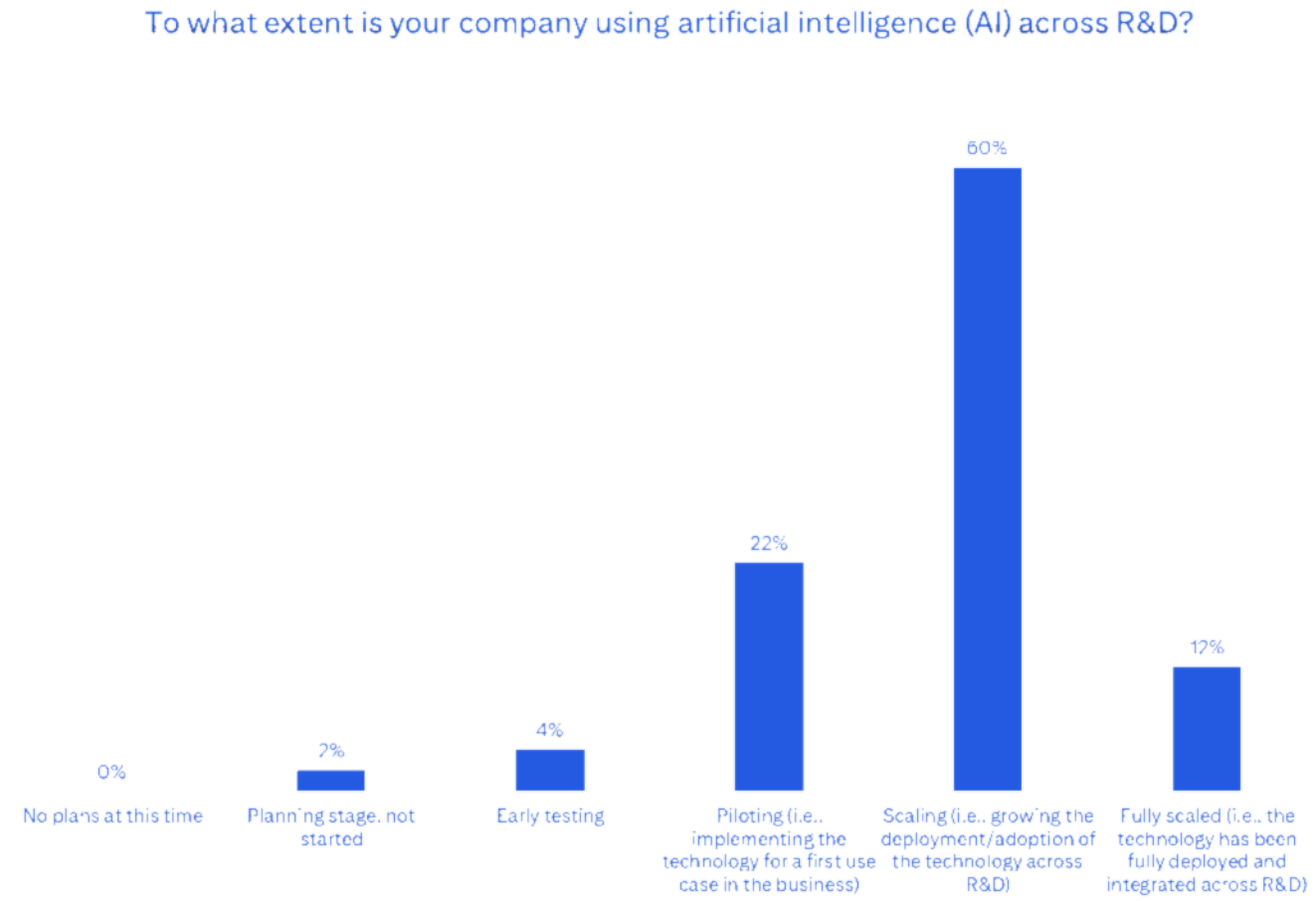


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High AI Adoption in drug R&D

The overwhelming majority of respondents are already scaling or have fully deployed AI across R&D, with **60%** at the scaling stage, **22%** piloting, **12%** fully scaled, **4%** in early testing, and only **2%** at the planning stage — and **0%** with no plans at all.

Figure 6. To what extent is your company using artificial intelligence (AI) across R&D?



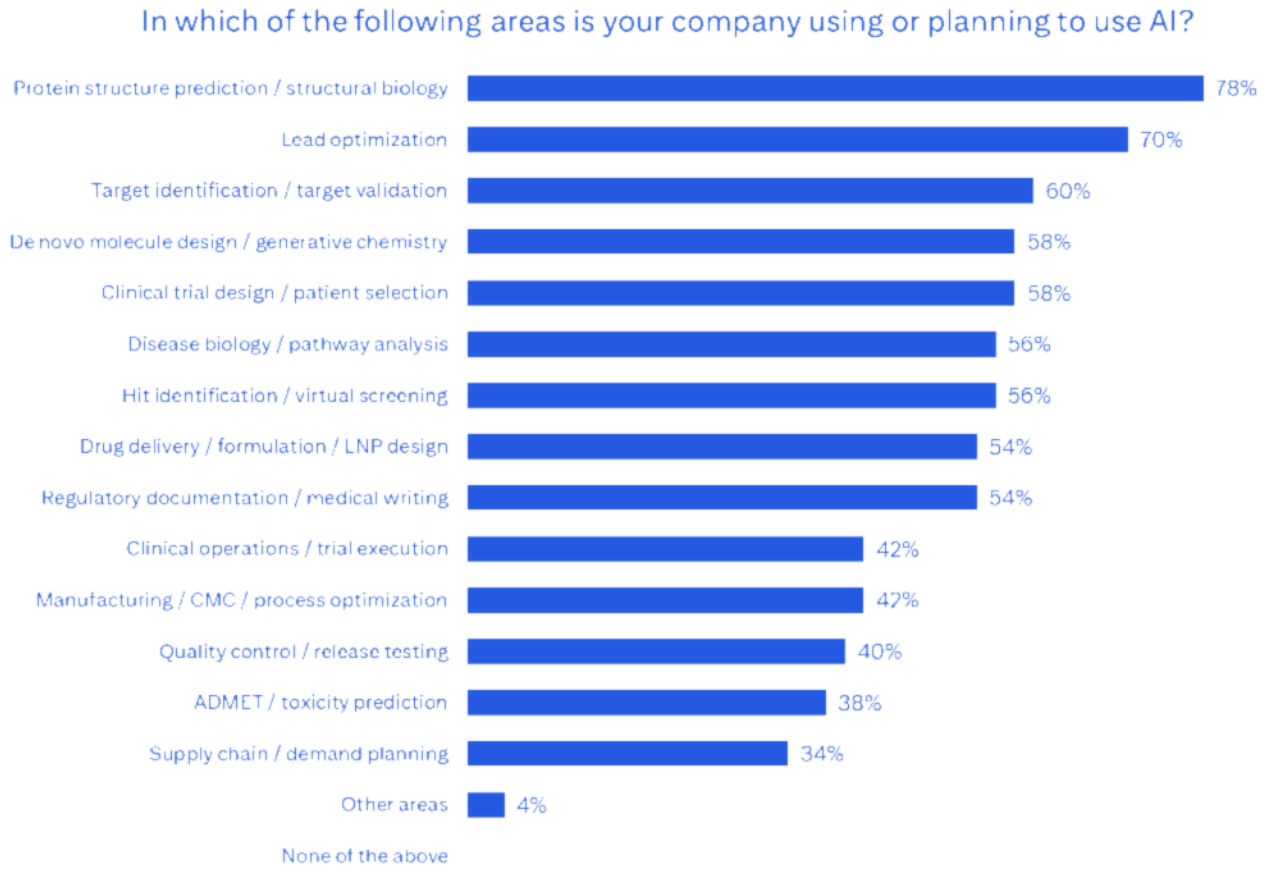
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AI application area

Protein structure prediction/structural biology leads adoption at **78%**, followed by lead optimization (70%) and target identification/target validation (60%), with most focusing on early-phase drug discovery. For clinical stage, clinical trial design / patient selection illustrates 58% AI adoption, and Clinical operations / trial execution has 42%. Additionally, AI adoption rate is 54% in regulatory documentation / medical writing.

