Equity Research Company Research

Biotech CRO

RECOMMENDATION (BUY)

Viva Biotech (1873.HK)

April 23, 2025

Deeply Engaged in AI-driven drug R&D revolution, Viva Starts a New Era of Globalized CRDMO Businesses

Hang Seng Index	22,072.62
Hang Seng Composite Index	3,279.04
Hang Seng Healthcare Index	2,923.57

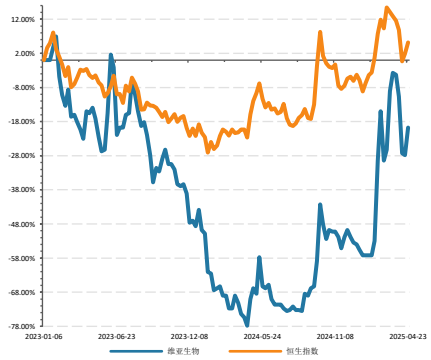
Target Price(HKD)	3.5
Upside/Downside(%)	133%
Market Consensus Price(HKD)	2.61

Market Data

Current Price(HKD)	1.5
52-Week High/Low(HKD)	2.12/0.41
Market Cap（HKDbn）	3.20
Free-float Market Cap（HKDbn）	3.20

Price Performance

Up/Down%	1m	3m	6m
Absolute	-16.7%	89.9%	61.29%
Relative	-9.8%	78.3%	53.6%



Source：Wind、uSMART Securities

Coverage Initiated on Viva Biotech (1873.HK), with a BUY rating and target price of 3.5 HKD. Our viewpoints are as follows.

- **Investment Thesis**

  In this report, we provide an in-depth and differentiated analysis of Viva Biotech as a leader in China's structure-based drug discovery (SBDD) CRDMO segment, highlighting its three core investment merits:

- **Viva is a global leader in SBDD with integrated CRO+CDMO capabilities.** SBDD is a mainstream technology in modern drug development. The basis of SBDD technology is to understand the interaction between drugs and targets at the molecular level, i.e. observing the inteprimaryraction between drug molecules and target proteins by analyzing their complex structure, to carry out rational drug design and improve drug R&D efficiency. The company has built the largest research platform on protein structures in the world and expanded into the realm of CDMO through the acquisition of Langhua Pharma in 2020, establishing an integrated drug R&D and manufacturing platform. Since Q2 2024, the company's new CRO order intake has shown gradual recovery, while cost optimization measures have helped maintain good profitability of the business. On the CDMO front, Langhua Pharma has provided CMC and CDMO services for 897 clients, with two commercialization projects set to launch in 2025-2026. The company plans to establish a new production capacity of 400 cubic meters between 2024 and 2025 to cater to commercial production of new molecules. At the same time, the CMC segment has seen consistent growth in the number of projects.

- **AI powers R&D and Manufacturing, creating new possibilities.** The company continues to enhance its competitiveness by introducing AI technologies, with a new proprietary AI drug design platform expected to launch this year, which covers the entire preclinical drug discovery process. AI adoption has also significantly accelerated research on new targets, novel mechanisms of action (MOA), and new modalities, creating new opportunities and enabling next-generation drug discovery. For instance, the company has studied over 2,098 independent drug targets, including 112 new targets delivered in 2024 alone. The company combines dry and wet experiments, using a large amount of experimental data to iteratively optimize AI models, which ensures parallel progress in computation and experimentation. In manufacturing, AI-powered large language models (LLMs) are being deployed to streamline CDMO workflows and boost efficiency.

- **The introduction of strategic Investors and undervaluation offer upside potential.** In 2023, Viva secured USD 225 million in funding from strategic investors, including Temasek, Highlight Capital (HLC), True Light and Investment Corporation of Dubai (ICD). The CRO segment alone was valued at CNY 4.6 billion (20x P/E at the time). However, the current stock price remains at a historically low valuation, presenting significant upside potential.

Where We Differ from the Market： We believe Viva Biotech, as a global SBDD leader, has successfully streamlined operations by exiting businesses with low marginal profits. Its early commitment to AI-driven drug discovery positions it well for future growth. The projects are progressing toward commercialization. Overall, the company's future development prospects are highly promising.

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Earnings Forecast

	2023A	2024A	2025E	2026E	2027E	2028E
Revenue（CNY million）	2156	1987	2264	2581	2943	3355
Revenue YOY	(9.4%)	(7.8%)	13.9%	14.0%	14.0%	14.0%
Gross profit（CNY million）	738	687	803	940	1099	1284
Gross profit YOY	(9.6%)	(6.9%)	16.9%	17.1%	16.9%	16.8%
Gross margin	34.3%	34.6%	35.5%	36.4%	37.3%	38.3%
Net profit（CNY million）	(100)	222	275	330	394	471
Net profit YOY	80.2%	322%	23.9%	15.8%	19.4%	19.5%
Net profit Margin	(4.6%)	11.2%	12.1%	12.8%	13.4%	14.0%
Adjusted net profit（CNY million）	209	315	345	400	464	541
Diluted EPS（CNY）	0.09	0.09	0.15	0.17	0.20	0.23

Source: Corporate financial statements, uSMART Securities.

Comparable Companies

Company	Close	YTD	Market Cap（Billions）	2024 Revenue (Billions)	2024 PE	PB
Viva Biotech	**1.5**	**74.42%**	**3.20**	**1.99**	**17.70**	**0.78**
Biocytogen	11.62	36.71%	4.64	0.98	128.13	5.17
Frontage Laboratories	1.2	-32.58%	2.44	1.91	397.85	0.57
XtalPi	4.88	-18.39%	19.62	0.25	-11.98	4.60
Harbour BioMed	7.85	322.04%	6.63	0.26	307.39	6.87
PharmaBlock	31.38	-6.61%	6.27	1.62	31.76	2.26
HitGen	14.43	17.13%	5.78	0.43	141.99	4.19
ChemExpress	37.16	4.09%	7.84	2.26	38.89	2.83

Source: Corporate financial statements, uSMART Securities.

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1. Viva is a global leader in SBDD，expanding into CDMO to build an integrated R&D and manufacturing platform.

Viva Biotech Holdings is a global leader in Structure-Based Drug Discovery (SBDD), offering one-stop integrated solutions from early-stage drug R&D to commercial manufacturing for innovative pharmaceutical companies worldwide. Founded in Shanghai in 2008 and listed on the Hong Kong Stock Exchange (Code: 01873.HK) in 2019, Viva Biotech has established itself as a pioneer in protein structure analysis, AI-driven drug design, and integrated chemistry-biology research, with its competitive technology platforms and innovation capabilities. The company provides CRO services for global partners in the research phase of innovative novel drugs, and has built several advanced technology platforms such as X-ray crystallography, Cryo-EM, DNA-encoded library (DEL), Affinity Selection Mass Spectrometry (ASMS), Surface Plasmon Resonance (SPR), Hydrogen Deuterium Exchange Mass Spectrometry (HDX-MS), AIDD/CADD, etc. The company also has a team led by senior medicinal chemists and drug discovery biologists to provide drug design, medicinal chemistry (H2L, LO), compound synthesis, chemical analysis and purification, kilogram scale-up and peptide discovery. Our advanced technology platforms and teams led by senior medicinal chemists and drug discovery biologists, who provide drug design, medicinal chemistry (H2L, LO), compound synthesis, chemical analysis and purification, kilo scale-up and peptide synthesis, and corresponding bioactivity testing services. The Company's acquisition of SYNthesis Med Chem in 2021 further strengthens the competitiveness of its CRO business.

The Company acquired Langhua Pharma in 2020, integrating its profound experience in chemical synthesis, process scale-up and quality control, and successfully expanded into the CDMO field, creating a complete industrial chain from preclinical development to commercial production, serving customers including the world's top ten pharmaceutical companies and many innovative pharmaceutical companies. Up to now, Langhua Pharma has provided CMC and CDMO services for 897 clients and will launch two commercialization projects in 2025-2026. On top of the current capacity of 860 cubic meters, the company plans to establish a new production capacity of 400 cubic meters between 2024 and 2025 to cater to commercial production of new molecules, and further consolidate its competitiveness in the global CDMO market. With efficient operations and continuous technological innovation, the CDMO business is becoming an important engine of revenue growth for the company.

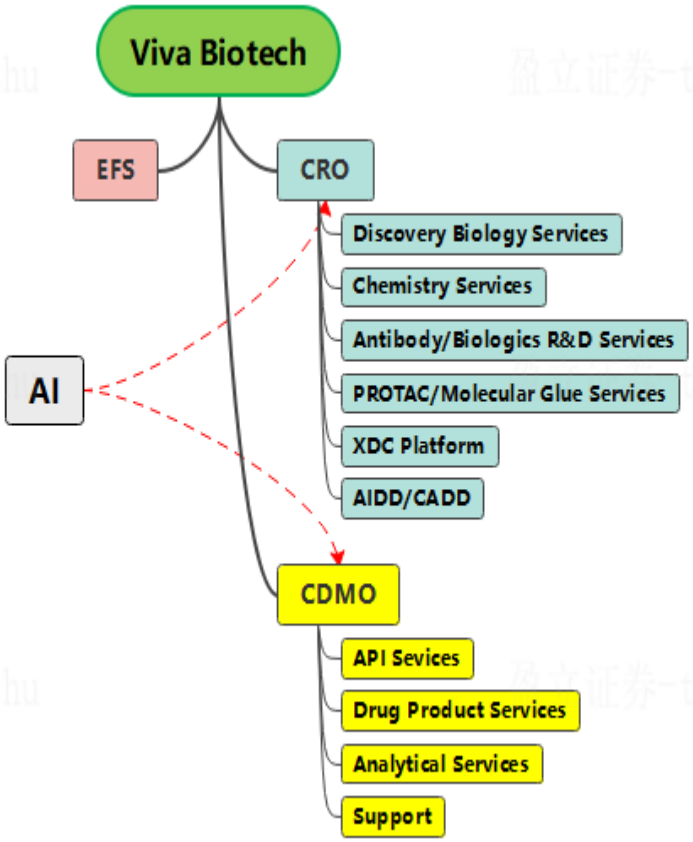
In addition, Viva Biotech is committed to discovering and investing in biopharmaceutical startups with great potential. Viva developed a unique “service + investment” business model by exchanging technology services for equity (EFS), which allows Viva to earn stable cash flow from short-term drug discovery service fees, as well as realize high returns from long-term drug incubation investments.

Figure 1: The Stages of Development of Viva

timeline	history
2008	The co-founder invested a total of $2 million to set up Viva Biotech;
2009	Developed gene-to-structure solutions.Established Chemical Department and In Vitro Assay Department, and began toprovide structural drug research and development service;
2011	Developed proprietary fragmentation compound library and ASMS screening technology and integrated them into SBDD service;
2012	Developed G protein-coupled receptor (GPCR) memebrane protein targeting technology platform;
2014	Developed a GPCR library of 6,000 samples and began to provide screening services;
2017	Developed a record-breaking 1,000 new drugs of target proteins, some of which with more than 7,000 individual crystal structures have been delivered;
2018	Raised a capital of $30 million through the funding round of Pre-IPO;
2019	Viva Biotech was listed on the Hong Kong Stock Exchange (HK.01873);
2020	Acquired 80% equity of Zhejiang Langhua Pharmaceutical, expanding the CDMO industry; Reached a strategic cooperation with Schrdinger on the joint development of anew targeting structure;
2021	Acquired the entire equity of SYNthesis, accelerating the expansion of global innovation and productivity of R&D in drug industries; Cooperated with BioMap strategically, accelerating the early research and development of new drugs through AI technology;
2022	Viva Biotech Chengdu officially completed; Newly constructed headquarters for drug R&D officially completed and put into use;
2023	Raised nearly US$ 150 million through the transfer of approximately 24% of equity interest to Temasek, HLC, and True Light;
2024	Establishes Boston Branch, Marking Another Milestone in Global Expansion;

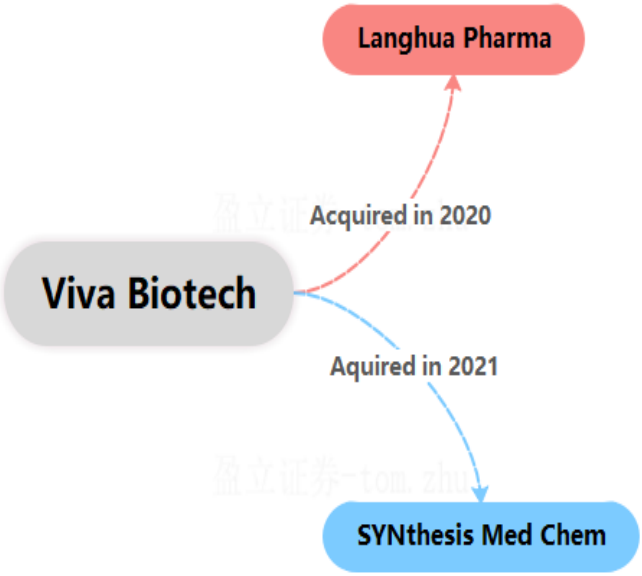
Source: Corporate financial statements, uSMART Securities.

Figure 2: Business Segments of Viva



Source: Viva official website, uSMART Securities.

Figure 3: Viva's M&A History



Source: Viva official website, uSMART Securities.

Accompanied by the global wave of AI applications, Viva Biotech has continuously increased the application of AI in its business segments. Based on SBDD, Viva has developed a unique AI-enabled SBDD drug discovery and development service platform centered on new targets, novel MOA and new modalities. The Company

expects to release the latest proprietary AI drug design platform this year, realizing full coverage of preclinical drug discovery process.

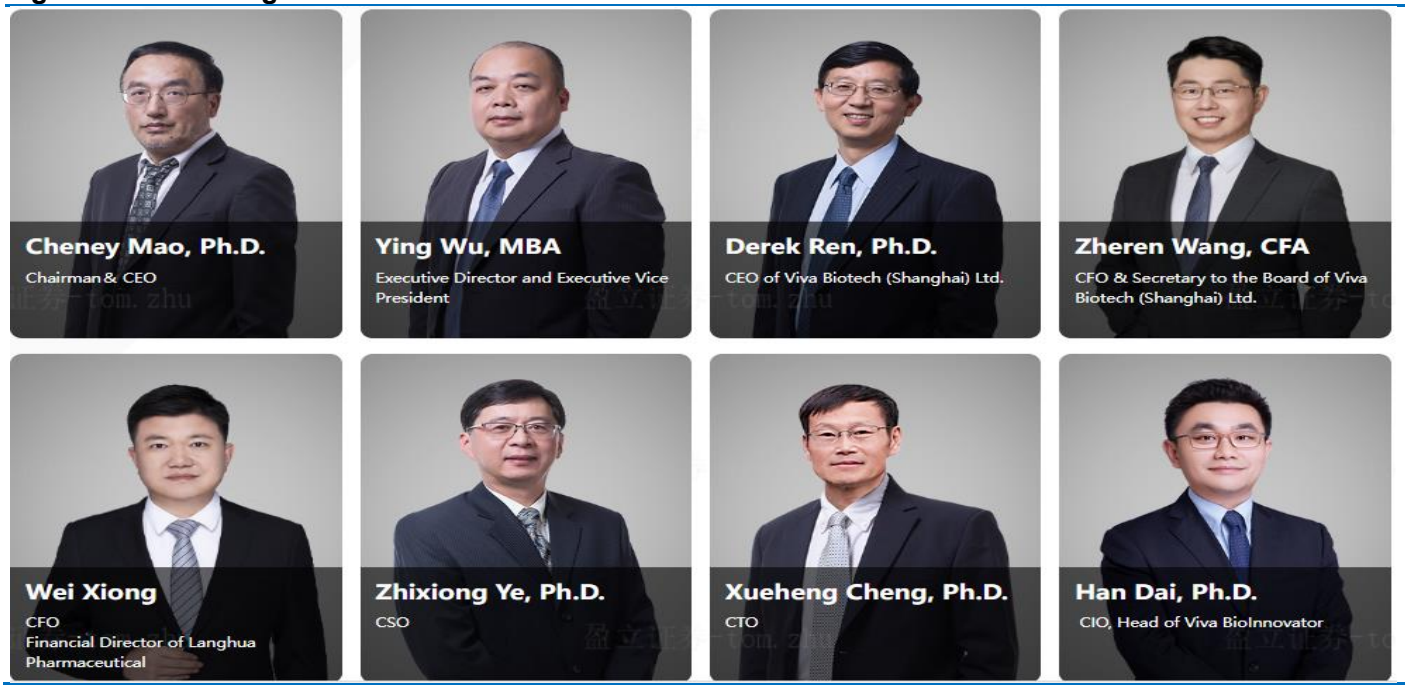
The Management Team

The Company's management team has extensive experience in the field of innovative novel drugs: Dr. Cheney Mao, Chairman and CEO of Viva, is responsible for the overall strategic planning and business development. Dr. Cheney Mao received his Ph.D. in Biochemistry from Cornell University and then worked as a postdoctoral fellow at Duke University Medical Center. He was the Director of Structural Biology at the Parker Hughes Institute (a research institute dedicated to structure-based drug discovery) from 1997 to 2003, and has published about 45 research papers on topics such as structural drug design, etc.. He has over 27 years of experience in the CRO industry.

