Beyond Efficiency: China's Next Leap in Biopharma Innovation

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Introduction

Over the past decade, China's biopharma innovation has undergone a deep and systemic "efficiency revolution," centered on a reshaping of system capabilities defined by scale, speed, and cost. As regulatory rules have progressively aligned with international standards, and as capital, talent, and the academia-industry ecosystem have rapidly coalesced, China has moved from being a follower on the margins of the global innovation system into an increasingly influential innovation hub. This accumulation of capabilities has elevated China into the forefront of global biopharma innovation.

Looking to the next decade, China's biopharma innovation stands at a new inflection point. The key question is whether efficiency gains can be translated into globally recognized innovation value—with the accompanying price tag. Moving from efficiency advantage to value leadership means shifting from an innovation model defined by efficiency to one defined by quality, originality, system maturity, and long-term sustainability. This transition will materially reshape China's role in the global innovation system and redefine its trajectory over the next decade.

As China's biopharma innovation enters a phase marked by accelerating breakthroughs, deepening validation, and expanding global recognition, BCG has tracked its evolution since 2020 and systematically examined the forces driving its rise. This report builds on that foundation and looks ahead to where China's biopharma innovation is headed over the next decade. We first examine China's new global stance in biopharma innovation and the evolving innovation paradigm that will define the years ahead. We then turn to the resilience of China's innovation ecosystem, unpacking the key enablers that support its continued evolution, especially the ecosystem's capacity for self-reinforcement and resilience, and how these will shape the boundaries and upper limits of innovation in the next decade.

China's New Global Stance in Biopharma Innovation and Its Next-Decade Trajectory

Over the past decade, China has emerged as a pivotal force in global innovative drugs, with momentum continuing to build. This rise has been powered by system-level advantages in scale, speed, and cost, which have been compounded by iteration and have gradually evolved into a sustainable innovation flywheel.

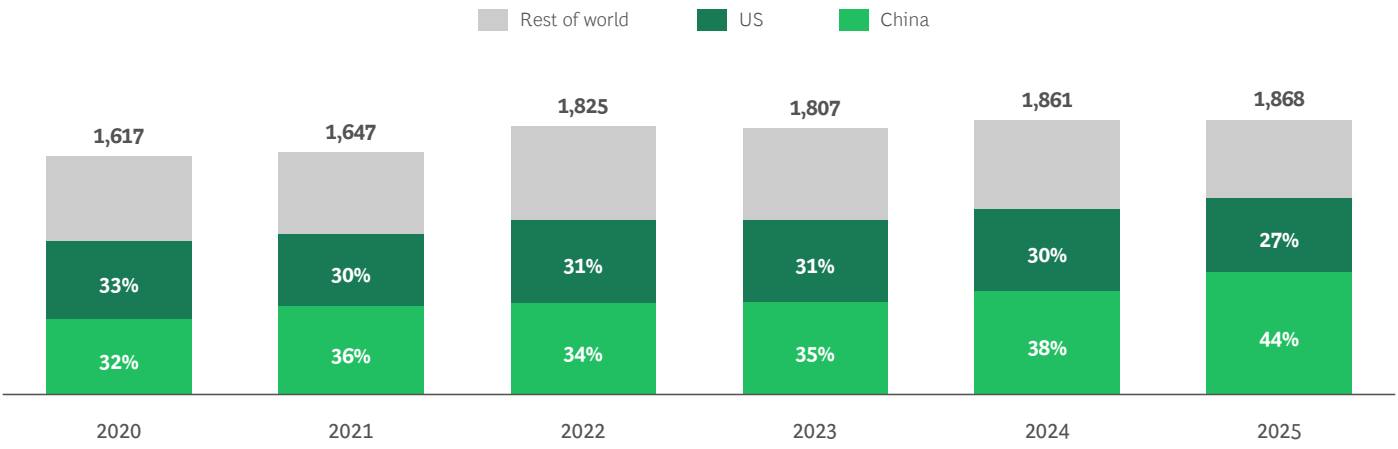
China's New Global Stance

Since 2021, China has surpassed the US in the annual number of new molecular entities (NMEs) entering clinical development, and the gap has widened further since. (See **Exhibit 1**.) More importantly, "scale" in the context of Chinese innovation is shifting from dense concentration in a few areas to broader expansion in both volume and breadth. The disease mix is no longer overwhelmingly centered on oncology; it is expanding outward across multiple therapeutic areas. In several global R&D hotspots, including respiratory, dermatology, immunology, gastrointestinal, and cardiovascular diseases, China already accounts for a larger share of clinical-stage innovative drug molecules than the US. That expansion, however, is not uniform. In neurology, psychiatry, and other areas with more complex mechanisms and greater uncertainty in translational pathways, China still trails the US significantly. (See **Exhibit 2**.) Overall, China's innovative drug innovation is moving beyond isolated breakthroughs, towards more structural and sustained output, making it an increasingly important engine of global innovation.

EXHIBIT 1

China Is Now a Pivotal Force in Global Innovative Drugs, with Strong Growth and Robust Output

Global number of NMEs newly entering clinical development, by year

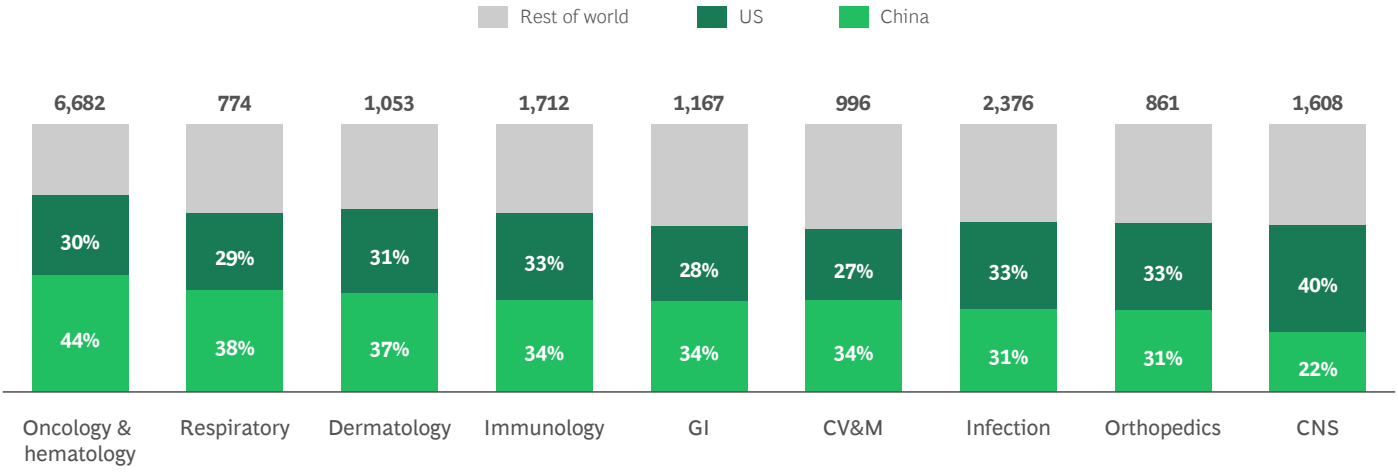


Sources: DXY; BCG analysis.

EXHIBIT 2

China's Pipeline Is Growing in Both Scale and Breadth, Spreading Across Multiple Therapeutic Areas

Share of global clinical-stage innovative drug molecules, by therapeutic area[1]

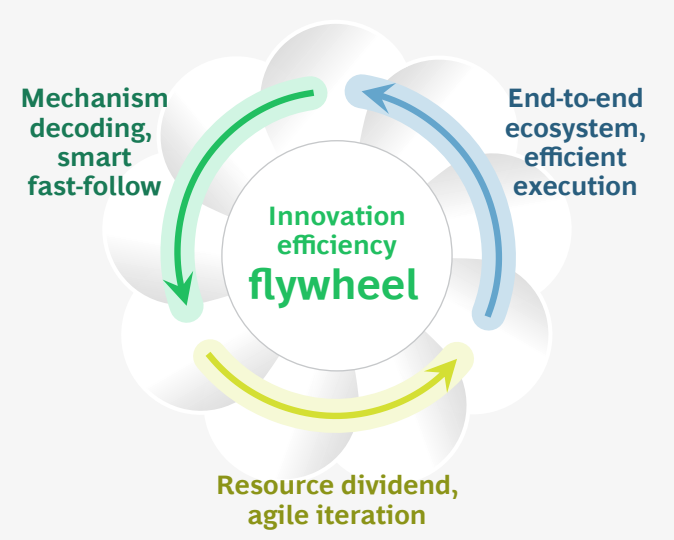


Sources: PharmCube; BCG analysis.
Note: GI = gastrointestinal. CV&M = cardiovascular and metabolism. CNS = central nervous system.
[1] Data as of January 9, 2026. Drugs for multiple therapeutic areas are counted more than once.

Underpinning the scale China has reached today are two core pillars: speed and cost efficiency, which continue to support the rapid progression and scaled output of its end-to-end R&D value chain. From target identification all the way through to new drug application (NDA) and biologics license application (BLA), China has become a global "speed apex" and "cost basin" for biopharma innovation. In drug discovery, costs are only 20%–30% of US levels, while preclinical development costs are at least 50% lower. (See **Exhibit 3**.) More importantly, this advantage is not confined to any single technology; it holds across modalities. The more labor-intensive the screening work, and the more animal studies and outsourced collaboration a modality requires during development, the more pronounced the China–US gap in both time and cost tends to be. (See **Exhibit 4**.)

These same advantages in speed and cost also carry over into clinical development. With its large patient pool and more concentrated patient-and-hospital network, China is known for rapid enrollment, which helps compress clinical timelines. This is also why more multinational companies are embedding China into earlier stages of global trial design, using its enrollment efficiency to accelerate overall development.

The foundation of China's scale, speed, and cost advantage is not merely a matter of resource endowment. It more closely resembles an innovation efficiency flywheel already in motion. Through a "decode–iterate–execute" loop, China turns information, knowledge, and engineering capabilities into sustained innovation output.



First, decode. In a global environment where information, including papers and patents, is highly accessible, Chinese teams, drawing on years of technical accumulation, are able to decode mechanisms and critical points of differentiation more quickly, and with deeper insight, enabling a smarter fast-follow capability. Take Innovent's IBI363, the world's first PD-1/IL-2α-biased bispecific antibody, as an example. Rather than simply following the old assumption that IL-2α activation of Tregs is unfavorable, the team re-examined the logic of the three-receptor IL-2 axis through in-house experimentation and research, revealing the immune-activating properties of its IL-2α molecular design. In doing so, it opened up a new path for validating an approach to the IL-2 pathway, one that many multinational companies had struggled to make work, and positioned IBI363 as a strong contender in next-generation immuno-oncology (IO). Another example is Keymed's TSLP/IL-13 bispecific antibody, which rapidly fast-followed a first-in-class (FIC) program, progressed broadly in step with multinational peers globally, and built a clear competitive edge through a differentiated long-acting design.

Second, iterate. With a deep engineer talent pool, lower costs, and shorter iteration cycles, China can run more design–test–learn loops faster. This allows teams to identify winning approaches, screen out weaker ones, and reduce uncertainty earlier, so R&D directions can be validated and optimized sooner. Akeso's FIC ivonescimab, a PD-1/VEGF bispecific antibody, illustrates this well. Early in development, the team conducted extensive combinatorial experimentation to identify the optimal IO bispecific path, and through repeated iteration, built reusable platform capabilities.

Last, execute. A mature contract research, development, and manufacturing organization (CRDMO) ecosystem translates high-frequency iteration into end-to-end delivery, supporting rapid R&D progress and scaled output with shorter timelines and lower costs. Providers represented by the WuXi Biologics ecosystem cover needs across modalities, from target discovery through preclinical development, and have earned broad recognition among global clients for delivery and quality. They also hold a clear edge over leading US and European peers in both pricing and turnaround time, at roughly 30%–50% of the price and 60%–70% of the time.