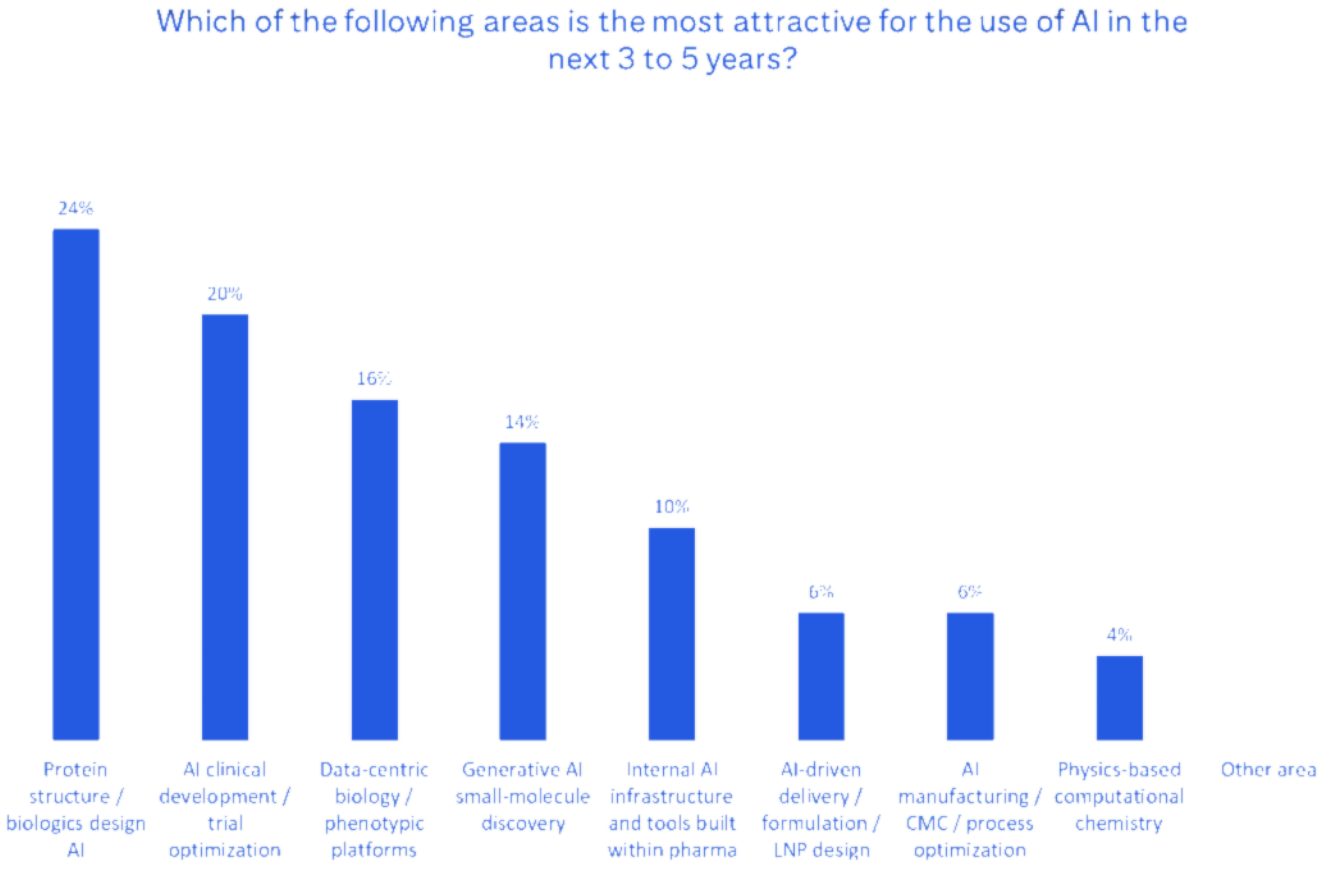
Figure 7. In which of the following areas is your company using or planning to use AI?



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Protein structure/biologics design AI is ranked the most attractive area for the next 3–5 years (**24%**), followed by AI clinical development/trial optimization (**20%**) and data-centric biology/phenotypic platforms (**16%**), with generative AI small-molecule discovery (**14%**).

Figure 8. Which of the following areas is the most attractive for the use of AI in the next 3 to 5 years?



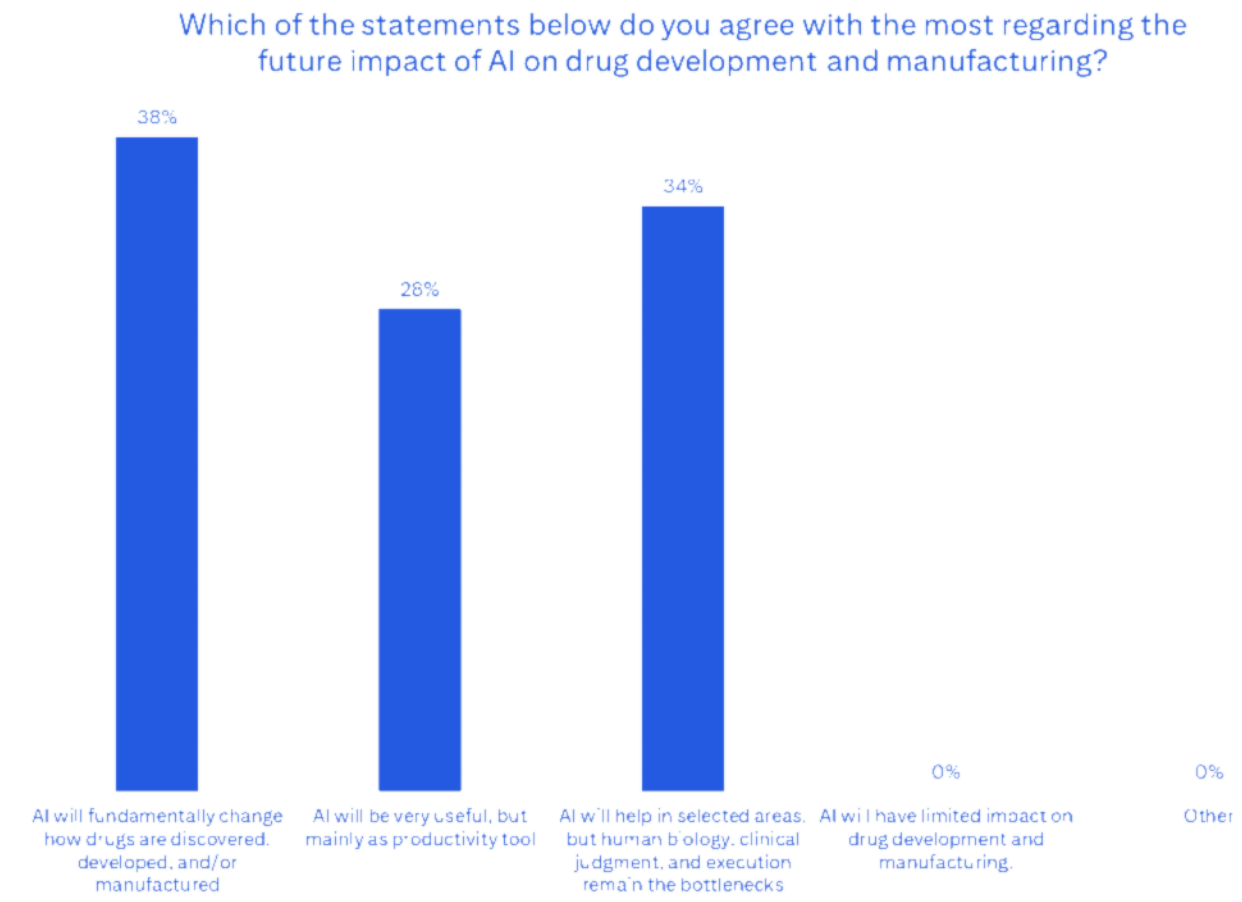
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AI Impact