Mr. Ying Wu, Executive Director and Executive Vice President of Viva, is mainly responsible for daily operation and client relations. Mr. Wu graduated from the Mathematics Department of Shanghai Normal University and later obtained an MBA degree from the Hong Kong International Business School. Mr. Wu is also a director of Viva Biotech HK, Viva Incubator HK, Viva Management, VivaGT and the manager of Jiaxing Viva. Mr. Wu has about 15 years of experience in the CRO industry.

Dr. Derek Ren, CEO of Viva Biotech Shanghai, is responsible managing the CRO segment. Dr. Ren obtained his Ph.D. in Animal Science from Michigan State University and did postdoctoral research in the Department of Biochemistry at Michigan State University. Later he worked as a researcher in Pfizer Global Research and Development. Dr. Ren has published about 10 research papers and has about 14 years of experience in the CRO industry.

Figure 4: The Management Team of Viva

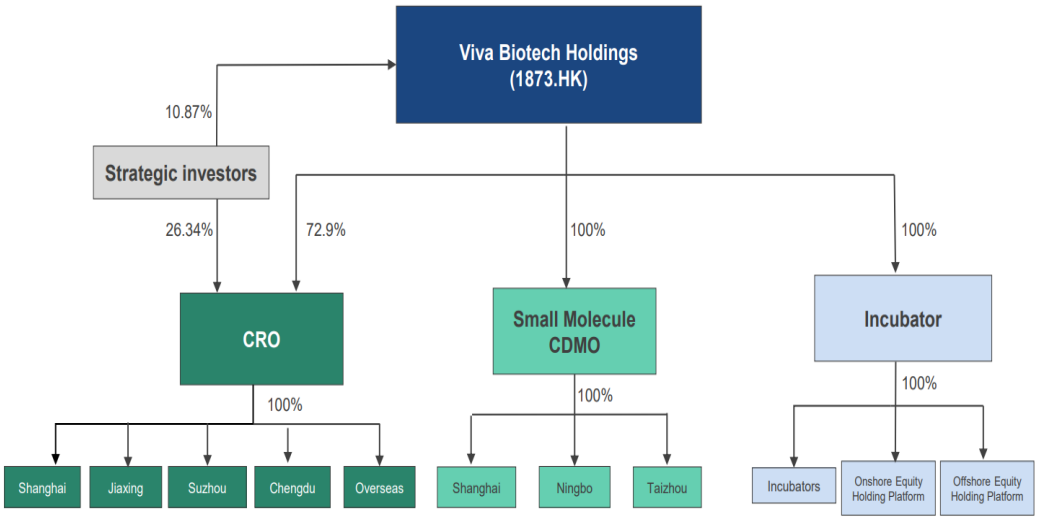


Ownership Structure

The company successfully introduced investments from Temasek, Highlight Capital (HLC), and True Light in June 2023. Viva Shanghai, as the main body of the CRO business, raised about USD 150 million through the transfer of nearly 24% of equity; meanwhile, the listed company also completed a financing of about USD 60 million at the group level. The introduction of strategic investors has generated significant synergies in Viva's corporate governance, business operations, investment and financing planning, and strategic development.

The company also plans to carry out an internal reorganization, and plans to spin off its CRO business for China A-share listing in the future. Upon completion of the reorganization, the CRO business will be taken over by Viva Shanghai and its subsidiaries, while the CDMO business will be transferred to other wholly-owned subsidiaries of the Viva Group. The company will carry out the CRO business and CDMO business respectively as independent subsidiaries, and hold equity interests in the invested/incubated companies.

Figure 5: Ownership Structure of Viva

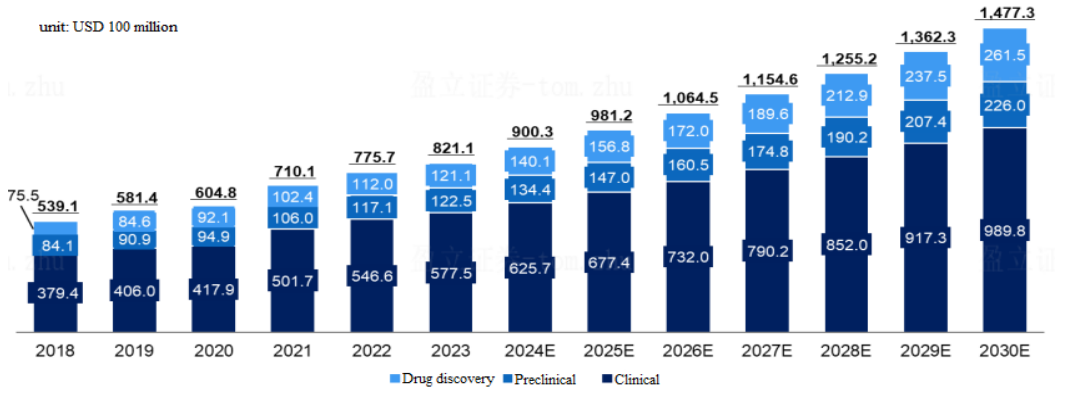


Source: Corporate financial statements, uSMART Securities.

2. Based on SBDD, Viva expands into CDMO, creating a one-stop R&D and manufacturing platform for innovative novel drugs.

In the 1980s, due to increasing drug costs, declining R&D success rates, fierce competition between innovative and generic drugs, and tightened regulation, pharmaceutical companies began to reorganize their businesses and expand internationally. Some pharmaceutical companies abandoned internal research and clinical trials, thus giving rise to the CRO industry. Normally CRO companies have professional and experienced R&D teams that can provide all or part of the R&D process services, ranging from drug development to marketing, effectively shortening the cycle of R&D on novel drugs, reducing the cost of R&D, and solving the problem of difficult, inefficient, and costly R&D for pharmaceutical companies. According to Frost & Sullivan, the global CRO industry will reach USD 147.7 billion in 2030, with an annual growth rate of about 8.7%. The drug discovery segment will grow the fastest, with an annual growth rate of 11.7%.

Figure 6: Global CRO Market Size



Source: Frost & Sullivan, uSMART Securities.

Table 1: Global CRO Market Size Growth Rate

Periods	Drug Discovery	Preclinical	Clinical	Overall CRO
2018-2023	9.9%	7.8%	8.8%	8.8%
2023-2026E	12.4%	9.4%	8.2%	9.0%
2026E-2030E	11.0%	8.9%	7.8%	8.5%

Source: Frost & Sullivan, uSMART Securities.

The mainstream drug discovery technology platforms currently available in the market are compound activity research and High-Throughput Screening (HTS), Structure/Fragment-based Drug Discovery (SBDD/FBDD), DNA-encoded library technology, and virtual screening technology. Since SBDD can help researchers precisely examine the interactions between target proteins and potential drug candidates that bind to the proteins, thus increasing the success rate of drug development and reducing the cost of drug discovery. The success of the Human Genome Project and the development of bioinformatics provide a large amount of

information on target proteins for drug discovery, making large-scale SBDD possible. In recent years, SBDD has gradually become a mainstream method for developing novel drugs, and various FDA-approved HIV-1 inhibitor drugs are the most successful cases of drug development by SBDD.

The general process of SBDD can be divided into the following steps:

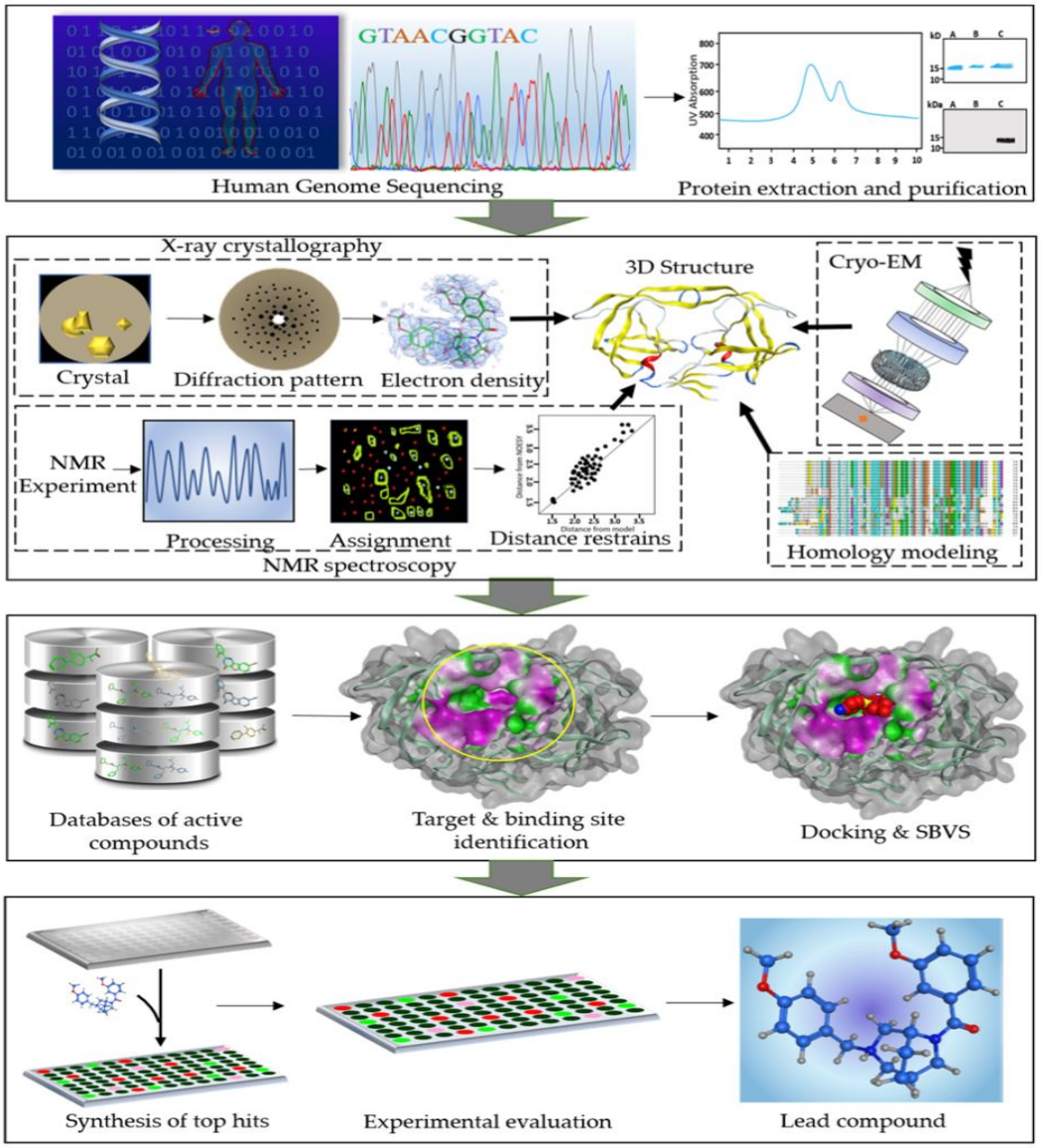
1. Sequence of the human genome to identify potential drug target genes. Extract target genes from the genome and obtain target proteins by cloning, expression and purification.

2. Determine the three-dimensional (3D) structure of the target protein using structural biology methods (e.g., X-ray crystallography, nuclear magnetic resonance (NMR), cryo-electron microscopy, etc.). If the structure is not available by experimental methods, computer simulation methods (e.g., homology modeling, etc.) can be used to predict the 3D structure of the target protein.

3. Prepare databases containing many active compounds that may be potential drug candidate molecules. Identify the binding sites (usually cavities or clefts) of the target proteins and determine the functioning regions. This step typically needs computational tools (e.g., Q-SiteFinder) to predict binding sites. Virtual screening techniques are then used to screen molecules from a database of compounds that are likely to bind to the target protein. Molecular docking techniques are used to predict how these molecules will interact with the binding site of the target protein and to assess their binding affinity.

4. The results of virtual screening and molecular docking are validated by experimental tests (e.g., in vitro biochemical assays), leading to the screening of lead compounds with high affinity and selectivity. Further structural optimization and chemical modification can improve the potency and specificity of the lead compounds as preclinical candidates.

Figure 7: The General Process of SBDD



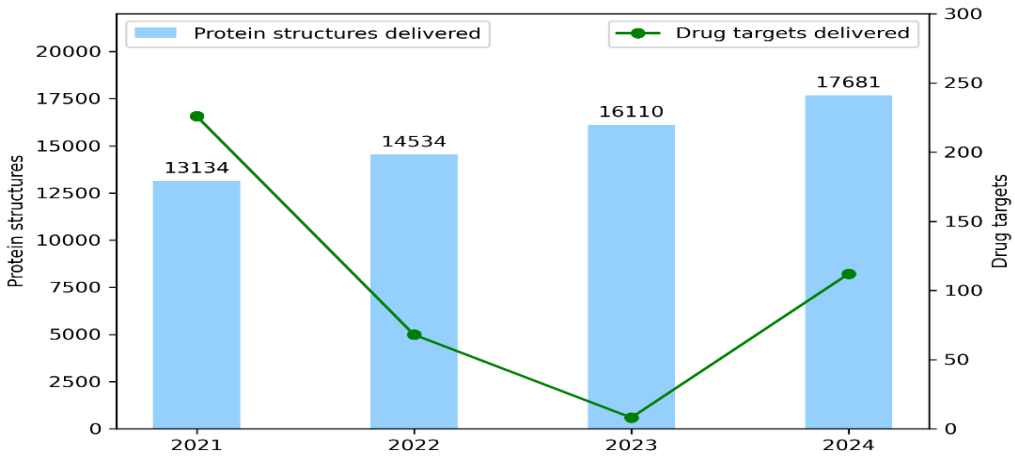
Source: Batool et al. (2019), uSMART Securities.

Viva Biotech is the No. 1 brand of SBDD technology in China, and maintains its position as the industry leader in protein structure research worldwide. By the end of 2024, the company has cumulatively delivered more than 82,716 protein structures to customers, of which approximately 17,681 protein structures were newly delivered in 2024, and researched a cumulative total of more than 2,098 independent drug targets, of which 112 were newly delivered in 2024. The company's cumulative number of CRO clients increased to 1,568, including the world's top 10 pharmaceutical companies. The top 10 clients accounted for 24.4% of revenue. The geographical distribution of CRO clients is diverse, income from overseas accounted for about 87.3% of revenue. The gross margin of the drug discovery business is high, which usually reaches over 40%.

