



Synthra Capital

AI Biopharmaceutical Industry
Dynamics Research Report

*For synthra Capital investors only

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Preface

In the 21st century technological wave, the intersection of artificial intelligence and biomedicine is becoming increasingly apparent. It can analyze, predict and improve life and health in unprecedented ways. From gene editing to intelligent diagnosis, from drug development to personalized treatment, the combination of AI and biomedicine is opening up a new era of smart medicine.

At present, the overall scale of the global AI medical market has reached billions of dollars and continues to expand at a double-digit compound annual growth rate (CAGR). This field has attracted the attention and investment of many technology giants, start-ups and traditional medical equipment manufacturers. The competitive landscape is diversified. International leading companies such as IBM Watson Health and Google Health have dominated the market with their strong technical research and development capabilities, and a large number of innovative start-ups have emerged in sub-sectors.

From the application level, imaging diagnosis, auxiliary decision support, personalized treatment plan design and telemedicine services are the main landing scenarios of AI medical care, and they have shown great potential in multiple links such as precision medicine, disease prevention and health management.

Starting from "AI+medical devices", "AI medical imaging" and "AI drug development", this report explores the new trend of AI technology + biomedicine industry integration and interprets the new direction of future development.

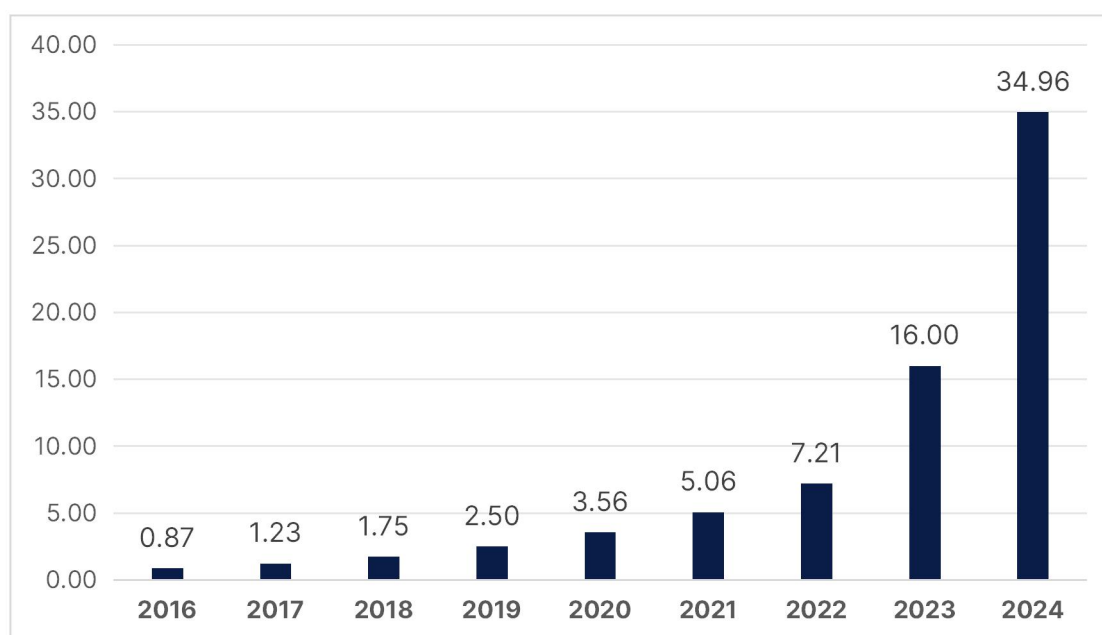
1. AI+Medical Devices

AI+ medical devices refer to medical devices that use artificial intelligence technology, including artificial intelligence independent software and artificial intelligence software components. Its application in auxiliary treatment, medical image processing and other fields is becoming more and more extensive, and it has become one of the hot tracks for the development of the medical device industry in the future. The rise of a new generation of artificial intelligence technology has provided new ideas and means for the medical industry to achieve intelligent transformation, and has also brought major opportunities for the development of the medical device industry. The development momentum of my country's artificial intelligence medical device industry is rapid, and the artificial intelligence medical device industry ecosystem has basically taken shape. Looking to the future, the commercialization of AI+ medical devices will surely make breakthrough progress.

1.1 Analysis of the market situation of AI+ medical devices

The market prospects for artificial intelligence medical devices are broad. Artificial intelligence technology brings major opportunities for the development of the device industry. On the one hand, trends such as an aging population and a younger age of chronic diseases have led to a continuous increase in medical and health needs. Artificial intelligence medical care is conducive to alleviating problems such as the imbalance between supply and demand of medical resources, and provides key ideas for the transformation and upgrading of the medical industry. On the other hand, the high-end medical device industry has long had problems such as some key process technologies being controlled by people and the relatively low level of whole machine manufacturing and assembly. Promoting the embedding of artificial intelligence technology into high-end medical devices and improving the intelligence of control, imaging and other systems can accelerate product upgrades and performance improvements, and help promote the leapfrog development of the industry.

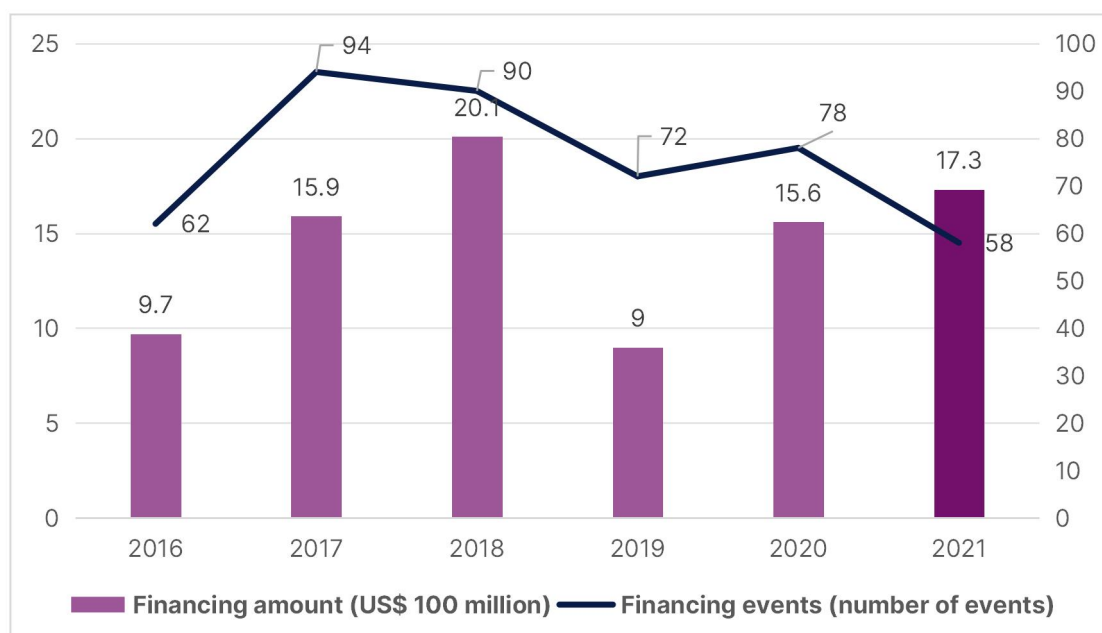
From a global perspective, the AI+medical device market size has grown from US\$86.5 million in 2016 to US\$506 million in 2021, with a compound growth rate of 42.4%. It is expected to grow to US\$3.496 billion in 2024, with a compound growth rate of 118.5% in the next three years.



AI+ medical device market size (billion US dollars)

The number of financing events has slowly declined, and the amount of financing has gradually recovered since 2019. The global AI+ medical device industry achieved financing of US\$970 million in 2016, and completed 62 financing events. In the following two years, financing events and amounts in the AI+ medical device field increased significantly, reaching a peak in 2018 with a financing amount of US\$2.01 billion. However, in 2019, with the arrival of the financial capital winter, both the amount and quantity of AI+ medical device financing declined significantly. In 2020, with the issuance of Class III certificates in the field of medical devices and the shift of

industry focus from R&D to commercialization and other factors, investment and financing in the AI+ device field will increase again; in 2023, a total of 58 financings will be generated in the global AI+ device field, with a total financing amount of \$1.733 billion.



