

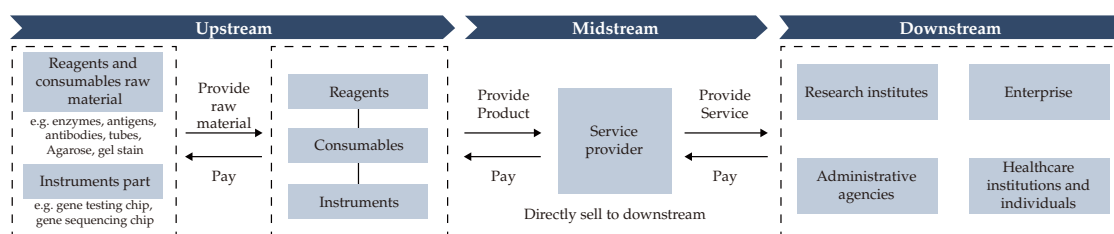
INDUSTRY OVERVIEW

Certain information and statistics set out in this section have been extracted from various official government publications, available sources from public market data providers and an independent third-party source, CIC. The report prepared by CIC and cited in this document was commissioned by us. The information from official government sources has not been independently verified by our Company, the Joint Sponsors, [REDACTED], any of our or their respective affiliates, directors, officers, employees, agents or advisors or any other person or party involved in the [REDACTED], and no representation is given as to its accuracy, fairness and completeness. For discussion of the risks relating to our industry, see "Risk Factors."

OVERVIEW OF LIFE SCIENCE TOOLS MARKET

Life science is one of the most significant disciplines, seeking to understand the structure, function, and behavior of living organisms at all levels of complexity. Central to both scientific research and clinical practice, life science tools encompass a broad range of instruments, reagents, and consumables that serve as the foundation for advancements in genomics, proteomics, cell biology, analytics and other cutting-edge technologies.

The value chain of life science tools forms a complex and dynamic network that comprises various participants. At the upstream, providers of instruments, reagents, and consumables supply the essential supports that enable midstream service providers to perform their work. These upstream contributions are critical in determining the efficiency and quality of the products and services that ultimately reach the market. Midstream service providers typically purchase the life science tools from upstream suppliers and use them for R&D, production, testing and other related services for downstream users, generating profit by offering these services in their intermediary role. The downstream segment consists of healthcare organizations, research institutions, regulatory agencies, and other end users who rely on the midstream service outcomes for medical treatments, scientific research, and diagnostic testing, thereby creating ongoing demand for life science tools. The following diagram sets forth an overview of life science tools value chain:

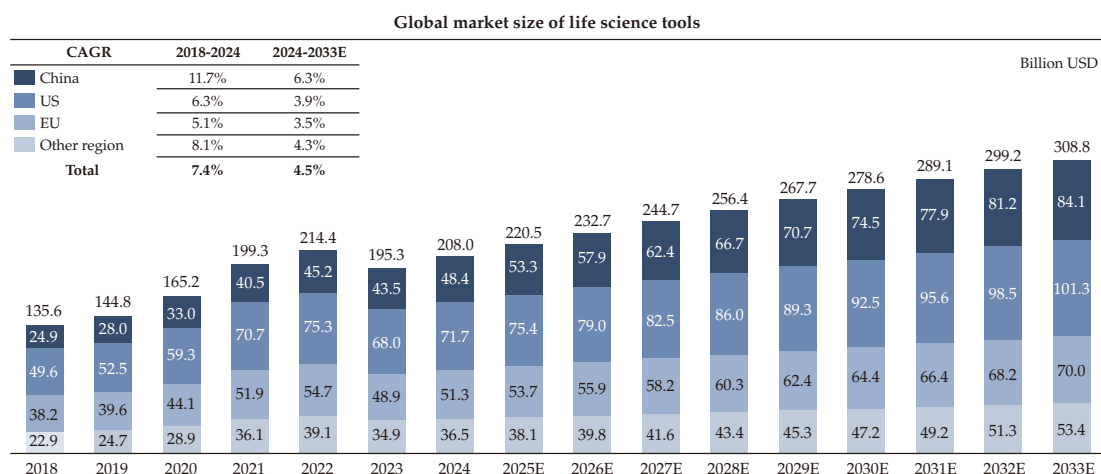


Source: CIC

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Global Life Science Tools Market

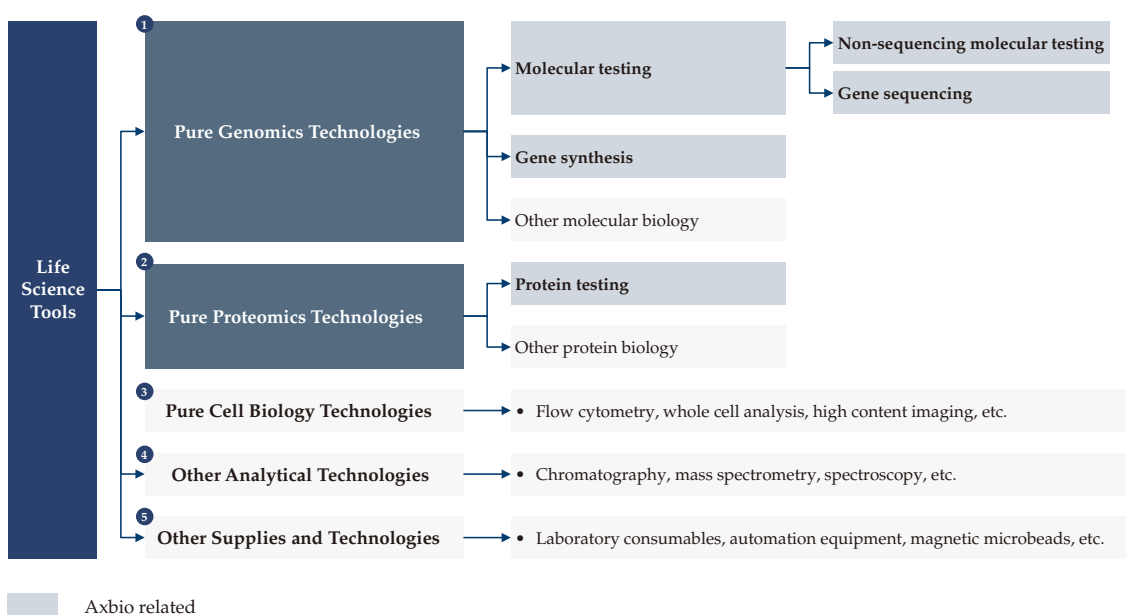
The global life science tools market has witnessed substantial growth in recent years, increasing from US\$135.6 billion in 2018 to US\$208.0 billion in 2024, with a CAGR of 7.4%. China's life science tools market has seen even greater growth, increasing from US\$24.9 billion in 2018 to US\$48.4 billion in 2024, reflecting a CAGR of 11.7%. The U.S. and EU life science tools markets expanded at more modest rates, rising from US\$49.6 billion and US\$38.2 billion in 2018 to US\$71.7 billion and US\$51.3 billion in 2024, respectively, representing CAGRs of 6.3% and 5.1%, respectively. In the post-pandemic era, despite a slowdown in the overall growth rate of the life science tools market, this sector continues to present strong market potential and is expected to maintain steady growth, as driven by ongoing technological advancements, increased investment in research and development, and rising demand for innovative life science solutions across academic, clinical, and industrial sectors. By 2033, the global, China, the U.S. and EU market sizes for life science tools are projected to reach US\$308.8 billion, US\$84.1 billion, US\$101.3 billion and US\$70.0 billion, respectively, representing CAGRs of 4.5%, 6.3%, 3.9% and 3.5% from 2024 to 2033, respectively. The chart below illustrates the historical and forecast size of the global life science tools markets for the periods indicated.



Source: World Health Organization (WHO), Organization for Economic Co-operation and Development (OECD), National Bureau of Statistics of China (NBSC), General Administration of Customs of the People's Republic of China (GACC), annual reports of listed companies, expert interviews, CIC

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The life science tools market can be broadly segmented into several technical categories, each catering to distinct areas of scientific research and clinical practice. Pure genomics technologies include molecular testing — such as non-sequencing molecular testing and gene sequencing — gene synthesis, and other molecular biology technologies. Pure proteomics technologies focus on protein testing and other protein biology applications. Pure cell biology technologies encompass methods like flow cytometry, whole cell analysis, and high content imaging. The market also features other analytical technologies, including chromatography, mass spectrometry, and spectroscopy. Additionally, other supplies and technologies — such as laboratory consumables, automation equipment, and magnetic microbeads — provide essential support across all segments of life science research. The chart below illustrates such segmentation of the overall life science tools market.



Source: CIC

Comparison of Molecular Testing and Protein Testing

Molecular testing (including non-sequencing molecular testing and gene sequencing) interrogates nucleic acids, uncovering inherited or acquired genetic alterations; by contrast, protein testing targets the downstream gene products, capturing dynamic biochemical changes that mirror real-time physiological states. Thus, molecular testing reveals static genomic information, whereas protein testing excels at functional status monitoring and biomarker discovery, making the two approaches scientifically distinct yet clinically complementary.

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The following table sets forth a comparison of the molecular testing and protein testing.