Viva acquired SYNthesis Med Chem in 2021 to enhance its competitiveness in CRO business and realize the synergy of biochemical integration in early-stage drug discovery. Founded in 2007, SYNthesis Med Chem is a preclinical small molecule novel drug discovery and development service company focusing on the discovery and optimization stages of lead compounds, mainly providing high-end medicinal

chemistry and synthetic chemistry services. The R&D team can be integrated into the drug discovery and development projects of client companies to enhance the R&D capabilities and insight, accelerating the process of the client's scientific research projects from the target active compounds to the discovery and optimization of lead compounds as well as the selection of preclinical candidates, forming a highly synergistic novel drug discovery and development services and project management business with Viva.

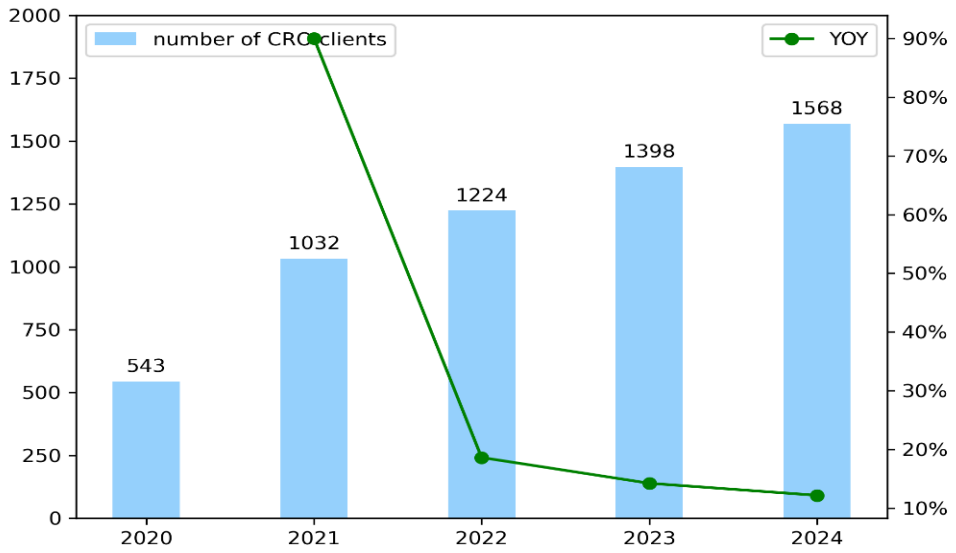
Figure 8: Number of Protein Structures and Drug Targets Delivered by Viva



Source: Corporate financial statements, uSMART Securities.

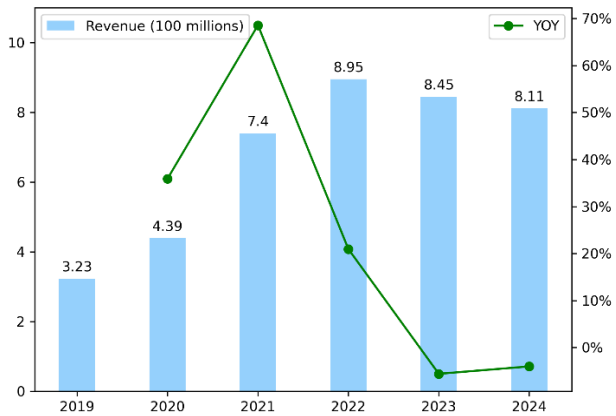
In terms of marketing and business development, on one hand, the company fully explores the value of existing customers through the synergistic development of biology and chemistry; on the other hand, the company continues to strengthen the full integration of online digital marketing and offline BD, and simultaneously promotes the expansion of overseas BD team to drive the recovery and growth of order intake. With the gradual recovery of global pharmaceutical and biological investment and financing in 2024, the company's new CRO projects have also started to grow since Q2, and order intake continues to improve, so the subsequent good CRO performance is fully guaranteed.

Figure 9: Client Service Data of Viva



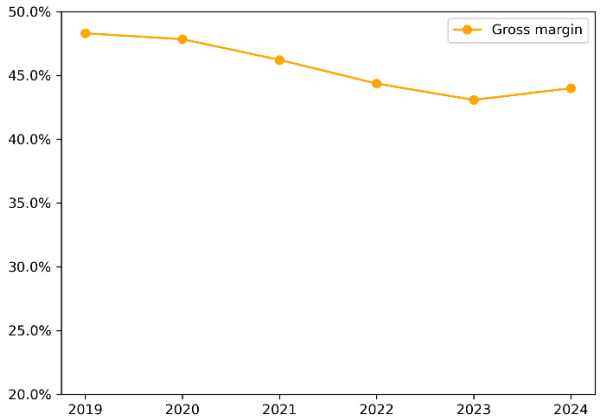
Source: Corporate financial statements, uSMART Securities.

Figure 10: Drug Discovery Service Revenue



Source: Corporate financial statements, uSMART Securities.

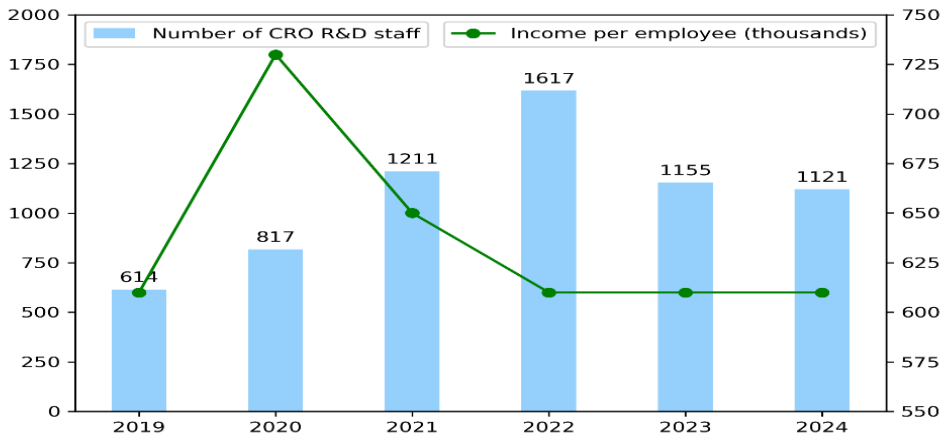
Figure 11: Drug Discovery Service Gross Margin



Source: Corporate financial statements, uSMART Securities.

Optimization of operation, talent quality enhancement, output efficiency improvement: the number of R&D staff in the CRO segment in recent years stays stable (over 1,000), in 2023 the company began to reduce costs and increase efficiency, with the number of R&D staff optimized 1,121 by the end of 2024. The ratio of R&D staff with at least a Master's degree has increased steadily, and revenue per employee has been maintained over CNY 610,000, indicating that the company has a significant improvement in the reduction of costs and efficiency optimization.

Figure 12: Data of CRO R&D Staff and Revenue per Employee



Source: Corporate financial statements, uSMART Securities.

Currently, the CRO segment of Viva can be divided into six categories as follows:

Table 2: Six Categories of Viva CRO

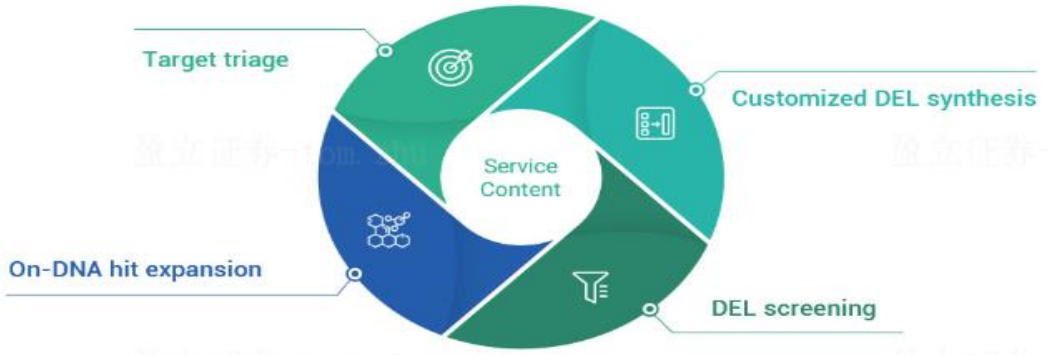
	Status Quo
Discovery Biology Services	Viva is committed to providing global pharmaceutical and biotechnology companies with one-stop discovery biology services from target protein preparation to PCC identification. We have a unique biophysical platform with the most advanced biophysical technologies widely used in drug discovery, such as X-ray crystallography, Cryo-EM, ASMS, Intact-MS, Native-MS, HDX-MS, TSA, and SPR. Relying on our advanced technology platform, we efficiently carry out Hit screening, MOA study, Structure-Based Drug Discovery, and Fragment-Based Drug Discovery for global clients, and accelerate innovative drug discovery and development and reduce R&D costs.
Chemistry Services	Viva's chemistry services are highly synergized with our discovery biology services and supported by AIDD/CADD drug design platform. Our focus is to provide comprehensive, high-quality and customized chemical synthesis services that accelerate drug discovery projects. This includes utilizing new synthetic technologies such as photochemistry and electrochemistry and delivering newer drug modalities such as PROTACs, Molecular Glues and ADCs, as well as small molecules and peptides.
Antibody/Biologics R&D Services	Customized One-stop Services from Antibody Discovery to Cell Line Development
PROTAC/Molecular Glue Services	Viva provides global customers with a full range of PROTAC/Molecular Glue drug discovery services using the world's leading Structure-Based Drug Discovery technology. These services cover biology and chemistry, including protein preparation and crystal structure studies, screening of PROTAC/Molecular Glue, kinetic studies, drug metabolism, medicinal chemistry, Bioassay, AIDD/CADD, and other services.
XDC	The Viva XDC Platform is a comprehensive platform

Platform	created by Viva Biotech. Leveraging extensive expertise in the development of antibody drugs, peptide drugs, and small molecule drugs, it offers clients efficient and high-quality XDC development services.
AIDD/CADD	AIDD and CADD are dedicated to the application of various computer simulation techniques to accelerate drug discovery and design processes, and combine with chemical and biological experiments to drive drug development programs more efficiently. Based on physics, structural chemistry, pharmaceutical chemistry, biochemistry, molecular biology and other disciplines, and based on the theory of quantum chemistry and molecular mechanics, it has developed structure-based drug design with the help of computer numerical calculation and logical judgment, database, graphics, artificial intelligence and other processing technologies.

Source: Viva official website, uSMART Securities.

Among them, the company has added V-DEL technology platform, covalent compound library, molecular glue technology platform, perfected peptide drug development platform, while expanding the services of antibody macromolecular R&D platform, and initially built XDC technology platform in this year.

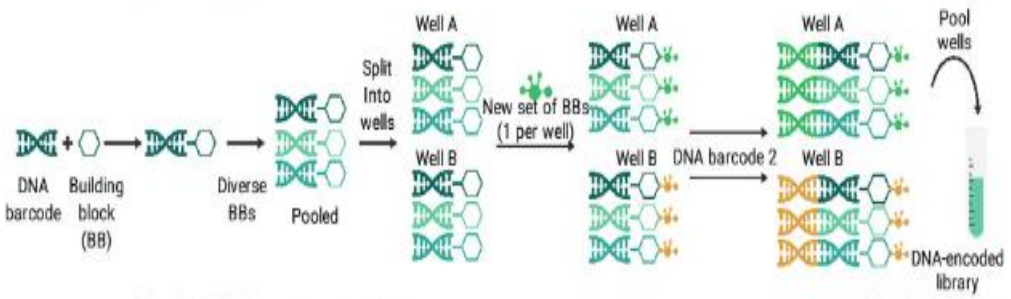
Figure 13: Viva's V-DEL Platform



Source: Viva official website, uSMART Securities.

V-DEL Platform: The V-DEL platform, led by our seasoned DEL experts, showcases high-quality DEL libraries and screening methods with high success rate. This platform integrates with Viva Biotech's comprehensive one-stop drug discovery solution, supported by advanced methodologies such as AIDD/CADD. It further synergizes with SBDD/FBDD and incorporates technologies like ASMS, SPR, X-Ray Crystallography, and Cryo-EM, offering a wide range of services. These include target protein production, customized DEL synthesis, affinity selection, follow-up synthesis, hit confirmation and assay development, medicinal chemistry as well as CDMO services. This holistic approach is designed to expedite the discovery of both FIC and BIC drugs.

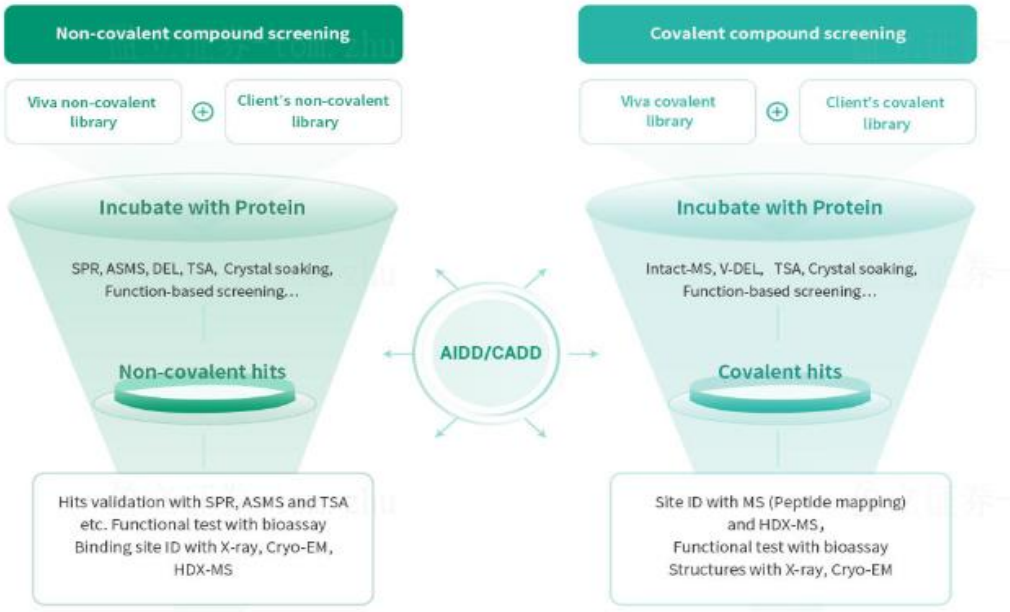
Figure 14: V-DEL libraries: High quality



Source: Viva official website, uSMART Securities.

Compound Libraries: consists of 2,000 compounds, covalently linked to Cys, designed and synthesized by Viva, Mw: 150-350. They have well-distributed warhead groups (chloroacetamide group vs. acrylamide group) and covalent reactivity. The compounds have good distribution of physicochemical properties and are suitable for mass spectrometry and cellular level screening, which can provide a sufficient amount of compounds for subsequent activity verification. Viva is currently expanding the compound library.

Figure 15: Viva's Compound Libraries



Source: Viva official website, uSMART Securities.

PROTAC/Molecular Glues Screening: Viva has advanced affinity screening platforms, including ASMS, SPR, crystal soaking, and TSA screening technologies, which meet customers' needs for developing new generation E3 ligase ligands or novel target protein binding molecules for screening. ASMS is an upgrade of traditional high-throughput technologies, which does not depend on radioactivity, fluorescent labeling, or enzymatic activity. ASMS allows low compound concentration, is an easy development method, has high screening throughput, can be performed in solution, and is suitable for fragment library screening and large drug-like compound library screening. Viva has chosen to combine three technologies - ultrafiltration ASMS, ultracentrifugation ASMS, and molecular exclusion ASMS- to design a fast, flexible,

and autonomous technology platform for screening almost all soluble protein targets through Viva's unique compound libraries. In addition, Viva has developed a targeted technical method applicable to molecule screening of molecular glue.

Antibody/Biologics R&D Services: Viva successfully established a rabbit monoclonal antibody platform and commenced external services, and initially completed the construction of phage display cyclic and linear peptide libraries, offering more options for the screening of peptide-based drugs. Around the bispecific antibody technology platform, Viva Biotech has reached an important technical cooperation with a well-known international biopharmaceutical company.