Executives are broadly optimistic, with **38%** believing AI will fundamentally change how drugs are discovered, developed, and/or manufactured, **34%** believing AI will help in selected areas but human biology, clinical judgment, and execution remain the bottlenecks, and **28%** viewing AI mainly as a productivity tool — while **0%** believe AI will have limited impact or selected "Other."

Figure 9. Which of the statements below do you agree with the most regarding the future impact of AI on drug development and manufacturing?



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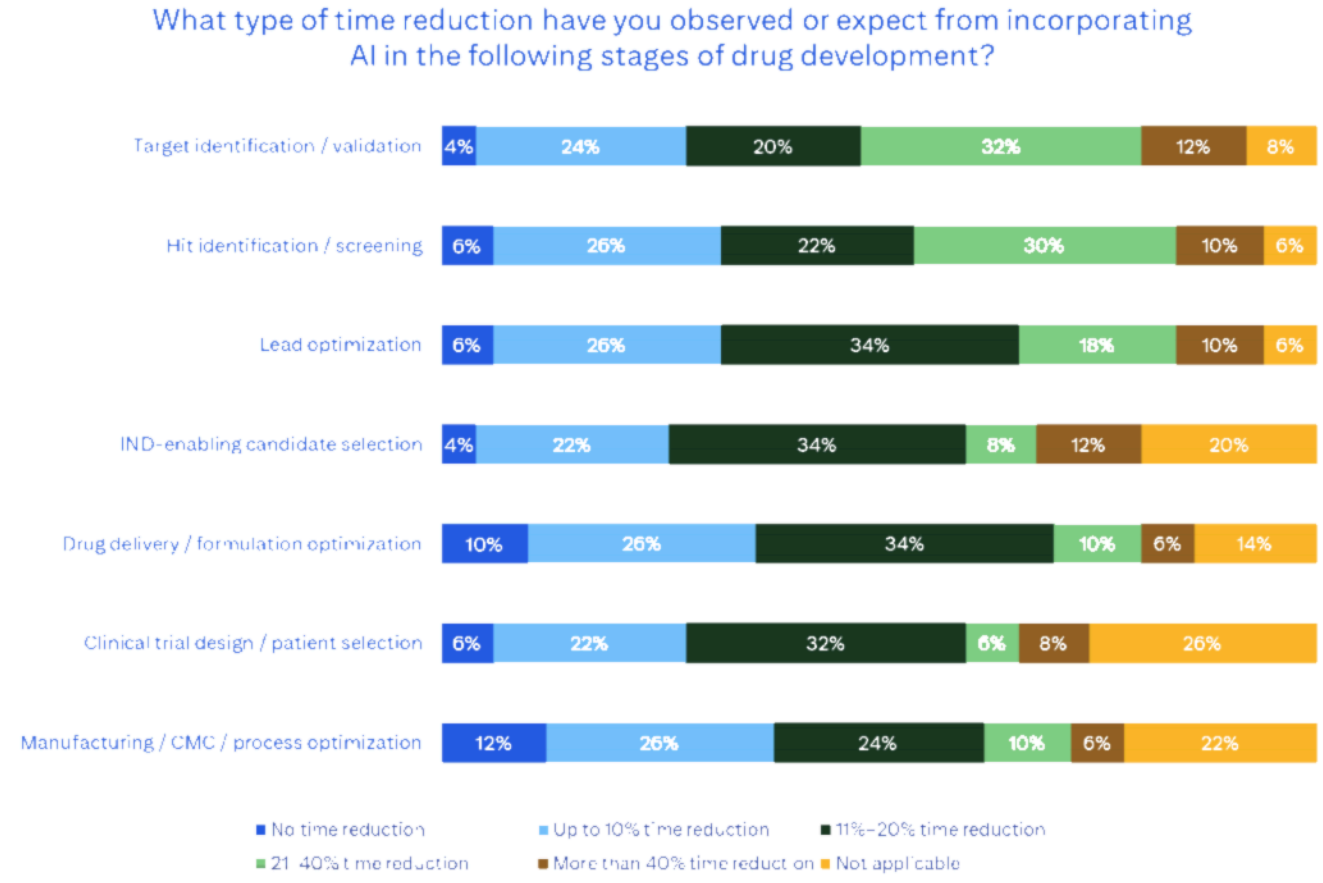
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AI reduces time and cost

Across all stages surveyed — Target Identification/Validation, Hit Identification/Screening, Lead Optimization, IND-enabling Candidate Selection, Drug Delivery/Formulation Optimization, Clinical Trial Design/Patient Selection, and Manufacturing/CMC/Process Optimization — the majority of respondents expect meaningful time savings, particularly in the **11%–20%** range, with Target Identification/Validation showing the highest proportion expecting 21-40% reduction. Even for manufacturing/ CMC/ process optimization, nearly a half of the respondents think AI can save 0-20% time.

Figure 10. What type of time reduction have you observed or expect from incorporating AI in the following stages of drug development?