Together, these three elements form the foundation that has turned China's advantages in speed and cost from episodic strengths into system-level capabilities. As a result, China's scale, speed, and cost advantages are converting more consistently into high-quality assets that can be validated and monetized. With value and competitiveness now being priced by the global market, Chinese innovation is entering a new phase, one defined by validation and realization.

Over the past five years, China's biopharma innovation has been undergoing a step-change in quality. Confidence among domestic companies has risen markedly, with a growing number of China-origin drugs being chosen to enter head-to-head Phase III trials against global blockbusters. Among studies newly initiated in 2025, several have gone directly up against major global products such as osimertinib, venetoclax, atezolizumab, and pembrolizumab. This, in turn, reflects rising confidence not only in individual assets, but also in the system-level R&D capabilities behind them. (See **Exhibit 5**.)

EXHIBIT 3

Behind the Scale, China Has Become the Global "Speed Apex" and "Cost Basin" for Innovation

China vs the US comparison: drug R&D timelines and costs across stages

	Drug discovery	Preclinical development	IND	Pre-PoC	Post-PoC	NDA/BLA
	Hit to PCC	PK, Tox, CMC, etc.	IND to FPI	Phase I–II clinical trials	Phase III pivotal clinical trials	NDA/BLA accelerated review
Timeline	**50%–70%** US time	**<70%** US time	**>1–2 months** extra time	**>2X** from Phase Ib, US patient-per-site enrollment speed	**<70%** US patient enrollment time	**5–6 months** extra time
Cost	**20%–30%** US cost	**<50%** US cost		**<50%** US cost per patient enrollment		

Sources: BCG survey; BCG analysis.
Note: PCC = preclinical candidate. PK = pharmacokinetics. Tox = toxicology. CMC = chemistry, manufacturing, and controls. IND = Investigational New Drug. FPI = First Patient In.

EXHIBIT 4

China Delivers World-Leading R&D Speed and Cost Advantages, with Applicability Across Modalities

	Drug discovery				Preclinical (PK, Tox, CMC, etc.)	China	US
Oncology BsAb	Hit screening: 3–6 months[1]	Hit-to-lead: 3–5 months[2]	Humanization: 2–3 months[3]	Lead optimization: 2–6 months[4]	PCC: 13–18 months	24–36 months; $7–10 Mn/PCC	12–24 months slower; 3–4X higher
Hematology autologous CAR-T	Antibody library building: 4–6 months	Antibody screening: 1–2 months	In-vitro functional assays: 2–3 months	Animal studies/ process: 5–6 months/ 2 rounds[5]	PCC: 8–12 months (IITs excluded)	20–28 months; $6–9 Mn/PCC	10–14 months slower; 3.5–4.5X higher
GalNAc-siRNA	Sequence design & synthesis: 1–2 months	In-vitro cell screening: ~1 months	mouse/rat screening: 1–3 months[6]	NHP screening: 1–7 months[6]	PCC: >10 months	16–24 months; $4–7 Mn/PCC	10–18 months slower; 2.5–3.5X higher

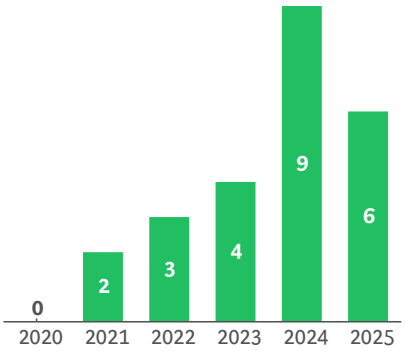
Sources: Expert interviews; desktop research; BCG analysis.
Note: PCC = preclinical candidate. PK = pharmacokinetics. Tox = toxicology. CMC = chemistry, manufacturing, and controls. IITs = investigator-initiated trials. NHP = non-human primate.
[1] Tech-dependent; hybridoma may take about 6 months.
[2] BsAb type-dependent; complex molecules (e.g., IL-based) may take longer.
[3] Tech-dependent; some molecules require little/no humanization optimization.
[4] BsAb type-dependent; complex cases may take over 4 months.
[5] If smooth and suboptimal, model/dose choices can add time and cost.
[6] Disease-dependent; long-acting data may require longer time.

EXHIBIT 5

As Value and Competitiveness Are Being Priced Globally, China Is Entering a New Phase of Recognition and Monetization

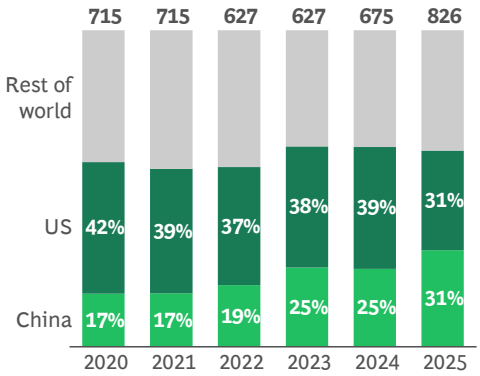
Rising confidence:
Taking on tougher comparators, with H2H Phase III trials now underway

Number of China-origin drug trials running H2H Phase III vs global non-LOE drugs



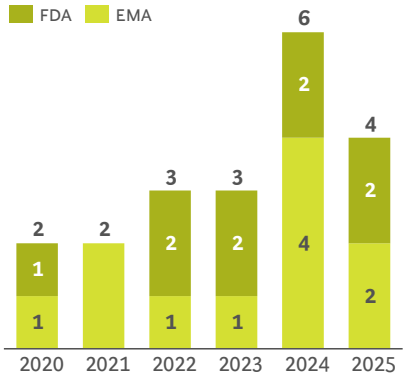
Increasing global recognition:
Going mainstream, lifting China's share of BD deal origination

Origin of global BD deals



Materializing regulatory recognition:
Milestones delivered, translating into FDA/EMA approvals

Number of FDA/EMA approvals for China-origin innovative drugs



Sources: PharmCube; Center for Drug Evaluation of China's National Medical Products Administration; BCG analysis.
Note: H2H = head-to-head.

Global recognition has also been rising in parallel. China's share of originators in global BD deals increased from 17% in 2020 to 31% in 2025, bringing it broadly in line with the US. In 2025, a number of headline-grabbing deals, including those involving GeneQuantum and Biohaven, Hengrui and GSK, and Innovent and Takeda, more directly signaled a shift in how multinational companies view China-origin assets. Regulatory recognition is also continuing to materialize, with approvals of China-origin innovative drugs by the Food and Drug Administration (FDA) and European Medicines Agency (EMA) increasing steadily in recent years, alongside a series of milestone events.

As China's capabilities are increasingly validated globally, the next leap for China innovative drugs will depend not only on continuing to amplify efficiency advantages, but also on translating innovation output into durable value. Over the next decade, whether China can achieve a new phase of leapfrogging will hinge on whether it can make systemic breakthroughs across five critical battlegrounds.

Critical Variables for the Next Leap

Depth: from Fragmented Breakthroughs and Hotspot-Driven Gains to Sustained, Scaled Innovation

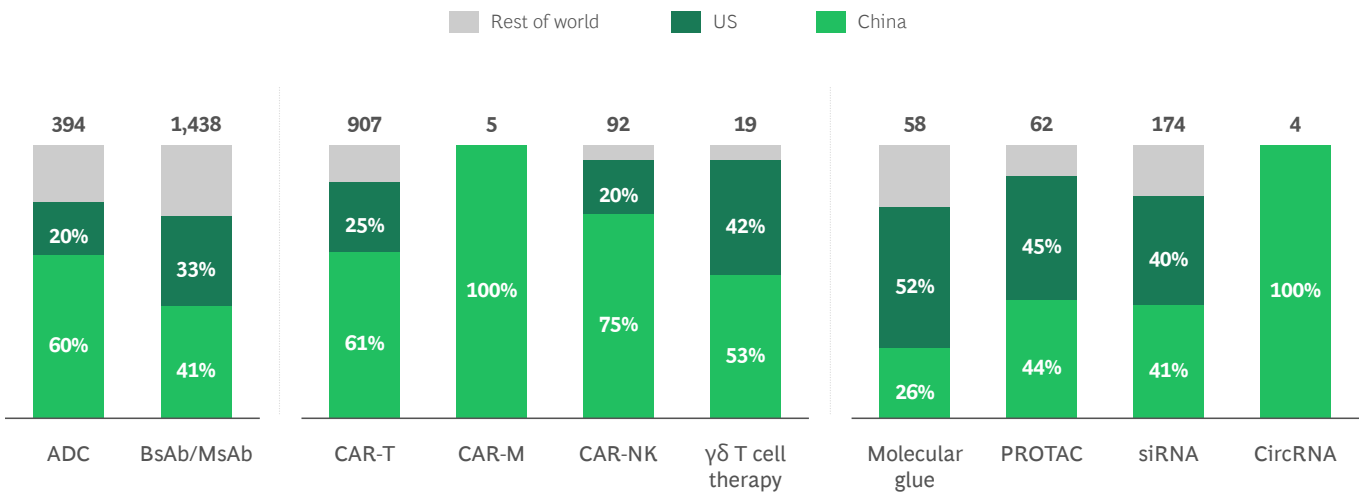
First, novel modalities have become a major source of pipeline expansion. Across a wide range of novel modalities, China has already built substantial pipeline scale and, in most of them, now surpasses the US in the number of molecules in development. Innovation in novel modalities is therefore becoming a major pillar of China's innovation output. (See **Exhibit 6**.)

In complex biologics, China has been particularly effective at turning combinatorial approaches, such as multi-specific ADCs and multi-payload ADCs, into repeatable engineering capabilities, sustaining leadership through systems integration and combinatorial innovation. In critical areas such as novel payloads and innovative antibody designs, including probody, China is still more often engineering its way along the US frontier than defining that frontier itself.

EXHIBIT 6

China Is Deepening Presence Across Novel Modalities and Is Likely to Remain a Major Source

Share of global clinical-stage innovative drug molecules, by novel modality[1]

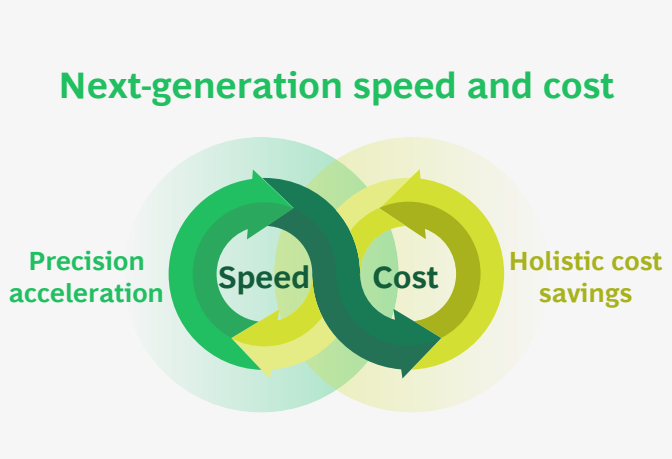


Sources: PharmCube; BCG analysis.
[1] Data as of January 9, 2026.

Cell and gene therapies, by contrast, have followed a more experimentation-intensive path. Through a dual-track approach that combines pre-approval investigator-initiated trials (IITs) with formal clinical development, companies have been able to generate human validation at lower cost and at a faster pace, while building up more systematized technical capabilities and experiential know-how. This has helped build stronger pipeline momentum in emerging cell therapies such as CAR-M and CAR-NK.

Looking more broadly across the modality landscape, wherever progress depends more heavily on large-scale screening, modular systems integration, and rapid process iteration, China's engineer dividend is more readily converted into an efficiency advantage, enabling more screening, faster iteration, and quicker emergence of modular breakthroughs and combinatorial innovation. Overall, China continues to deepen its presence and build capabilities across multiple novel modalities, including PROTACs and RNA therapies, and is likely to remain an important and high-level contributor of new pipeline growth in these areas.