Investment and Financing of the Global AI+ Medical Device Industry from 2018 to 2023

1.2 AI+Medical Device Application Scenarios

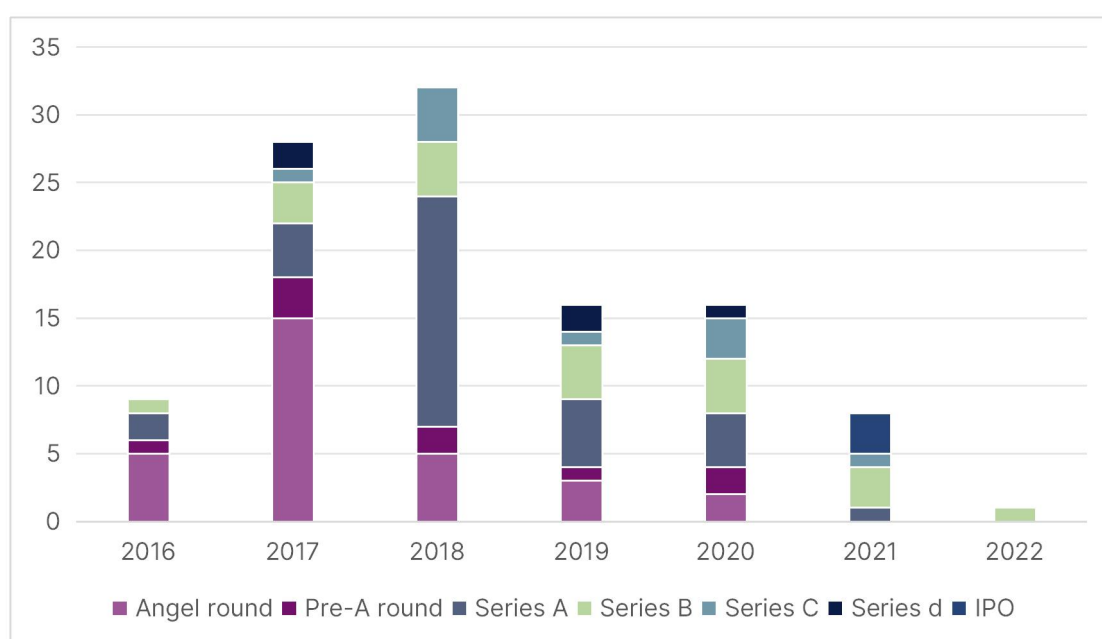
In terms of application scenarios, medical imaging is the most widely used and mature scenario for AI in the medical field. my country has more than 7.5 billion medical imaging examinations per year. In 2021, the scale of my country's medical imaging market reached 52.37 billion yuan, and it is expected to reach 57.76 billion yuan in 2022. The huge amount of examinations has brought about the rapid growth of imaging data. At present, the annual growth rate of imaging data has reached 30%, while the annual growth rate of radiologists in the same period is only 4%, resulting in a large supply gap. The shortage of radiologists has caused a high misdiagnosis rate. The characteristics of medical imaging data such as strong availability, easy labeling, and relatively high degree of standardization have greatly reduced the application threshold of AI. Therefore, medical imaging has become the main application market for AI at present.

The key application scenarios of AI+medical devices are mainly divided into the following aspects:

- ✓ Out-of-hospital monitoring of acute exacerbation of COPD. Early identification of patients at high risk of acute exacerbation of COPD and thus individualized intervention can help
- ✓ Improve clinical outcomes. By combining the collectible patient information with the acute attack situation, an AI prediction model for acute exacerbation risk and an out-of-hospital monitoring model are established to provide early warning of future acute attacks in COPD patients.
- ✓ AI-assisted interpretation of cancer images. In the field of lung cancer, AI-assisted cancer

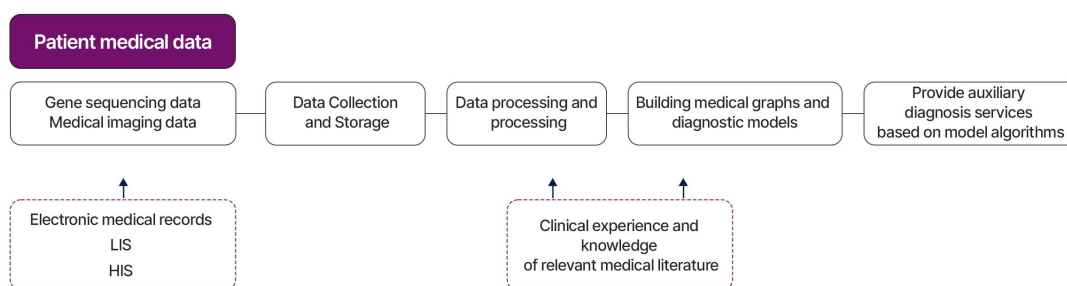
detection, benign and malignant analysis, and quantitative analysis are of great significance for doctors to quickly and accurately judge patients' conditions during large-scale screening. In the field of breast cancer, breast ultrasound-assisted AI provides higher diagnostic accuracy and efficiency for breast cancer ultrasound screening, helping early screening and diagnosis of breast cancer.

- ✓ CT screening for COPD. Pulmonary function tests are the gold standard for the diagnosis of COPD. Due to the low penetration rate of primary pulmonary function meters and the high requirements for patient cooperation in pulmonary function tests, patients are missed or misdiagnosed, missing the best time for intervention. Imaging AI technology has been widely used in the diagnosis and evaluation of tumors and cardiovascular and cerebrovascular diseases.



Number of financing rounds for AI medical imaging companies from 2016 to 2022

AI-assisted diagnosis and treatment mainly focuses on single diseases, and its applications are concentrated in the field of tumors. AI-assisted diagnosis is based on massive medical data and artificial intelligence algorithms, using cognitive computing, deep learning, computer vision and other technologies to discover disease patterns and provide assistance to doctors in diagnosing diseases and formulating treatment plans.



Construction of AI-assisted diagnosis system

1.3 AI+Future Development Direction of Medical Devices

The new generation of artificial intelligence technology represented by deep learning will empower the field of medical devices. At present, artificial intelligence medical devices are mainly used in the diagnosis, treatment, monitoring, rehabilitation and other fields of diseases, and have emerged in decision-making assistance, medical data processing, health management and other aspects. Since 2022, medical device products using deep learning technology have been approved for listing one after another, and medical devices based on the new generation of artificial intelligence technology are accelerating into clinical application. Artificial intelligence medical devices have entered the commercialization stage, and their clinical value has become increasingly prominent. The industrial ecology of artificial intelligence medical devices has basically taken shape. The traditional medical and health industry is the provider of data resources. The new generation of artificial intelligence algorithm research and development companies and medical information and medical device companies jointly lead product research and development, empower the traditional medical and health industry, and form an industrial ecological closed loop. With the improvement of technology and the deepening of application, several typical products have been developed, including intelligent auxiliary diagnosis products, intelligent auxiliary treatment products, intelligent monitoring and life support products, intelligent rehabilitation physiotherapy products, and intelligent traditional Chinese medicine diagnosis and treatment products. The bottleneck of artificial intelligence technology needs to be further broken through. On the one hand, the existing volume of medical data is difficult to support the full learning of artificial intelligence, and the application effect of artificial intelligence technology in small data scenarios is still unsatisfactory. On the other hand, many medical artificial intelligence algorithms lack medical explainability. Patients cannot understand the basis behind diagnostic decisions when seeking medical treatment, which affects their trust in doctors and subsequent treatment outcomes. To a certain extent, this leads to the application of artificial intelligence in the medical industry facing greater doubts and concerns than in other industries.