Testing type	Molecular testing		Protein testing
	Non-sequencing molecular testing	Gene sequencing	
Analyte	Specific molecular marker	Nucleic acids	Protein molecule
Technology Principle	PCR, FISH, gene chip	Sanger, NGS, Single molecular sequencing, EL-NGS	Elisa, CLIA, Western blot, Mass spectrometry, etc.
Output	Quantitative values (copy numbers, ratios) or qualitative results (positive/negative)	Genetic variants, mutations, and their clinical significance	Protein levels, expression patterns, and activity measurements
Reflection	Specific target status, mutation presence	Genetic profile and disease susceptibility	Protein expression and disease biomarker status
Level of sophistications*	+	+++++	+++
Purpose	Rapid pathogen detection, known mutation screening, companion diagnostics, etc.	Genetic variation detection, tumor mutation analysis, birth defect screening, etc.	Disease diagnosis, treatment monitoring, and biomarker analysis

* Level of sophistications refers to the inherent complexity of the testing technology, the requirements for laboratory infrastructure and equipment, the difficulty of data analysis and clinical interpretation, as well as the cost and skill level of the personnel involved.

Source: CIC

Growth Drivers and Future Trends of Life Science Tools Market

The growth of the life science tools market is expected to be driven and shaped by the following factors:

- National-level favorable policy support.** China has implemented a series of favorable policies to drive the growth of the life sciences tools industry. For example, the 14th Five-Year Plan for the Development of the Bioeconomy (《「十四五」生物經濟發展規劃》), issued on May 10, 2022, encourages better tools for gene testing and disease detection, and also supports new methods like synthetic biology and microfluidics, which can be used in medicine, farming, and environmental protection. The 14th Five-Year Plan for National Health (《「十四五」國民健康規劃》) released on April 27, 2022, emphasizes strengthening the

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development and deployment of advanced medical equipment and diagnostic tools to support national health objectives. Notably, its focus on preventive medicine and early disease detection has driven demand for innovative non-sequencing molecular detection technologies. The U.S. has also launched the National Biotechnology and Biomanufacturing Initiative on September 12, 2022, which supports the development of new diagnostic technologies, promotes R&D efforts through coordinated interdepartmental collaboration, and aims to improve the regulatory environment to drive bioeconomy growth.

- ***Expansion of downstream market demand.*** The growing focus on genetic research and patient needs is driving the expansion of personalized and precision medicine, which relies on advanced life science tools for quick biomarker identification and high-throughput screening, thereby fueling market demand. Beyond healthcare, the adoption of high-throughput sequencing in non-medical sectors, such as crop and livestock breeding, animal disease monitoring, and food safety testing, also contributes to the rising demand for life science tools.
- ***Technological innovation and AI integration.*** Technological advancements, especially automation in high-throughput applications, spatial multi-omics and artificial intelligence, have significantly accelerated experimental processes while driving the development of more advanced life science tools and analytical platforms. In addition, the integration of automation with AI and big data analytics enables high-quality, large-scale, and highly accurate data generation and analysis, significantly enhancing efficiency, accelerating scientific discoveries, and expanding the applications of life science tools across diverse fields.
- ***Prevention and control of health emergencies.*** The emergence of sudden outbreaks, particularly the COVID-19 pandemic, has highlighted vulnerabilities in global health systems, emphasizing the need for rapid, scalable and cost-effective diagnostic solutions. This has driven a surge in demand for advanced life science which play a critical role in detection, monitoring, and treatment.
- ***Transnational cooperation and technical standardization.*** Given the acceleration of collaboration between multinational pharmaceutical companies and research institutions, the standardization and regulation of life science tools have become essential to ensuring the quality and consistency of processes, driving the worldwide expansion of the life science tools market.
- ***National reimbursement policy support.*** In recent years, the National Healthcare Security Administration (NHSA) and provincial health authorities have introduced a series of reimbursement reforms to accelerate market access for innovative life science tools. Nationally, the NHSA now fast-tracks insurance inclusion and procurement policies for devices approved under the innovation pathway; Sichuan's pilot program grants priority support for

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facility setup, charging item configuration, and insurance coverage of nationally approved devices; Jiangsu's Medical Insurance Bureau allows DRG/DIP special-case negotiations with separate pricing and higher payment ratios for innovative devices; and Zhejiang has boosted DRG incentives for qualifying medical technology projects. Together, these measures lower adoption costs, shorten reimbursement timelines and drive broader uptake of advanced tools.

OVERVIEW OF MOLECULAR TESTING MARKET

Overview of Molecular Testing

Molecular testing comprises a spectrum of advanced techniques designed to detect and analyze nucleic acids, including DNA and RNA, to identify genetic mutations, gene expression patterns, and epigenetic modifications at the molecular level. Emerged as a transformative segment within the life science tools industry, molecular testing enables precise detection and characterization of genetic, and epigenetic markers.

One of the most significant applications of molecular testing is in oncology management. As cancer remains a leading cause of mortality worldwide, molecular testing, especially through liquid biopsy, demonstrates immense market potential. Liquid biopsy enables the non-invasive collection of cancer biomarkers from bodily fluids such as blood or urine, allowing for the detection of circulating tumor DNA (ctDNA), circulating tumor cells (CTCs), extracellular vesicles, circulating tumor RNA (ctRNA), and exosomes. Beyond oncology, pathogen molecular testing, including PCR-based and NGS tests, plays a crucial role in identifying the genetic material of pathogens. This enables precise diagnosis and ensures targeted therapeutic interventions in the management of infectious diseases.

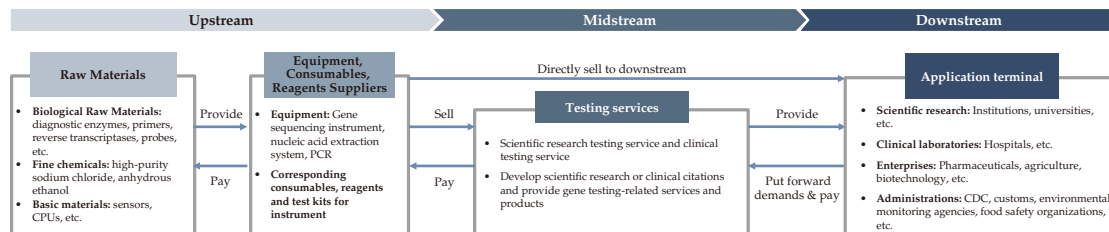
In addition to clinical applications, consumer molecular testing has gained popularity, offering individuals insights into their genetic predisposition, potential health risks and overall wellness. Consumer molecular testing include carrier screening, genetic health risk assessments, pharmacogenetics tests, cancer predisposition screening, low-risk general wellness tests, and ancestry tests. All these consumer services are revolutionizing personal healthcare by empowering individuals to make informed decisions based on their genetic data.

Industrial Chain and Workflow of Molecular Testing

The molecular testing industry is built around a value chain that includes upstream suppliers, midstream service providers, and downstream users. Upstream companies provide raw materials like reagents and chemicals, instruments as technology platforms, as well as clinical test kits. Midstream players offer testing services for both research and clinical use. Downstream users include research institutions, hospitals, government agencies, and biotech companies.

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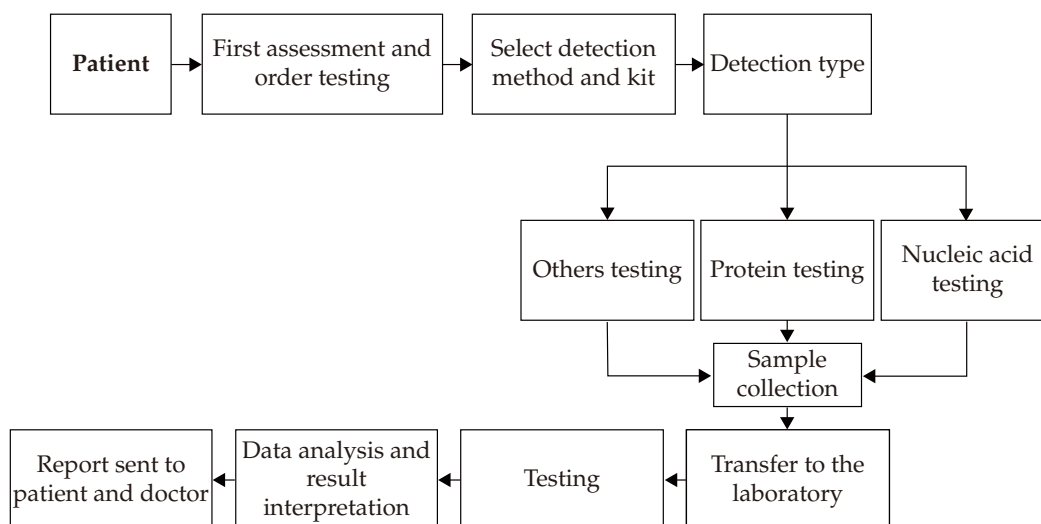
The following diagram sets forth the industrial chain of the molecular testing market.



Source: CIC

Molecular testing instruments, as the core of diagnostic and research platforms, support a standardized yet highly adaptable workflow across a wide range of applications. These instruments and their associated consumables are typically designed as general-purpose platforms, enabling broad applicability in both clinical and research settings. Their versatility is particularly valuable in clinical diagnostics, where testing must comply with standardized procedures, quality control systems, and regulatory frameworks to ensure accuracy, repeatability, and clinical reliability.

In clinical setting, the typical workflow begins with a patient assessment, followed by the selection of an appropriate detection method and clinical test kit, such as nucleic acid testing, protein testing, or other specialized assays, based on the diagnostic or research objective. Samples are then collected and transferred to the laboratory, where the molecular testing instrument performs the analysis. The resulting data are processed and interpreted, and a report is generated for both the patient and the physician. The following diagram sets forth the typical application workflow of molecular testing in clinical setting.