The increment brought by novel modalities gives China a supply base for continued expansion. But the next stage is not simply about making the number bigger. It is about moving "scale" from the existence of supply to ecosystem-based, repeatable output. China's next step should not rely only on isolated breakout assets, that is, occasional single-asset hits driven by hotspots or scattered transactions. It needs to evolve toward the sustainable supply of a "forest," and even the "soil" beneath it, delivering stable sequences of differentiated assets within the same technology platform or disease area, and turning knowledge, data, organizational capability, and operating systems into enduring "soil." That is what creates structural advantages and depth of capability within selected technologies or disease spaces. For multinational companies, this shift means moving from buying an opportunity point to plugging into a platform-based organizational capability that can produce continuously, and from one-off transactions to longer-term co-building and iterative collaboration around platforms or therapeutic areas.



Speed: from Labor-Driven Process Acceleration and Cost Advantage to AI-Enabled Next-Generation Speed and Cost

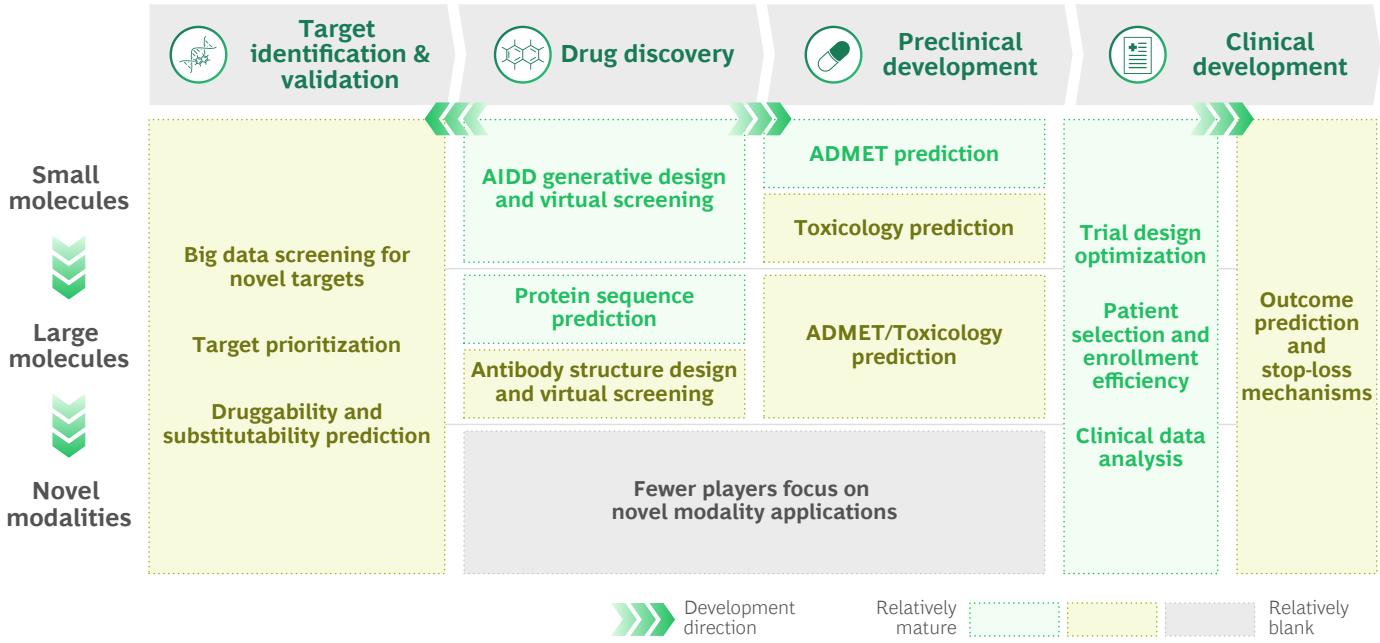
The second critical question is how to build on existing labor-driven process acceleration and cost advantage by leveraging AI to drive next-generation speed and cost efficiencies. The issue is not whether AI can simply compress existing steps, but whether China can be the first to establish an industry-scale closed loop in which AI drives not just the speed of R&D, but its precision, and shifts cost advantage from lower point costs to a lower end-to-end cost of success. In essence, this means migrating trial and error upstream, ensuring course corrections are earlier and thus smaller, minimizing the cost of failure, and thereby creating a sustainable low-cost engine.

The logic of AI-driven efficiencies closely mirrors China's leadership path in new energy vehicles (NEVs): propelled by a flywheel of high-frequency iteration and real-world data feedback, China has moved from manufacturing strength to becoming an innovation proving ground. In biopharma, the question is therefore clear: how can China's innovative drug sector harness AI to replicate, and ultimately surpass, the NEV innovation flywheel, and become a global validation hub for biopharma innovation?

At present, AI deployment at scale in biopharma remains in the early stages. Proven and relatively mature applications are still concentrated mainly in small-molecule AI-driven drug discovery (AIDD), including use cases such as generative molecular design and virtual screening, where AI has already demonstrated value in improving early discovery efficiency. At the same time, AI's capabilities are rapidly expanding from a point tool into a multimodal capability stack deployed across the R&D value chain, with applications extending from small molecules into large molecules and a broader set of emerging therapeutic modalities. (See **Exhibit 7**.)

EXHIBIT 7

AI Is Expanding Beyond AIDD Towards End-To-End and Novel Modalities, Accelerating R&D and Reducing Costs



Sources: Expert interviews; BCG analysis.
Note: ADMET = absorption, distribution, metabolism, excretion, and toxicity.

At the front end of R&D, AI applications are moving further upstream. In target discovery and validation, new target screening and research based on multi-omics, real-world data, and literature databases, together with target prioritization and systematic prediction of druggability and substitutability, have the potential to improve early-stage decision quality and reduce the hidden cost of directional mistakes. The gain in R&D efficiency is no longer only about more quickly generating candidate molecules; it is increasingly about optimizing resource allocation earlier in the development process.

In preclinical development, the value of AI is moving from single-parameter prediction toward systematic, front-loaded risk management. Absorption, distribution, metabolism, excretion, and toxicity (ADMET) prediction for small molecules is already relatively mature, and toxicology and safety models continue to improve. That enables some key risks to be identified and filtered out early on, compressing downstream failure cost and improving overall probability of success.

Further downstream, AI applications in clinical development are beginning to enter a scalable phase. More mature use cases have emerged in trial design optimization, patient stratification and enrollment efficiency, and clinical data analysis. On top of this, outcome prediction and stop-loss mechanisms are becoming the next important direction of evolution, with the potential to support faster and more rational clinical decision making.

At the most fundamental level, AI competition is defined by three core pillars: algorithms, computing, and data. In biopharma, however, the real differentiator is increasingly shifting toward the accumulation of high-quality data and the ability to convert it into strategic assets. The US is stronger in frontier science and in the deep integration of AI with science, with a richer supply of high-quality data, but it also operates with higher costs, tighter compliance constraints, and limited ability to accumulate data at scale. China moves faster in engineering adaptation and productization and holds a lower-cost advantage in large-scale data generation and iteration, but the ceiling on high-value data accumulation still depends on the vibrancy of upstream innovation and the strength of its data ecosystem.

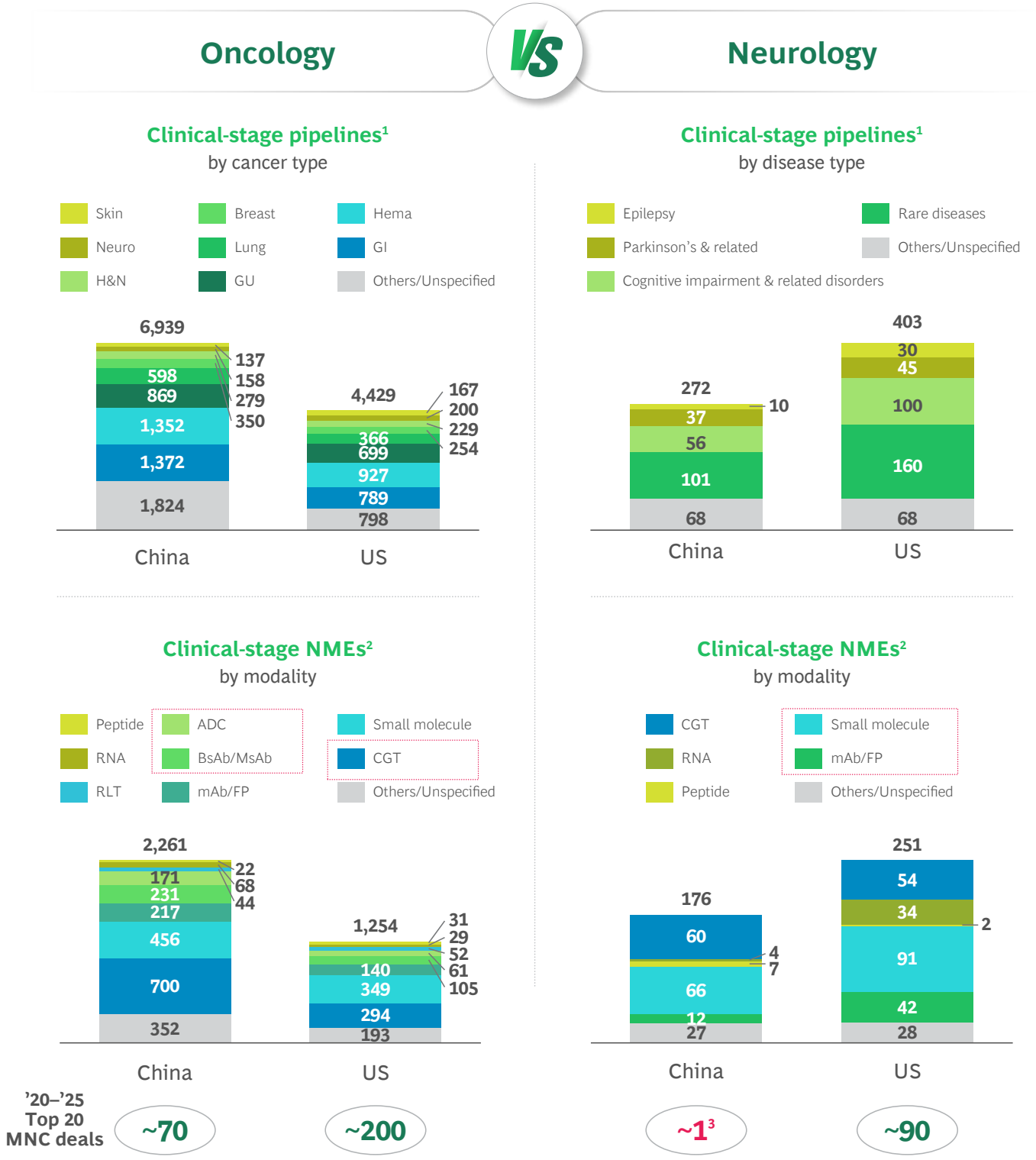
Breadth: from Crowding into High-Incidence Tumors and De-Risked Paths to Multiple Therapeutic Area Expansion and Proven Capability in Frontier Areas

As innovation expands beyond areas such as oncology, where mechanisms are relatively clear and endpoints more objective, the real dividing line begins to emerge in frontier fields such as neurology. China has already built greater clinical pipeline depth and a broader range of modality combinations in oncology, but in neurology its pipeline remains meaningfully thinner than that of the US. An even clearer external signal is the near absence of landmark BD deals in neurology, suggesting that the market remains cautious. (See **Exhibit 8**.) This gap reflects not only the intrinsic difficulty of the field, but also a structural capability shortfall: central nervous system (CNS) biology is more complex, development timelines are longer, and failure risk is higher, while China has yet to build the depth of long-term investment and organizational capability needed in this area. As a result, volume, quality, and external confidence have been difficult to build in parallel.