Figure 16: Viva's Antibody/Biologics Platform

Source: Viva official website, uSMART Securities.

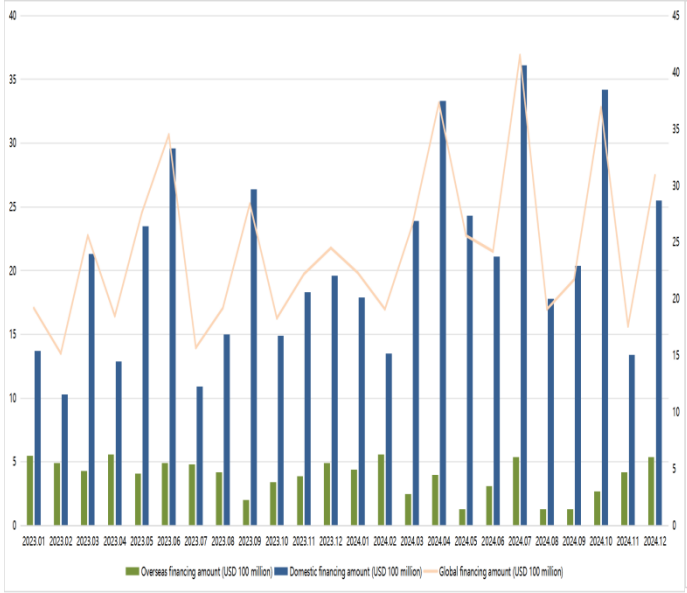
XDC Platform: The Viva XDC Platform is a comprehensive platform created by Viva Biotech. Leveraging extensive expertise in the development of antibody drugs, peptide drugs, and small molecule drugs, it offers clients efficient and high-quality XDC development services.

Figure 17: Core Advantages of the XDC Platform

Source: Viva official website, uSMART Securities.

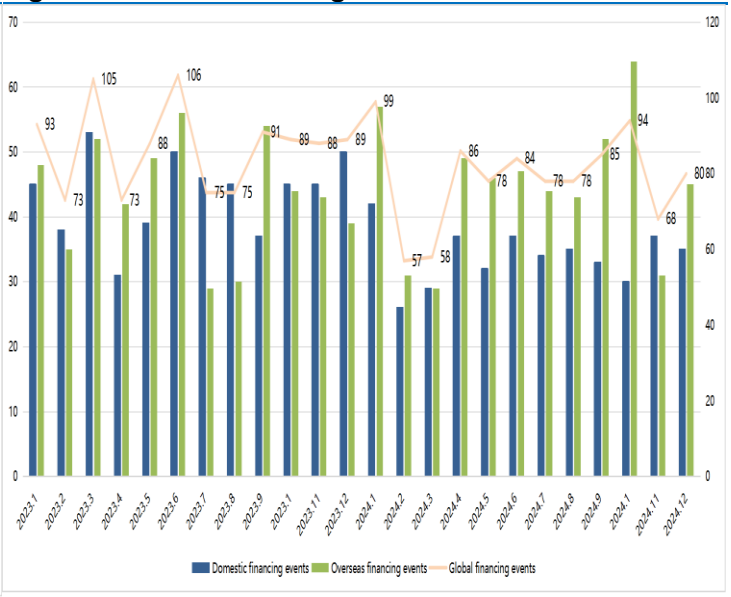
In 2024, the primary market of global innovative novel drugs showed positive changes in financing, though the number of financing events decreased year-on-year, the decline rate narrowed, and the amount of money financed grew positively. The number of financing events in the primary market of global innovative novel drugs totaled 945, down 9.6% from 1,045 last year. Among them, 407 domestic financing events in the primary market of innovative novel drugs were recorded, down 22.3% year-on-year, while 538 overseas financing events were recorded, up 3.3% year-on-year. In terms of money financed, the total amount of investment and financing in the primary market of global innovative novel drugs reached USD 32.26 billion, up 20.0% from last year's USD 26.88 billion. Among them, the total amount financed to primary domestic market of innovative drugs was USD 4.13 billion, down 21.2% year-on-year; the total amount of overseas financing was US$28.13 billion, up 30.0% year-on-year. It is worth noting that the year-on-year figures of global biopharmaceutical investment and financing have improved significantly. The CRO business engaged by the company is at the front end of the CXO industry chain, and since the second half of 2024, it has clearly felt the warming demand brought about by the gradual recovery of investment and financing, and the newly signed orders of CRO have shown a better trend, which provides strong support for the company's subsequent performance growth.

Figure 18: CRO Financing Size



Source: Frost & Sullivan, uSMART Securities.

Figure 19: CRO Financing Events



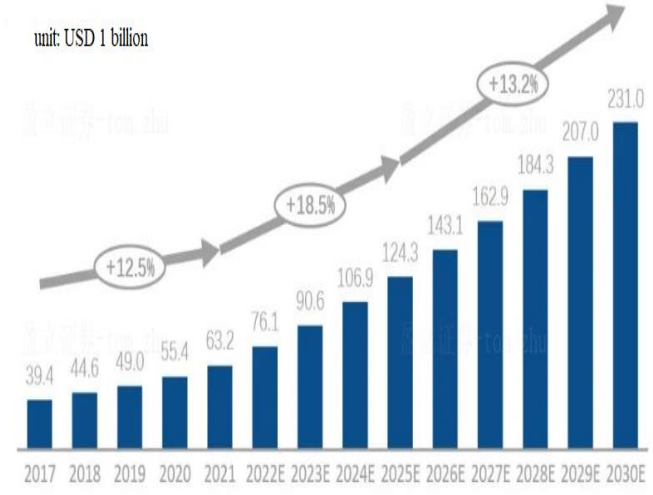
Source: Frost & Sullivan, uSMART Securities.

Acquisition of Langhua to Create a Complete Chain of CXO R&D and Manufacturing Service Platform

Viva acquired Langhua Pharma in 2020 and entered the CDMO field, aiming to create a one-stop R&D and manufacturing platform for innovative drugs. As an important component in pharmaceutical R&D and manufacturing, the CDMO industry empowers pharmaceutical companies in the following four aspects: assisting in R&D and production, lowering enterprise costs, improving service efficiency and promoting technology advancement. According to Frost & Sullivan's report, the global CDMO industry is in a trend of continuous development and has high prosperity. The global

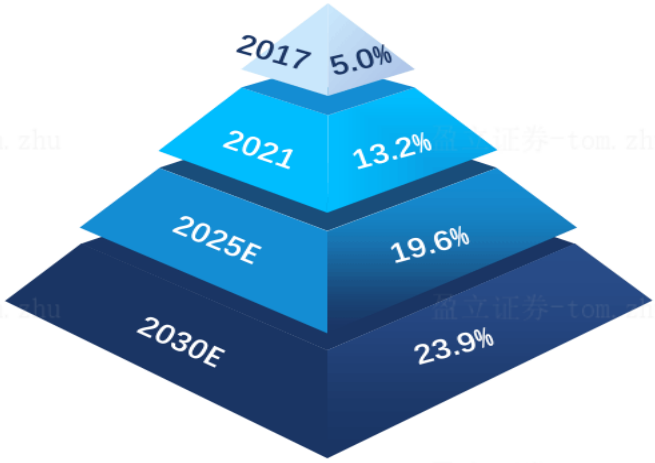
CDMO market size is expected to reach USD 231 billion in 2030. Among them, China's CDMO market size will grow rapidly, accounting for 23.9% of the global share. Through this acquisition, Viva Biotech has been able to enter the CDMO field and benefit from the rapid growth in the CDMO industry.

Figure 20: Global CDMO Market Size



Source: Frost & Sullivan, uSMART Securities.

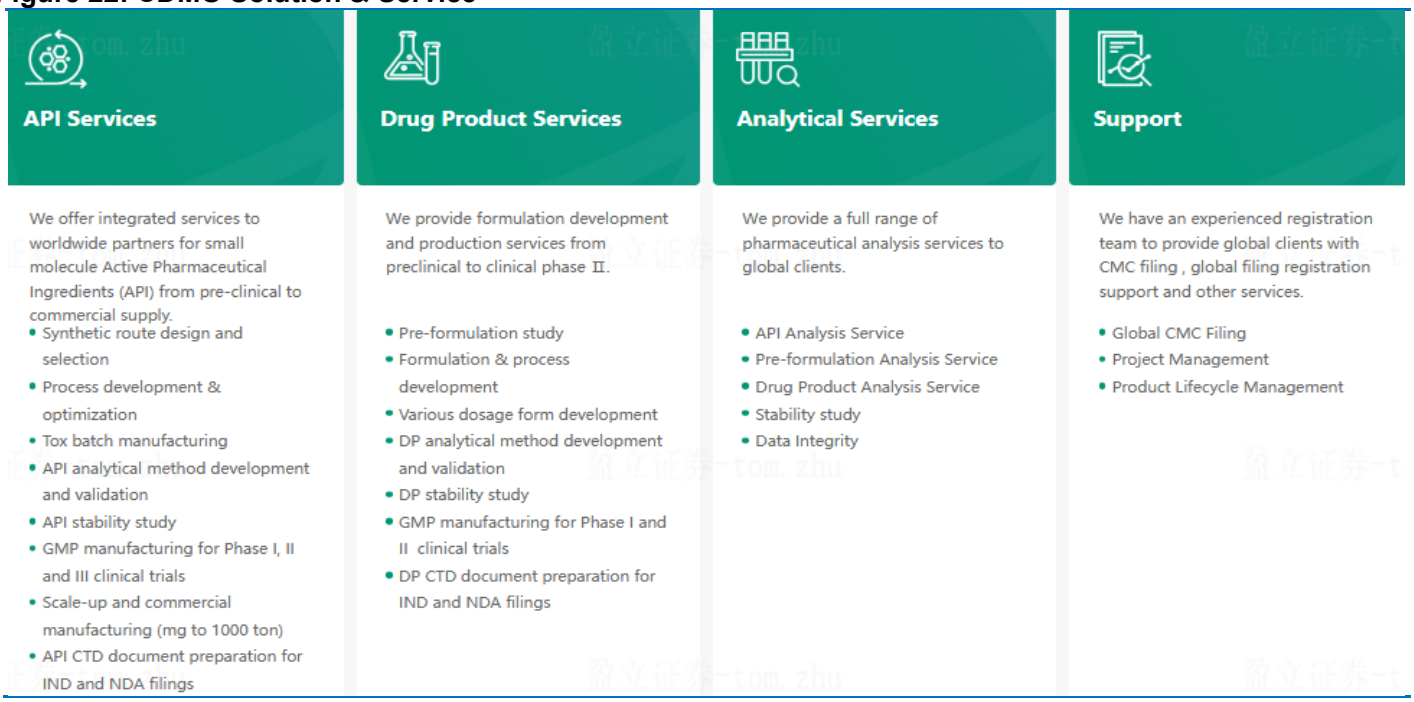
Figure 21: Global Share of the Chinese CDMO Market



Source: Frost & Sullivan, uSMART Securities.

Langhua Pharma is a comprehensive pharmaceutical company engaged in research and development, production, marketing, and sourcing of pharmaceutical products. As the subsidiary of Viva Biotech Holdings, the leading enterprise in the field of innovative drug discovery, it offers worldwide partners a One-Stop CDMO solution in new drugs' entire life cycle for small molecule Active Pharmaceutical Ingredients (APIs) and Finished Dosage Form (FDF), from pre-clinical to commercial supply. Langhua is the leading manufacturer of Spironolactone, Olanzapine, Antivirus, and fluoroquinolones in the world, and offers our global customers high-quality and competitive Generic APIs. Up to now, Langhua has contributed to more than 20 new drug launches in the past years and ensured long-term and sustainable supply of outstanding services and products to its global partners.

Figure 22: CDMO Solution & Service



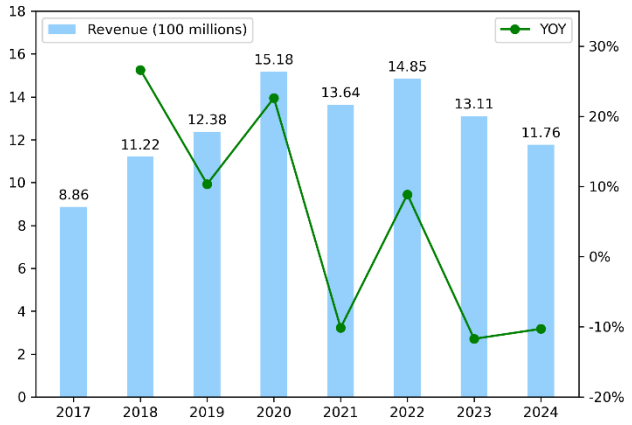
Source: Viva official website, uSMART Securities.

In 2024, Longhua Pharma's revenue of CNY 1.176 billion decreased by approximately 10.3% year-on-year, and adjusted gross profit totaled CNY 345 million decreased by approximately 11.4% year-on-year, which was mainly affected by the delivery schedule of certain CDMO orders, which are expected to be delivered in the first quarter of 2025.

By the end of 2024, Langhua Pharma has served a total of 897 customers, with 66.8% of revenue accounted for by the top 10 customers and 100% retention rate of the top 10 customers. In addition, Langhua Pharma has provided CMC and CDMO services for 12 group incubated companies and companies channeled from CROs. In terms of capacity building, based on the current total capacity of 860 cubic meters, Langhua Pharma plans to build a new production capacity of 400 cubic meters between 2024-2025 to serve the commercial production of new molecules. Currently, the civil works have been basically completed, the internal fire-fighting works are in the process of being installed, and it is expected that it will subsequently enter into the stage of equipment procurement and installation.

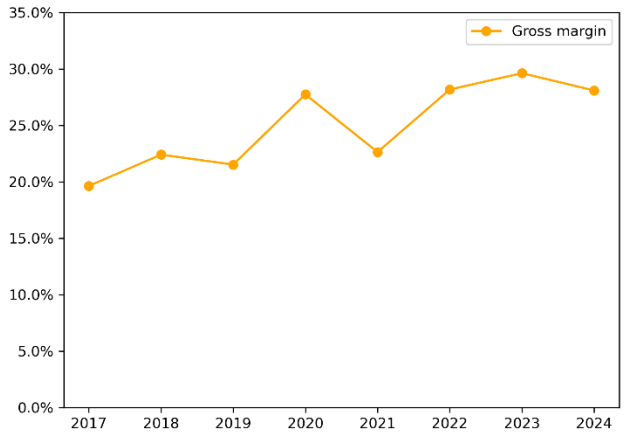
Prior to the merger and acquisition, Langhua was mainly engaged in the production of APIs, with less customized CDMO services and lower profit level; the gross profit margin was about 20%. After Viva's entry into the company, Langhua has generated good synergies with Viva in terms of business. By continuously increasing and expanding its production capacity as well as improving its R&D strength, the company has made structural changes in its business, and the share of CDMO business has steadily increased, with a significant increase in profitability. In the future, with the launching of new CDMO commercialization projects and the release of reserved capacity, the company's revenue will grow sufficiently, especially as two important new commercialization projects are already in the process performance confirmation (PPQ) stage. They are expected to be commercialized in 2025 and 2026 respectively.

Figure 23: Langhua Revenue



Source: Corporate financial statements, uSMART Securities.

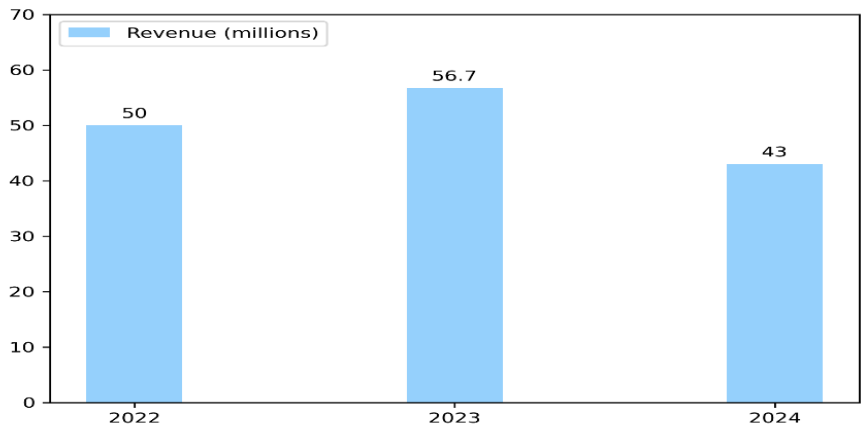
Figure 24: Langhua Gross Margin



Source: Corporate financial statements, uSMART Securities.