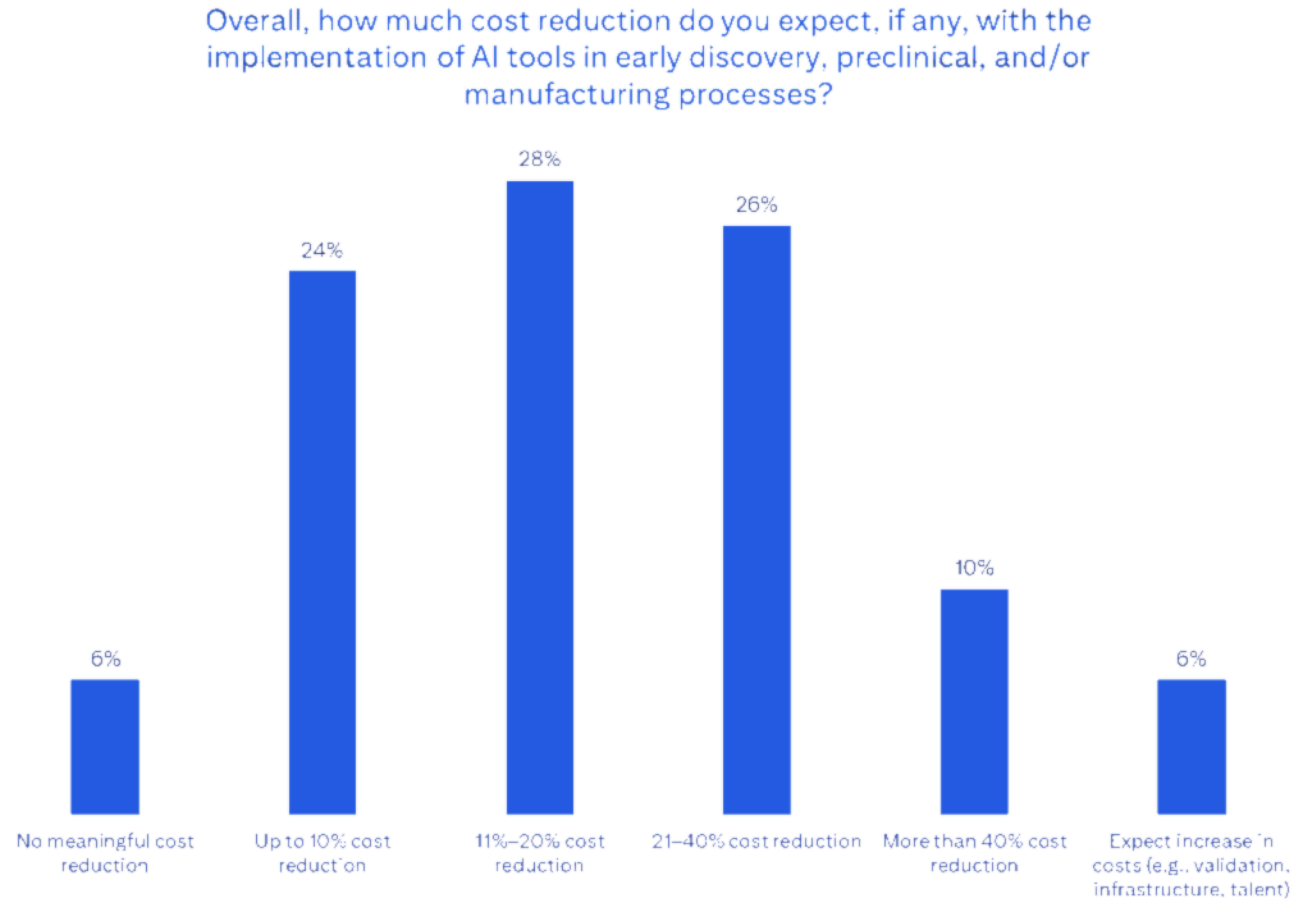


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Most respondents anticipate moderate-to-significant cost savings, with **28%** expecting 11–20% cost reduction, **26%** expecting 21–40%, and **24%** expecting up to 10% — while only **6%** foresee no meaningful cost reduction and another **6%** expect costs to increase.

Figure 11. Overall, how much cost reduction do you expect, if any, with the implementation of AI tools in early discovery, preclinical, and/or manufacturing processes?



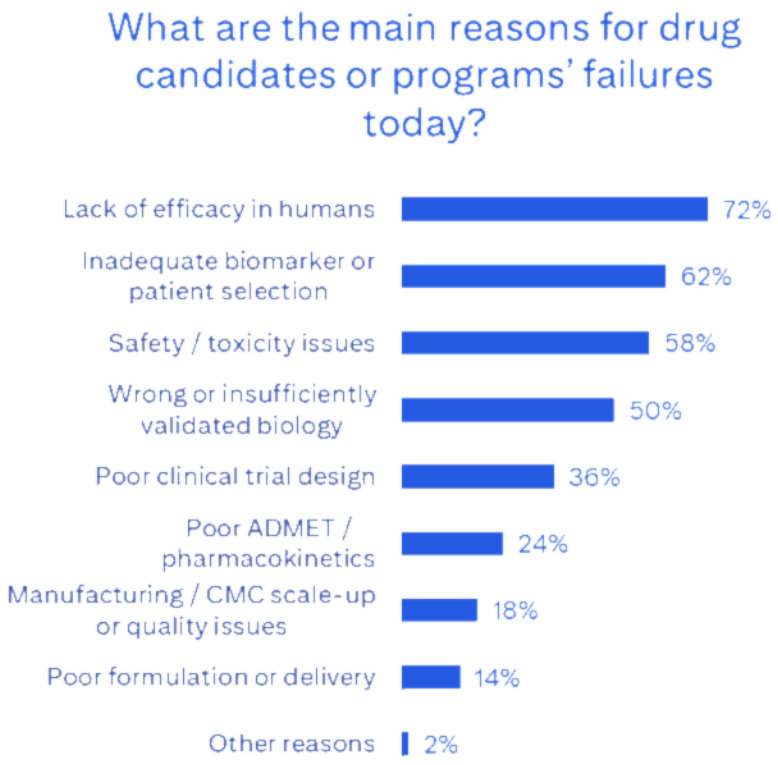
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AI to optimize R&D

Lack of efficacy in humans is cited as the top failure reason (**72%**), followed by inadequate biomarker or patient selection (**62%**) and safety/toxicity issues (**58%**), while poor formulation/delivery (**14%**) and manufacturing/CMC issues (**18%**) are considered less critical contributors.

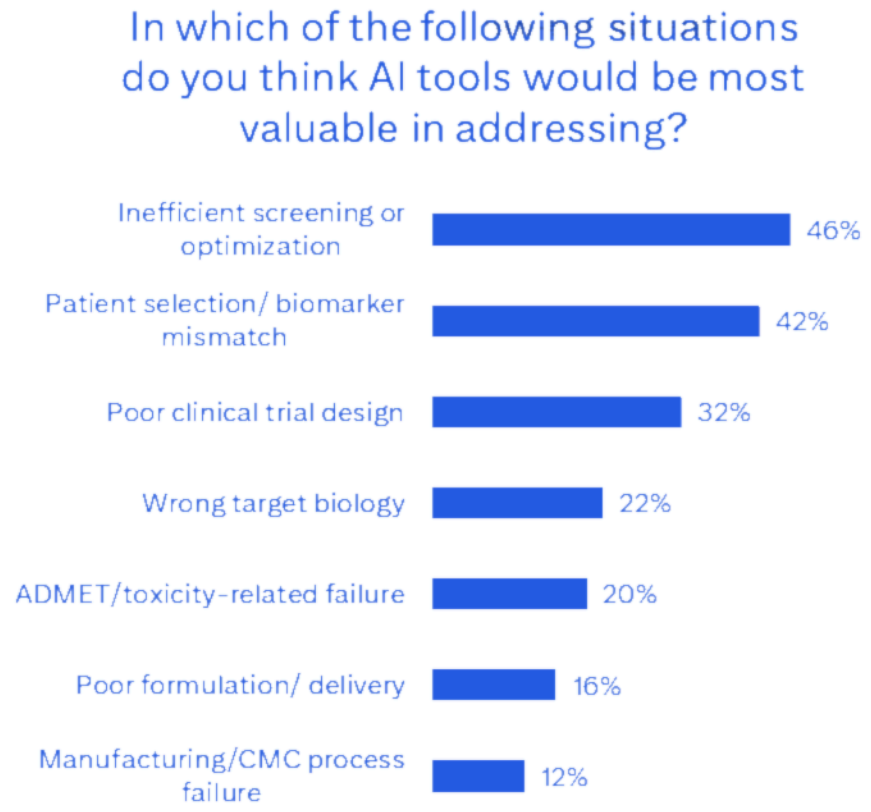
Figure 12. What are the main reasons for drug candidates or programs' failures today?