For China to reach its next peak, one of the key priorities is to build out system-level capabilities in frontier fields and turn them into sustained output. Only when high-difficulty areas such as neurology can also contribute molecules and evidence on a consistent basis, can Chinese innovation move beyond efficient execution and scaled output towards gains in innovation and value.

EXHIBIT 8

China Still Faces Capability Gaps in Frontier Disease Areas



Sources: PharmCube; BCG analysis.
Note: H&N = head and neck. GU = genitourinary. GI = gastrointestinal. NMEs = new molecular entities. RLT = radioligand therapy. FP = fusion protein.
[1] Each molecule is counted once per indication in the therapeutic area.
[2] Diagnostic-related molecules are excluded here.
[3] A preclinical molecular-glue program co-developed by Degron Therapeutics and Takeda has not disclosed its indication, and as Degron covers neuro, it is counted under neurology here.

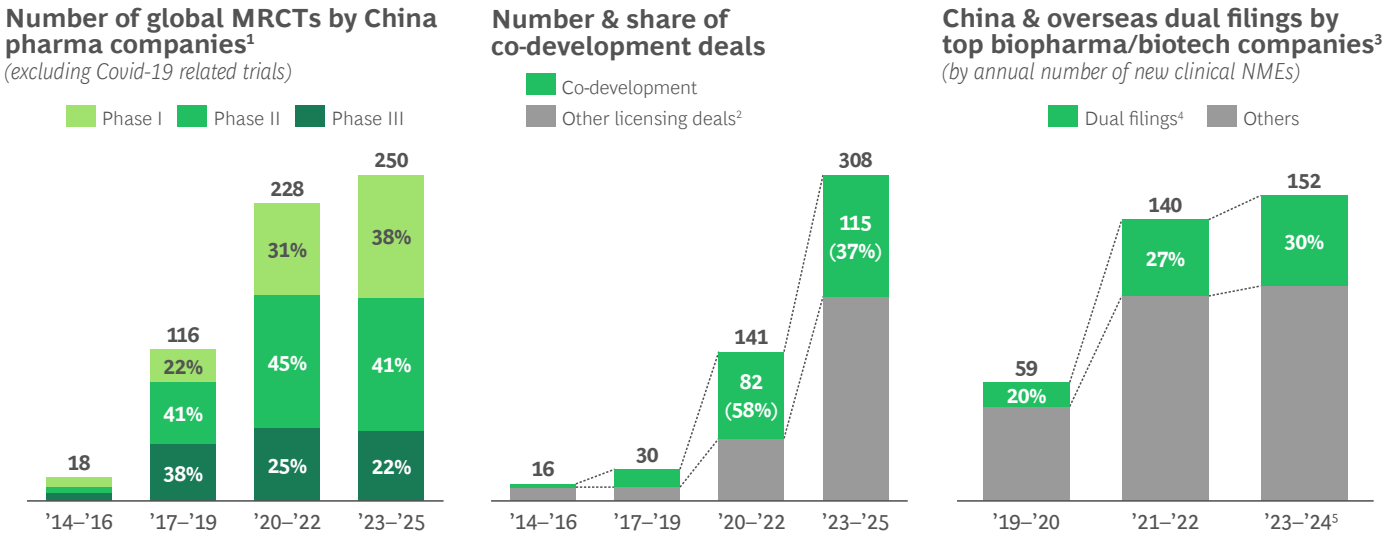
Credibility: from Stepwise Gains in Local Quality and Data Credibility to a Globally Aligned, Trusted Clinical and Data System

An increasing number of external outcomes is validating the quality of China's innovative drugs. But for that quality to translate into durable global recognition, China will need to build a trusted development and evidence system, one that can be repeatedly tested and reused across programs, so that global confidence rests not just in individual assets or deals, but in the system itself.

At the company level, this alignment is increasingly becoming systematized. Global multi-regional clinical trials (MRCTs) are becoming more common and are shifting more visibly into earlier stages, with a growing number of programs going global as early as Phase I or II and placing their development hypotheses into an international context for validation sooner. Meanwhile, co-development continues to take up a larger share of BD activity, accounting for nearly 40% of licensing deals from 2023 to 2025. Through co-development with multinational companies, domestic players are learning and internalizing leading clinical development practices through real programs. At the same time, the share of dual filings in China and overseas among leading biopharma and biotech companies has risen to around 30%, reflecting how development strategies designed for global markets from the outset are gradually becoming the norm. (See **Exhibit 9**.)

EXHIBIT 9

China Pharma Companies Are Aligning with Global Standards via MRCTs, Co-Development, and Dual Filings



Sources: PharmCube; DXY; BCG analysis.
Note: NMEs = new molecular entities.
[1] Phase II includes Phase II and Phase I/II; Phase III includes Phase II/III and Phase III.
[2] Includes licensing deals and asset acquisitions.
[3] Sample based on the top 10 listed biotech and biopharma companies by market cap as of December 31, 2025.
[4] Dual filings refers to pipelines with ongoing clinical trials in China and the US/Europe/Japan/other overseas regions.
[5] 2025 data excluded due to lag in overseas clinical timelines.

Novelty: from Fast-Follow and Hot-Target Supply to Constructive and Sustained Contribution to Original Innovation

China's innovation supply is highly concentrated at the target level, with an even stronger clustering around hot targets. Target distribution data show that in China, the top 80 hot targets account for roughly 80% of the top 200 pipelines, while the US needs about 109 hot targets to reach the same cumulative share. (See **Exhibit 10**.) This structure suggests that China's innovation resources are still concentrated in more de-risked directions, boosting execution efficiency but also narrowing the room for differentiation and intensifying crowding in similar spaces.

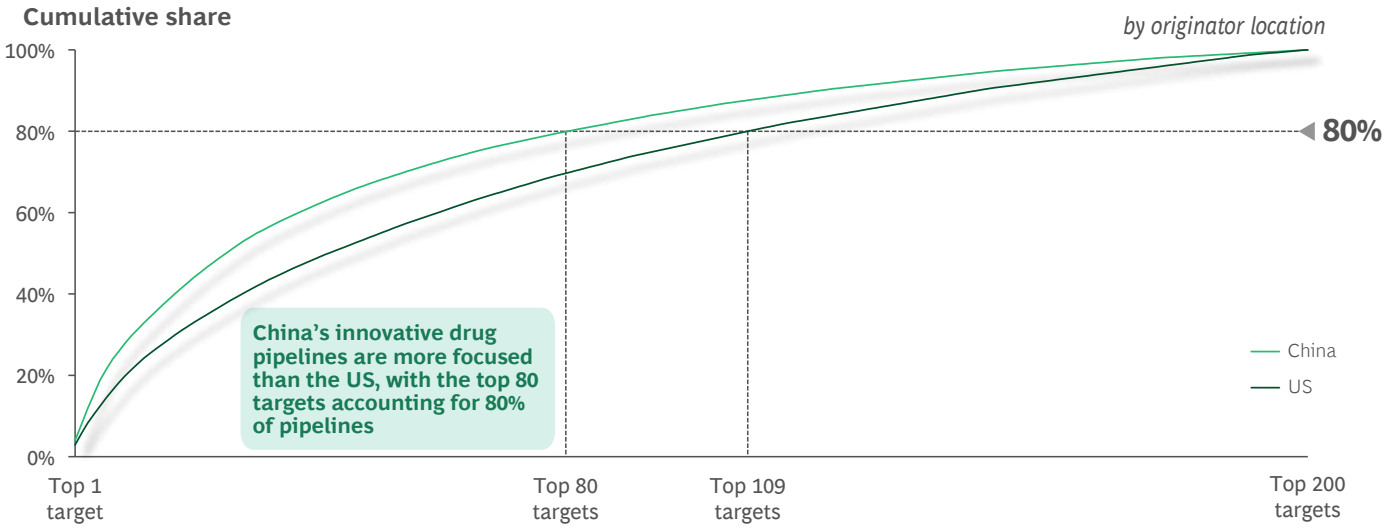
Under the broad definition of potential first-in-class (FIC), defined as a globally leading program within the same target and modality, China's global presence has risen sharply: its share of potential FICs increased from 16% in 2020 to 34% in 2025, closing in on the US's 38%. In composition, however, this "novelty" remains driven mainly by engineer-style optimization solutions, notably target-combination innovation and the migration of established targets into new modalities. It reflects optimization within an existing problem frame rather than sustained original breakthroughs in underlying mechanisms. (See **Exhibit 11**.)

The gap becomes even clearer when the focus shifts to potential original mechanisms. On the scientific front, measured by foundational research on targets and biomarkers, the number of papers published by China in Cell, Nature, and Science (collectively, CNS) has risen steadily over the past decade, but still amounts to less than one-third of the US total. In other words, the upstream reservoir of original targets is rising, but the gap remains. On the translational front, the number of molecules based on genuinely unexplored mechanisms has also increased year by year, but stood at only eleven as of 2025, of which eight (about 73%) came from novel modalities and only three (about 27%) from established modalities. (See **Exhibit 12**.) This suggests that the recent increase in China's FIC output has been driven more by novel modalities bringing new molecules into play than by breakthroughs in new mechanisms.

EXHIBIT 10

China's Current Target Landscape Remains Focused, with a Notable Skew Toward Hot Targets

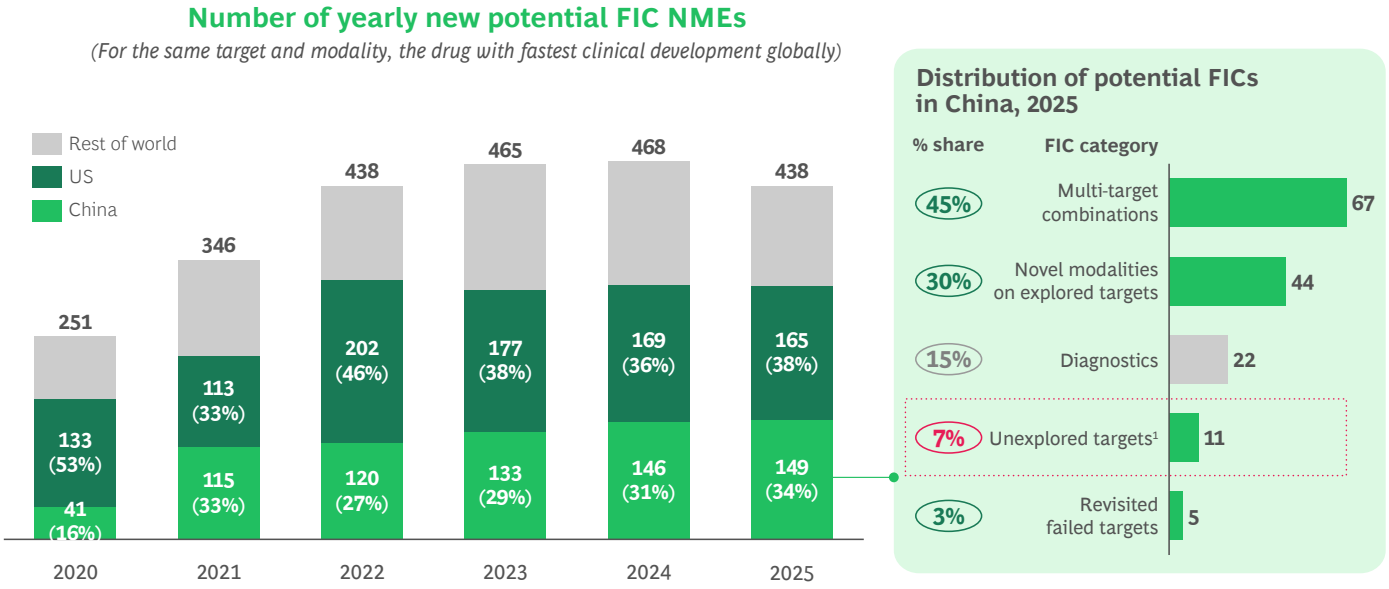
Cumulative share of the top 200 targets in Phase I–III innovative drugs in China and the US[1]



Sources: PharmCube; BCG analysis.
[1] Data as of January 5, 2026; excludes common T-cell engager targets CD3/CD19.