In recent years, the company has established the Chemistry, Manufacturing, and Control (CMC) business unit and built a CMC R&D center of about 10,000 square meters, which includes a 3,000 square meters GMP standard plant. As of the end of 2024, the number of new drug projects completed or in progress in the CMC department of the Company was 255, and the number of research and development staff reached 105. In 2024 CMC realized revenues of nearly CNY 43 million. The company's channeling program is advancing smoothly, and one pipeline has entered clinical phase III and is progressing rapidly. In the future, the company plans to further strengthen the BD and channeling of high-quality CMC projects, and promote the CMC business to achieve break-even on the basis of fully tapping internal project resources and cost reduction and efficiency. In 2024, in terms of the number of client orders, the proportion of CMC's external BD was nearly 74%, and the proportion of Viva's channeling was nearly 26%; in terms of the revenue of client orders, the proportion of CMC's external BD was 38.0%, and the proportion of Viva's channeling was 62.0%. It shows that in CMC's existing projects, the projects channeled by Viva are large in revenue, while the external BD projects are large in number.

Figure 25: CMC Revenue



Source: Corporate financial statements, uSMART Securities.

As of the end of 2024, the total number of employees of the company was 2,063, among which the number of employees in the CRO R&D department reached 1,121 and the total number of employees at Langhua Pharma was 711. The company offers competitive packages for employees as well as for attracting more talents according to the market situation as well as the individual performance, qualification and experience. Meanwhile, the company has established comprehensive office and laboratory facilities and is continuously expanding its production capacity, which is capable of meeting the business needs of the company's rapid development in the future.

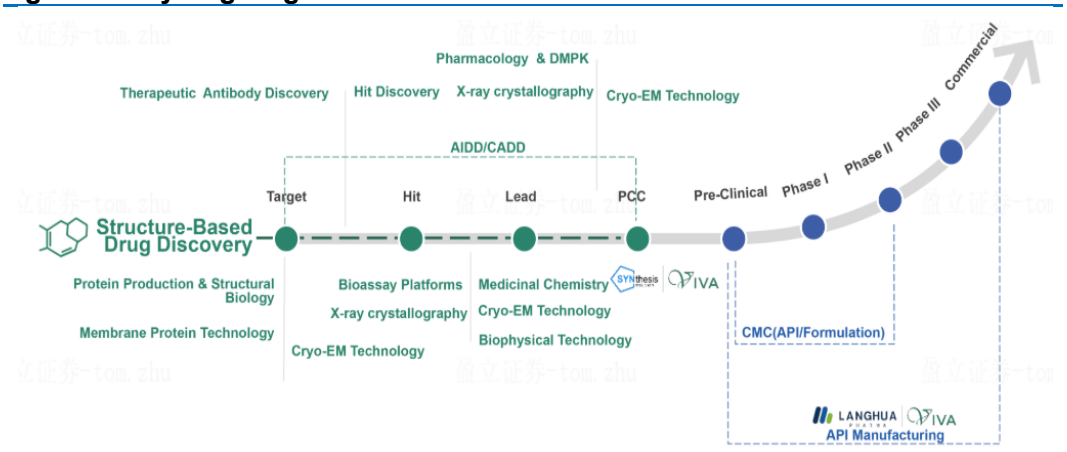
Table 3: Viva's Production Capacity

Site	Floor Area(㎡)	Laboratory area(㎡)	Utilization
New heaquarters Zhoupu, Shanghai		40,000	Fully put into use
Investment Incubation Center, Faraday Road, Shanghai	7,576	5,552	Fully put into use
Chengdu Park	64,564	10,800	The 2,210㎡ property part has been officially put into use.
Suzhou Park	7,545	5,305	Fully put into use
Jiaxing Park	6,362	5,335	Fully put into use
Shanghai Supercomputing Center			Officially put into use, supporting multiple types of computing
Taizhou factory,Langhua	35,168		Fully put into use
NuoBai R&D Center,Ningbo	1,300		Fully put into use
NuoBai Office building,Ningbo	1,500		Fully put into use

Source: Viva Official Website, uSMART Securities.

To summarize, the company has now formed a strategic layout with SBDD as the core in the whole industry chain of new drug R&D, and synergized its efforts through multiple technology platforms to enable the rapid development of its business.

Figure 26: Synergizing Viva's Platforms



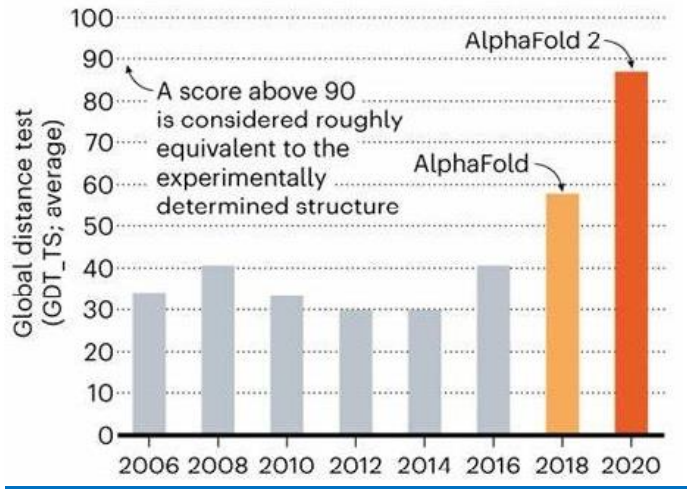
Source: Viva Official Website, uSMART Securities.

3. AI Empowers the Entire Industry Chain, Generates a Unique Moat, and Is Expected to Create New Possibilities in the Future.

Artificial Intelligence (AI) technology has been developing rapidly in recent years. AI, as a cutting-edge technology, covers a wide range of fields such as image recognition, natural language processing (NLP), and computer vision (CV). In recent years, with the emergence of large-scale language models (LLMs) such as ChatGPT, Gemini, DeepSeek, and generative AI such as Sora, the application of AI in various fields has grown rapidly.

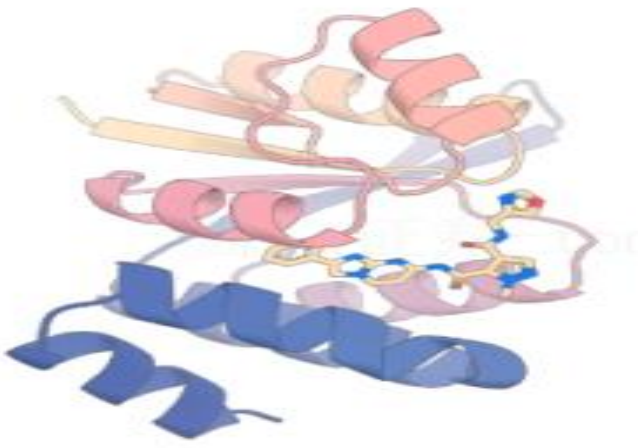
Among AI for Science (AI4Science), the application of AI to protein structure analysis is particularly impressive and great breakthroughs have been made in recent years. Since Christian Anfinsen's discovery in 1972 that the three-dimensional structure of a protein is determined by its amino acid sequence, progress on predicting protein structure based on amino acid sequences has been slow. In the CASP competition for protein structure prediction, the prediction accuracy scores never exceeded 40 from 1994 to 2016. Thanks to the efforts of Demis Hassabis and John Jumper et al. from DeepMind, and with the help of recent research in artificial intelligence and sufficient data within the Protein Data Bank, the accuracy score for protein structure prediction has risen to about 90 (AlphaFold 2), which is essentially indistinguishable from detecting protein structure by experimental means. The success of AlphaFold 2 holds the promise of replacing traditional time-consuming and costly experimental methods. In terms of protein structure generation, scientists have been working for years to generate the corresponding amino acid sequence based on the desired protein structure. Rosetta, developed by David Baker et al, can generate the desired protein structure from scratch. With the advent of artificial intelligence, Baker added an AI model based on the Transformer architecture to Rosetta, which greatly enhanced its molecular generation capabilities. The trio of Baker, Hassabis, and Jumper have been awarded the 2024 Nobel Prize in Chemistry for their great contributions.

Figure 27: Highest Scores in CASP Competitions



Source: Nature, uSMART Securities.

Figure 28: A Small Protein Designed with RFdiffusion



Source: Krishna et al. (2024), uSMART Securities.

AI also has many potential applications in drug development, for example:

1. Target Identification: The identification of small-molecule targets, such as proteins or nucleic acids, is a critical process in drug discovery. Traditional methods such as affinity pull-down and whole-genome knockdown screening are widely used, but tend to be time consuming and labor intensive, with high failure rates. Advances in AI technology are revolutionizing this field by enabling the analysis of large datasets within complex biological networks. AI facilitates the identification of disease-related molecular patterns and causal relationships by constructing multi-omics data networks, thus facilitating the discovery of candidate drug targets.

2. Virtual Screening: Virtual screening is a critical strategy for efficiently identifying potential lead compounds or drug candidates. The rapid expansion of compound libraries necessitates accelerated virtual screening of ultra-large libraries, prompting advancements in AI technologies for ligand docking. AI-based receptor–ligand docking models can predict ligand spatial transformations, directly generate complex atomic coordinates. Notably, recent receptor-ligand co-folding networks based on AlphaFold 2 and RosettaFold show promise in predicting complex structures directly from sequence information.

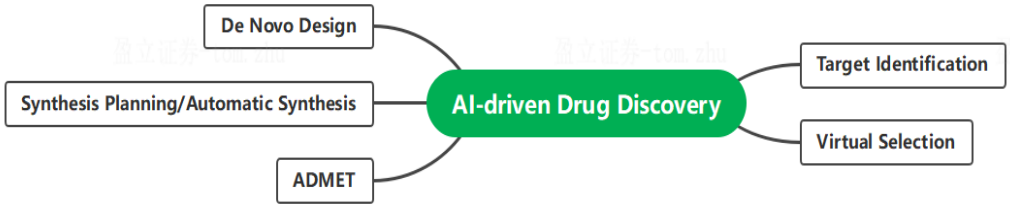
3. De Novo Design: De novo drug design involves autonomously creating new chemical structures to optimally satisfy desired molecular features. Traditional methods, including structure-based, ligand-based and pharmacophore-based designs, are manual and rely on expert designers and explicit rules. AI, particularly deep learning, has enabled the automated identification of novel structures that meet specific requirements, bypassing traditional expertise. In deep learning-driven de novo design, the molecular generation component is central, normally using chemical language or graph-based models. Chemical language models convert molecular generation tasks into sequence generation such as SMILES string. Although extensive pretraining is required and may produce invalid SMILES due to syntactic errors, these errors can aid model self-correction by filtering improbable samples. Conversely, graph-based models represent molecules as graphs, generating structures using autoregressive or non-autoregressive strategies.

4. ADMET: ADMET plays a critical role in determining drug efficacy and safety. While wet-lab evaluations are required for market approval and cannot be fully replaced by simulations, early-stage ADMET predictions can help reduce failures due to poor characteristics. AI has emerged as a valuable tool for predicting ADMET properties using predefined features like molecular fingerprints or descriptors. For instance, Bayer's in silico ADMET platform uses machine learning techniques such as random forest and support vector machines, using descriptors like circular extended connectivity fingerprints to ensure accuracy and relevance. Deep learning now drives ADMET prediction, automatically extracting meaningful features from simple input data. Various neural network architectures, including transformers, convolutional neural networks and, more recently, graph neural networks, excel in modeling molecular properties from formats such as SMILES strings and molecular graphs.

5. Synthesis Planning and Automatic Synthesis: Chemical synthesis, one of the bottlenecks in small-molecule drug discovery, is a highly technical and extremely

laborious task. Computer-aided synthesis planning (CASP) and automatic synthesis of organic compounds have been used as a tool to assist chemists in determining reaction routes via retrosynthesis analysis, a problem-solving technique in which target molecules are recursively transformed into increasingly simpler precursors. Early CASP programs were rule based. Since then, a range of machine learning techniques, particularly deep learning models, have been developed, yielding gradual improvements in the synthesis planning of artificial small molecules and natural products. Recently, the transformer model has also been applied to retrosynthetic analysis, prediction of regioselectivity, and stereoselectivity. An optimal automated synthesis platform would seamlessly integrate and streamline various components of the chemical development process, including CASP as well as automated experiment setup and optimization, and robotically executed chemical synthesis, separation and purification.

Figure 29: AI-driven Drug Discovery



Source: Zhang et al. (2025), uSMART Securities.

As of 2022 there are already a number of drugs with AI-assisted design in late clinical phases, but AI technology is also only involved in part of the process, for example, the POC proof-of-concept stage conducted in the early stage of drug development. In the future, AI will gradually penetrate into multiple aspects of drug development, and end-to-end projects completely driven by AI will emerge.

Table 4: Selected AI Drugs in Clinical Phase III（Up to 2022）

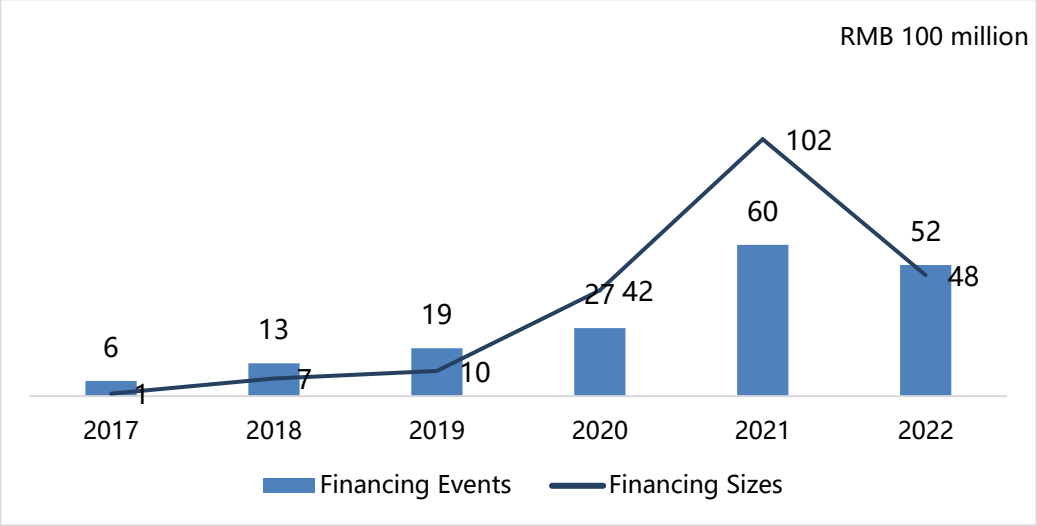
Drug Name	Indications	Clinical progress	Company
BXCL501	Neurological diseases	Phase III	BioXcel Therapeutics
EG-007	Endometrial cancer	Phase III	Evergreen Therapeutics
BT-11	Ulcerative Conjunctivitis	Phase III	Landos Biopharma
PXT3003	Rare diseases	Phase III	Pharnext

Source: Frost & Sullivan, uSMART Securities.

At present, the domestic AI drug development field has also attracted various organizations to actively invest. According to Frost & Sullivan's report, from 2017 to 2022, the investment and financing scale in the field of AI drug development increased from CNY 100 million yuan to CNY 4.8 billion, during which financing in 2021 once reached CNY 10.2 billion. The state level is also vigorously supporting the

transformation and development of the pharmaceutical industry in the field of digital intelligence, cultivating cutting-edge technologies such as artificial intelligence, big data, the Internet of Things, virtual reality, etc., promoting the construction of international standard digital pharmaceutical industrial parks, and intensifying the attraction of digital manufacturing projects, in order to help the industry to form a development mode of clusters.