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Inefficient screening or optimization is seen as the area where AI can add the most value (**46%**), followed by patient selection/biomarker mismatch (**42%**) and poor clinical trial design (**32%**), while manufacturing/CMC process failure is ranked the least addressable by AI (**12%**).

Figure 13. In which of the following situations do you think AI tools would be most valuable in addressing?

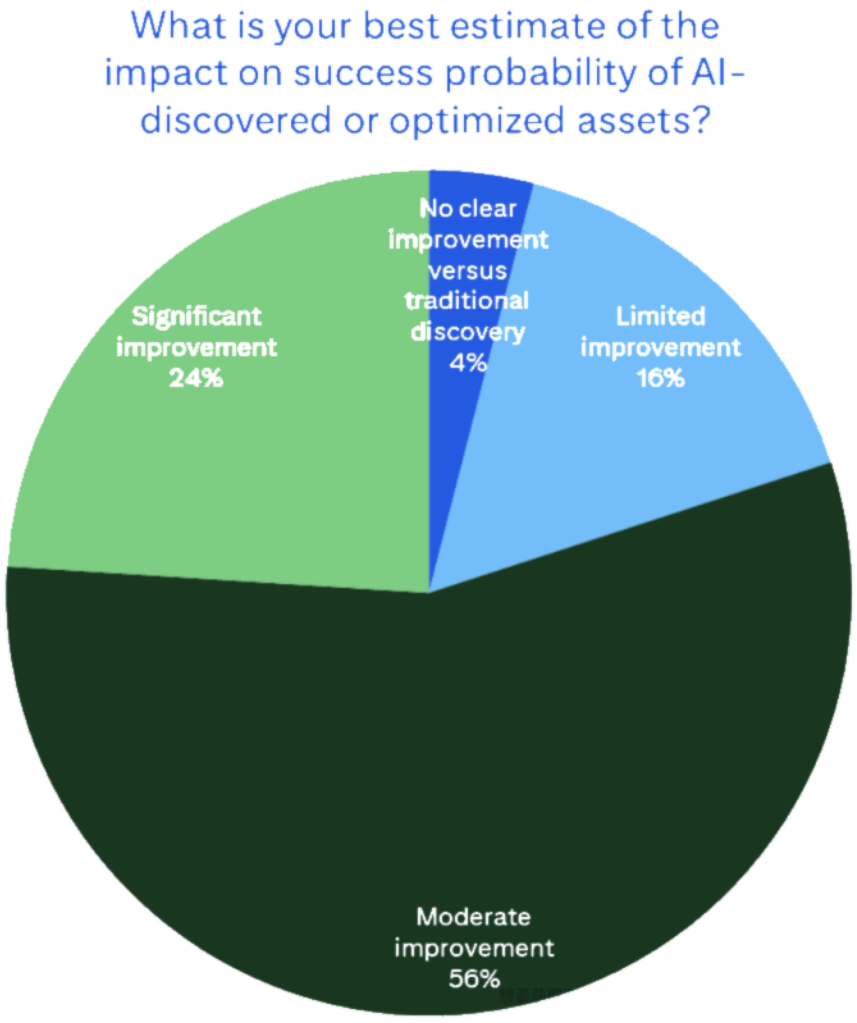


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Expected Success with AI

A strong majority — **56%** — expect moderate improvement in success probability for AI-discovered or optimized assets, **24%** expect significant improvement, **16%** expect limited improvement, and only **4%** see no clear improvement versus traditional discovery.

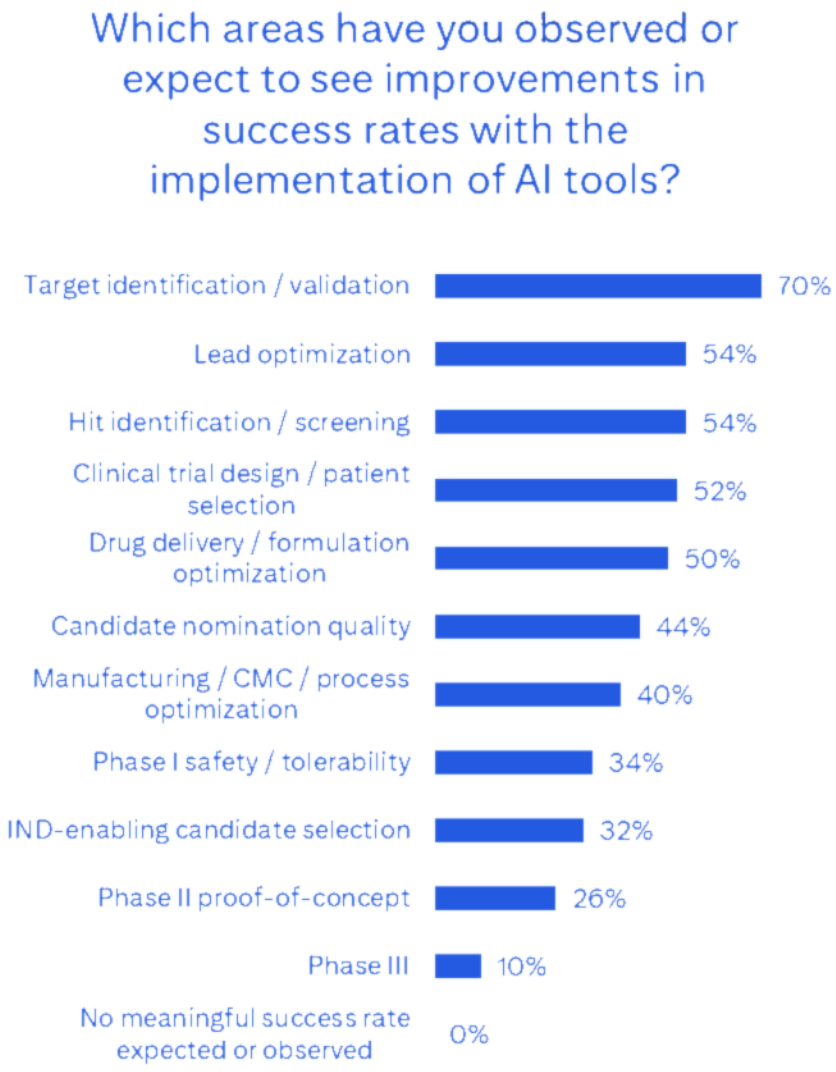
Figure 14. What is your best estimate of the impact on success probability of AI-discovered or optimized assets?



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Target identification/validation leads expectations for improved success rates (**70%**), followed by lead optimization and hit identification/screening (both **54%**), and clinical trial design/patient selection (**52%**), while Phase III success rate improvement is expected by only **10%** of respondents and **0%** see no meaningful success rate improvement in any area.

Figure 15. Which areas have you observed or expect to see improvements in success rates with the implementation of AI tools?