2. AI Medical Imaging

AI medical imaging uses deep learning to achieve functions such as lesion identification and labeling, target area delineation, etc., helping doctors to find hidden lesions faster and complete diagnosis and treatment. Currently, global AI medical care is in a stage of rapid development. Countries are actively launching various support policies. Many AI medical imaging devices have been approved for marketing, involving multiple fields such as heart, tumors, and lungs. AI medical imaging has officially entered the era of commercialization.

2.1 Overview of AI Medical Imaging Industry Chain

The upstream of AI Medical Imaging Industry Chain is mainly divided into hardware providers, software providers and algorithm and data companies. Hardware providers mainly provide MCU (microprocessor sensor), ASIC (application-specific integrated circuit), DSP (digital signal processor), precision resistor, power chip, sensor and other electronic components. The main companies are ABB, TSMC, etc. Software providers mainly provide basic medical equipment software such as image acquisition software, image archiving, output system and image printing system. Representative companies include GE. Algorithm platform and data platform mainly provide learning materials for later AI products. The algorithm models of most AI medical imaging companies are derived from the study of various papers. In the midstream of AI medical imaging industry chain, many companies rely on medical imaging equipment or image management writing system to enter medical institutions. Internet companies such as Google have capital and algorithm advantages, have mastered and developed advanced AI technology, and have made breakthroughs in the application layer. Chronic glaucoma-like optic neuropathy fundus image-assisted diagnosis software and pneumonia CT image-assisted triage and evaluation software have been approved as Class III medical devices. Among technology companies, Arterys Arterys and others have made early deployments in AI medical imaging, focusing on application layer construction, and have their own algorithms. They have attracted great attention from capital and are the types of companies that currently occupy the domestic market share.

The downstream application scenarios of the AI medical imaging industry chain include hospitals, community clinics, imaging centers, physical examination centers, etc., mainly for image reconstruction, brain disease diagnosis, injury identification, etc.

2.2 Global AI Medical Imaging Industry

FDA further speeds up the approval of AI medical products. To accelerate the development of AI medical care, FDA has broken the restrictions on AI products in traditional medical device approval policies, established a separate AI and digital medical review department, and shortened the approval process by lowering the threshold for medical AI products and

downgrading some Class III medical AI products to Class II products for approval. Under this circumstance, the number of AI/ML medical products approved by FDA ranks first in the world. As of October 2022, FDA has supported a total of 521 AI/ML medical devices.

Global AI medical imaging has entered a period of rapid development. Nova One Advisor predicts that by the end of 2027, the global AI medical imaging scale will be approximately US\$20 billion, with a compound annual growth rate of 35.9%. From January to July 2022 alone, FDA approved 79 AI/ML medical devices, a month-on-month increase of 58%. Many companies around the world are actively launching new AI medical imaging products. In July 2022, GE launched the software-intensive platform Vivid E95/E90/E80 for cardiac imaging; Siemens launched the intelligent integrated imaging software syngo.CT for bone diagnosis; Philips launched the AI application MRCAT Head & Neck for head and neck tumor treatment. In terms of market share, established medical imaging institutions such as GE, Philips and Siemens occupy an advantageous position in the industry, and the three institutions account for 80% of the global market share. Although the competitive landscape in the field has been basically determined, there are still new and emerging star companies in various countries entering the market from the segmented track and emerging in the field. Viz.ai and Subtle Medical (Subtle Medical) in the United States explored the launch of Viz SDH and SubtlePET for stroke monitoring and machine image quality improvement. BriefCase and HealthCCSng developed by Aidoc Medical in Israel have both been approved by the FDA for marketing for large vessel occlusion and cardiac imaging.

Company Name	Main products	Field	Nation
GE	Deep Learning Image Reconstruction, Vivid E95/E90/E80, Venue Fit, FlightPlanforLiver	Heart/blood vessels	USA
Aidoc Medical	BriefCase	Skeleton	Israel
Zebra Medical Vision	HealthCCSng, HealthCCSng	Heart	Israel
Viz.ai, Inc.	Viz SDH, Viz ICH	Head/Cardiovascular	USA
Cella Vision AB	CellaVision DC-1, CellaVision DC-1 PPA	Cell	Sweden

Products of leading AI medical imaging companies

The global AI medical imaging track capital market is active. In the first half of 2022, there were 329 financing events in the US digital health track, with a total financing amount of US\$10.3 billion. Viz.ai completed a US\$100 million Series D financing. The company's self-developed Viz ANEURYSM system was approved by the FDA to detect stroke-related indicators. RedBrick AI completed a US\$4.6 million seed round of financing. The company mainly accelerates the development and application of artificial intelligence in clinical environments by quickly annotating data on medical images. Subtle Medical completed tens of millions of dollars in Series B financing. The company previously received US\$12.2 million in Series A financing. The self-developed SubtlePET and SubtleMR™ systems were approved by the FDA for optimizing MRI

image quality. South Korea's Lunit (Lunying Medical) successfully IPOed on its own GEM in August 2022. Lunit specializes in the field of tumor diagnosis and treatment. Its core products are LunitINSIGHT, an AI image analysis solution for cancer screening, and Lunit SCOPE, an AI biomarker platform.

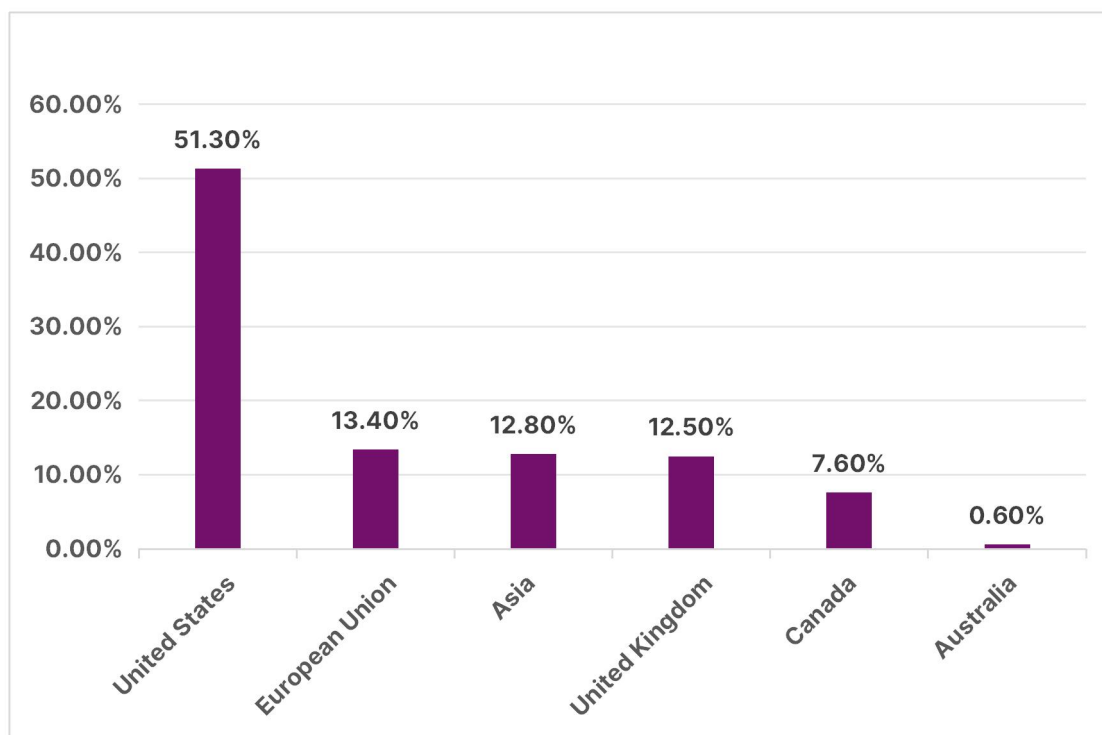
Global giants and R&D companies in the field of medical imaging are actively joining forces. Siemens has cooperated with RaySearch, Varian Medical Systems, and Elekta. At the same time, the company acquired Varian Medical in 2021 to enhance its competitiveness in radiotherapy. GE acquired Elekta in 2022 and cooperated with RaySearch to increase its research and development in radiotherapy. In terms of landing applications, Subtle Medical has reached application landing business agreements with RadNet, the US Imaging Center Alliance, and Capstone, the Medical Procurement Alliance. Previously, Subtle Medical has reached business agreements with Affidea in Europe and DASA in South America.