Figure 30: Domestic Investing and Financing of AI Drug Development



Source: Frost & Sullivan, uSMART Securities.

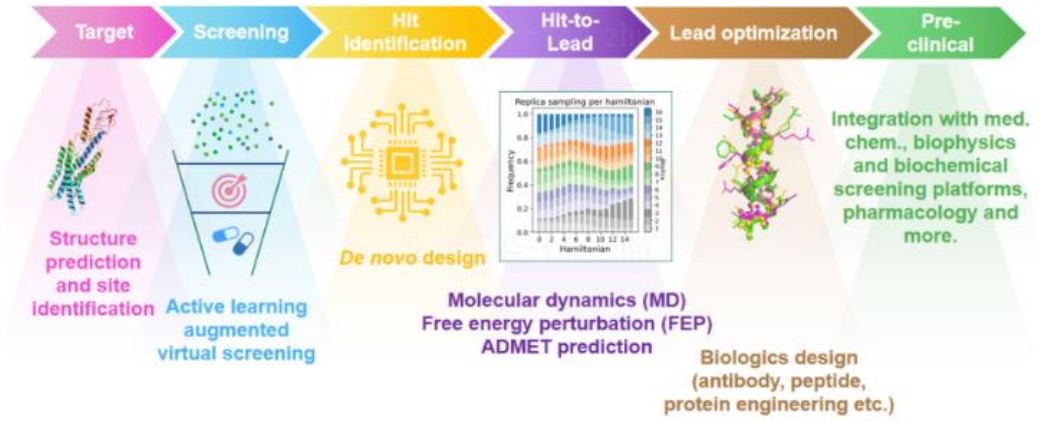
Viva Deploying Computing Power in Advance and Building a New AI-based Drug Design System

As a company specializing in the development and production of innovative novel drugs, through the in-depth integration of AI technology, Viva is creating a unique competitive advantage, building a strong moat, and is expected to create a significant new market in the future. The application of AI technology cannot be separated from the support of computing power. As early as at the beginning of the rise of AI, Viva has strategically deployed the Shanghai Supercomputing Cluster since 2020 to provide strong support for R&D in AI. The Shanghai Supercomputing Center was completed in 2022 and put into use, and is currently able to support computational chemistry (CADD) calculations, artificial intelligence (AIDD)-related calculations, as well as crystal group and cryo-electron microscopy group calculations. On February 14, 2025, Viva announced the local deployment of DeepSeek-R1 model. DeepSeek is a universal large language model with extensive knowledge base and powerful reasoning capabilities. The advantage of this universal large language model is that it has explored and mastered numerous algorithmic principles from massive data, which can help researchers and developers to quickly locate problems and optimize experimental solutions, so that they can devote more energy to deep scientific research.

With the support of ample computing power, Viva's computational chemistry department has integrated CADD and AIDD methods based on physical chemistry models, and developed a series of advanced algorithms, which are more targeted than traditional computational chemistry tools and commercial software packages to optimize the problems encountered in practice and efficiently advance the progress of drug discovery projects. After years of effort, the company has built its own

AIDD/CADD platform, and through continuous iteration and systematic optimization, it has gradually evolved into a full-cycle AI-enabled system from target prediction to optimization of candidate compounds, and preclinical research, which has greatly accelerated the process of drug discovery and development. On this innovative platform, a series of AI algorithms and physical chemistry models, such as virtual screening based on active learning, augmented sampling molecular dynamics simulation, free energy perturbation, de novo design, ADME/PK prediction, are integrated with each other and are widely used in all stages of drug development. In addition, the AIDD/CADD platform is not an independent “island”, but closely linked with each wet experiment platform, deeply understanding the experimental process and empowering each experimental platform, realizing the perfect integration of computation and experimentation, forming a virtuous interaction, and driving the synergistic development of the whole platform. The company expects to publicly release the new AI drug design platform this year.

Figure 31: Viva’s AIDD/CADD Platform

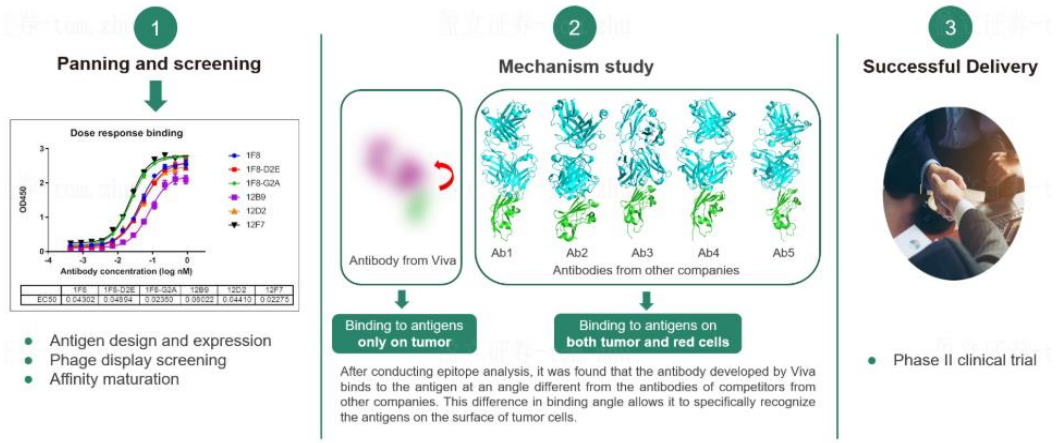


Source: Viva Official Website, uSMART Securities.

Take antibody research as an example. The antibody drug discovery process is a long journey requiring substantial time, effort, and financial investment, with only a mere 5% of candidates making it to the market. However, the advancement of AIDD/CADD technology may bring a turning point to this arduous process. Assisted by AIDD/CADD, the Viva Biotech R&D team successfully completed the entire process for a client, starting from antigen design and expression to fully human antibody screening and subsequent affinity maturation. By analyzing the structure of the antigen-antibody complex, they discovered that the antibody binds to the antigen at a unique angle of approximately 45 degrees, distinguishing it from other competing products. Despite the primary sequence of the antigen epitope being slightly different, this 3D structural difference explained the distinct mode of action: the antibody selectively binds to the antigen on tumors without binding to antigens on red blood cells, thus reducing side effects. This discovery opened the door to additional research, ultimately leading to a significant licensing agreement. The project is currently in Phase II clinical trials. This achievement is primarily attributed to the synergy of two core technology platforms: the powerful protein structure analysis platform and the advanced AIDD/CADD platform. The protein structure analysis platform integrates three complementary technologies—X-ray crystallography, cryo-EM, and HDX-MS—to meet the structural analysis needs at various stages. In 2023 alone, Viva Biotech successfully resolved over 16,000 protein/complex structures. By the end of 2023, they had delivered over

65,035 protein/complex structures involving more than 1,900 unique drug targets to their clients. These figures highlight the platform's efficiency and broad applicability. The AIDD/CADD platform, equipped with a high-performance computing center, supports extensive molecular dynamics simulations, free energy calculations, molecular docking, and efficiently applies various AI algorithms. This combination of structural biology, AIDD/CADD, and experimental validation significantly expedites antibody drug discovery and enhances success rates, paving a more efficient and precise path for the antibody drug R&D process.

Figure 32: One Example of Antibody Discovery by Viva



Source: Viva Official Website, uSMART Securities.

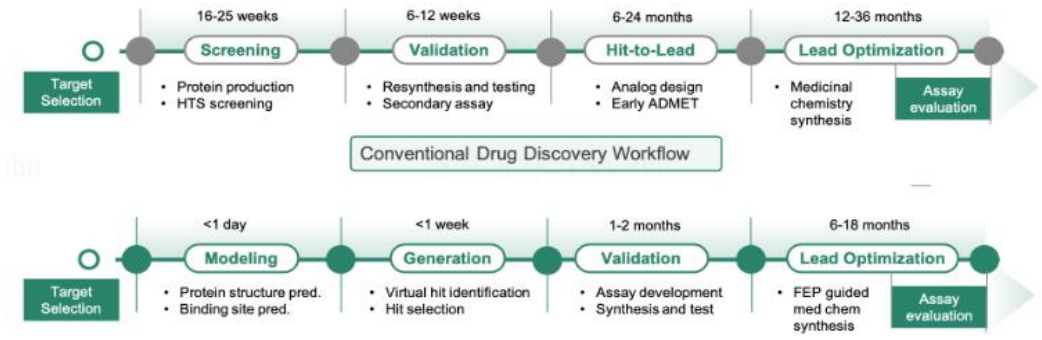
For small molecule design, Viva employs the computational tool of Free Energy Perturbation (FEP) and improves it. FEP is a highly accurate binding affinity calculation method that has been widely used for lead optimization. Given well-characterized starting geometries, FEP calculations with error ranges under 1 kcal/mol (better than Schrödinger's module) are routinely used to accelerate the molecular design and in turn improve the success rates. Viva Biotech's AIDD and CADD team uses quantum mechanics (QM) in conjunction with its proprietary FEP platform, which accurately captures the transitional states in covalent reactions and the corresponding energy barriers. A high correlation between the apparent free energy changes and the Kinact/Ki value is established as validated by the experiments. This method is well-suited to guide the covalent compound design and improve target selectivity, regardless of the warhead and chemical reaction types. FEP plays a crucial role in Viva's AI and computer-aided small molecule drug discovery workflow, integrating with molecular dynamics (MD) for binding site identification, high throughput virtual screening, and ADMET predictions to create a comprehensive AI-driven drug discovery ecosystem. The newest research by Viva has been published on J. Comput. Chem.

Viva's unique AI + SBDD demonstrates advantages in targeted RNA small molecule design. RNA as a target has unique advantages over traditional protein targets enabling previously undruggable proteins to become druggable. Traditional methods often fail to capture the dynamic characteristics of RNA structures and are not able to predict the structural changes of the flexible and highly charged RNA under different conditions. Viva Biotech's AIDD and CADD platform has developed MD-based methods to describe these dynamic features, highlighting the RNA pocket changes in the presence of small molecules and providing a series of quantitative metrics for rational RNA-targeting small molecule design.

When designing cyclic peptide compounds, Viva employs a strong combination of AI+DEL strategies. Cyclic peptides are often used to target protein-protein interaction sites, offering advantages such as stability, bioavailability, and specificity. Traditional screening methods struggle with covering the vast chemical space of cyclic peptides, resulting in low hit rates and inefficient screening. Viva brings out the best of AI and V-DEL screening. Viva first leveraged structure-based modeling to enrich peptide building blocks and create focused peptide libraries with over a billion cyclic peptides. Viva then incorporated AIDD and CADD algorithms to optimize the cyclic peptide hits while closely monitoring their stability and membrane permeability. Such tools are used iteratively to ultimately identify high affinity and highly specific cyclic peptides.

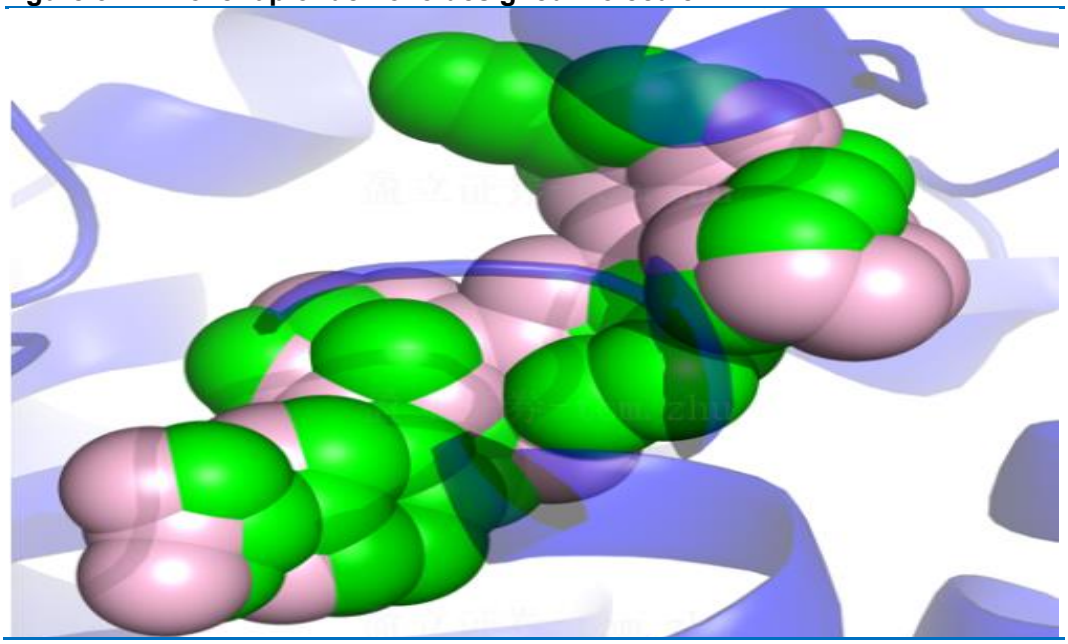
Viva is also using AI to actively explore new ideas for drug design such as de novo design. The idea of de novo design was proposed decades ago in the field of computational chemistry. Recent advancements in generative AI that materialized the concept into practical applications. This approach enables the direct generation of novel molecules complementary to the targets without conventional screening thereby escaping the chemical-space boundary of the compound libraries. When combined with FEP for lead optimization, it can accelerate the R&D process by orders of magnitude. Viva Biotech's computational platform integrates de novo design with experimental validations at all stages, from synthetic accessibility (SA) to drug-likeness of the compounds. Figure 34 below shows an overlay of the de novo designed molecule (pink) and the crystal structure ligand (green) in the binding pocket, where similar binding mode is achieved by novel chemical matters.

Figure 33: Flow Chart of De Novo Design and Time Consumption



Source: Viva Official Website, uSMART Securities.

Figure 34: An overlap of de novo designed molecule



Source: Viva Official Website, uSMART Securities.

Viva Focuses on New targets, Novel MOA and New Modalities to Develop New Markets

In addition, Viva's CRO segment focuses on new targets, novel MOA and new modalities to develop new markets. New targets are the most important source of original innovation. So far, the Company has delivered to clients a series of target protein structures that have not been reported in the PDB Protein Structure Database, and clarified the structural principles of these proteins in functioning, laying a solid foundation for subsequent drug molecular design. For example, in the cancer therapeutic area, industry players are still searching for new targets as breakthroughs, in addition to traditional target proteins such as kinases, proto-oncogenes/tumor suppressor genes, immune checkpoints, etc. In the fields of new tumor target proteins related to cell division control and mRNA stability, Viva successfully analyzed many previously unreported protein structures and complex structures of proteins and drug candidate molecules, and explained structural details of the interaction between target proteins and compounds, which provide clear guidance for designing more effective compounds and lead to the emergence of a range of new drug candidate molecules. Besides, the company contributed a number of new structures in the molecular glue protein complex structural field, which further provide effective clues for rational design and improvement of molecular glue drugs. Relevant research by Viva has been published on Oncogene.

Regarding novel MOA research progress, the CRO business has successfully established a one-stop platform for novel MOA-based drug discovery and research, and set up relevant technical platforms covering protein production, preparation and structure research, Cryo-EM technology, membrane protein research technology, drug screening technology, bioassay and so on. Moreover, based on the validation and tests of hit compounds, the company can rely on its strong pharmaceutical chemistry team and computing team to help clients further optimize the structure of hit compounds until they reach the PCC milestone. Meanwhile, the company's pharmacology and

pharmacokinetics platform can also provide clients with systematic compound druggability evaluation services for the development of novel MOA-based compounds.