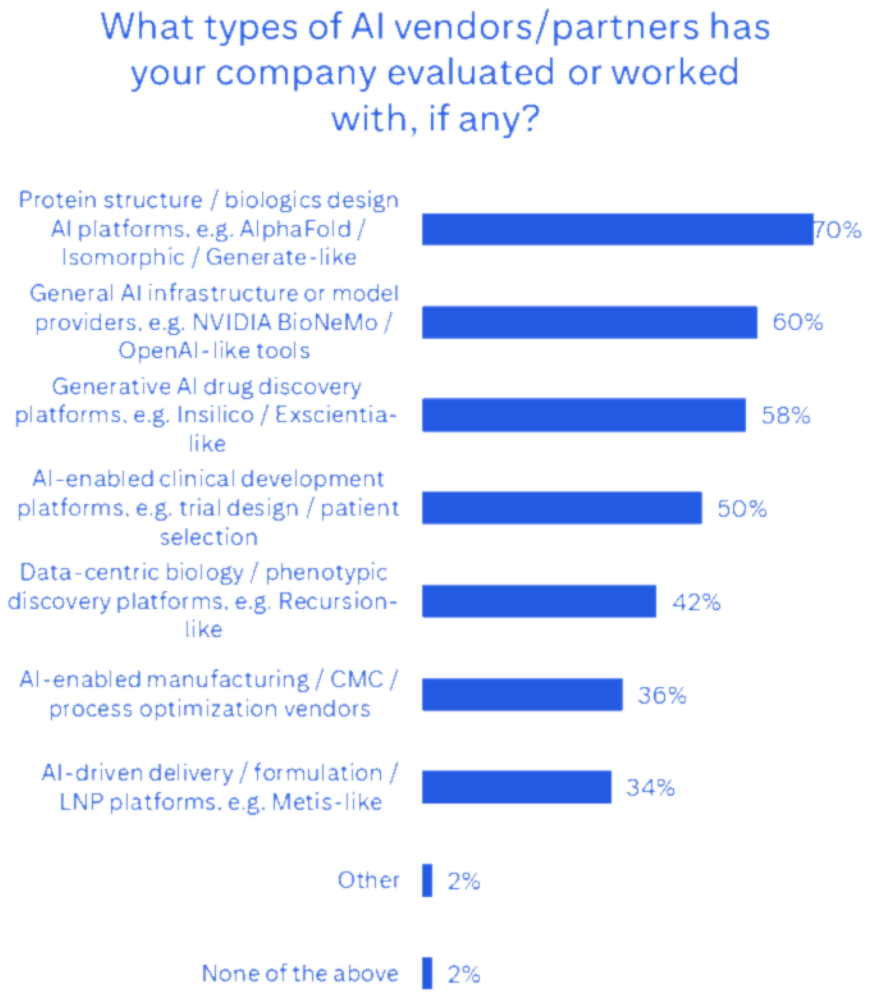
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AI Vendors

Protein structure/biologics design AI platforms (e.g., AlphaFold/Isomorphic/Generate-like) are the most widely evaluated (**70%**), followed by general AI infrastructure or model providers such as NVIDIA BioNeMo/OpenAI-like tools (**60%**), generative AI drug discovery platforms (e.g., Insilico/Exscientia-like) (**58%**), and AI-enabled clinical development platforms (**50%**).

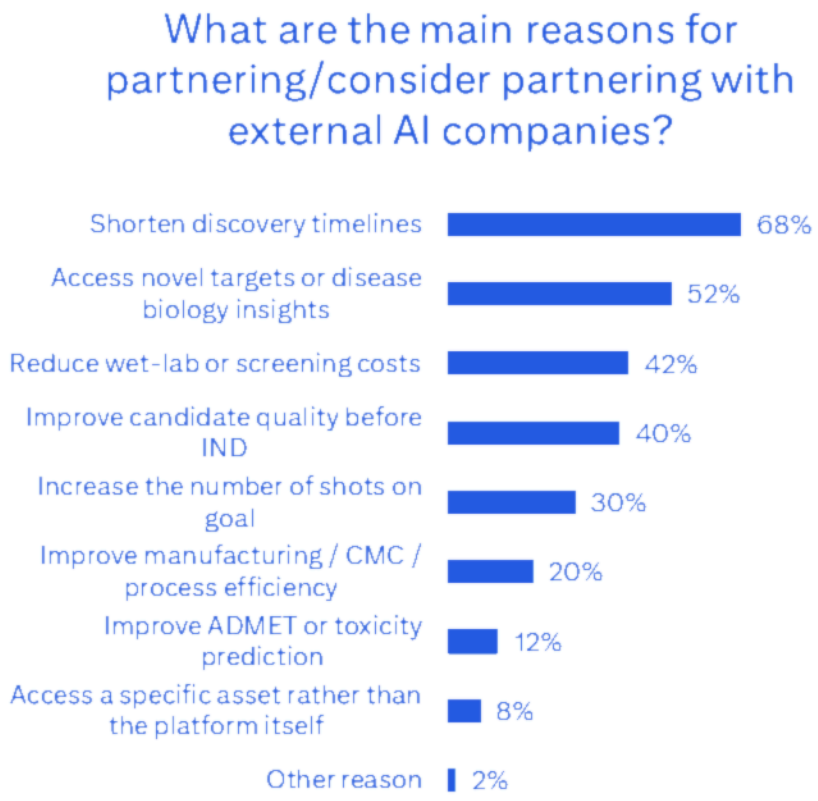
Figure 16. What types of AI vendors/partners have your company evaluated or worked with, if any?



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Shortening discovery timelines is the primary motivation for external AI partnerships (**68%**), followed by accessing novel targets or disease biology insights (**52%**) and reducing wet-lab or screening costs (**42%**), and improving candidate quality before IND. Interestingly, only 8% of respondents chose accessing a specific asset rather than the platform itself is the least cited reason, showing collaboration intention with AI-featured platforms.

Figure 17. What are the main reasons for partnering/consider partnering with external AI companies?



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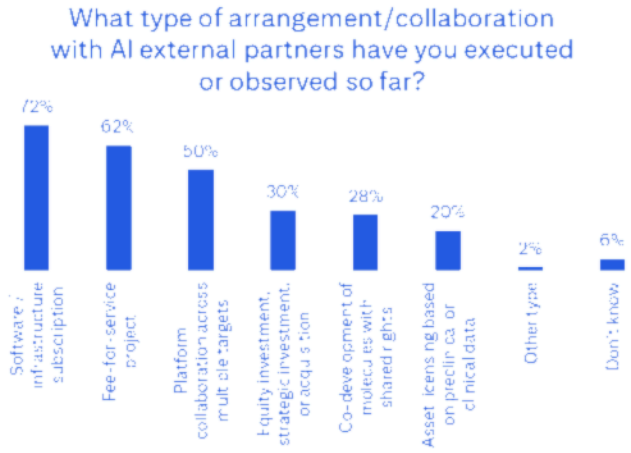
Software/infrastructure licensing is the most common collaboration type (**72%**), followed by fee-for-service arrangements (**62%**) and platform collaboration (**50%**), while asset licensing based on milestones (**20%**) and co-development of assets (**28%**) are less prevalent.

We also notice high reliance on cooperation with an external AI partner, For the possibility of AI-input projects using internal capabilities only with the absence of external AI partners, respondents are split, with **46%** saying "No," **44%** saying "Maybe," and only **10%** saying "Yes".