2.3 Summary

The current global AI medical imaging field is still in a period of rapid development and exploration. As a new format combined with manufacturing and artificial intelligence, AI medical imaging has the characteristics of multidisciplinary cross-border and high added value, and is one of the important emerging industries in the future.

3. AI for drug discovery

Global AI drug R&D maintains a growth trend. North America is the largest market for AI drug R&D in the world, with more than half of the global AI drug R&D companies concentrated in the United States. North America accounts for the largest share of the global AI drug R&D market, and the Asia-Pacific region ranks third. It is estimated that the global AI drug R&D market will reach US\$3.88 billion in 2025. Currently, there are about 700 AI drug R&D companies in the world, of which more than 50% are concentrated in the United States, the United Kingdom and the European Union account for 12.5% and 13.4% respectively, and Asia accounts for about 12.8%.



The proportion of AI drug development companies around the world in 2023

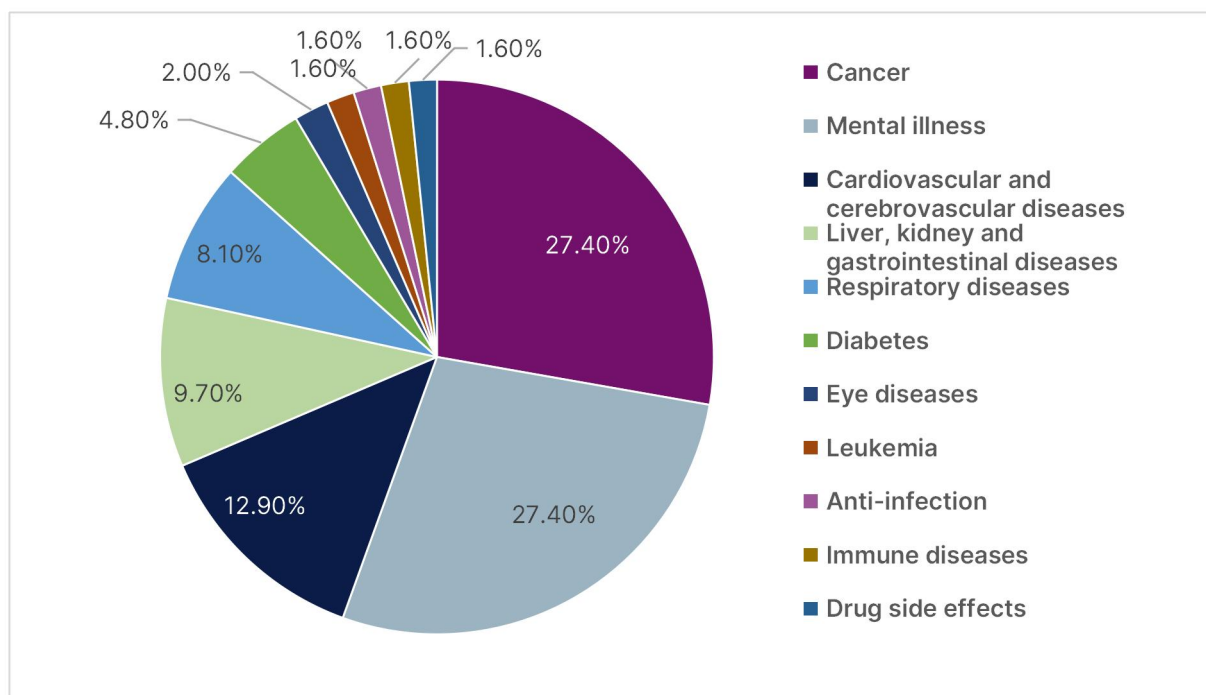
3.1 Financing capabilities

The global AI drug R&D financing capabilities have improved overall. In 2022, the total number of global AI+ drug R&D related financing events reached 144, with a total amount of US\$6.202 billion (approximately RMB 42.67 billion). Compared with the overall total of 77 events in 2021, the total amount of financing of US\$4.56 billion showed a trend of both increases. Among them, there were 71 AI drug R&D financing events in the United States and 30 in other countries and regions. Investment and financing activities were mainly active in the United States and Europe.

3.2 Products under development

From the perspective of online AI drug R&D, AI-assisted drug R&D layout is distributed in various stages of drug discovery, preclinical research, clinical trials and drug sales. Among them, the most deployed links are the design, optimization and synthesis of lead compounds, followed by compound screening, target discovery and drug repositioning. There are relatively few companies that have deployed crystal form prediction and dosage form design. In 2022, virtual screening of small and medium-molecule compounds, new target discovery, drug optimization design and drug redirection in the field of AI drug R&D are currently more popular directions. There are no successful cases of using AI technology to launch new drugs in the world. From the perspective of the disease areas that AI drug products under development focus on, they mainly focus on cancer and mental illness, accounting for more than 50%; followed by cardiovascular and cerebrovascular, liver, kidney, gastrointestinal and respiratory systems,

accounting for about 30%; the remaining areas involved include diabetes, eye diseases, leukemia, infectious diseases, immune diseases, and drug side effects. Some companies have laid out niche tracks such as genetic diseases and rare diseases. Among them, the more well-known ones are LY-CoV555 jointly developed by AbCellera and Eli Lilly, and AI Therapeutics and Yale University jointly developed the LAM-002 pipeline. LY-CoV555 is the world's first coronavirus neutralizing antibody to enter the clinical stage, and was granted emergency use authorization (EUA) by the US FDA in November 2020.



Global AI Drug R&D Clusters

Judging from the development progress of products under development, the United States still dominates the global AI drug pipeline layout. As of June 2022, there are 26 AI drug development companies and about 51 drug pipelines assisted by AI that have entered clinical phase I. Among them, more than 80% are American companies, and the leading AI drug development companies that have been listed are basically European and American companies.

3.3 Market players (major players)

There are currently three major players in the global AI pharmaceutical market, namely large pharmaceutical companies, AI pharmaceutical start-ups and Internet leading companies. Among them, large pharmaceutical companies are divided into traditional pharmaceutical companies and CRO companies. From the perspective of the AI drug development industry chain, the upstream is the supply of AI model data sets and cloud computing platforms. The medical data provided by the data sets is the key competitive barrier of the industry, and the cloud computing platform is used to ensure the computing power supply of the underlying architecture. The midstream of the industry chain is composed of AI drug R&D companies and IT companies. AI drug R&D companies

mainly cooperate with downstream companies in the form of pharmaceutical R&D outsourcing, and build and train models based on pharmaceutical data sets based on internal training tools and AI development tools; IT companies participate in AI drug R&D by building their own AI drug R&D platforms and providing computing power and computing framework services. The downstream is traditional pharmaceutical companies. Midstream AI drug R&D companies will sell their drug R&D services directly to traditional pharmaceutical companies, so traditional pharmaceutical companies are the direct demanders of AI drug R&D.

From the perspective of the participation of major players, there are mainly the following characteristics:

- ✓ Head pharmaceutical companies: mainly enter the AI drug R&D track through self-built teams and business cooperation. Among them, cooperation with AI drug R&D companies is the main business model. Head pharmaceutical companies can make up for the shortcomings of AI drug R&D companies with their advantages in R&D pipelines and professional backgrounds. For example, the number of cooperations with head pharmaceutical companies such as Johnson & Johnson, Pfizer, AstraZeneca, Novartis, and Bayer is close to 10, and WuXi AppTec cooperates with Insilico Medicine to conduct compound screening, etc.
- ✓ Internet leading enterprises: relying on their AI model and platform advantages, cross-border entry through three ways: external investment, self-built AI drug research and development platform and providing algorithm services.
- ✓ AI drug research and development enterprises: as the main force of the industry, AI new drug research and development enterprises rely on their algorithm and data advantages, and use CRO (pharmaceutical research and development outsourcing) and self-developed pipelines as the main mode to cut into the application scenario. Technically, the algorithms of AI drug research and development enterprises are becoming more and more popular, becoming an important technical barrier. In addition, the data self-development capabilities of such enterprises are key competitive factors, and the high-value data required for AI drug research and development mostly come from their smart laboratories.