Types of Molecular Testing

Molecular testing technologies can generally be categorized into non-sequencing-based testing and gene sequencing, depending on the underlying

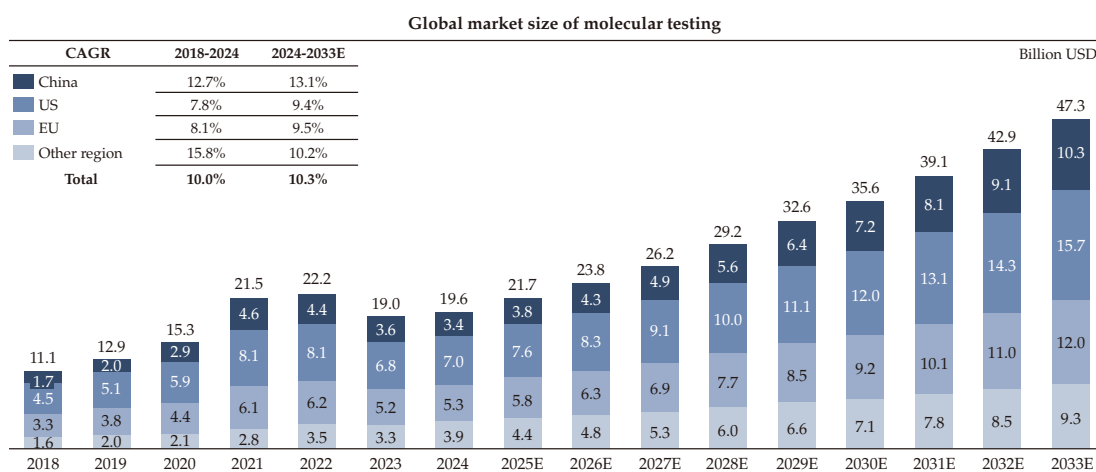
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methods and diagnostic objectives. Each approach plays a distinct technical role and serves different functional purposes across various application scenarios, based on differences in detection principles, information depth, and cost structure.

Non-sequencing molecular testing is primarily used for the rapid detection of specific targets. It offers advantages such as simplicity, cost-effectiveness, and operational efficiency, making it well-suited for large-scale screening and companion diagnostics. In contrast, gene sequencing excels at providing comprehensive genetic information, enabling in-depth analysis of complex genomic variations. However, it typically involves higher costs and greater data processing requirements.

Molecular Testing Market Size

The broad applications of molecular testing have driven substantial growth and innovation in this sector. The global molecular testing market grew from US\$11.1 billion in 2018 to US\$19.6 billion in 2024, with a CAGR of 10.0%. The China’s molecular testing market increased from US\$1.7 billion in 2018 to US\$3.4 billion in 2024, reflecting a CAGR of 12.7%. The U.S. molecular testing market grew from US\$4.5 billion in 2018 to US\$7.0 billion in 2024, reflecting a CAGR of 7.8%. The EU molecular testing market increased from US\$3.3 billion in 2018 to US\$5.3 billion in 2024, with a CAGR of 8.1%. The global, China, the U.S. and EU molecular testing markets are expected to reach US\$47.3 billion, US\$10.3 billion, US\$15.7 billion and US\$12.0 billion by 2033, respectively, representing a CAGR of 10.3%, 13.1%, 9.4% and 9.5% from 2024 to 2033, respectively. The chart below illustrates the historical and forecast size of the global molecular testing market for the periods indicated.



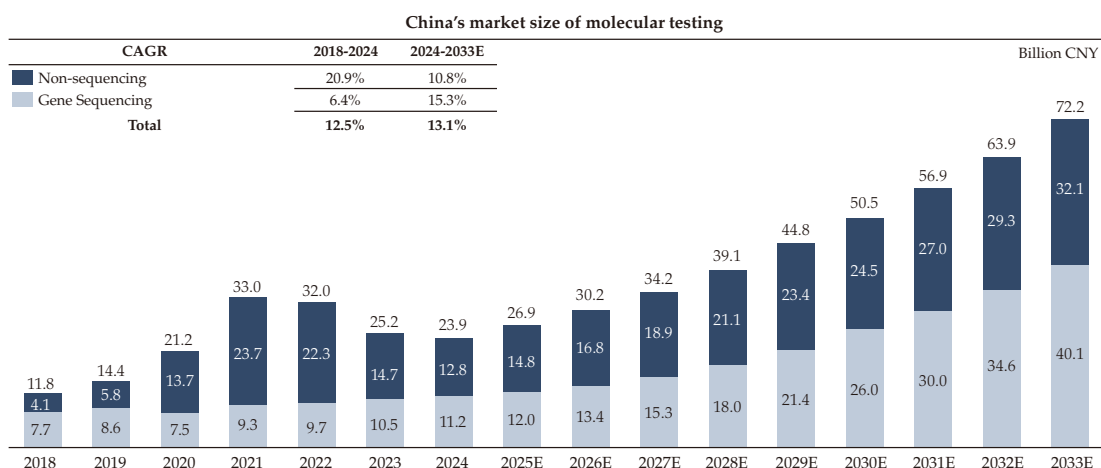
Note:

- (i) This market size includes molecular testing instruments, consumables, and clinical test kits across all applications.

Source: WHO, FDA, NMPA, annual reports of listed companies, expert interviews, CIC

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In China's molecular testing market, gene sequencing method was the leading segment before the COVID-19 pandemic and is projected to regain its dominant position in the next few years. The chart below illustrates a breakdown of the China's molecular testing market by molecular testing technology, including non-sequencing molecular testing and gene sequencing, for the periods indicated.



Note:

- (i) This market size includes molecular testing instruments, consumables, and clinical test kits across all applications.

Source: NMPA, Chinese Medical Association (CMA), NBSC, GACC, annual reports of listed companies, expert interviews, CIC

Entry Barriers of Molecular Testing Market

The major entry barriers for new players in the molecular testing market are set forth as follows:

- **Stringent regulatory requirements.** Molecular testing tools are subject to rigorous regulatory scrutiny in most major markets, such as the FDA, the EMA, and the NMPA. Meeting these requirements demands extensive documentation, clinical validation, and compliance with complex quality and safety standards, all of which require considerable time, expertise, and financial resources. Navigating these regulatory pathways can be particularly difficult for new entrants lacking the necessary experience or regulatory infrastructure.
- **Advanced technologies.** The development of molecular testing products relies on sophisticated technologies across multiple disciplines, including molecular biology, genomics, bioinformatics, chemistry, materials science, and engineering. This requires a high level of scientific and technical expertise, along with continuous innovation to maintain competitiveness. New entrants without a solid technological foundation or access to experienced talent may find it difficult to match the capabilities of established players, both in product performance and innovation speed.

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- **Market awareness and reputation.** Hospitals, laboratories, and healthcare providers tend to prefer molecular testing solutions from well-known and trusted brands with a proven track record of reliability, accuracy, and regulatory compliance. Building market recognition and earning user trust takes time, which places new entrants at a disadvantage compared to established players who already have an extensive customer base, validated products, and strong distribution networks.
- **Intensive capital investment.** Developing and commercializing molecular testing products demands substantial upfront investment in research and development, manufacturing, quality assurance, and regulatory approvals. Additionally, the sales cycle in this industry can be long, with significant time lags between development and revenue generation. While well-established companies often have the financial capacity to support sustained investment and absorb initial losses, new entrants may face considerable pressure in securing sufficient capital to fund operations through pre-commercialization and scale-up stages.

OVERVIEW OF NON-SEQUENCING MOLECULAR TESTING MARKET

Overview of Non-Sequencing Molecular Testing

The non-sequencing molecular testing relies on targeted methods that amplify or detect specific nucleic acid sequences to identify genetic variations, mutations, or the presence of pathogens, without sequencing the entire genome. The widely employed technologies in non-sequencing molecular testing include polymerase chain reaction (PCR), fluorescence in situ hybridization (FISH) and gene chips.

PCR is a powerful technique that utilizes DNA polymerase and primers through repeated temperature cycles to exponentially amplify target DNA sequences, enabling the production of millions of copies from a single DNA template for subsequent analysis. Depending on diverse underlying principles and detection mechanisms, PCR technology can be further classified into various subtypes, including traditional PCR, reverse transcription PCR (RT-PCR), quantitative PCR (qPCR), RT-qPCR, digital PCR (dPCR) and multiplex PCR. These variants deliver different result types — from qualitative analysis to relative and absolute quantification — with varying levels of sensitivity, specificity, and accuracy, enabling the achievement of distinct detection objectives across applications ranging from basic gene amplification to advanced tumor companion diagnostics and non-invasive prenatal screening.

FISH, as another prevalent non-sequencing technology, uses fluorescent probes to bind to specific DNA sequences in tissue samples, allowing for the visualization of gene location and chromosomal abnormalities.