EXHIBIT 11

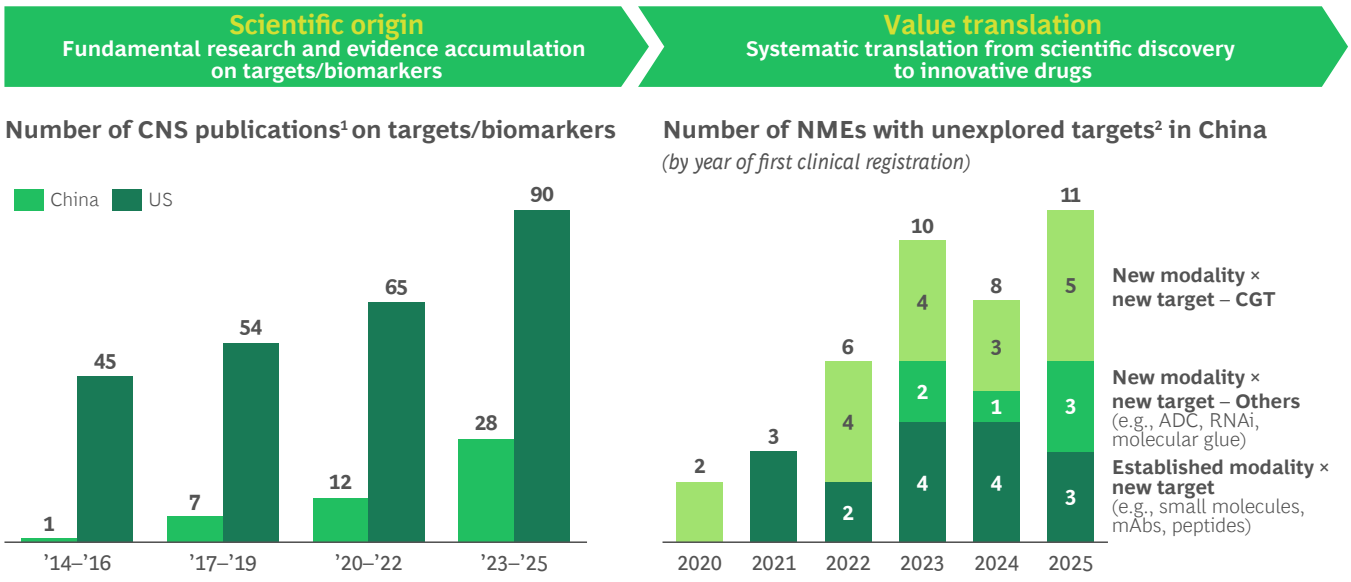
China Has Emerged as a New Global FIC Supply Hub, but Fundamental Advances Remain Limited



Sources: PharmCube; BCG analysis.
Note: FIC = first-in-class. NMEs = new molecular entities.
[1] A target with no prior clinical exploration by any molecule, in any modality.

EXHIBIT 12

Over the Past Decade, China Has Made Steady Progress in Both Basic and Translational Research, but a Gap with the US Remains



Sources: PharmCube; BCG analysis.
Note: NMEs = new molecular entities.
[1] Includes Cell, Nature, and Science; publications with authors from both China and the US are counted twice.
[2] A target with no prior clinical exploration by any molecule, in any modality.

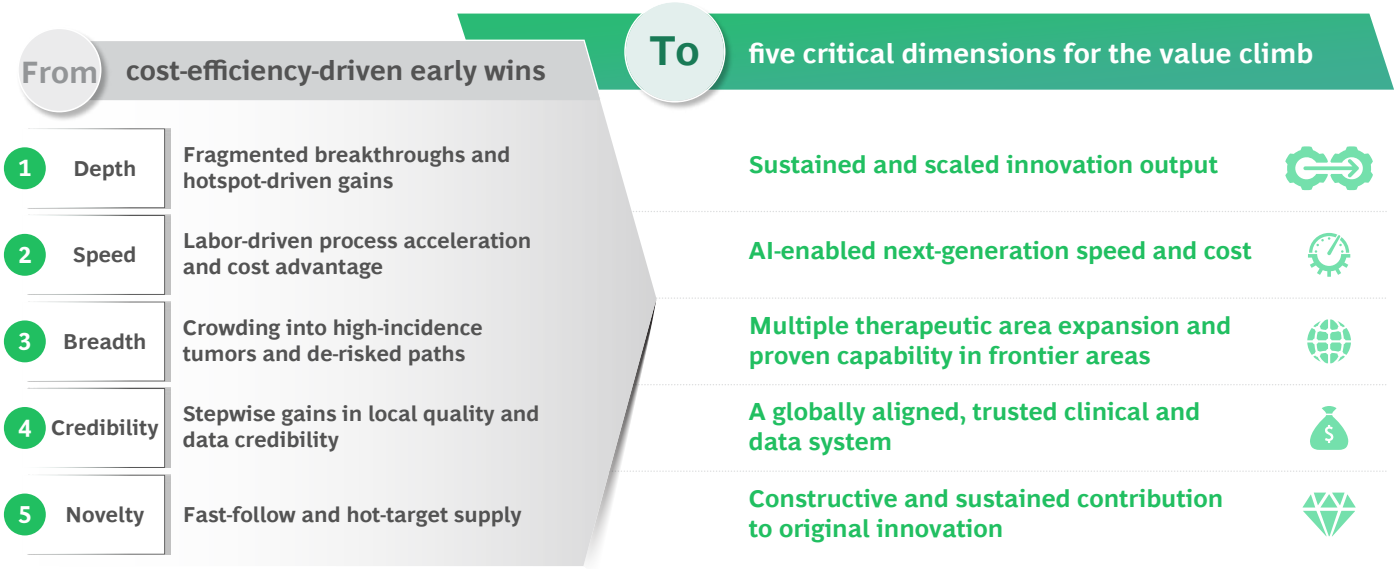
Over the past decade, China's biopharma innovation has redefined "China efficiency" across three fronts: depth, speed, and breadth. This has been achieved through a systematic rebuilding of capabilities, and in doing so, China has established a clear presence on the global innovation landscape. At the same time, the seeds of greater quality and novelty have already begun to emerge in selected frontier areas. But looking to the next decade, the real challenge is how to convert this hard-won efficiency advantage into innovation capabilities that are sustainable, reproducible, and resilient across cycles.

This means China's innovative drug sector must move from isolated breakthroughs to systemic evolution, with broad-based progress across depth, speed, breadth, credibility, and novelty: from episodic success driven by scattered assets to organizational capabilities and ecosystem foundations that can sustain scaled output; from labor- and process-driven speed and cost advantage to an AI-powered next-generation R&D paradigm that moves trial and error upstream and systematically lowers the cost of failure; from strength in areas with clearer mechanisms to long-term investment and proven capabilities in frontier fields; from stepwise gains in local quality and data credibility to a trusted clinical and data system deeply aligned with global standards and capable of repeated validation; and ultimately, at the global frontier of innovation, from participation and fast-follow to constructive and sustained contribution. (See **Exhibit 13**.)

Efficiency determines how fast we move; value determines how far we go.

EXHIBIT 13

Chinese Innovation Must Climb from Efficiency to Value Across Five Critical Dimensions in the Coming Decade



The Resilience and Strength of China's Biopharma Innovation Ecosystem

After more than a decade of development, a support system for China's biopharma innovation has begun to take shape, with its key enablers starting to work in concert and providing a foundational basis for R&D innovation. Looking to the next decade, the priority is to further strengthen the innovation ecosystem's capacity for self-sustaining circulation and resilience, so as to provide enduring momentum for the continuous generation of innovation outcomes.

Today, the ecosystem supporting China's biopharma innovation can be summarized into six key enablers: the policy and regulatory environment, talent sustainability, the CRDMO ecosystem, the academia-industry translation system, accessibility of R&D infrastructure and tools, and capital resilience. Among these six enablers, the main gaps with the US are concentrated in capital resilience, talent sustainability, and the maturity of academia-industry translation. (See **Exhibit 14**.)

Capital Resilience

Relative to the US, China has already developed a multi-layered funding structure for innovative drugs, encompassing policy capital, market-based investment, and company self-funding, and the basic architecture is in place. However, a gap remains in overall capital scale. In 2025, innovative drug R&D spending in the US exceeded USD 260 billion, while China's total was about USD 39 billion. (See **Exhibit 15**.) At the same time, the self-funding capacity of Chinese innovative drug companies remains limited. Company-funded R&D accounted for only about 40% of total innovative drug funding in 2025, with government and external capital still providing the majority of support.

EXHIBIT 14

Reaching the Next Apex Will Require Advances in Capital Resilience, Talent Sustainability, and Academia-Industry Translation

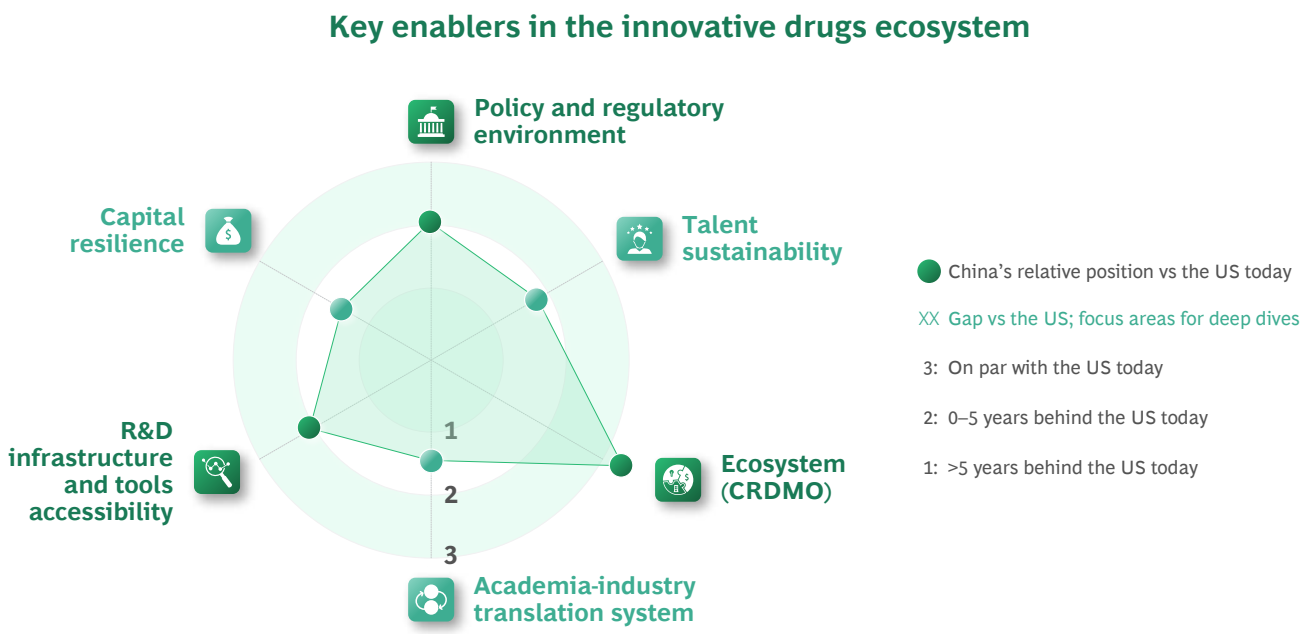
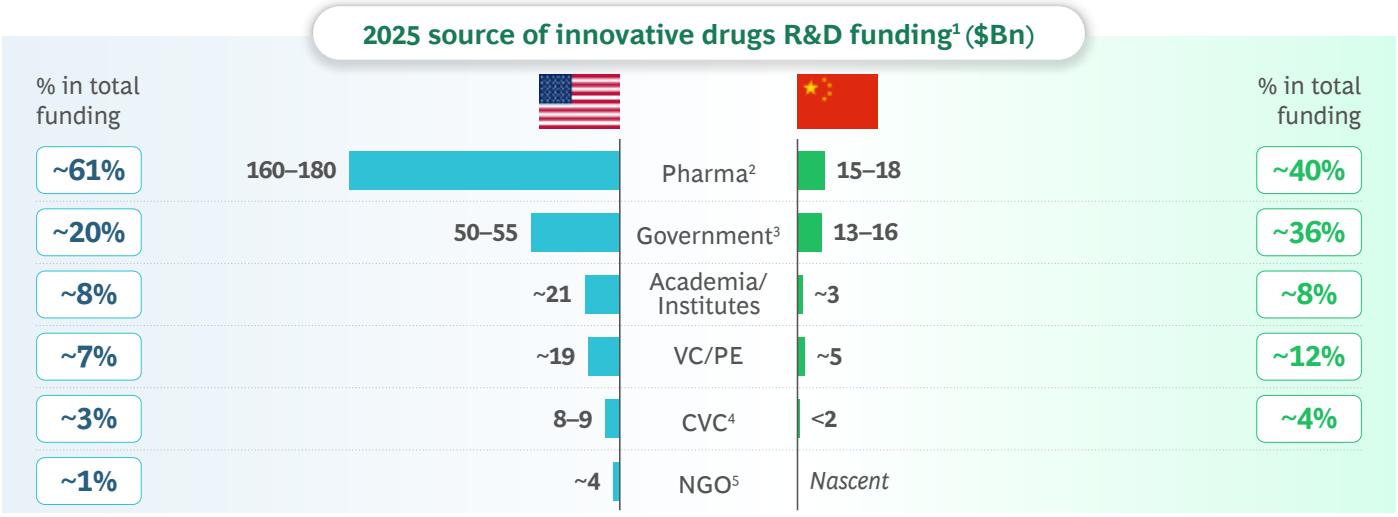