3.4 Existing problems

Insufficient data volume, high cycle and cost of data acquisition. The threshold for obtaining high-quality data is high. Even if cutting-edge AI technology is used, it cannot immediately reverse the challenges faced by new drug research and development. The data sources of AI drug research and development enterprises can be divided into public data and non-public data. Public data include various literature databases, public project simulation data and some clinical data. Such data are easy to obtain, but the data quality is difficult to guarantee, and the model calculation based on this is not reliable enough. Non-public data is mainly the accumulation of previous projects of various pharmaceutical companies. Such data has high accuracy and is more suitable for model training and calculation. However, since data belongs to the core assets of pharmaceutical companies, it is extremely difficult to obtain.

The matching requirements between algorithms and application scenarios are high, and professional talents are scarce. The advantages of algorithm models in AI drug development can be reflected in multiple dimensions, such as the accuracy of results, calculation speed, model volume, generalization performance, etc. Different algorithm models may have different focuses,

so the advantages will also be different. It is crucial to reasonably select algorithm models with corresponding advantages under specific task requirements and application scenarios. How to make the algorithm and biology more perfectly combined requires technicians to have a deep understanding of pharmaceutical medicine and AI artificial intelligence in order to better play the advantages of the model. The scarcity of such talents has also become an important factor hindering the development of the industry.

3.5 Development trend

AI drug development will enter the field of macromolecules such as antibodies. In April 2022, Israeli pharmaceutical company Biologic Design announced that its first ever computationally designed antibody entered clinical trials. In November, Canadian pharmaceutical company AbCellera and its partner Regeneron announced that they had advanced the first antibody candidate for an undisclosed G protein-coupled receptor (GPCR) to the preclinical development stage. In the same month, AI pharmaceutical company Exscientia announced that its AI technology platform will include human antibody design. Some media have made incomplete statistics that more than 20 companies around the world are using AI technology to discover antibody drugs. From a regional perspective, most of these companies are located in Europe and the United States.

Automated laboratories have become a new eye-catching point. In 2023, the quantity and quality of data will still be the core issues in the development of AI pharmaceuticals. The emergence of automated laboratories is precisely to solve this problem. In 2021, some AI pharmaceutical companies have begun to establish automated laboratories with the aim of improving internal data generation capabilities to optimize AI models. According to incomplete statistics, Exscientia, Arctoris, Recursion, Insitro, etc. have established automated laboratories. Automation has become the next important module in the strategic map of many AI pharmaceutical companies. In early 2021, UK-based Automata Labs raised \$50 million for automated laboratory research.

4. In the first quarter of 2024, global digital healthcare investment and financing amounted to US\$3.7 billion

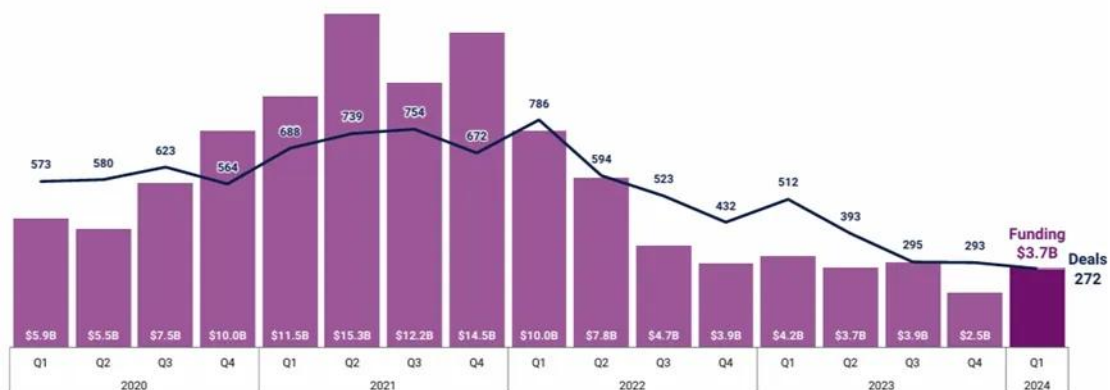
Recently, CB Insights released the "2024 Q1 Global Digital Healthcare Investment and Financing Report", which sorted out the global digital healthcare investment and financing overview in the first quarter of 2024. In Q1 2024, global digital healthcare investment and financing amounted to

US\$3.7 billion, with a total of 272 transactions. Although the number of transactions has dropped to the lowest quarterly level since 2014, the average size of transactions has increased by 38%. So far, the average transaction size in 2024 has reached US\$16.4 million.

01 Overall Overview of Global Digital Healthcare Investment and Financing Although the number of quarterly transactions in digital healthcare investment and financing has hit a multi-year low, the total transaction amount in Q1 2024 showed a rebound trend. In Q1 2024, global digital healthcare investment and financing amounted to US\$3.7 billion, with a total of 272 transactions, and global digital healthcare investment and financing increased by 48% month-on-month. However, compared with Q1 2023, the financing amount still fell by 12%, and compared with Q1 2022, it fell by 63%. At the same time, the number of digital healthcare transactions declined in the first quarter of 2024, falling to the lowest quarterly level since 2014.

State of Digital Health | Global Trends | Investment Trends

Quarterly equity funding & deals



From regional perspective, the United States is the largest location for digital health investment and financing in Q1 2024, with a total of 144 related transactions and a total investment and financing amount of US\$2.6 billion. Asia has a total of 43 related transactions and a total investment and financing amount of US\$300 million.

State of Digital Health | Global Trends | Investment Trends

Funding & deals by global region in Q1'24



The United States, Asia, and Europe remain the largest markets for digital healthcare. The United States maintains its leading position, accounting for more than half, while the digital healthcare markets in Europe and Asia have fluctuated.

State of Digital Health | Global Trends | Investment Trends

Percent of quarterly deals by global region



In Q1 2024, there were 7 transactions with financing amounts exceeding US\$100 million, namely Freenome (early cancer screening), BioAge Labs (AI drug discovery platform), Abridge (AI automated medical conversation recording), Cellanome (cell biology automation platform), Capital Rx (pharmacy benefit management), Zephyr AI (precision medicine platform), and Medical Micro Instruments (microsurgical robot). Compared with the 3 transactions exceeding US\$100 million last year, the number has increased significantly.

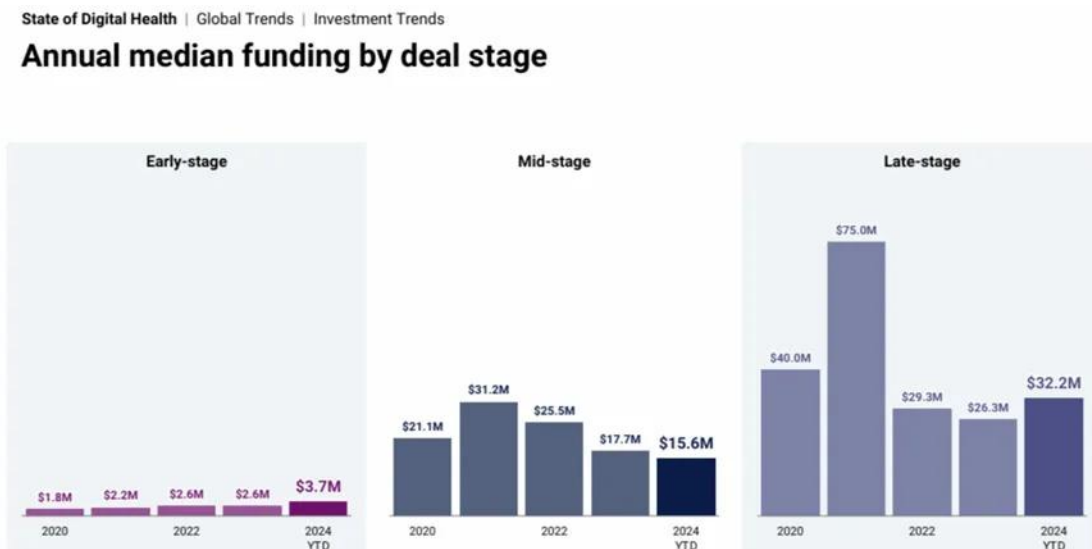
State of Digital Health | Global Trends | Investment Trends