Gene chips are used to analyze gene expression patterns across thousands of genes simultaneously by detecting hybridization between labeled DNA or RNA samples and fixed probes on a solid surface. The following chart provides a comparative analysis of

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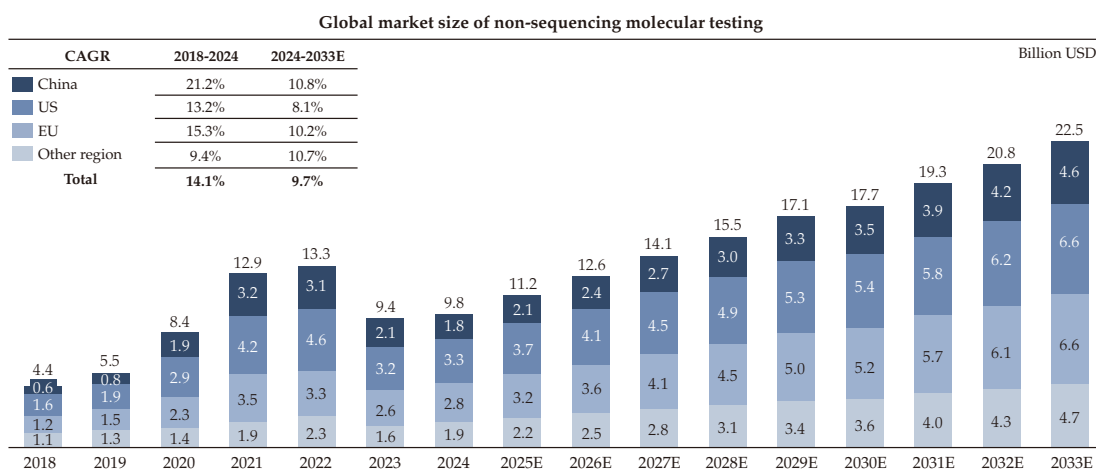
these three non-sequencing molecular testing techniques in terms of their fundamental principle, technology maturity, and applications.

	Principle	Technology maturity			Application
		Operation requirement	Time efficiency	Cost efficiency	
PCR	<ul style="list-style-type: none"> DNA becomes single strand at high temperature and complements each other at low temperature. 	<ul style="list-style-type: none"> Low to moderate operation requirement 	<ul style="list-style-type: none"> Moderate throughput Relatively shorter experiment duration 	<ul style="list-style-type: none"> Relatively lower cost 	<ul style="list-style-type: none"> Infectious diseases diagnosis Tumor early detection and companion diagnostics Genetic diseases
FISH	<ul style="list-style-type: none"> The process of hybridizing the labeled known sequencing nucleic acid with the nucleic acid in the cell or tissue section, so as to accurately locate the specific nucleic acid. 	<ul style="list-style-type: none"> Low to moderate operation requirement 	<ul style="list-style-type: none"> Moderate time consumption with the rather cumbersome experiment process 	<ul style="list-style-type: none"> Low cost with mature technology 	<ul style="list-style-type: none"> Virus detection Disease classification, prognosis and medication guidance of tumors
Gene chip	<ul style="list-style-type: none"> Known DNA sequences are integrated and hybridized with sample molecules on the same chip to obtain sample sequence information. 	<ul style="list-style-type: none"> High operation difficulty 	<ul style="list-style-type: none"> High throughput Relatively longer experiment duration 	<ul style="list-style-type: none"> High test cost 	<ul style="list-style-type: none"> High-throughput disease screening and multi-target genetic analysis New drug development

Source: Literature review, CIC

Non-Sequencing Molecular Testing Market Size

Currently, the non-sequencing molecular testing market serves over 110 million target individuals and eligible users worldwide. The global non-sequencing molecular testing market grew from US\$4.4 billion in 2018 to US\$9.8 billion in 2024, reflecting a CAGR of 14.1%, which is expected to reach US\$22.5 billion in 2033, with a CAGR of 9.7% between 2024 and 2033. China's non-sequencing molecular testing market increased from US\$0.6 billion in 2018 to US\$1.8 billion in 2024, reflecting a CAGR of 21.2%, which is expected to reach US\$4.6 billion in 2033, with a CAGR of 10.8% between 2024 and 2033. The U.S. non-sequencing molecular testing market grew from US\$1.6 billion in 2018 to US\$3.3 billion in 2024, reflecting a CAGR of 13.2%, which is expected to reach US\$6.6 billion in 2033, with a CAGR of 8.1% between 2024 and 2033. The EU non-sequencing molecular testing market increased from US\$1.2 billion in 2018 to US\$2.8 billion in 2024, reflecting a CAGR of 15.3%, which is expected to reach US\$6.6 billion in 2033, with a CAGR of 10.2% between 2024 and 2033. The chart below illustrates the historical and forecast size of the global non-sequencing molecular testing market for the periods indicated.



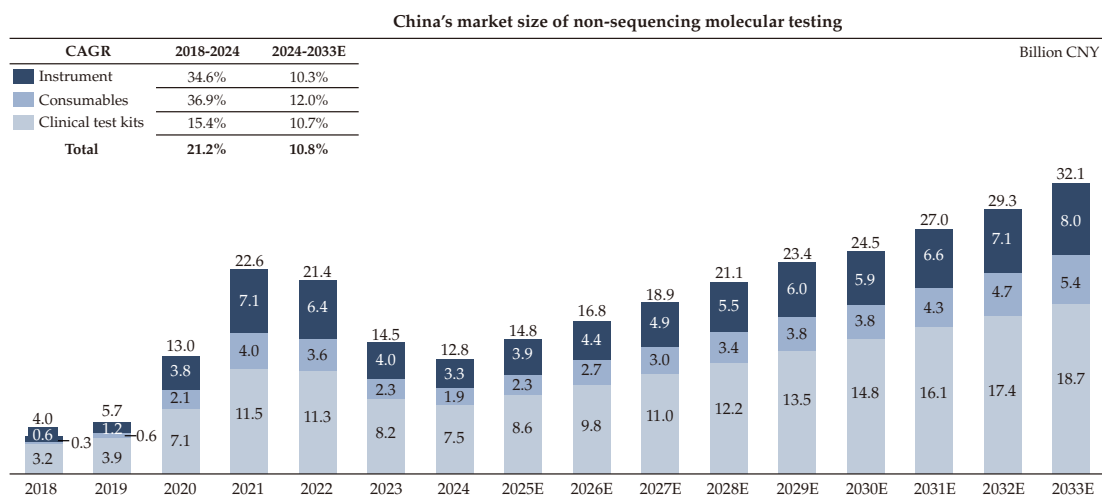
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Note:

- (i) This market size includes non-sequencing molecular testing instruments, consumables, and clinical test kits across all applications.

Source: WHO, FDA, NMPA, annual reports of listed companies, expert interviews, CIC

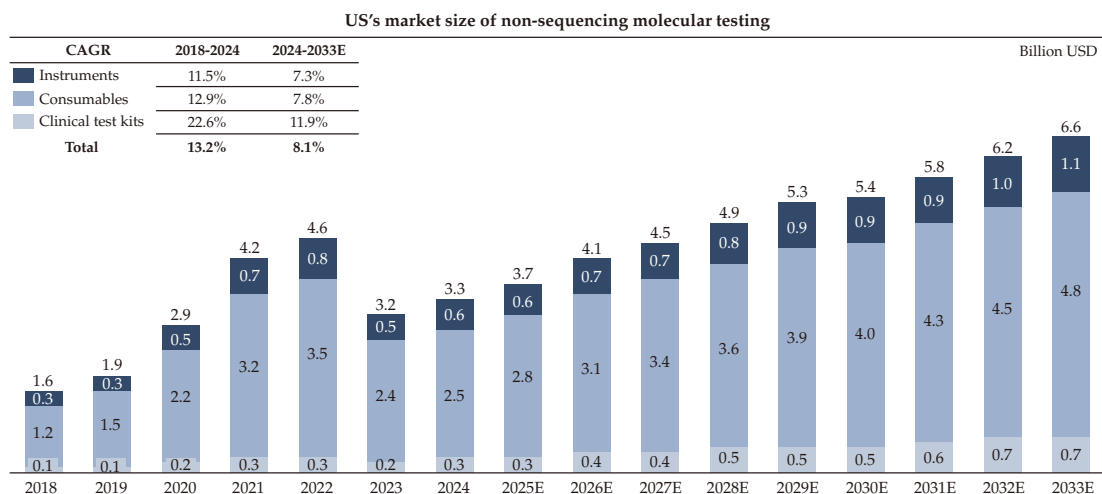
The charts below further illustrate the breakdown of non-sequencing molecular testing markets in China, the U.S. and the EU, respectively, by product type, including instruments, consumables and clinical test kits, for the periods indicated.



Note:

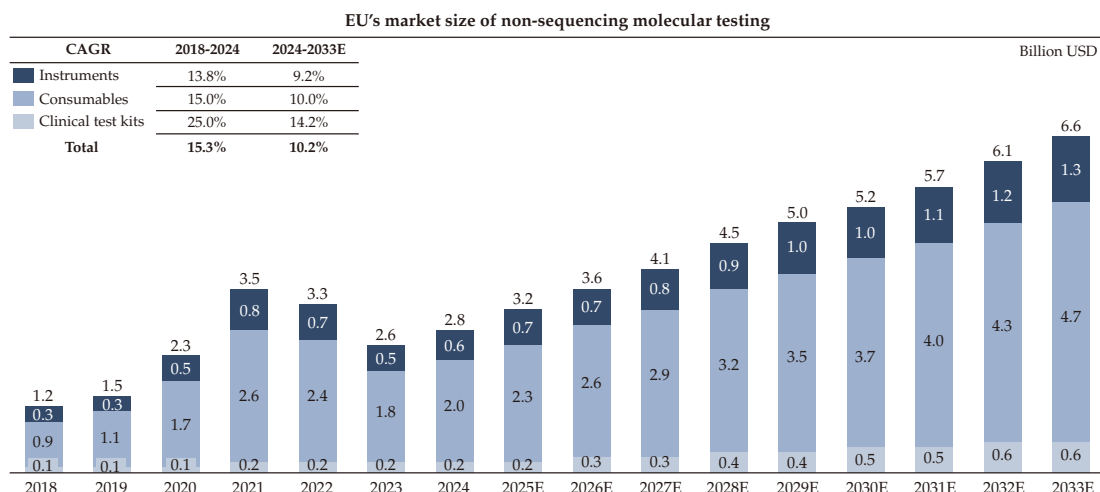
- (i) This market size includes non-sequencing molecular testing instruments, consumables, and clinical test kits across all applications.