EXHIBIT 15

A Multi-Layer Structure Is Taking Shape, Converging Toward the US; the Next Decade Will Rely on Capital Scale and Self-Funding



Sources: Congress.gov; US National Science Foundation (NSF); National Bureau of Statistics of China; Pitchbook; PharmCube; BCG analysis.
[1] Pharma R&D spending based on 2024 and 2025H1 results and extrapolated to 2025FY; Chinese government, institutional R&D spending, and government-guided funds estimated from 2024 actuals and historical growth.
[2] Global R&D spending of large pharma/biotech companies headquartered in the US or China.
[3] Mainly includes funding from the US National Institutes of Health (NIH) and the National Science Foundation (NSF); and, in China, funding from the National Natural Science Foundation of China (NSFC, medical and life sciences only), the National Key Research and Development Program (NKRDP), and other central and local government funding directly related to biopharma.
[4] Corporate venture capital (CVC) from major MNCs, e.g., Pfizer Ventures, JJDC.
[5] Mainly includes philanthropic funding, e.g., Bill & Melinda Gates Foundation, Howard Hughes Medical Institute (HHMI).

At the company level, differences remain between Chinese and US drug companies in both scale and the allocation of R&D resources. Across large pharma, biopharma, and biotech players, US companies typically generate revenues several times those of their Chinese peers. This structural gap is directly reflected in the amount of R&D funding available to any single company. Based on the revenue scale and R&D spending ratios of the top 20 companies in each of the three company categories, US companies command roughly 10 to 25 times the R&D budgets of comparable Chinese companies, underscoring the capital constraints that still limit the overall funding capacity of China's innovative drug sector. (See **Exhibit 16**.)

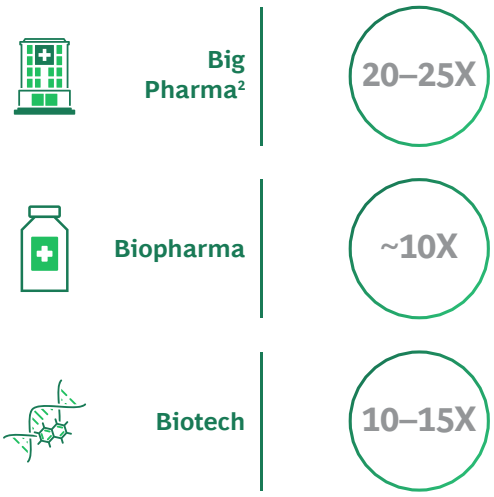
Notably, over the past several years, multiple leading Chinese innovative drug companies have adopted R&D operating efficiency as a core strategic response, continuously reducing inefficient spend across areas such as project prioritization and project management.

From 2020 to 2025, the average clinical development cost per program for leading listed Chinese innovative drug companies declined markedly. This shows that, under constrained capital conditions, releasing efficiency gains through process optimization and tighter operations has become an important hallmark capability of Chinese innovative drug players.

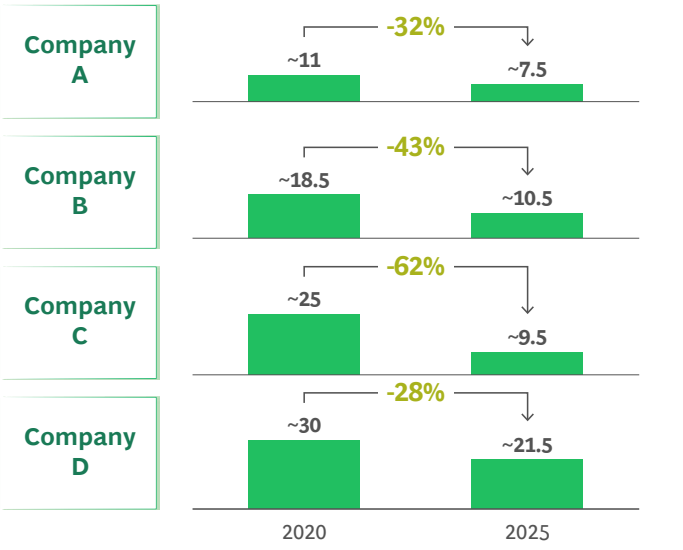
EXHIBIT 16

R&D Spending in China Still Trails the US, but Capital Efficiency Has Improved

Comparison of R&D spending scale among top 20 companies by type in China and the US[1]



Change in average clinical development cost per program among leading Chinese companies (RMB million)[3,4]



Sources: Wind; DXY; company reports; BCG analysis.
[1] Calculated based on revenue scale and the share of R&D spend among the top 20 companies in each type.
[2] China Big Pharma includes traditional pharmaceutical companies focused mainly on generics and biosimilars.
[3] Sample selected from leading A/H-share listed companies based on a combination of market cap and revenue.
[4] Normalized by clinical trial phase. As Phase II/III trials vary in cost due to factors such as enrollment difficulty and trial design, Phase I is used as the baseline, with Phase II and III discounted by 1.5x and 2.6x, respectively; the denominator is the number of globally active pipelines for each company in the given year.

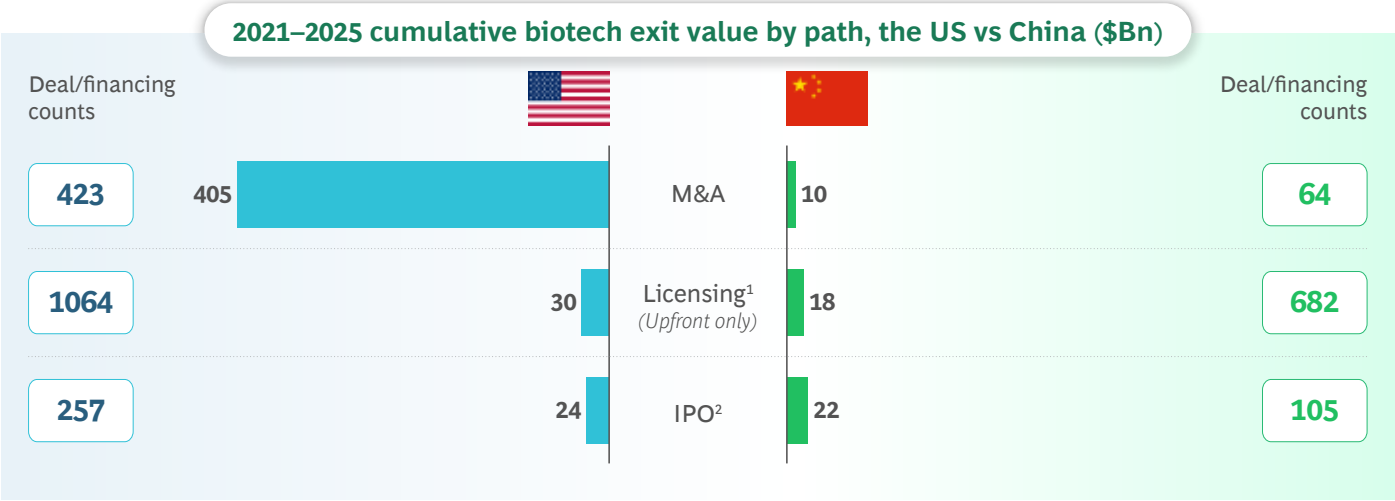
In terms of exit mix, IPOs and licensing deals among Chinese biotech companies are now approaching US levels. Over the past five years, the cumulative value of IPOs and licensing deals reached about USD 54 billion in the US, compared with roughly USD 40 billion in China over the same period. (See **Exhibit 17**.) Activity by China's innovative drug companies in both capital markets and licensing has been rising rapidly.

China still lags behind, however, in M&A as an exit pathway. Over the past five years, the US generated about USD 405 billion of exit value through large-scale M&As across 423 transactions, while China delivered only about USD 10 billion across 64 deals over the same period, with average deal size at roughly one-sixth of the US level. The relative lack of M&A exits continues to constrain capital recycling and risk diversification for China's innovative drug companies after early- and mid-stage financing.

Over the next decade, an M&A ecosystem may begin to emerge in China's biotech sector, driven in large part by resource reallocation as the market returns to greater rationality. The conditions that once allowed biotech companies to grow into biopharma players primarily on the back of capital are gradually fading. In this environment, if small and mid-sized biotech companies can produce assets with genuine first-in-class (FIC) or best-in-class (BIC) potential, larger biopharma and traditional pharmaceutical companies may, at reasonable valuations, use M&As to integrate those assets more rapidly and close gaps in critical targets and technology platforms for global competition. The formation of such an M&A exit ecosystem would also help move China's innovative drug sector toward a more mature model, one driven increasingly by product and technology value.

EXHIBIT 17

IPO and Licensing Are Nearing US Levels, but China's M&A Exit Pathway Is Still Nascent



Sources: PharmCube; BCG analysis.
[1] Based on the origin country of licensors; includes deals with disclosed upfront payments only.
[2] Includes companies headquartered in China and listed in all countries/regions.