To the extent of allowing an external AI partner to use data generated from your collaboration to train or improve its general AI models for use with other customers, respondents show significant caution: **36%** would allow it only within a restricted field or target area, **22%** only if data is anonymized and non-identifiable, **14%** only if commercially compensated, **14%** would not allow model training using proprietary data, and **14%** don't know.

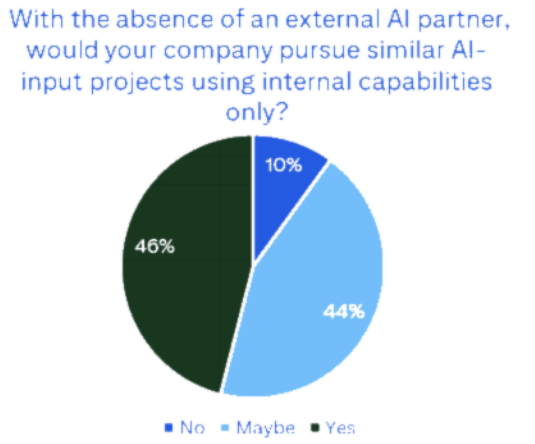
When selecting an AI partner/vendor, data security/compliance is the top selection criterion (**70%**), closely followed by quality of AI models/algorithms (**68%**), while demonstrated candidate nomination/clinical asset track record (**36%**), costs (**34%**), and speed of execution (**28%**) also rank highly; manufacturing/CMC know-how is the least important factor (**6%**).

Figure 18. What type of arrangement/collaboration with AI external partners have you executed or observed so far?



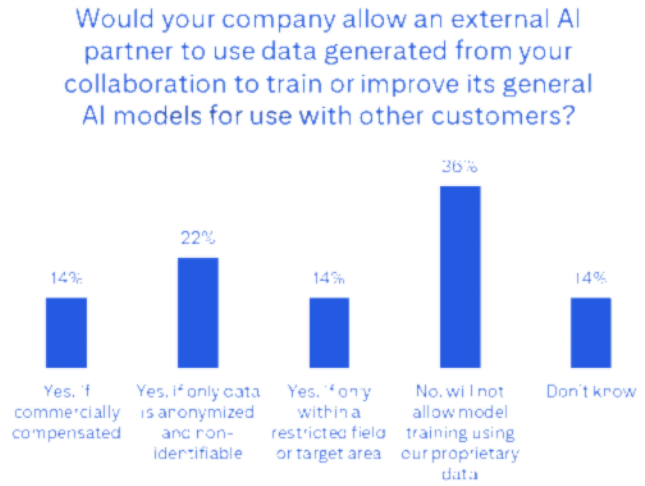
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Figure 19. With the absence of an external AI partner, would your company pursue similar AI-input projects using internal capabilities only?



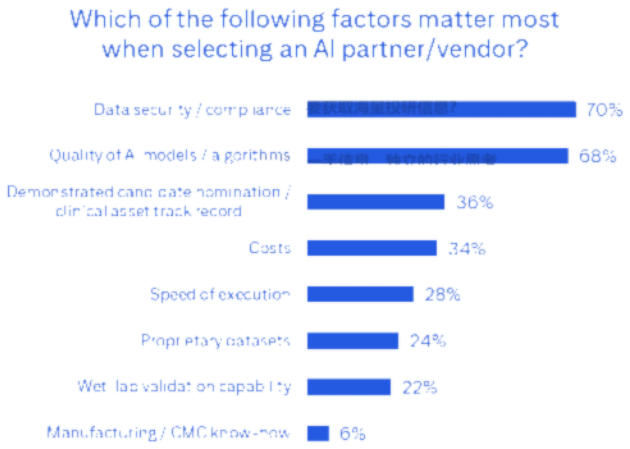
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Figure 20. Would your company allow an external AI partner to use data generated from your collaboration to train or improve its general AI models for use with other customers?



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Figure 21. Which of the following factors matter most when selecting an AI partner/vendor?

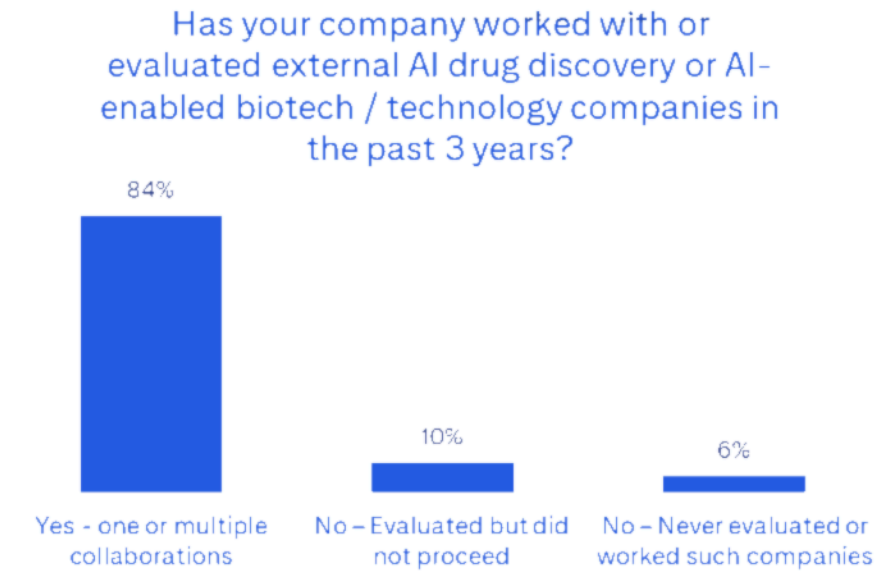


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AI Drug Discovery Platform

The vast majority — **84%** — have worked with or evaluated at least one external AI drug discovery or AI-enabled biotech/technology company in the past 3 years, while only **6%** have never evaluated such companies.

Figure 22. Has your company worked with or evaluated external AI drug discovery or AI-enabled biotech / technology companies in the past 3 years?

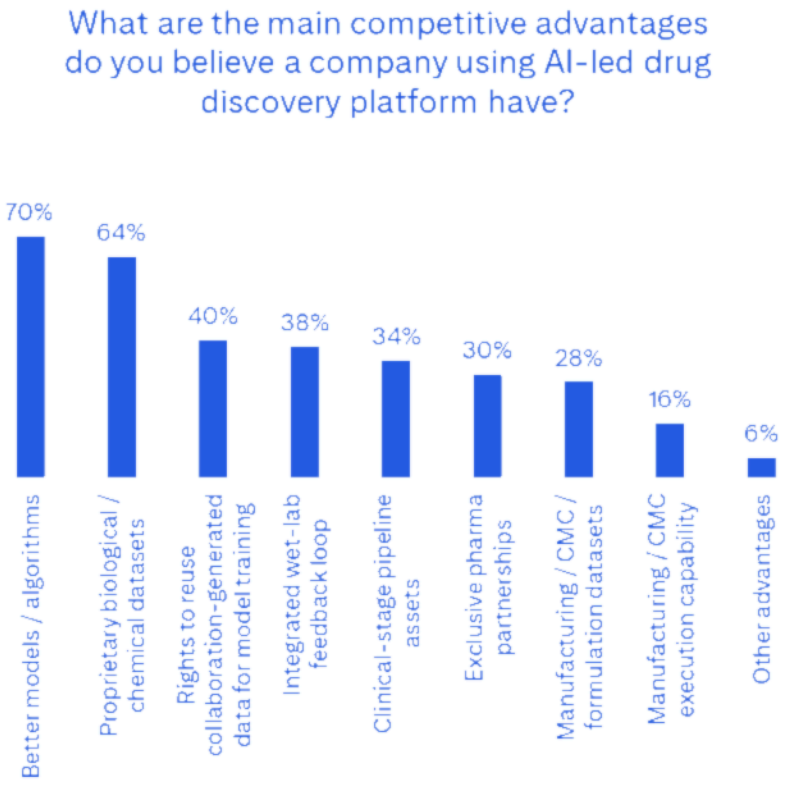


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Better models/algorithms is ranked the top competitive advantage (**70%**), followed by proprietary biology data (**64%**) and rights to reuse data for model training (**40%**), followed by integrated wet-lab feedback loop (38%) and clinical-stage pipeline (34%), while manufacturing/CMC know-how (**16%**) and other advantages (**6%**) are considered much less differentiating.