Source: NMPA, CMA, NBSC, GACC, annual reports of listed companies, expert interviews, CIC



Source: Annual reports of listed companies, expert interviews, CIC

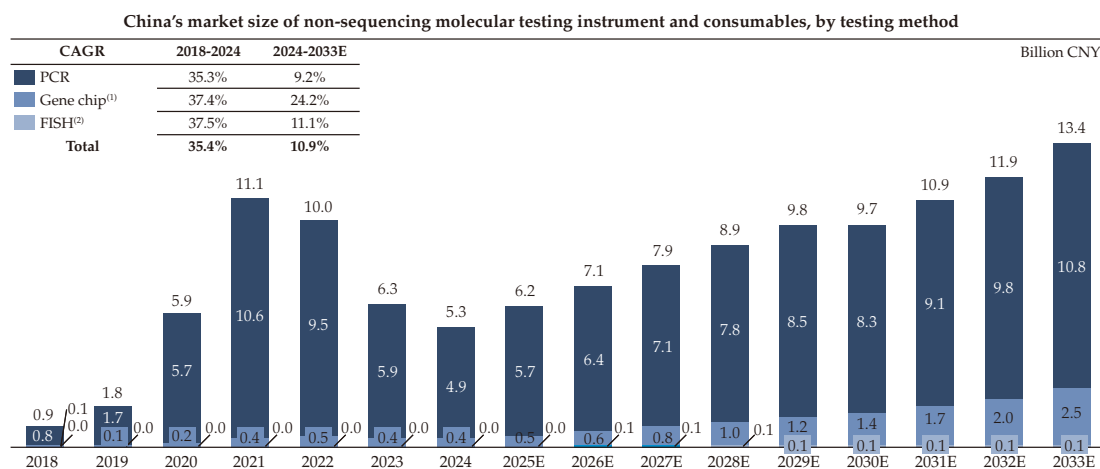
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Source: Annual reports of listed companies, expert interviews, CIC

Non-Sequencing Molecular Testing Instrument and Consumables Market Size

Technologies used in non-sequencing molecular testing instrument and consumables include PCR, FISH, and gene chips. The chart below sets forth a breakdown of China's non-sequencing molecular testing instrument and consumables market by testing method for the periods indicated.



Notes:

- (1) While conventional gene chip rely solely on hybridization-based detection, technological advances have introduced nucleic-acid-amplification-enhanced formats to improve analytical performance. In particular, multiplex PCR-microarray platforms combine PCR-based amplification with microarray readout to enable multi-target detection. Depending on system architecture, amplification may occur independently prior to hybridization or be integrated within a unified workflow.

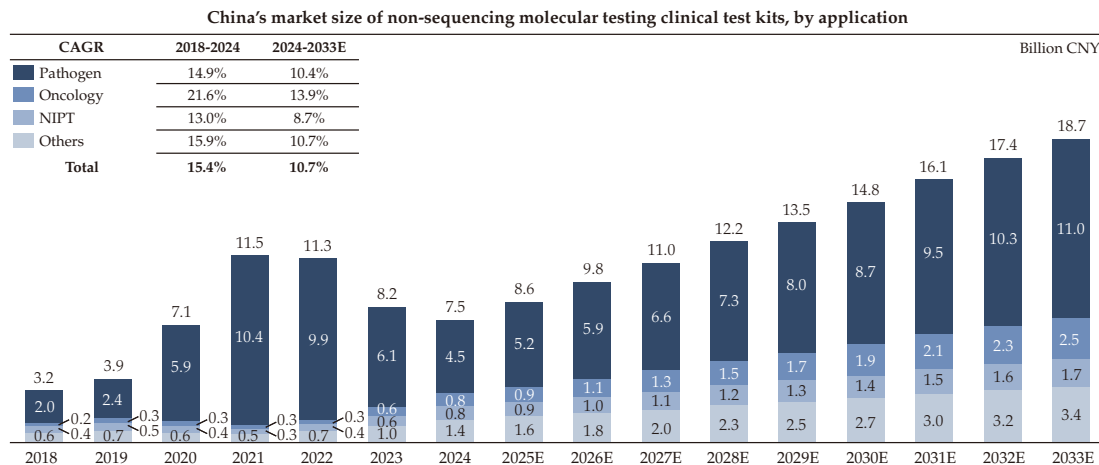
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- (2) FISH is a commonly used laboratory technique and has become an important tool in clinical settings, especially in oncology. The FISH detection technique uses fluorescent probes to visualize microscopic molecular pathological phenomena. By using a fluorescence microscope, fluorescent signals can be observed at the target locations. Since FISH testing does not require specialized instruments and only needs a fluorescence microscope for observation, FISH itself is considered test kit only. We have included some common consumables related to FISH, such as fluorescent probes and buffer solutions in the market size.

Source: NMPA, CMA, NBSC, GACC, annual reports of listed companies, expert interviews, CIC

Non-Sequencing Molecular Testing Clinical Test Kits Market Size

Clinical test kits are typically used alongside corresponding instruments and consumables. Their primary applications include pathogen detection, oncology diagnostics, and non-invasive prenatal testing (NIPT). The chart below presents the market breakdown of China's non-sequencing molecular testing clinical test kits by application for the periods indicated.



Source: NMPA, CMA, NBSC, GACC, annual reports of listed companies, expert interviews, CIC

Competitive Landscape of Non-Sequencing Molecular Testing Market

The global non-sequencing molecular testing instrument and consumables market is highly competitive and fragmented, with numerous multinational corporations and regional players vying for market share. The key players include bioMérieux, Bio-Rad Laboratories, Danaher Corporation, Qiagen N.V., and Roche Diagnostics, leveraging their broad product portfolios, ongoing innovation, and global distribution networks to maintain their competitive positions.

China's non-sequencing molecular testing instrument and consumables market mirrors global trends in fragmentation, with both multinational corporations (such as bioMérieux, Bio-Rad Laboratories, Danaher Corporation, Qiagen N.V., and Roche Diagnostics) and a rapidly growing cohort of domestic players (such as Axbio and Daan Gene) launching new products and expanding their portfolios. As of the Latest Practicable Date, there were a total of 155 PCR instruments, 1,049 PCR kits, 35 FISH kits, 80 multiplex

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PCR-microarray testing instruments, and 57 multiplex PCR-microarray testing kits that have been approved for market entry by the NMPA in China.

The table below sets forth the top five players in the China's non-sequencing molecular testing instrument and consumables market, as well as their revenues and corresponding market shares in 2024.

	Revenue (billion RMB)	Market share (%)
Company A ⁽¹⁾	0.7	13.2%
Company B ⁽²⁾	0.6	11.8%
Company C ⁽³⁾	0.6	11.7%
Company D ⁽⁴⁾	0.5	9.0%
Company E ⁽⁵⁾	0.4	8.3%

Source: Annual report, expert interview, CIC

Notes:

- (1) Company A was established in 2006 through the merger of several entities, with its headquarters located in Massachusetts, USA. It provides scientific instruments, reagents, and services to laboratories worldwide and was listed on the NYSE in 2006.
- (2) Company B is a provider of genetic testing and molecular diagnostic technologies. Founded in 1997 and headquartered in Xi'an, China, it supplies PCR instruments, in-vitro diagnostic reagents, and automated solutions to medical institutions.
- (3) Company C is a specialized manufacturer of medical PCR analysis systems. Established in 2003 and based in Shanghai, China, it offers fully automated nucleic acid detection equipment to diagnostic laboratories.
- (4) Company D is a comprehensive supplier of end-to-end molecular testing products. Founded in 2002 with headquarters in Hangzhou, China, it provides fully automated real-time PCR systems, nucleic acid processing workstations, and matching reagents to healthcare institutions and research organizations.
- (5) Company E is an enterprise focused on the molecular diagnostics industry. Established in 2010 and headquartered in Suzhou, China, it delivers integrated PCR technology solutions for pathogen detection.

Within the broader non-sequencing molecular testing segment, related instruments, consumables and matching clinical test kits can also be subdivided into two functional categories, including single-plex assays that detect one target at a time, and multiplex nucleic acid tests that read many targets simultaneously. Today, multiplex capability is delivered mainly by multiplex PCR and multiplex PCR microarray platforms. The table below sets forth the major multiplex nucleic acid detection instruments globally as of the Latest Practicable Date.