Global: Top equity deals in Q1'24

Company	Round Amount	Round Date	Round Valuation	Select Investors	Country	% of Total Funding
1 Freenome	\$254M	Series F 2024-02-15	\$2.0B	Roche, Andreessen Horowitz, Artis Ventures, DCVC, Perceptive Advisors	United States	6.9%
2 BioAge Labs	\$170M	Series D 2024-02-13	\$424M	Sofinnova Ventures, Andreessen Horowitz, Amgen Ventures, Cormorant Asset Management, Lilly Ventures	United States	4.6%
3 Abridge	\$150M	Series C 2024-02-23	\$850M	Lightspeed Venture Partners, Redpoint Ventures, Bessemer Venture Partners, Institutional Venture Partners, Spark Capital	United States	4.1%
3 Cellanome	\$150M	Series B 2024-01-29	\$495M	General Catalyst, 8VC, Cambridge Innovation Capital, Illumina Ventures	United States	4.1%
5 Capital Rx	\$115M	Series E 2024-03-21	N/A	B Capital Group, Edison Partners, Frist Cressey Ventures	United States	3.1%
6 Zephyr AI	\$111M	Series A 2024-03-13	N/A	EPIQ Capital Group, Eli Lilly and Company, Red Cell Partners, Revolution	United States	3.0%
7 Medical Micro Instruments	\$110M	Series C 2024-02-21	N/A	Fidelity Investments	Italy	3.0%
8 Harbor Health	\$96M	Series A 2024-01-11	\$190M	General Catalyst, 8VC, Alta Partners, Health2047 Capital Partners, Lembi Ventures	United States	2.6%
9 Huanuotai	\$83M	Series B 2024-03-22	N/A	Belyao Group, Mingtai Asset Management, 3E Bioventures, Moom Capital, Shunxi Fund	China	2.3%
10 Nalu Medical	\$65M	Series E 2024-01-03	N/A	Novo Holdings, Advent Life Sciences, Aperture Venture Partners, Decheng Capital, Endeavour	United States	1.8%

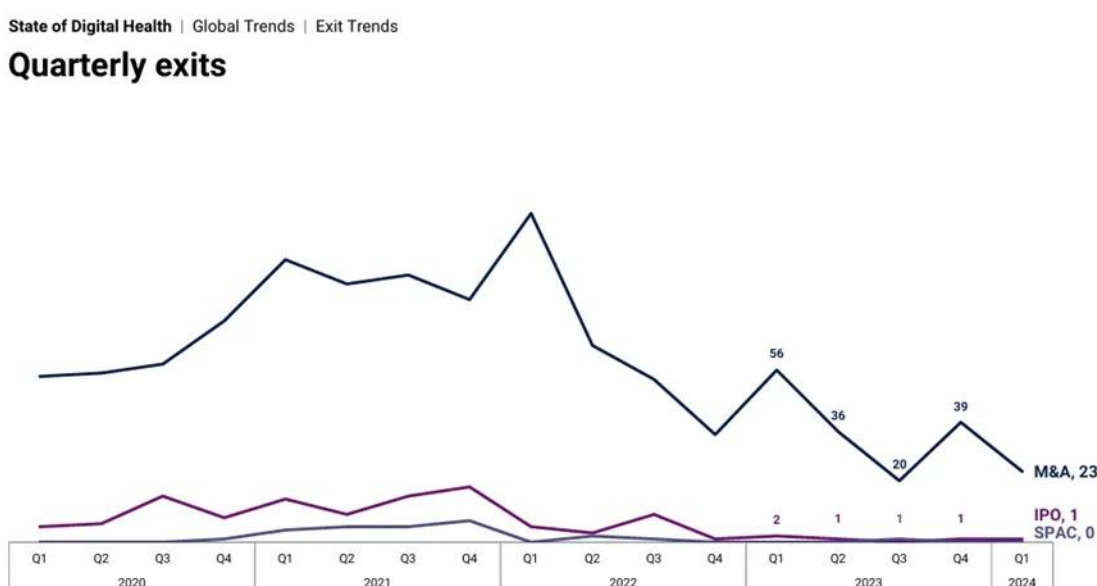
In Q1 2024, the scale of early-stage investment and financing increased significantly, with a median of US\$3.7 million. The scale of mid-term investment and financing declined slightly, while

the scale of late-stage investment and financing showed a slight growth trend, reaching US\$32.2 million.



Compared with previous years, the median transaction size in 2024 has increased significantly. Among them, the United States is still leading, reaching US\$6.7 million, while Asia and Europe are relatively close, at US\$5.2 million and US\$5.4 million, respectively.

VC institutions are still the most important investors in digital healthcare, accounting for about 32% of the investment and financing market share in Q1 2024, followed by corporate strategic investors, CVC, angel investors, asset management institutions, PE institutions, and incubators. In terms of exit events, in Q1 2024, there was a total of 1 digital healthcare company IPO listed worldwide, and a total of 23 digital healthcare companies completed exits through mergers and acquisitions.



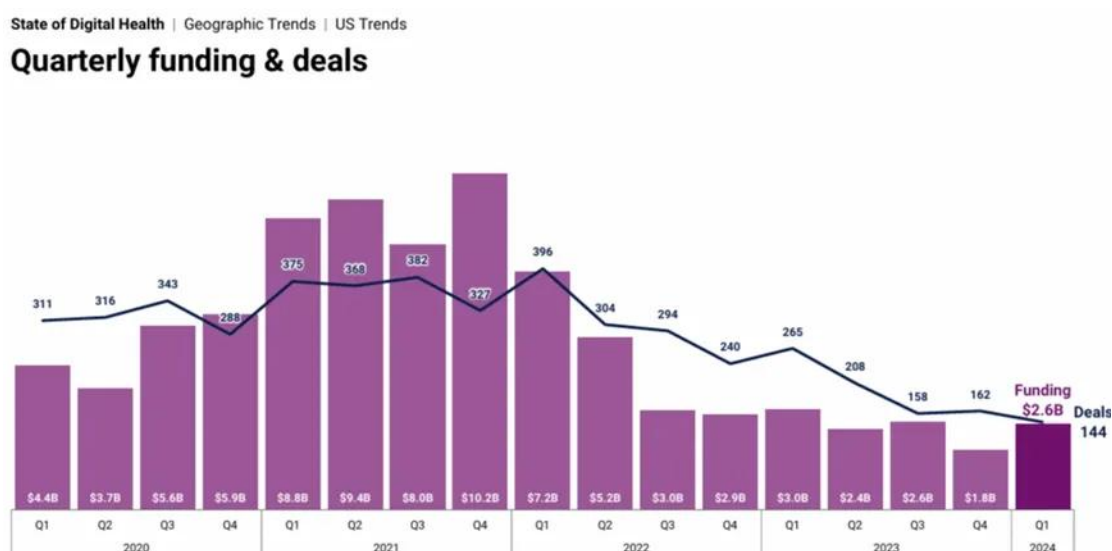
Among the projects that exited through mergers and acquisitions, the largest one was the

acquisition of SciencelO, a provider of medical artificial intelligence basic models, by Veradigm, a medical data and technology solution provider, with a transaction valuation of US\$184 million.

02 Trends in digital healthcare investment and financing in different regions around the world

(1) United States

In Q1 2024, the total amount of digital healthcare investment and financing in the United States was US\$2.6 billion, with a total of 144 transactions. Although the number of transactions and transaction amount decreased year-on-year, the transaction amount increased by about 44% month-on-month. Among the transactions, the majority were early-stage, accounting for 44%, which was significantly reduced compared with previous years (about 60%), mainly due to the increase in the proportion of mid-stage transactions to 28%.