Figure 23. What are the main competitive advantages do you believe a company using AI-led drug discovery platform have?

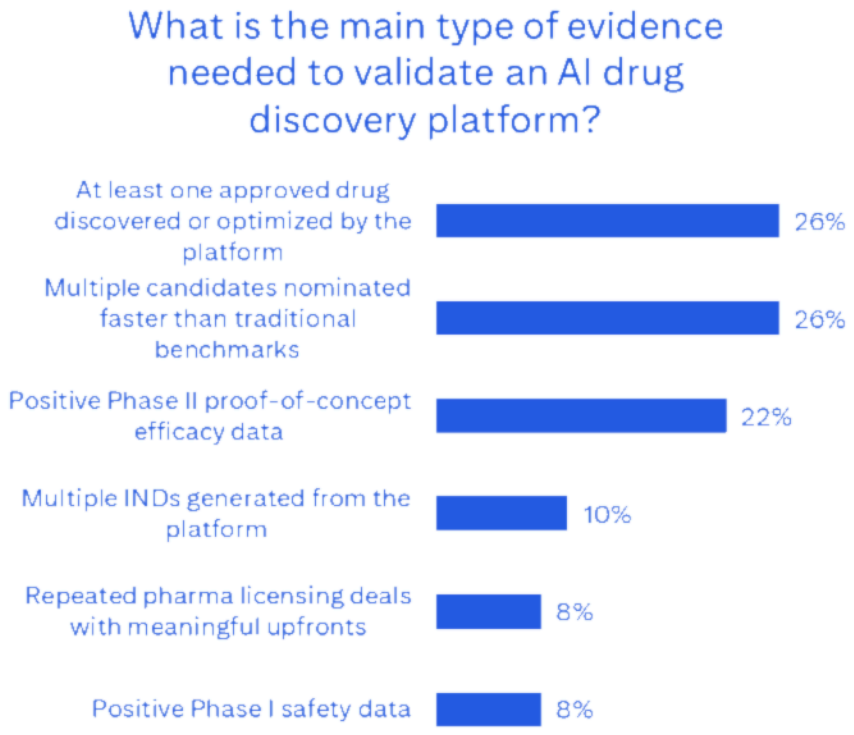


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Both "at least one approved drug discovered or optimized by the platform" and "multiple candidates nominated faster than traditional benchmarks" are tied as the most compelling forms of validation (each **26%**), followed by positive Phase II proof-of-concept efficacy data (**22%**), while positive Phase I safety data and repeated pharma licensing deals are seen as less definitive evidence (each **8%**).

Figure 24. What is the main type of evidence needed to validate an AI drug discovery platform?

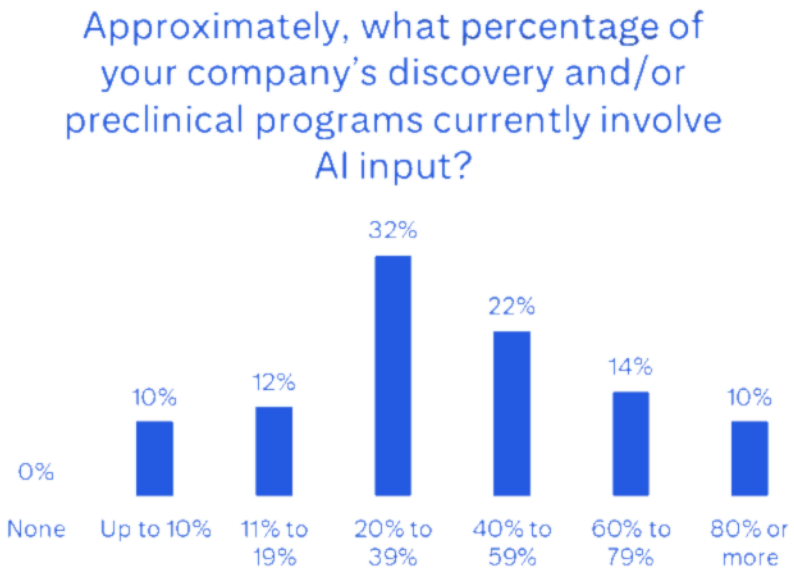


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AI Input Analysis

The most common response is 20–39% of programs have AI input (**32%**), followed by 40–59% (**22%**) and 60–79% (**14%**), indicating that AI input is already mainstream across the discovery and preclinical pipeline for most respondents.

Figure 25. Approximately, what percentage of your company's discovery and/or preclinical programs currently involve AI input?



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AIDD budget

Spending on AIDD is spread across a wide range: 24% spent US$1M-9.99M, 18% up to US$1M, 16% US$10M–49.9M, 10% US$50M–99.9M,8% US$100M–500M, 10% over US$500M, and only **4%** spent nothing — reflecting substantial and broad-based investment.

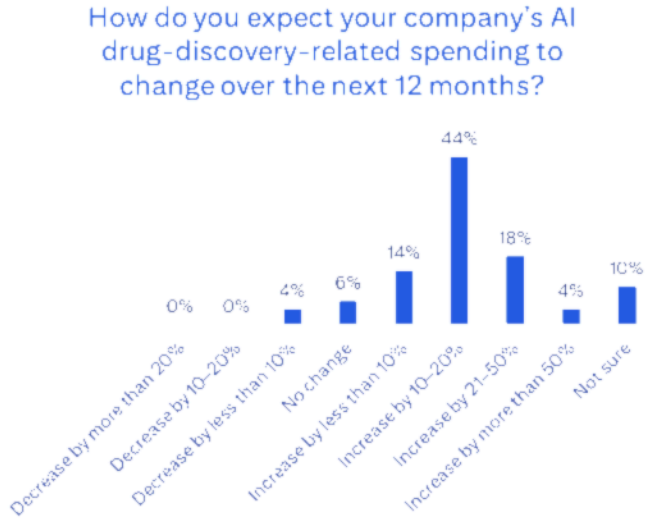
Budget growth is clearly anticipated, with **44%** expecting an increase of 10–20%, **18%** expecting 21–50% growth, and **14%** expecting less than 10% increase; no respondents expect a decrease of more than 10%, and only **4%** expect a decrease of less than 10%.

Figure 26. Approximately how much has your company spent on AI drug-discovery related projects in the past 12 months?



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Figure 27. How do you expect your company's AI drug-discovery-related spending to change over the next 12 months?



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