Regarding current progress of new modality related technology platforms, Viva Biotech drew upon a wealth of projects completed over the years to gradually integrate its macromolecular drug/antibody platform, peptide platform and micromolecule drug platform into a cross-field XDC platform. Deeply integrating computational chemistry and artificial intelligence technology with XDC technology, the company explored in a wide range of innovative fields such as coupling site screening design, linker-drug payload design, overall hydrophobicity and stability modification of XDC drugs, and development of novel coupling reactions, expanding new directions for XDC drug R&D. On this basis, the company further integrated the XDC platform with DNA encoded library (DEL) technology, leveraging strong screening capabilities of the Viva DEL platform to help screen special micromolecule linkers and drugs, and relying on its team's unique experience in nucleic acid conjugation to establish an antibody-oligonucleotide conjugate (AOC) platform. So far, based on full integration of our existing technology platforms across multiple fields, Viva has established a powerful, comprehensive and one-stop XDC technology service platform.

In addition, Viva also provides services relevant to PROTAC/molecular glue drug R&D, and revenue generated in this regard accounted for almost 10.87% of total revenue from the CRO business. Viva's services primarily include studies on protein preparation and structure, screening of PROTAC/molecular glue, kinetics, drug metabolism, pharmaceutical chemistry, Bioassay, CADD/AIDD, etc. As of June 30, 2024, the company has studied more than 50 E3 ligase complexes and delivered 140 PROTAC ternary complex structures. The PROTAC business also became a revenue contributor to the growth of our Viva's CRO business.

How Langhua's CDMO Business Benefits from AI

AI technology also offers many possibilities for drug production. According to the discussion paper "Artificial Intelligence in Drug Manufacturing" published by the FDA Center for Drug Evaluation and Research, the use of AI for drug manufacturing can be categorized into four main scenarios, including process design optimization as well as process scale-up, advanced process control, process monitoring and fault detection, trend monitoring and testing.

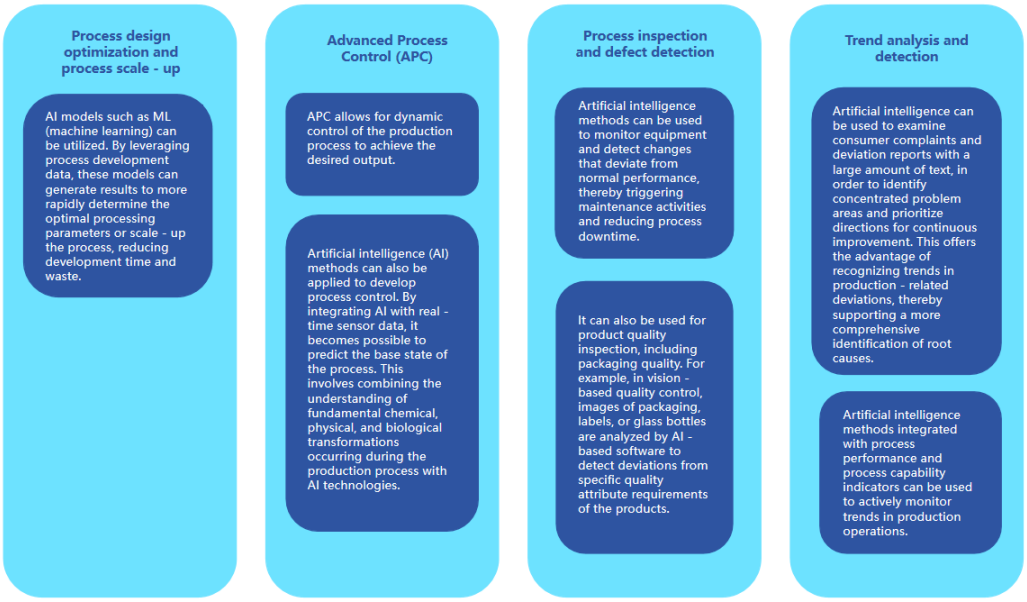
The use of AI for drug manufacturing is still immature, but some milestones have been achieved. For example, a biotech company Pow.bio is moving towards optimizing and automating fermentation through its AI fermentation platform, making it both cost-effective and streamlined.

Digital twins can be used in process optimization and design. Process digital twins are digital replicas of physical processes used to better understand, analyze, predict and optimize process performance. Austrian startup Novasign has developed a hybrid model-based digital twin system, which is used to optimize the process of expressing superoxide dismutase in E. coli, accelerating the process of fermentation process optimization; Siemens acquired PSE's process digital modeling software platform, gPROMs, in 2019 for the layout of bioprocess digital twins.

In the drug manufacturing process, AI technology can be used to implement APC with real-time process data as input. For pharmaceutical quality control, computer vision

inspection technology is often used. For trend monitoring, AI can be used to assist in reviewing deviation reports.

Figure 35: AI Empowering Drug Manufacturing



Source: China AI Dug Manufacturing White Paper, uSMART Securities.

Viva Biotech operates CDMO business through its subsidiary, Langhua Pharma. Under the wave of big language modeling, intelligent drug manufacturing becomes the trend. Viva has already localized and deployed large language models through its own Shanghai Supercomputing Center, and the whole workflow of CDMO has now introduced large language models, which improve productivity.

Figure 36: Examples of AI Applications to Drug Manufacturing

Hours Tech	·Application scenarios: Small molecule ·Pharmaceutical industry scenario AI decision platform · Focusing on the fields of intelligent manufacturing and process optimization, it is committed to "molecular synthesis", "process design" and "process production amplification", which are less involved in AI.
Great Bay Bio	Application scenario: Macro molecules · Pioneer the concept of "AI + Bio processing", committed to enabling AI in the whole process of biological technology. AlfaCell: High-yield and stable fixed-point integrated cell strain construction platform AlfaMedX: intelligent media development platform AlfaOPATM: Intelligent screen-free medium development platform (metabolic model of key components of cell lines)
Space Peptides	· Application scenarios: Poly peptides · focuses on building a one - stop AI - CRDMO service platform covering the entire process from new drug discovery to industrial production of peptides, peptidomimetics, and peptide - drug conjugates (PDCs). · Poly peptide CDMO: using solid phase liquid phase combination technology and Raman. Infrared process control technology, using the AI database to find the optimal process parameters, so that the synthesis yield reached 99.5%, the total productivity increased by 15%, and the cost was reduced.

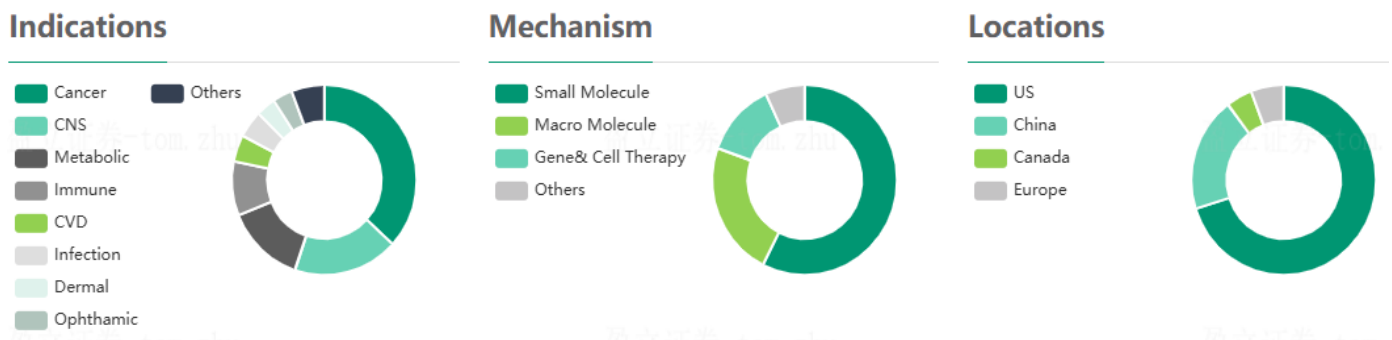
Source: China AI Dug Manufacturing White Paper, uSMART Securities.

Viva's Unique EFS Business Model

Viva Biotech combines conventional cash for service (CFS) and unique equity for service (EFS) business models, maintaining steady cash inflow from short-term drug discovery services while realizing massive revenue from long-term investments in drugs incubation. As the investment division of Viva Biotech Holdings (1873.HK), Viva BioInnovator (VBI) is committed to being a collaborative platform for Innovative Biotech companies from around the world. By the end of 2024, Viva has already participated in the incubation of 93 companies, with 227 pipeline projects, of which 186 pipelines are in the preclinical stage and 41 are in the clinical stage.

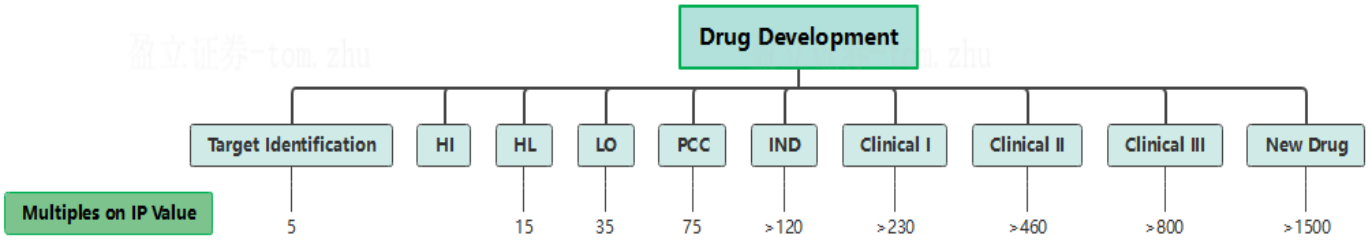
Early-stage drug discovery provides the fastest growth in value (the full drug development process from target identification to the approval of the new drug application can result in a return on investment of approximately more than 1,500 times). According to Frost & Sullivan's report, the average valuation of a biotech startup with only one validated target is approximately $5 million, while the same company's valuation may increase to an average of $150 million if the company receives IND approval for that validated target. Investors who are better able to manage the risks associated with the early stages of drug development will be in an advantageous position to achieve higher returns on their investments. At the same time, an incubation model that focuses on early-stage opportunities can provide a more flexible exit strategy. For these two reasons, Viva's unique EFS model can capitalize on the advantages of investing in early-stage drug discovery.

Figure 37: Areas of Exploration on Promising Biotech Startups



Source: Viva Official Website, uSMART Securities.

Figure 38: Investment Gains in Different Stages of Drug Development



Source: Company prospectus, uSMART Securities.

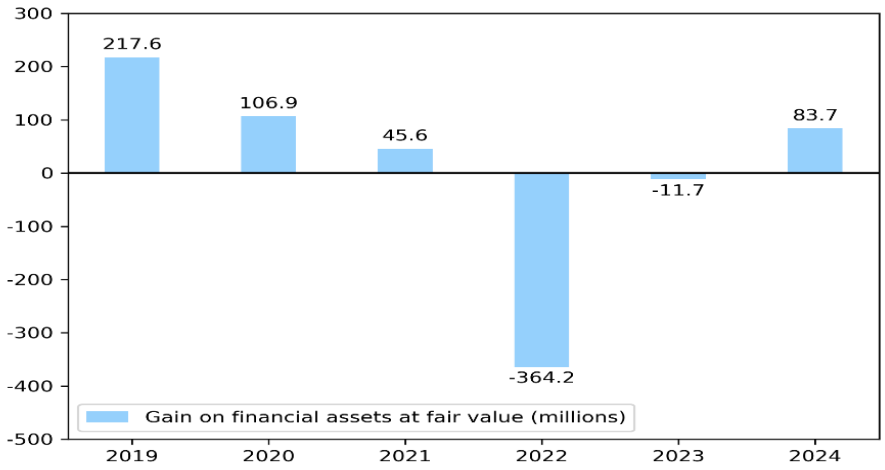
Viva's EFS investment model is sufficiently diversified to minimize potential investment losses. In terms of the indications, the company invests a wide range of projects in cancer, CNS, metabolic diseases, immune diseases, CVD, infection diseases, dermal

diseases, ophthalmic diseases, etc.; in terms of mechanisms, Viva invests in small molecules, macromolecules, and gene & cell therapies, etc.; and in terms of the regions, the company has invests in projects in the United States, China, Canada, and Europe.

At the same time, Viva has a professional, progressive, and practical investment team. The team members have rich experience in entrepreneurship, management, operation, R&D, and investment in the medical industry. Additionally, an expert team of more than 30 world-class scientists and entrepreneurs from home and abroad will be involved in the project, working closely during the due diligence process, and providing advice on entrepreneurship, management, and scientific development for incubators.

In 2024, Viva successfully realized investment returns by withdrawing partially from a number of companies (Focus-X, Saverna, Dogma, Riparian, DTX and Nerio), totaling a return of approximately CNY 163 million.

Figure 39: EFS-related Investment Gains



Source: Corporate financial statements, uSMART Securities.

In 2022, the EFS valuation, following the overall market, was cut by approximately CNY 370 million. The company's book value of investments is close to their historical cost, with more exits from commercialized projects ahead. By the end of 2024, Viva have achieved full or partial withdrawal from 15 companies in the incubation program. In addition, there are several projects with potential exits, and the number of exits is expected to peak over the next three years (approximately 3-5 exits per year). Viva's portfolio of incubatees includes a few high-quality assets such as Dogma, Arthrosi, Basking, Triumvira, Deka, Mediar, Cybrexa, VivaVision, Haya and Nerio. In the future, with the successful development of the incubatees and the stabilization of the industry sentiment, the continued financing and exit of the previous investments will gradually enter the harvesting period and generate cash returns and investment income for Viva.

Table 5: Part of Companies Incubated by Viva in 2024

	Current Progress
Nerio	Boehringer Ingelheim acquired Nerio Therapeutics in up to $1.3 billion deal for novel immune checkpoint inhibitors.
Apeiron	Apeiron reached an agreement with Exscientia plc (NASDAQ: EXAI) to sell 50% of its interest in the highly

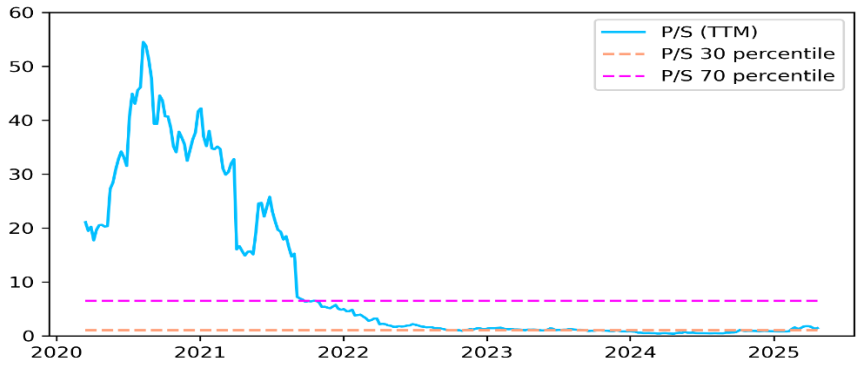
	selective oral CDK7 inhibitor GTAEXS617 (: 617) to Exscientia at USD 30 million.
FULL-LIFE	FULL-LIFE signs an agreement with SK Biopharmaceuticals for innovative therapies targeting multiple solid tumors in a deal totaling USD 571.5 million.
QurAlis	QurAlis announced an exclusive worldwide license agreement with Eli Lilly for the ASO therapy QRL-204. QurAlis will receive a prepayment of USD 45 million as well as up to an additional USD 577 million in future milestone payments and tiered net sales commission.
Lucy Therapeutics	Lucy secures USD 12.5 Million Plus Round to advance new approaches to Alzheimer's and Parkinson's treatments. The round was led by existing investors Engine Ventures and Safar Partners, and followed by the Bill & Melinda Gates Foundation, Parkinson's UK Foundation and Michael J. Fox Foundation.
HAYA Therapeutics	Eli Lilly and Haya signed a potential multi-year collaboration agreement worth USD 1 billion to utilize Haya's proprietary RNA-guided genomic platform to identify drug targets to address obesity as well as other chronic diseases.
MEDIAR Therapeutics	Mediar and Eli Lilly agreed to collaborate for the advancement of WISP1, the first antibody for the treatment of idiopathic pulmonary fibrosis (IPF) with WISP1, with potential payments of up to USD 786 million.
Absci	Absci reached an agreement with AstraZeneca to develop antibody therapeutics for specific tumor targets for a total of USD 247 million. Additionally, Absci secured a strategic partnership with AMD to enhance its AI drug discovery capabilities, with AMD investing $20 million in Absci through private equity (PIPE).