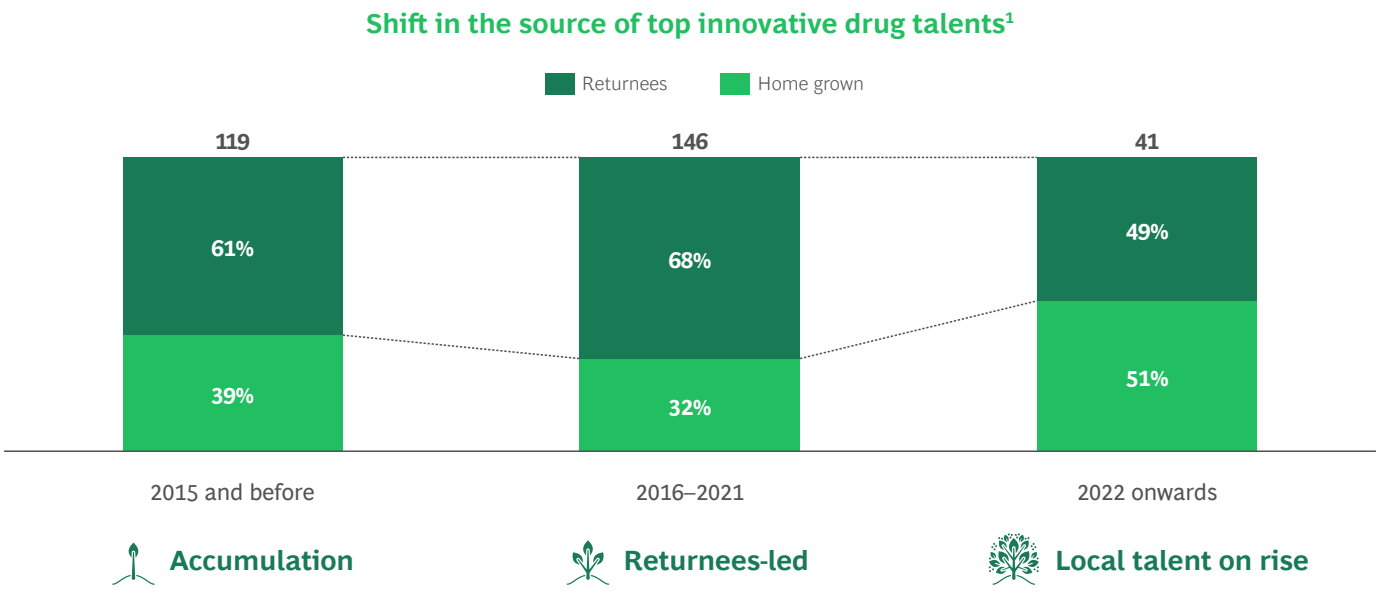
Talent Sustainability

There has been a clear evolution in the top talent in China's innovative drug sector, moving broadly through three phases: initial accumulation, a wave of overseas returnees, and rapid growth in domestic talent. Beginning in 2016, a large number of returnees with overseas scientific backgrounds and multinational pharma experience joined domestic biopharma and biotech companies, rapidly filling organizational and capability gaps in R&D, clinical development, and other critical functions. They became a key force in shaping China's innovative drug ecosystem. After 2022, as the capital environment tightened, the focus of talent building shifted from scale-up to more focused capability building, and the composition of top talent began to change visibly. Among biopharma and biotech companies founded in or after 2022, domestic talent now accounts for 51%, indicating that domestic talent development is becoming a new structural trend. (See **Exhibit 18**.) This shift does not mean international experience matters less. Rather, it suggests that the talent base underpinning China's biopharma innovation is gradually building a stronger foundation for endogenous evolution and a sustainable talent pipeline.

Looking to the next decade, talent scarcity in China's innovative drug sector will be defined less by headcount than by the availability of complex skillsets. First, China will need R&D talent that can combine scientific originality with judgment on global commercial value, as these individuals will help determine whether Chinese innovation has the potential to be priced by global markets. Second, it will need senior clinical talent with real hands-on experience and professional depth across both Chinese and international systems in critical areas such as clinical development strategy, multi-regional clinical trial (MRCT) operations, and clinical quality. Their capabilities will directly shape whether China's innovation output can earn global recognition. High-quality R&D project managers are also in short supply. These individuals must be able to combine strategic judgment with organizational execution in highly uncertain settings, understand local R&D culture, and interface efficiently with global standards and partners. The supply of such compound talent will, to a significant extent, determine whether China's innovative drug sector can complete the shift from efficiency-driven growth to value-driven advancement.

EXHIBIT 18

A Structural Shift Towards Local Talent Since 2022 Underpins a More Sustainable and Self-Reinforcing Talent System



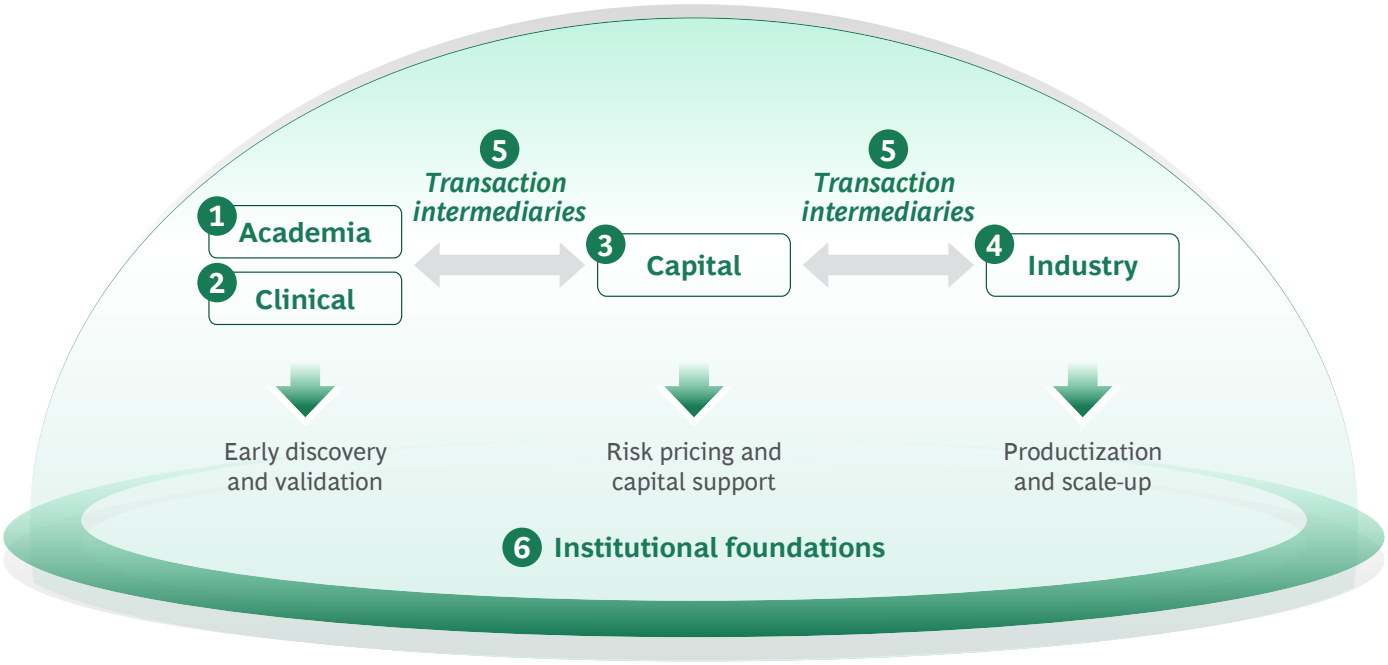
Sources: Desktop research; BCG analysis.
[1] Sampled ~90 leading listed biopharma/biotech and startup companies (ranked by market cap or total funding) to analyze the education and professional backgrounds of founders, co-founders, CEOs, chief medical officers, and chief R&D officers.

Academia-Industry Translation System

A mature and efficient academia-industry translation system is, fundamentally, a continuous value-conversion mechanism built on clear institutional foundations. (See **Exhibit 19**.) It begins with systematic exploration by academia and clinical institutions of scientific questions and unmet clinical needs, while early research and validation progressively reduce uncertainty. Transaction intermediaries, such as industrial incubators and technology licensing offices (TLOs), then screen scientific output, clarify its value, and package it into standardized, investable opportunities. Capital prices risk and provides funding. Industry, in turn, takes forward initially validated technologies and assets, translating them into products and scaling them. Throughout the process, institutional foundations, including clear ownership, stable incentive mechanisms, and a predictable regulatory environment, determine whether long-term collaboration across stakeholders can be sustained. (See "**A Comparison of Academia-Industry Translation Systems in China and the US**".)

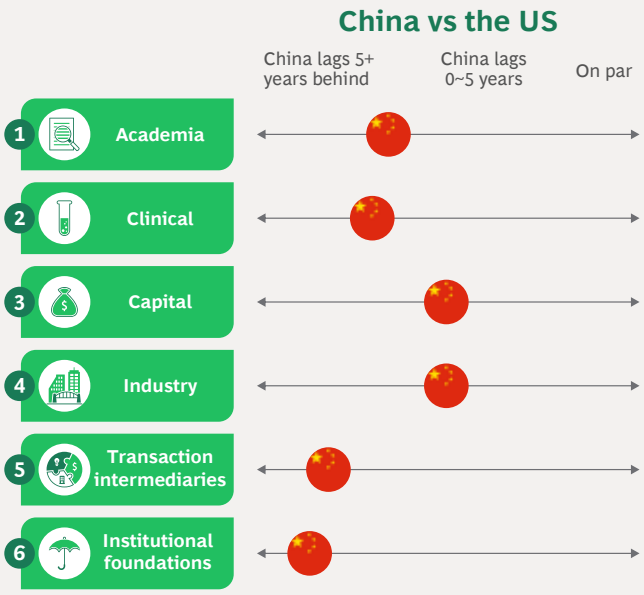
EXHIBIT 19

A Proven Model Requires Mature Intermediaries and Institutional Foundations Linking Academia, Clinical, Capital, and Industry



A Comparison of Academia-Industry Translation Systems in China and the US

A comparison between the two leading biotech clusters, Boston/Cambridge and Shanghai Zhangjiang, brings into sharper relief the structural differences in the maturity of academia-industry translation systems in China and the US. (See exhibit below.)



Academic and clinical strength: In the 2025 Nature Index city ranking combined health sciences and life sciences output, Shanghai ranks seventh and Boston second. Shanghai has three hospitals in the Nature Index top 50, compared with five in Boston, indicating that a gap remains in the density of world-leading research and clinical resources.

Capital: Measured across PE, VC, and government funding, the Boston cluster had roughly USD 15 to 16 billion of capital support in 2025, about five times the level of Zhangjiang. That underpins Boston's advantage in early risk taking and sustained innovation investment.

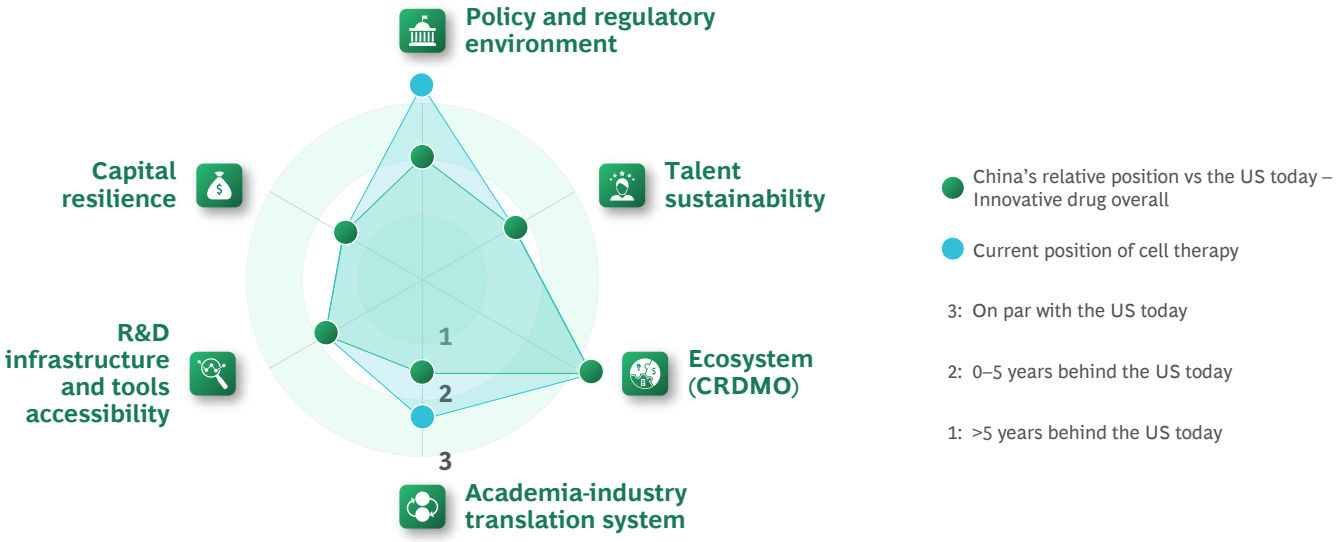
Industry: Boston hosts multiple large multinational pharma companies, and biopharma employment density is about 7,100 people per square kilometer, making it one of the most vibrant biopharma clusters in the world. Zhangjiang, by comparison, is at about 1,500 people per square kilometer, suggesting a still meaningful gap in industrial concentration.