In terms of exit events, in Q1 2024, there was 1 digital healthcare company in the United States that went public through IPO, and 14 digital healthcare companies exited through mergers and acquisitions.

(2) Asia

In Q1 2024, the total amount of digital healthcare investment and financing in Asia was US\$300 million, with a total of 43 transactions. The number of digital healthcare investment and financing transactions continued its previous downward trend, but the amount of investment and financing tended to stabilize amid fluctuations. Among the transactions that were completed, the proportion of mid-term transactions continued to expand, reaching 40%, which is now on par with the proportion of early-stage transactions.

Quarterly funding & deals



In terms of exit events, in Q1 2024, no digital healthcare companies in Asia were listed, and only three digital healthcare companies completed exits through mergers and acquisitions.

(3) Europe

In Q1 2024, the total investment and financing of digital healthcare in Europe was US\$700 million, with a total of 71 transactions. Both the number of investment and financing transactions and the amount of investment and financing increased month-on-month. Although the number of transactions decreased by nearly 50% year-on-year, the transaction amount increased by US\$100 million. Among the closed events, the proportion of early-stage transactions remained stable (73%) compared with the United States and Asia.

Quarterly funding & deals



In terms of exit events, in Q1 2024, no digital healthcare companies in Europe were listed through IPO or SPAC, but four digital healthcare companies completed exit through mergers and acquisitions.

5. Synthra Capital 2024

Investment Strategy by Industry

Global: HPV/PCV/shingles and other major products continue to increase in volume, RSV performed well in the first sales quarter

In 2023Q1-3, Merck/GSK/Pfizer/Sanofi's conventional vaccine business achieved revenue of US\$10.39 billion/GBP17.14 billion/US\$15.676 billion/EUR15.49 billion, up 24%/22%/10%/1-0.5% year-on-year, respectively. Revenue growth was mainly contributed by the increase in volume of existing products in Europe/emerging markets or the launch of new products.

- ◆ Merck: 419-valent HPV vaccine achieved revenue of US\$7.02 billion (year-on-year +29%), accounting for ~68% of total revenue, including US\$1.72 billion in the US market (year-on-year -5%) and US\$5.30 billion in markets outside the US (+46%);
- ◆ GSK: Shingrix achieved revenue of £2.54 billion (year-on-year +16%), accounting for ~36% of total revenue, including £1.40 billion in the US market (year-on-year -6%) and £1.14 billion in markets outside the US (year-on-year +62%); 2023Q3 is the first sales quarter for RSV vaccine Arexy for the elderly, achieving revenue of £710 million GBP, 2023 full-year sales guidance of 900 million to 1 billion GBP;
- ◆ Pfizer: PCV13120 vaccine achieved revenue of 4.84 billion USD (year-on-year +5%), accounting for ~85% of total revenue, including 3.21 billion USD (year-on-year +7%) in the US market and 1.63 billion USD (year-on-year +2%) in the non-US market. PCV20 adult/child indications were approved in June 2021 and April 2023, respectively, and were recommended by ACIP in October 2021 and September 2023. It is expected that PCV13120 revenue in 2024 will be mainly driven by demand from US children and overseas adults; 2023 Q3 is the first sales quarter for Abrysvo, the RSV vaccine for the elderly/pregnant women, with revenue of 375 million USD.

Global: New technologies drive the continuous expansion of the vaccine industry, and it is in a new round of product iteration cycle

The spectrum of infectious diseases objectively exists. The early vaccine development technology based on empirical approach (e.g. inactivated! attenuated live) has picked some "low-hanging fruits", but for more infectious diseases. It faces the problem of being unable to become a drug (e.g. RSV inactivated vaccine cannot provide protection and has ADE effect) or poor effect (e.g. first-generation attenuated live herpes zoster vaccine Zostavax). After the 1980s, vaccine development entered a new path driven by new technologies (modern approach). In recent years, through technology/antigen design/adjuvant innovation and multi-link multivalent upgrades, the overseas vaccine industry has entered a new round of product selection cycle.

- ◆ Technology platform innovation: mRNA vaccines shine in the new crown vaccine development competition. Pfizer BioNTech and Moderna's new crown mRNA vaccines have

achieved cumulative revenue of more than US\$160 billion; in addition to the new crown vaccine. Moderna's RSV vaccine based on mRNA technology has submitted BLA and influenza vaccine Ph3 clinical data, which is superior to the 4-valent influenza inactivated vaccine:

- ◆ Antigen design innovation: COVID-19 and RSV vaccines use pre-fusion conformation antigens, and LZ901 of Green Bamboo Biotechnology uses recombinant gE-1gGfc fusion protein to enhance cellular immunity;
- ◆ Adjuvant innovation: GSK's Shingrix and Arexvy use AS01B/E new adjuvants respectively, and the protective efficacy is the best in the same category;
- ◆ Multi-component and multi-valent upgrades: pneumonia vaccine (PCV13→15/20), meningitis vaccine (MenACWY→MenABCWY).

CXO investment advice: Pay attention to leading companies with differentiated competitive advantages and subdivided boom tracks

At present, the global investment and financing environment is recovering slowly, but US inflation and interest rates are both at high levels. Combined with the extremely low valuation of the CXO sector as a whole, it is possible to deploy leading companies with differentiated competitive advantages and subdivided boom tracks, waiting for the fundamental reversal to come. It is recommended to pay attention to the following three main lines:

1) From the perspective of sector valuation, the valuation has fallen to the historical bottom. The current valuation implies the expectation of medium-to-low growth (10-15%), and the leading companies will maintain a growth of more than 20% after 2023 after digesting the high base of the epidemic; from the supply side, global production capacity has increased significantly, low-end production capacity has fallen into involution, and production capacity in some subdivided fields is still in short supply. At the same time, due to factors such as customer verification, a good competitive landscape is maintained; from the demand side, investment and financing data have gradually stabilized. The preferred valuation is at the bottom, the production capacity is differentiated, and the competitive landscape is good (the risk of profitability decline is low).

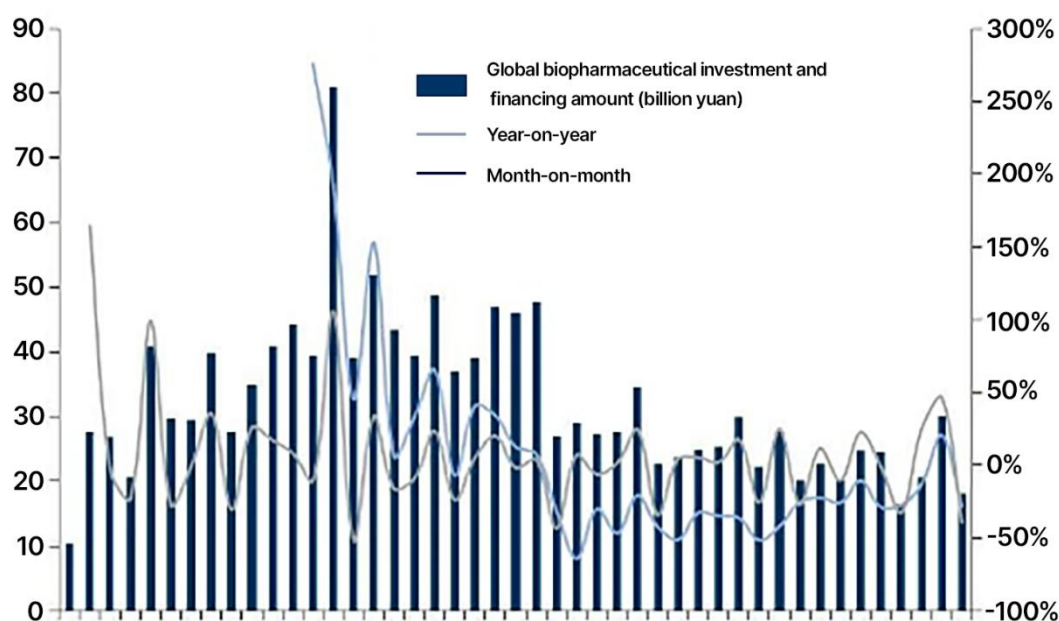
2) The rapid development of new molecular businesses such as peptides, oligonucleotides, and CGT is expected to further open up the growth space of the CXO sector. It is recommended to pay attention to investment opportunities in related industrial chains.