Source: Viva Official Website, uSMART Securities.

4. With the Introduction of Strategic Investors, the Undervaluation of Viva is obvious.

The current valuation of Viva is low. From the point view of the past five years, the P/S of Viva Biotech is near the 30th percentile, much lower than the valuation of close to 60 times P/S at the peak; similarly, the P/B of Viva is also near the 30th percentile and is already below 1 , much lower than the valuation of 10 times P/B at the peak. For a leader in the innovative novel drug industry (SBDD), the current valuation has big upside room if the industry boom continues.

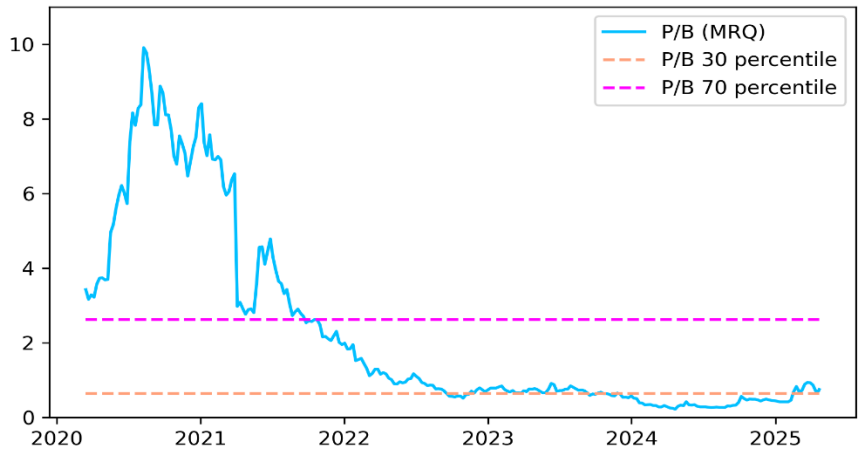
Figure 40: P/S (TTM) of Viva in the Past 5 Years



Source: Wind, uSMART Securities.

The low valuation of Viva attracted a group of strategic investors. In 2023, Viva secured USD 150 million in funding by transferring 24.21% equity to strategic investors, including Temasek, Highlight Capital (HLC), and True Light. In addition, the listed company also received financing of about USD 60 million at the group level at HKD 2.0 per share. Meanwhile, it was also revealed in the deal that the company plans to spin off its CRO business for China A-share listing in the future.

Figure 41： P/B (MRQ) of Viva in the Past 5 Years



Source: Wind, uSMART Securities.

Among these strategic investors, Temasek is an well-known investment company

under the Singaporean government with a net portfolio value of SGD 403 billion (CNY 1.89 T) as of 31 March 2022. Headquartered in Singapore, it has 12 offices in 8 countries around the world. Temasek's Purpose "So Every Generation Prospers" guides it to make a difference for today's and future generations. The Temasek Charter defines its three roles as an Investor, Institution and Steward, and shapes its ethos to do well, do right and do good. Sustainability is at the core of all that Temasek does. It is committed to catalyzing solutions to global challenges and activating capital – financial, human, social and natural – to bring about a better and more inclusive world for all. Temasek received Aaa/AAA ratings from Moody's and S&P.

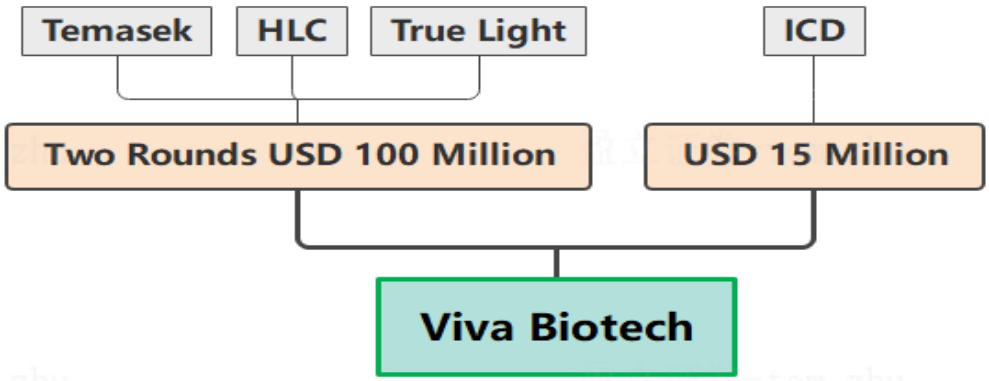
As another strategic investor, HighLight Capital (HLC) is dedicated to creating long-term values through the promotion of technology innovations. Empowered by deep knowledge in chemical, biological and material sciences, and leveraging proprietary industry research and comprehensive enablement services, HLC strives to create sustainable value over the long term by investing in companies that boost manufacturing efficiency. HLC has invested in over 100 leading companies, including Mindray, United Imaging, Yuwell, Wuxi Biologics, Tigermed, Baheal Pharma, Pharmaron, BrightGene, Hongene, BABO, XINGYUN Group, CHOWSING Nourse, Nayuki. HLC manages USD and RMB dual currency funds, with operations in Hong Kong, Shanghai, and Shenzhen.

HLC stated, "Based on a thorough analysis of the development features of the biopharmaceutical industry, the operation rules of the capital market, and the unique attributes of Viva Biotech, upon our in-depth and sincere discussion and research with Viva Biotech's management team, the investment in Viva Biotech is a transaction for the enhancement of overall development and realization of value of the Company, as well as an improvement plan on corporate governance system. We hope that through our joint efforts, Viva Biotech will further unleash its value through its world-leading structure-based new drug discovery service platform and other business segments, meet global customers' needs by providing integrated "CRO+CDMO" services and realize stable and long-term growth."

Additionally, Viva Biotech received nearly USD 15 million in financing, transferring about 2.33% of its stake in Viva Biotech (Shanghai) Limited to Raed Capital Holdings 2 Ltd on Dec 15, 2023. In the transaction, Viva Biotech (Shanghai) was valued at approximately CNY 4.6 billion. This round of investment marked ICD's first direct investment project in China, reflecting its full recognition of Viva Biotech's unique position in the global innovative drug discovery industry. Additionally, ICD's involvement will provide significant strategic support for Viva's global business development and help to further enhance synergies.

Raed Capital Holdings 2 Ltd is a private company incorporated in the Dubai International Financial Center of the United Arab Emirates and is wholly owned by Investment Corporation of Dubai ("ICD"). ICD is the principal investment arm of the Government of Dubai. Established in 2006, ICD manages a broad portfolio of assets, both locally and internationally, across a wide spectrum of sectors that support Dubai's dynamic economy.

Figure 42：Strategic Investors in Viva



Source: Viva Official Website, uSMART Securities.

As the current price of Viva Biotech is lower than the cost of HKD 2.0 per share invested by the strategic investors, some of which are state-owned capitals such as Singapore and the United Arab Emirates, the probability of the price recovery is higher, and there may be further revaluation in the future.

5. Earnings Forecast and Valuation

As Viva is a leading CRO+CDMO company in the innovative drug industry, we make the following assumptions about the company's future operations:

1. **Drug Discovery Services**: Due to the continued improvement in the global industry prosperity index and the company's position as an industry leader in the SBDD field, along with the broad prospects brought about by AI in the future, we assume that the revenue of company's drug discovery services will grow by 12.5% per annum from 2025 onwards, with gross margin increasing by 1% per annum.

2. **CDMO and Commercialization Services**: Considering that the global CDMO industry continues to remain prosperous, and that incubated drugs (peptides, small molecules, etc.) will be commercialized soon, we expect the company's CDMO and commercialization services to grow by 15% per annum from 2025 onwards. Gross margin will grow by 1% per annum.

3. **EFS**: As the company has strategically contracted its EFS business and will gradually exit previous incubated projects to realize gains in the future, we forecast that the company's annual gain on financial assets at fair value (appreciation of EFS investment assets) from 2025 onwards will be CNY 50 million.

4. **Other Hypotheses**: From 2025 onwards, other income and gains as a percentage of revenue will be 4.0%; finance costs as a percentage of revenue will be 3.5%; the selling and distribution expense ratio will be 5.0%; the administrative expense ratio will be 12%; the research and development expense ratio will be 4.0%; the net impairment losses on financial assets will be CNY 8.0 million; other expense ratio will be 2.5%; the fair value gain on financial liabilities at fair value through profit or loss (FVTPL) will be CNY 0; income tax expense will be 15% of earnings before tax.

Table 6: Viva's Consolidated Statement of Profit or Loss and Forecast

	2021A	2022A	2023A	2024A	2025E	2026E	2027E	2028E
Revenue (CNY million)	2104	2380	2156	1987	2264	2581	2943	3355
-Drug Discovery Services (including VBI)	740	895	845	811	912	1026	1155	1299
----Full-time-equivalent (FTE)	532	706	671	——	——	——	——	——
----Fee-for-service (FFS)	122	135	161	——	——	——	——	——
----SFE	86	54	12	——	——	——	——	——
-CDMO and Commercialization Services	1364	1485	1311	1176	1352	1555	1788	2056
----Fee-for-service	0	28	52	——	——	——	——	——
----Sale of products	1364	1456	1259	——	——	——	——	——
Cost of sales (CNY million)	(1453)	(1564)	(1417)	(1285)	(1461)	(1641)	(1844)	(2071)
-Drug Discovery Services	(398)	(498)	(481)	(454)	(502)	(554)	(612)	(675)
-CDMO and Commercialization Services	(1055)	(1066)	(936)	(831)	(959)	(1087)	(1232)	(1396)
Gross profit (CNY million)	651	816	738	687	803	940	1099	1284
-Drug Discovery Services	342	397	364	357	410	472	543	624
-CDMO and Commercialization Services	309	418	375	330	393	468	556	660
Gross margin	30.9%	34.3%	34.3%	34.6%	35.5%	36.4%	37.3%	38.3%
-Drug Discovery Services	46.2%	44.4%	43.1%	44.0%	45.0%	46.0%	47.0%	48.0%
-CDMO and Commercialization Services	22.7%	28.1%	28.6%	28.1%	29.1%	30.1%	31.1%	32.1%

Other income and gains (CNY million)	123	68	87	82	91	103	118	134
Selling and distribution expenses (CNY million)	(94)	(131)	(133)	(112)	(113)	(129)	(147)	(168)
Administrative expenses (CNY million)	(226)	(274)	(277)	(252)	(272)	(310)	(353)	(403)
R&D expenses (CNY million)	(92)	(136)	(128)	(88)	(91)	(103)	(118)	(134)
Fair value gain on financial assets at FVTPL (CNY million)	46	(364)	(12)	84	50	50	50	50
Net impairment losses on financial assets (CNY million)	(1.4)	(9.4)	(8.1)	(6)	(8)	(8)	(8)	(8)
Other expenses (CNY million)	(13)	(254)	(322)	(45)	(57)	(65)	(74)	(84)
Finance costs (CNY million)	(183)	(185)	(177)	(54)	(79)	(90)	(103)	(117)
Fair value gain on financial liabilities at FVTPL (CNY million)	137	10	174	0	0	0	0	0
EBT (CNY million)	348	(459)	(56)	296	324	388	464	554
Income tax expense (CNY million)	(47)	(45)	(44)	(74)	(49)	(58)	(70)	(83)
Net profit (CNY million)	301	(504)	(100)	222	275	330	394	471
Net profit margin	14.3%	(21.2%)	(4.6%)	11.2%	12.1%	12.8%	13.4%	14.0%
amortization of acquired assets from acquisition (CNY million)	48	48	48	48	48	48	48	48
Impairment losses on Property, Plant and Equipment (CNY million)	0	5	0	31	10	10	10	10
Subsidiary's share incentive expenses (CNY million)	0	0	0	12	12	12	12	12
Transaction costs of restructuring (CNY million)	0	0	37	2	0	0	0	0
Interest expenses of the debt components of convertible bonds (CNY million)	136	140	124	0	0	0	0	0
Fair value gain on (embedded derivative instruments) of convertible bonds (CNY million)	(144)	(10)	(174)	0	0	0	0	0
Loss on repurchase of convertible bonds (CNY million)	0	45	223	0	0	0	0	0
Fair value loss on contingent consideration (CNY million)	6	0	0	0	0	0	0	0
Foreign exchange loss (CNY million)	(31)	146	51	0	0	0	0	0
Adjusted Net profit (CNY million)	321	(134)	209	315	345	400	464	541
Diluted EPS (CNY)	0.16	(0.08)	0.09	0.09	0.15	0.17	0.20	0.23

Source: Corporate financial statements, uSMART Securities.

The company is a leading global provider of structure-based drug discovery + CDMO services. The company innovatively empowers global innovative pharmaceutical companies with its leading drug discovery technology platform for the whole industry

chain and shares their innovation dividends by EFS; at the same time, the company entered the CDMO industry through the acquisition of Langhua Pharmaceuticals, creating a one-stop manufacturing and R&D platform for innovative novel drugs. The company has formed a unique technological moat through the development of AI, broadened the scope of business, created new market opportunities, and improved the company's operational efficiency. The company is expected to show high growth in the next 3-5 years. We forecast its 2025 adjusted net profit to be CNY 345 million and diluted EPS to be HKD 0.16, which yields a target price of HKD 3.5 given a valuation of 22x PE.

Risk Disclosure

1. Increased competition: The CRO/CDMO industry is highly competitive, and the expansion of new entrants and existing companies may weaken Viva's market share and bargaining power. In particular, Viva's leading position in SBDD may attract other companies to enter the industry, which may affect Via's profitability.

2. AI technology development and application do not meet expectations: the company plans to release its proprietary AI drug design platform. If subsequent development is not as expected, it may affect the company's competitiveness in the field of AI medicine, and also affect the company's overall efficiency.

3. EFS risk: There are possible failures of investment in incubation projects. The EFS business involves investment in early-stage drug discovery projects, which may result in investment losses if the project fails or progresses poorly, and Viva does not exit the project in a timely manner. In addition, the EFS business model may lead to a decrease in the Company's cash flow, increasing debt pressure and adversely affecting the company's operations.

4. Revaluation less than expected: the company's current valuation is low. If the industry boom fails to continue to improve, or the stock market as a whole plunges, the revaluation of the company may be less than expected, affecting the performance of the stock price.

Ratings and related definitions

Company short-term ratings

Stock ratings of Buy, Hold and Sell have a time horizon of 6 months from the publishing date of the initiation or subsequent rating/price target change report issued for the subject company's stock:

Buy: The subject company's stock price should outperform the typical benchmark market index (eg.HSI) by 20% or above.

Hold: The subject company's stock price should outperform the typical benchmark market index by5-20%

Neutral: The subject company's stock price change is within ±5% compared to the benchmark index.

Rating Suspended: No judgment is made on the company's stock performance in the next 12months.

Company long-term ratings

A: The company's long-term growth potential is above the industry comparable average level.

B: The company's long-term growth potential is in line with the industry comparable average level.

C: The company's long-term growth potential is below the industry comparable average level.

Sector ratings and definitions

Over the 6-month period from the publishing date of the initiation or subsequent rating/price target change, the performance of the industry index relative to the concurrent market benchmark (HSI) is used as the standard:

Overweight: The industry fundamentals are favorable, and the industry index outperforms the benchmark by more than 10%.

Neutral: The industry fundamentals are stable, and the industry index moves within ±5% of the benchmark.

Underweight: The industry fundamentals are weak, and the industry index is expected to underperform the benchmark by more than -10%.

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Important Disclosures

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