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Major multiplex nucleic acid detection instruments

Company	Product/Series	Testing technology	Detection method	Description	Development stage
Biofire (bioMérieux)	Filmarray	Multiplex PCR	Optical	• Fully enclosed cartridge-based multiplex PCR platform with integrated sample-to-result workflow, commonly used for respiratory, bloodstream, and GI panel	NMPA approved FDA approved
	Spotfire	Multiplex PCR	Optical	• Desktop multiplex PCR instrument for rapid pathogen detection	CE mark FDA approved
Cepheid (Danaher)	GeneXpert	Multiplex PCR	Optical	• Modular sample-to-result system widely used for tuberculosis, respiratory pathogens, and drug resistance gene detection	NMPA approved FDA approved CE mark
Bio-Rad	CFX	Multiplex PCR	Optical	• Multi-channel real-time PCR detection systems supporting up to 5-target multiplexing with advanced optical technology and precise thermal control	NMPA approved FDA approved CE mark
GenMark (Roche)	eSensorXT-8	Multiplex PCR Microarray	Electrochemical	• Automated system for multiplex detection on electrochemical probe microarrays after PCR amplification	FDA approved
	ePlex	Multiplex PCR Microarray	Electrochemical	• Multi-target detection through PCR amplification combined with electrochemical chip hybridization probes	FDA approved CE mark
Affymetrix (Thermo Fisher)	GeneChip System	Hybridization-based Microarray	Optical	• Solid-phase oligonucleotide microarray platform that relies on labeled nucleic acid-hybridization	NMPA approved FDA approved CE mark
Agilent	SurePrint Microarray	Hybridization-based Microarray	Optical	• High-throughput oligonucleotide hybridization platform for gene expression and multi-target analysis	NMPA approved CE mark
Illumina	Infinium/BeadChip	Hybridization-based Microarray	Optical	• Solid-phase microbead-based genotyping microarray platform that utilizes whole-genome amplification and hybridization with single-base extension chemistry	RUO
CapitalBio	BioMixer/ LuxScan Series	Multiplex PCR Microarray	Optical	• Early domestic chip detection instruments for respiratory pathogens and tumor marker detection	NMPA approved
Axbio	EL-100	Multiplex PCR Microarray	Electrochemical	• Electrochemical biochip analyzer for multi-target analysis through microarray electrochemical signal detection after PCR amplification	NMPA approved
Atlas Genetics/ binx health	IO	Multiplex PCR Microarray	Electrochemical	• Isothermal nucleic-acid amplification platform with microfluidic cartridge and electrochemical detection	FDA approved
	Callisto	Multiplex PCR Microarray	Electrochemical	• automated microfluidic sample-preparation system for nucleic acid extraction and library preparation	RUO
Daan gene	DA9100	Multiplex PCR Microarray	Electrochemical	• Electrochemical gene chip detector with 72 electrodes on each chip, capable of multi-locus and multi-allelic gene analysis	NMPA approved
One-chip	/	Multiplex PCR Microarray	Electrochemical	/	Under development

Source: Company official websites, literature review, CIC

Overview of Multiplex PCR-Microarray Testing

Multiplex PCR-microarray testing, in particular, represents a powerful integration of the amplification capability of multiplex PCR and high-throughput screening capacity of microarray technology, which offers significant economic advantages through streamlined detection processes and reduced instrumentation costs. By amplifying target DNA with PCR primers and verifying sequences using electrochemical probes, multiplex PCR-microarray testing reduces testing time and ensures accurate results. Its high throughput multiplexing ability allows simultaneous analysis of multiple targets in a single sample, saving time and resources compared to traditional methods.

With its high sensitivity and specificity, multiplex PCR-microarray can be applied across various fields. In disease diagnosis, it is used to detect infectious diseases, genetic disorders, and cancer biomarkers, offering precise and efficient results. In drug screening, multiplex PCR-microarrays can identify antibiotic resistance genes, tumor drug targets, endocrine hormone interactions, and conduct toxicological studies, thereby accelerating pharmaceutical research and development. Beyond healthcare, this technology extends its utility to genetic polymorphism studies, environmental monitoring, and agricultural breeding programs to enhance crop resilience and productivity.

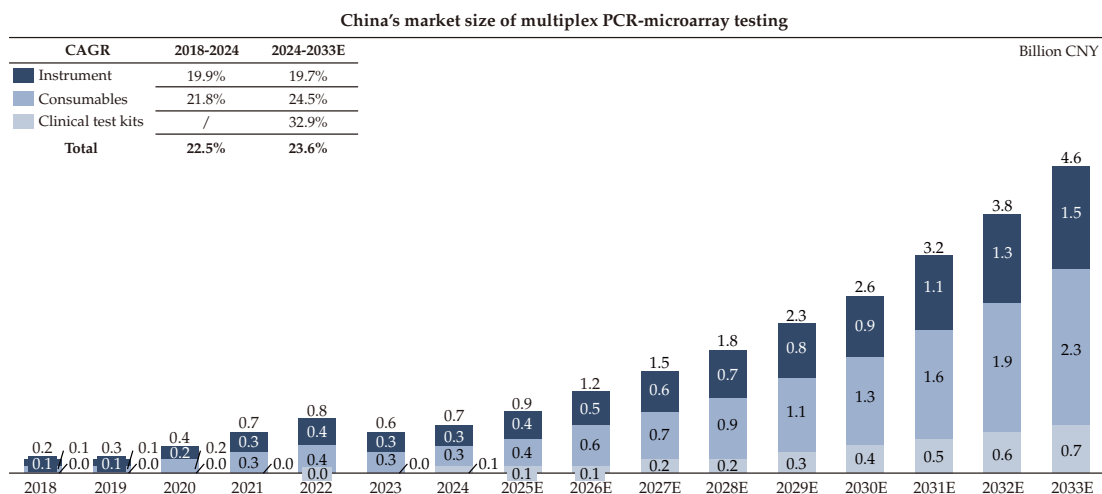
This broad applicability is supported by a well-structured industrial value chain. Upstream manufacturers produce essential components such as microarray substrates, sample spotting technologies, probes, and equipment like spotters and robotic arms. Midstream companies develop diagnostic kits and instruments tailored to multiplex PCR-microarray workflows. Finally, downstream users include clinical laboratories, healthcare providers, pharmaceutical enterprises, agricultural organizations, academic

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research institutions, and regulatory bodies such as disease control centers and environmental monitoring agencies. This cohesive ecosystem ensures the seamless integration of multiplex PCR-microarray technology from production to application across diverse industries.

China's multiplex PCR-microarray testing market is expanding rapidly as the technology gains broader clinical adoption for syndromic testing and high-multiplex pathogen detection. The market size grew from approximately RMB0.2 billion in 2018 to RMB0.7 billion in 2024 and is expected to reach RMB4.6 billion by 2033, representing a CAGR of 23.6% between 2024 and 2033. This growth is supported by increasing penetration into tier-2 and tier-3 hospitals, the expansion of test menus beyond respiratory pathogens to include gastrointestinal, CNS, and antimicrobial resistance panels, and continued investment in molecular diagnostics infrastructure by public hospitals and independent clinical laboratories.

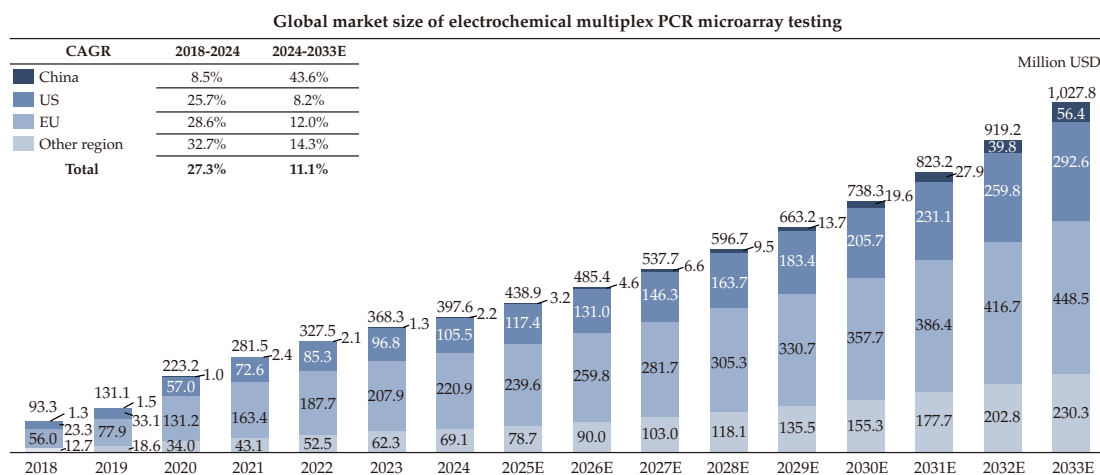
The chart below illustrates a breakdown of the China's multiplex PCR-microarray testing market by product type, including instruments, consumables and clinical test kits, for the periods indicated.



Source: NMPA, CMA, NBSC, GACC, annual reports of listed companies, expert interviews, CIC

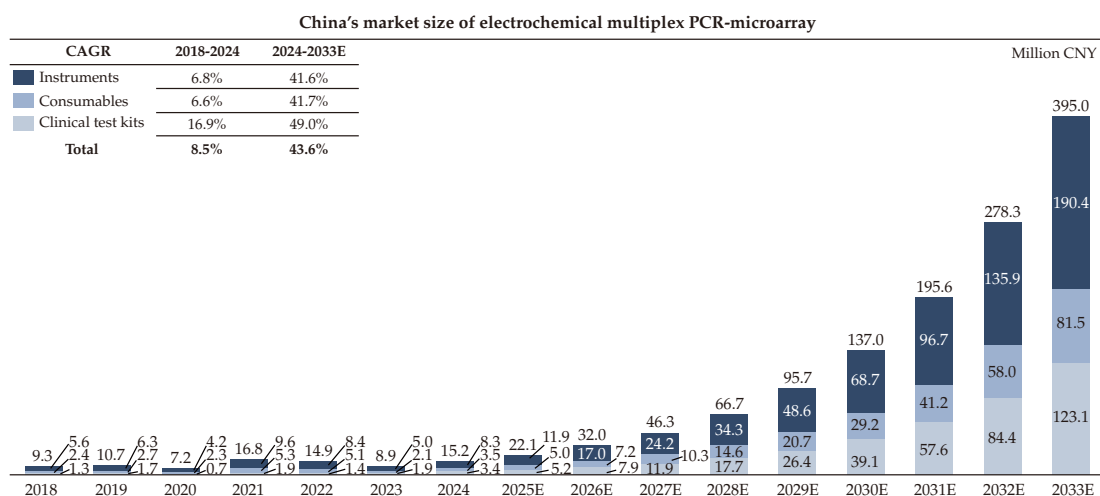
Among the existing multiplex PCR-microarray testing instruments, a majority of them are based on fluorescence microarray detection and few optine on electrochemical microarray detection which offers greater multiplexing capacity, lower costs, simpler and more compact instrumentation, and a streamlined workflow compared to fluorescence-based systems. The chart below illustrates the historical and forecast size of the global electrochemical multiplex PCR microarray testing market for the periods indicated.