3) Generic drug CROs remain highly prosperous, and Chinese medicine CROs bring new growth. It is recommended to pay attention to CXO companies in high-prosperity segments with high growth in operating a/orders.

Demand side: Global biopharmaceutical investment and financing gradually picks up

The decline in the amount of global biopharmaceutical investment and financing (quarterly data) has gradually narrowed. In January 2022, the amount of global biopharmaceutical investment and financing declined year-on-year under a high base, and the year-on-year decline widened to -43% in the third quarter of 2022. Starting from the fourth quarter of 2022, the year-on-year

decline has gradually narrowed, from -43% in the third quarter of 2022 to -6% in the third quarter of 2023, showing signs of gradual recovery.



Global biopharmaceutical investment and financing

6. Synthra Capital Investment Targets

Generate Biomedicines

Funding amount: US\$273 million

Funding round: C round

Investors: ADIA, Pictet, T. Rowe Price, Synthra Capital, etc.

In 2023, Generate: Biomedicines announced the completion of a US\$273 million Series C financing. Generate Biomedicines completed a US\$370 million Series B financing in November 2021, with a total financing amount of over US\$643 million.

Founded in 2018 and headquartered in Massachusetts, USA, Generate Biomedicines focuses on creating new proteins and has now produced more than 1 million proteins that have never existed in nature.

In September 2023, Generate: Biomedicines published a generative AI model called Chroma in Nature magazine, which can design new proteins that do not exist in nature and have good biophysical and therapeutic properties.

Generative biology represents a fundamental shift in the development of therapeutics driven by generative AI. This approach goes beyond proteins found in nature and can generate new

proteins to address existing or emerging therapeutic needs. It is expected to usher in a new era of programmable drugs, making drug development faster, cheaper and more flexible. Generate has currently built a rich pipeline involving tumors, immunity, infectious diseases, etc. The fastest project has entered Phase I clinical trials. The company expects to submit multiple IND applications in 2024.

Investment advice: Maintain earnings forecasts and maintain a "buy" rating. The company's current performance is steadily improving, and earnings forecasts are maintained. The company's net profit attributable to shareholders is expected to be US\$5.5/8.0/1.02 billion in 2023-2025, up 75.0%/45.5%/27.5% year-on-year, respectively. Earnings per share in 23-25 are US\$0.45/0.65/0.82, respectively, and a "buy" rating is maintained.

Genesis Therapeutics

Funding amount: US\$200 million

Funding round: Seed round

Investors: Radical Ventures, T. Rowe Price, Synthra Capital, etc.

Genesis announced the completion of its seed round (\$4.1 million) financing in 2021.

Founded in 2019 and headquartered in California, USA, Genesis is committed to accelerating and optimizing the discovery of small molecule drugs using its proprietary generative and predictive AI platform GEMS. The GEMS platform integrates deep learning-based predictive models, molecular simulations, and chemical perception language models.

Genesis' internal pipeline projects are developed by the GEMS AI platform, which uses field-leading generative and predictive artificial intelligence methods to generate new molecules and quickly and accurately predict the potency, selectivity, and ADMET properties of candidate molecules. Genesis claims that GEMS is capable of developing candidate drugs for challenging, data-poor, and previously undruggable targets.

Investment advice: Maintain earnings forecasts and maintain a "buy" rating. The company's current performance is steadily improving, and its profit forecast is maintained. It is expected that the company's net profit attributable to shareholders will be US\$300 million, US\$420 million, and US\$550 million in 2023-2025, up 70.0%/40.0%/31.0% year-on-year, respectively. EPS in 23-25 are US\$0.35/0.48/0.63, respectively, and the "buy" rating is maintained.

Seismic Therapeutic

Financing amount: US\$121 million

Financing round: Round B

Investors: Google Ventures, Alexandria Venture Investments, Codon Capital, Synthra Capital, etc.

In December 2023, Seismic Therapeutic announced the completion of a US\$121 million Series B financing, which will be used to advance Phase I trials of two major projects. In February 2022, Seismic completed a US\$101 million Series A financing and was also selected in the 2022 Global AI Pharmaceutical Financing TOP10 list.

Seismic, headquartered in Massachusetts, is a biotechnology company that applies machine learning (ML) to immunology drug development. Its unique IMPACT™ technology platform can significantly improve the efficiency and scale of traditional therapeutic drug discovery by systematically integrating ML, structural biology, protein engineering and translational immunology, developing new biologics and optimizing their properties. Through this new approach, the company is accelerating the development of a biologics product pipeline for adaptive immune system disorders to treat autoimmune diseases.

Seismic has two projects entering IND, and there are also multiple preclinical pipelines.

Investment advice: Maintain earnings forecasts and maintain a "buy" rating. The company's current performance is steadily improving, and earnings forecasts are maintained. The company's net profit attributable to shareholders is expected to be US\$400 million/550 million/720 million in 2023-2025, up 80.0%/37.5%/30.9% year-on-year, respectively. Earnings per share in 23-25 are US\$0.50/0.68/0.89, respectively, and a "buy" rating is maintained.

Odyssey Therapeutics

Funding amount: US\$101 million

Funding round: Round B

Investors: Colt Ventures, Woodline Partners, Synthra Capital, etc.

On December 5, Odyssey Therapeutics announced the completion of a US\$101 million Series C financing. Odyssey was founded in 2018 and completed a US\$168 million Series B financing in October 2022; in December 2021, it completed a US\$218 million Series A financing, and the total financing amount has reached US\$487 million.

Odyssey's drug search engine combines next-generation ML, target biology, and drug and structural chemistry, aiming to accelerate drug discovery by unlocking targets with the greatest potential while minimizing losses.

Investment advice: Maintain earnings forecasts and maintain a "buy" rating. The company's current performance is steadily improving, and earnings forecasts are maintained. The company's net profit attributable to shareholders is expected to be US\$6.0/8.1/1.05 billion in 2023-2025, up 95.0%/35.0%/29.6% year-on-year, respectively. Earnings per share in 23-25 are US\$0.60/0.81/1.05 respectively, and the "Buy" rating is maintained.

7. Disclaimer

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Synthra Capital Investment Rating

CATEGORY	LEVEL	ILLUSTRATE
Stock investment rating	Buy	Stock price outperformed the market index by more than 20%
	Overweight	The stock price outperformed the market index by 10%-20%
	Neutral	The stock price performance is between the market index and $\pm 10\%$
	Sell	The stock price underperformed the market index by more than 10%
Industry investment rating	Overweight	Industry index outperformed the market index by more than 10%
	Neutral	The performance of the industry index is between $\pm 10\%$ of the market index
	Underweight	The industry index underperformed the market index by more than 10%

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About Synthra Capital

Initiated by the famous angel investor Reid Hoffman, it is a professional private equity investment institution jointly established by well-known companies such as NVIDIA, Microsoft, Open AI, Tesla, as well as emerging industry experts and financial veterans. As a top fund company based in the United States, we are committed to providing excellent financial services to global investors through cutting-edge investment strategies and deep industry knowledge. We firmly believe that artificial intelligence and big data not only represent the future technological trends, but also the core force driving global economic growth and industrial transformation. Through AI and big data financial management funds, investors can not only participate in this trend of the times, but also obtain rich investment returns in the wave of technological revolution. Synthra Capital was established in 2021, with clients and offices all over the world.

- **US\$62 billion** in discretionary asset management scale
- **500+** IPOs and M&A exits
- Deeply cultivate **17** AI industry tracks
- Provide financial support and incubation solutions for **187** AI companies
- **1000+** customer relationships
- **12+** global offices