Transaction intermediaries: Boston's TLOs and incubation system are already highly marketized and deeply embedded in university and industry networks, making them a normalized channel for translating research into industry. Chinese biotech parks represented by Zhangjiang have begun to build technology transfer and incubation mechanisms, but overall, they remain more administrative and project-support oriented and have not yet matured into a repeatable market model.

Institutional foundations: The Bayh-Dole Act of 1980 clarified ownership of federally funded research outputs in the US and supported efficient links among universities, capital, and industry. Some top Chinese universities have launched breakthrough pilots on ownership and incentive mechanisms, but overall, China is still in the early phase of institutional exploration. If China is to fully build a stable, self-propelling, and repeatable academia-industry translation system, it will still require a period of systematic cultivation.

EXHIBIT 20

Comparison of Cell Therapy Ecosystems in China and the US



Cell therapy offers a more intuitive example of the systemic innovation capability China can unlock in selected frontier areas when policy and academia-industry translation move in tandem. From the perspective of innovation output, China already leads on multiple key dimensions in cell therapy, including pipeline scale, exploration at the technology frontier, and early clinical validation. (See **Exhibit 20**.)

Firstly, at the **pipeline level**, China has more cell therapy programs in development than the US across different technology platforms and therapeutic areas, showing greater density and broader coverage. (See **Exhibit 21**.) A portfolio built this way, with multiple platforms and multiple indications advancing in parallel, allows different technical paths to be tested against both clinical and commercial feasibility at broader scale and creates more room to identify viable ones and priority indications.

Secondly, at the **technological frontier**, China is exploring new technical routes and new disease areas more actively, with some already achieving early proof of concept and meaningful breakthroughs. In in vivo CAR-T, for instance, multiple Chinese companies are advancing lentiviral and tLNP-mRNA approaches in parallel and have produced exploratory clinical results that have attracted international attention. In stem cells, China continues to advance original research and translational practice in process development and clinical application, while making steady progress on critical issues such as cell sourcing, scalable manufacturing, and clinical accessibility.

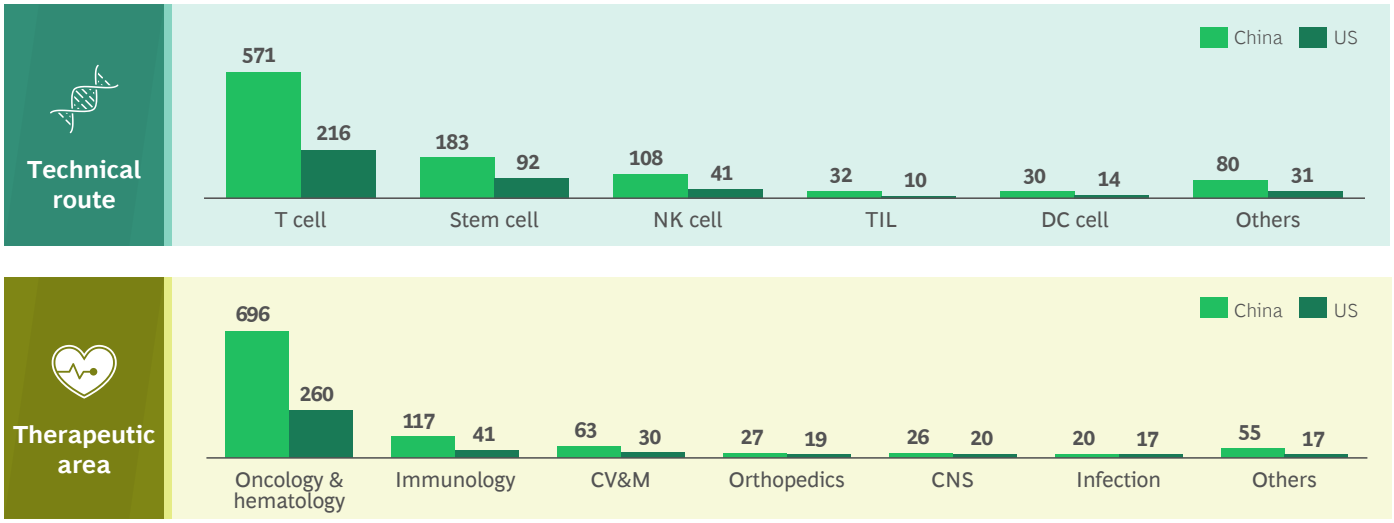
Finally, in **clinical translation and validation**, China's cell therapy innovation is characterized by front-loaded hypothesis testing and rapid validation. Through pathways such as investigator-initiated trials (IITs), some programs can enter real-patient settings relatively early, generate interpretable initial clinical signals, and accumulate reusable clinical and technical know-how along the way. This early-validation-driven translational model allows certain cell therapy approaches to move more quickly into a sustained cycle of iteration, while gradually transitioning toward standardized clinical development.

Underlying the innovation dynamics described above are supportive policy conditions and regional academia-industry innovation ecosystems. In recent years, the national regulatory framework for cell therapy-related research has continued to improve, providing clearer compliance guidance for frontier exploration. IITs have also acquired a more defined place within the existing regulatory system, and in practice have become an important route for some cell therapy technologies to pursue early clinical exploration.

EXHIBIT 21

In Cell Therapy, China's Pipeline Far Exceeds That of the US

Number of cell therapy products by technical route and therapeutic area[1]



Sources: PharmCube; BCG analysis.
Note: CV&M = cardiovascular and metabolism. CNS = central nervous system.
[1] Products are counted once by highest clinical stage, but assets studied in multiple indications may be counted more than in each indication. Data from January 1, 2020 to January 12, 2026.

In September 2025, the State Council of China issued Decree No. 818, "Regulations on Administration of Clinical Research and Clinical Translational Application of New Biomedical Technologies," providing a regulatory basis for cell therapy related research activities. The Regulations set out overarching requirements on the responsibilities, boundaries, and compliance obligations of medical institutions conducting clinical research, while also providing a clearer legal framework for the dual-track approach, in which IITs and registration-directed clinical trials can be pursued in parallel. The Regulations also make clear that, once approval for clinical translational application has been obtained from the health authorities under the State Council, qualified medical institutions may charge fees in accordance with relevant rules when carrying out clinical application of the technology.

At the level of academia-industry coordination, cell therapy innovation in China shows a clear pattern of regional concentration. In particular, the Yangtze River Delta has gradually emerged as one of the country's most active regional innovation clusters in cell therapy, underpinned by a relatively concentrated research base, strong clinical capacity, active industry and capital participation, and continued local efforts in policy coordination and resource alignment. This has enabled the region to build strong links across basic research, clinical exploration, and industrialization.

The Road Ahead

Over the past decade, China's biopharma innovation has been defined by scale, speed, and cost efficiency, systematically building a scalable and reproducible efficiency advantage. Looking ahead, it is now approaching a critical inflection point, one that will determine whether it can move from efficiency advantage to value leadership over the next decade.

This leap is not a simple extension of existing strengths, but a systemic upgrade in China's capability structure. New technologies led by AI will push speed and cost efficiency into their next phase, further deepening China's efficiency advantage and reinforcing its role as a key accelerator of global innovation. Furthermore, the center of innovation will shift toward underlying mechanisms and frontier disease areas, enabling sustained output of original innovation with global credibility and pricing potential. At the same time, stronger ecosystem resilience will be critical to long-term progress. A more sustainable capital structure and a stronger compound-talent base will be essential to ensuring that innovation potential can continue to be mined sustainably. (See **Exhibit 22**.)

The next decade of Chinese biopharma innovation will be a collective climb from the efficiency high ground to the value summit. Its success will depend on deep coordination among domestic innovative drug companies, multinational pharma companies, government, and investors, aligning forces around efficiency, sources of value, and ecosystem resilience to shape China's new global stance in biopharma innovation. This will not be a linear leap, but a system-wide journey that demands patience, coordination, and long-term commitment; no single player can deliver the breakthrough alone. (See **Exhibit 23**.)

Efficiency is both the starting point of China's biopharma innovation and a core source of confidence in its global competitiveness. Over the next decade, all stakeholders will need to continue strengthening China's advantages in scale, speed, and cost efficiency, and to keep converting them into platform-based and system-level capabilities.

Value, by contrast, is the next threshold China's biopharma innovation must cross. That means choosing harder but more meaningful paths, moving beyond fast-follow toward differentiated and original innovation, and delivering real breakthroughs in complex diseases and frontier mechanisms. Only then can China earn greater pricing power and a stronger voice in global competition.

Ecosystem resilience is the critical foundation for the continued advancement of China's biopharma innovation. Sustaining its stability and long-term viability will require joint stewardship from policymakers, investors, and industry alike.

EXHIBIT 22

From Efficiency Advantage to Value Leadership

The past decade		The next decade
An efficiency advantage		*Key leaps toward value leadership*
Built **systematic advantages** across **depth**, **speed**, and breadth	→	**Efficiency hub:** Sustained scaled innovation output with next-generation speed and cost, positioning China as a **global innovation acceleration hub**
Progress made in credibility and novelty, but still **structurally behind the US**	→	**Value source:** From fast-follow to original innovation; China's original value more widely **validated, recognized, and priced globally** in complex diseases and frontier areas
The innovation ecosystem has **taken shape**, but self-reinforcing capabilities in **capital, talent, and translational system** still to be improved	→	**Ecosystem resilience:** Global pricing power and capital will remain centered in the US; Chinese innovators need clearer paths to **global value realization** and a globally capable, battle-tested team

EXHIBIT 23

Collective Forces to Redefine the Next Decade

	Local innovators	MNCs	Government	Investors
Efficiency hub	Build an R&D system that leads in efficiency and cost, moving **from hotspots to ecosystem-based output**	**Integrate China earlier into global R&D** (e.g., early clinical exploration) to achieve faster, earlier validation and iteration	**Enhance compliant research data access and reusability** to upgrade the data infrastructure	Decide on the **exposure to "China efficiency dividend"** and support portfolio companies to **institutionalize and scale**
Value source	Evolve from fast-follow to **differentiation**, **original innovation**, and **complex diseases breakthrough** to strengthen pricing power	**Shift from asset acquisition to early co-creation**, ensuring **early engagement with local innovation ecosystem** to maximize value	Steer capital toward **original innovation**; accelerate alignment with **global clinical and data standards**	Showcase China's original value on the global stage, earning **global recognition** and **global pricing**
Ecosystem resilience	Build global clinical, operational and commercial capabilities to **transform beyond asset out-licensing**	**Invest, incubate, and partner to embed in the local ecosystem**, making Chinese innovation a must-have rather than a nice-to-have	**Institutionalize transaction intermediaries and IP ownership** to bridge translation gaps; encourage long-term government funds to participate in original innovation	Strategically allocate funding to Chinese innovation with a relatively **long-term and patient approach**

This is a climb for the entire industry. It begins now, with every stakeholder's choice of direction and commitment to long-term value.

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