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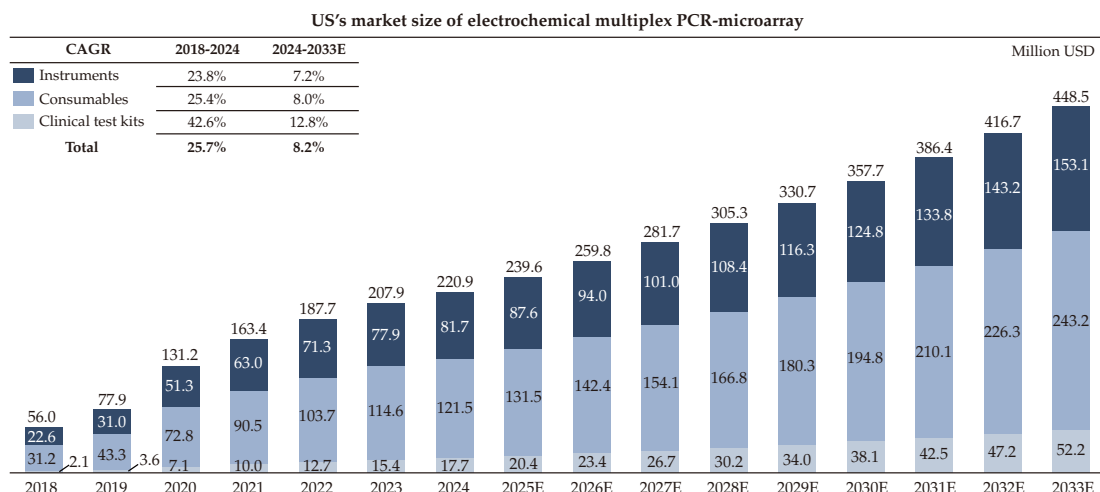
Source: Annual reports of listed companies, expert interviews, CIC

The charts below further illustrate the breakdown of electrochemical multiplex PCR microarray testing markets in China, the U.S. and the EU, respectively, by product type, including instruments, consumables and clinical test kits, for the periods indicated.

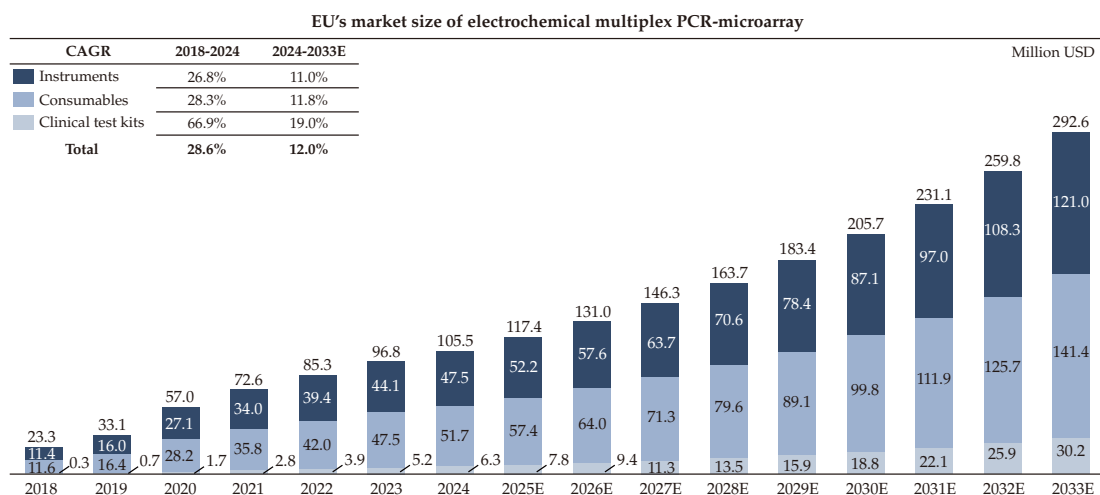


Source: Annual reports of listed companies, expert interviews, CIC

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Source: Annual reports of listed companies, expert interviews, CIC



Source: Annual reports of listed companies, expert interviews, CIC

Competitive Landscape of Multiplex PCR-Microarray Testing Instrument Market

As of the Latest Practicable Date, an aggregate of 80 multiplex PCR-microarray testing instruments developed by 58 companies had been approved by the NMPA or its local counterparts, of which only two were electrochemical platforms, including our Core Product AxiLona EL-100, and the remaining 78 were optical systems. The market mix therefore remains optical-led, with established domestic vendors (e.g., Affymetrix, CapitalBio) anchoring placements in tertiary and large secondary hospitals, while newer entrants focus on regional laboratories and incremental menu expansion. The chart below illustrates the competitive landscape of China's multiplex PCR microarray analyzer market.

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Analysis of China's competitive landscape of multiplex PCR microarray analyzer market

Indicator	Multiplex PCR + Fluorescence Microarray Detection	Multiplex PCR + Electrochemical Microarray Detection
Sensitivity	• ≥200 Copies/mL	• Can be as low as 100 Copies/mL
Specificity ⁽¹⁾	• ~97% (only specific primers for amplification 90%~95%)	• >99.9% (The combination of specific primers for amplification and highly specific probes for hybridization significantly improves specificity)
Sample Throughput per Unit Time	• Relatively low	• High
Instrument Cost	• High, complex optical components lead to high instrument cost	Low, no complex optical components, 1/3-1/2 the cost of a fluorescent quantitative PCR instrument
Reagent Cost	• Relatively high (signal detection requires multiple fluorescent-labeled probes like TaqMan probes, increasing production cost)	• Low, about 1/2 the cost of fluorescent detection reagents (only one electrochemical group is needed per signal detection; thus only one type of label is needed, resulting in lower production cost)
Number of NMPA approval product	• 78	• 2
Key Players	<ul style="list-style-type: none"> • CapitalBio • Afymetrix • Agilent 	<ul style="list-style-type: none"> • Axbio • Daan Gene

Note:

- (1) Specificity refers to the probability that the test correctly identifies true-negative samples. High specificity minimizes false positives and therefore avoids inappropriate antimicrobial use, unnecessary follow-up testing, and clinical mis-classification. Specificity for multiplex PCR-microarray assays is kit-dependent and influenced by probe design, primer specificity, target sequence diversity, specimen type, reference method, and laboratory workflow.

Source: NMPA, public information, literature review, CIC

In general, the multiplex PCR-microarray testing instrument market remains fragmented and still reflects the characteristics of an emerging industry, with a small number of leading domestic players achieving broader hospital penetration and more extensive test menus, while many newer entrants focus on specific regions or niche panels. Competition centers on menu breadth and clinical validation, workflow simplicity and automation, reagent economics, and hospital tender access and service capability. Although optical systems currently dominate, electrochemical platforms represent an alternative technological route. As clinical adoption advances, platforms are expected to differentiate increasingly based on throughput, ease of use, and total economic value.

The chart below sets forth the analysis of comparison between Axbio EL-100 and Daan Gene DA9100.

Analysis of Comparison between Axbio EL-100 and Daan Gene DA9100

Indicator	Axbio EL-100	Daan Gene DA9100 ⁽¹⁾
Limit of Detection	• Can be as low as 100 Copies/mL	• NA
Speed	• On-instrument testing takes just 3 mins, total turnaround time < 2 hrs	• Complete at least 100 tests within 3 hrs
Single chip electrodes	• Up to 54	• Up to 72
Dimensions (mm)	• 370(L)×242(W) ×148(H)	• 840(L) × 545(W) × 665(H)
Weight	• 6.15kg	• 60kg

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Given the notable differences in product positioning, intended application scenarios, and commercialization strategies, the two products are not directly comparable. DA9100 is designed primarily for centralized, high-throughput testing environments, such as third-party laboratories, and is significantly larger in size and weight. In contrast, EL-100 is a compact and portable microarray analyzer suitable for both centralized and decentralized testing scenarios. Crucially, both systems require prior PCR amplification before detection.

Growth Drivers of Non-Sequencing Molecular Testing Market

The growth of the non-sequencing molecular testing market is expected to be driven by the following factors:

- ***Increasing respiratory infection burden and heightened clinical awareness.*** RSV, influenza, and other respiratory pathogens remain leading causes of acute lower respiratory tract infections in infants and young children, and continue to drive substantial healthcare utilization among individuals with underlying cardiopulmonary conditions. Hospitalization rates for RSV are particularly high among children under two years of age, and recurrent seasonal epidemics together with co-infection scenarios reinforce the need for rapid and accurate pathogen identification. According to CIC, China reported 10.2 million cases of notifiable infectious diseases in 2019, rising to 18.7 million cases in 2023 (excluding COVID-19), underscoring the increasing burden of infectious diseases and strengthening diagnostic demand. With growing emphasis on early diagnosis, appropriate antiviral or supportive treatment, and infection-control decision-making, demand for rapid molecular respiratory testing platforms continues to increase — particularly in pediatric and emergency-care settings where swift triage and precise pathogen differentiation are critical.
- ***Growing demand for cost-effective diagnostics.*** Advances in domestic manufacturing have reduced the costs of non-sequencing molecular testing instruments and reagents, making diagnostics more affordable. Furthermore, its widespread application in primary care, disease monitoring, and early detection aligns with efforts to improve diagnostic accessibility within China's hierarchical diagnosis and treatment system.
- ***Expanding applications for rapid detection.*** Non-sequencing molecular testing is becoming increasingly important in food safety and traceability, addressing global food security challenges with its speed, sensitivity, and cost-effectiveness. For example, in the field of food safety, non-sequencing methods are widely used in genetically modified ingredient detection, allergen screening, and contaminant traceability, meeting consumers' high requirements for food transparency and safety. Additionally, the growing number of older pregnant women and heightened awareness of prenatal health have made non-invasive prenatal testing (NIPT) a crucial part of modern prenatal screening, with non-sequencing methods offering significant advantages in this area.

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- **Technological Advancement.** The integration of AI with biochip technology represents a powerful growth driver in molecular diagnostics. AI excels at analyzing the vast datasets generated by biochips, uncovering subtle patterns and biomarkers that traditional analytical methods often overlook. In turn, biochips deliver standardized, large-scale data inputs essential for AI algorithms. This synergistic relationship enables rapid, high-throughput processing of complex biological samples, significantly reducing testing turnaround times and lowering overall costs in molecular diagnostics. The convergence of these technologies is poised to revolutionize clinical testing workflows and expand market opportunities.
- **Policy support.** The Chinese government actively promotes non-sequencing diagnostic technologies through favorable policies. For example, the 14th Five-Year Plan for Medical Equipment Industry Development (《「十四五」醫療裝備產業發展規劃》), which was issued on December 21, 2021, emphasizes advancements in *in vitro* diagnostics, high-throughput intelligent testing, and multifunctional diagnostic tools, with a clear emphasis on non-sequencing technologies. The NMPA has also streamlined approvals for innovative non-sequencing diagnostic products, accelerating market entry.

Future Trends of Non-Sequencing Molecular Testing Market

The non-sequencing molecular testing market is expected to be shaped by the following factors:

- **Advancing personalized medicine.** Non-sequencing technologies, particularly those designed for high-throughput and point-of-care diagnostics, will be central to the progress of personalized medicine. These technologies allow for the rapid and accurate identification of genetic variations and microbial compositions, which are crucial for determining the most effective treatment options.
- **AI-driven Advancement.** The integration of AI in the sector will drive the miniaturization and automation of non-sequencing tests. AI-powered microfluidic devices will autonomously manage fluid dynamics and enhance the reliability of immunoassays, improving diagnostic accuracy and convenience. This trend will enable faster, more efficient testing, making non-sequencing technologies even more accessible and effective.

OVERVIEW OF GENE SEQUENCING MARKET

Overview of Gene Sequencing Technology

Gene sequencing technology refers to the methods used to determine the order of nucleotides in a DNA or RNA molecule, which plays a crucial role in genomics, enabling the analysis of genetic information for applications in research, diagnostics, and other fields. As gene sequencing technology has advanced, a range of methods has emerged,

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each with unique features and capabilities. Key parameters that define the performance of these technologies include read length, detection methods, and sequencing methods.

Read Length: Long-Read vs. Short-Read Sequencing

The read length of a gene sequencer refers to the number of DNA base pairs that can be sequenced continuously in a single read, representing a vital technical feature of gene sequencing technologies. Short-read sequencing technologies, such as those offered by Illumina, deliver high-throughput, cost-effective, and highly accurate sequencing of short DNA fragments. However, they encounter difficulties in handling complex genomic regions, especially those with repetitive sequences, and are limited in their ability to detect structural variants and assemble intricate genomic regions. In contrast, long-read sequencing technologies, such as those from Pacific Biosciences and Oxford Nanopore, can sequence longer fragments, even up to several kilobases. Longer reads provide superior accuracy in assembling complex genomic regions, though they come at a higher cost and lower throughput.

Detection Method: Fluorescence-Based vs. Electrochemical-Based Detection

Fluorescence-based detection identifies DNA sequences by measuring the emission of light from fluorescently tagged nucleotides as they pass through a detection system. While this method offers high sensitivity, it also presents several limitations, such as restricted read lengths and variable signal detection sensitivity. Furthermore, the use of fluorescence can damage critical biochemical components, potentially compromising sequencing accuracy and reducing the longevity of the reaction.

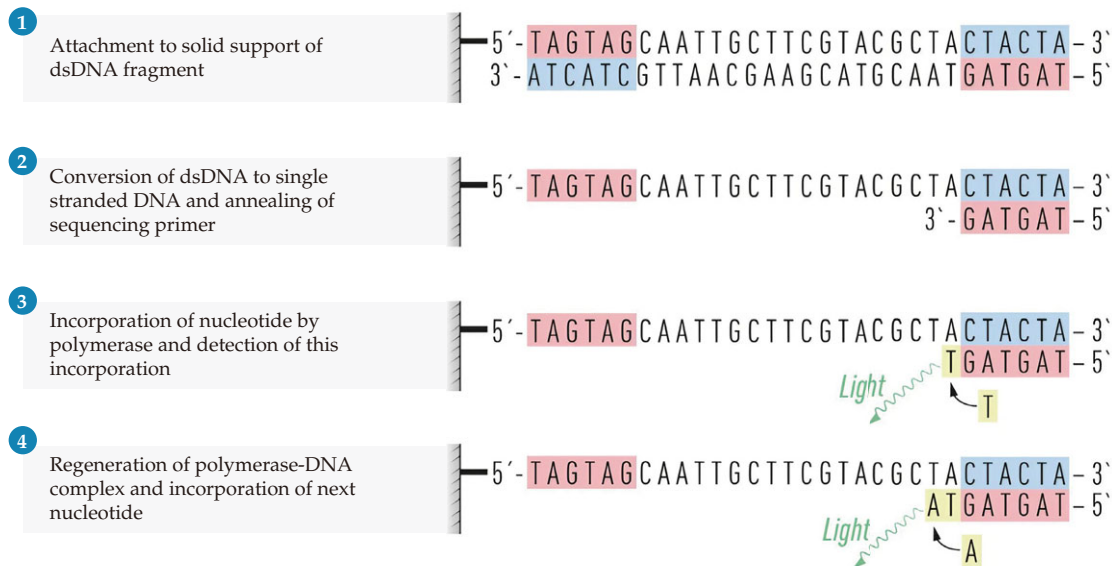
Electrochemical-based detection, on the other hand, identifies DNA sequences by measuring changes in ionic current as nucleotides pass through a nanopore, with each nucleotide type tagged with a unique polymer that creates a distinct current blockage pattern. This method eliminates the need for costly optical components and fluorescent labels, thus reducing both instrument and reagent costs. It also allows for faster, real-time data processing, offering the potential for more compact, reliable, and portable systems, making it ideal for miniaturization and integration into mobile devices.

Sequencing Method: Direct Sequencing vs. Sequencing by Synthesis

Direct sequencing of native DNA bypasses the need for amplification or chemical modification, enabling faster sequencing of DNA and RNA. However, this approach may result in lower accuracy and higher error rates.

In contrast, sequencing by synthesis (SBS), widely commercialized by Illumina as the dominant NGS platform, determines DNA sequences by detecting the sequential incorporation of nucleotides using engineered DNA polymerase. Each DNA fragment is independently bound to sites on the flow cell, enabling parallel sequencing of millions of fragments simultaneously. By following the natural DNA replication process and leveraging the base-pairing specificity of polymerase, SBS offers high accuracy and simplifies the workflow by eliminating the need for multiple cycles of reagent addition and washing. The chart below illustrates the SBS workflow.

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Source: Literature review, CIC

Type of Gene Sequencing Technology

Over the years, various gene sequencing technologies have been developed, each offering unique features in terms of accuracy, speed, and application. These technologies have been widely applied in various areas such as tumor detection, NIPT, pathogen detection and other related testing activities. The below table illustrates the capabilities, advantages and limitations of the four main types of gene sequencing, including Sanger sequencing, next-generation sequencing (NGS), single molecular sequencing, and electrochemistry long-reading next-generation sequencing (EL-NGS).

Technology	Capabilities	Advantages	Limitations
Sanger sequencing	<ul style="list-style-type: none"> High precision (error rate 0.001-0.01%) Moderate sequencing length (1kbp) Low throughput (<1kb) cDNA sequencing method 	<ul style="list-style-type: none"> Fast and cost-effective for low target number Well-established workflow Simple data analysis 	<ul style="list-style-type: none"> Low sensitivity (15-20% detection limit) Low discovery power Low scalability due to increasing sample input requirements
NGS	<ul style="list-style-type: none"> Sequencing length 50-300bp 0.1% error rate Low cost per base, high cost per run 	<ul style="list-style-type: none"> Multiplexing/sample pooling to lower unit cost High throughput 	<ul style="list-style-type: none"> Complex data analysis Higher error rate than Sanger Short read
Single molecule sequencing	<ul style="list-style-type: none"> Fluorescent signal-based Medium throughput Sequencing length 10k-100kbp 	<ul style="list-style-type: none"> Extremely high accuracy (<0.01%) 	<ul style="list-style-type: none"> High error rate at single pass (~15%) Expensive sequencer
EL-NGS	<ul style="list-style-type: none"> Electrical signal-based Ultra-long read length (>100kb) 	<ul style="list-style-type: none"> Really (ultra-) long reads Portability 	<ul style="list-style-type: none"> High overall error rate (~10%) Systematic errors
EL-NGS	<ul style="list-style-type: none"> Electrical signal-based 1 million individual sensing channels; targeting 10 million individual sensing channels in the future High throughput 100Gb; 1,000Gb expected in the future 	<ul style="list-style-type: none"> Long read capabilities High sequencing accuracy Scalable to high throughput Extremely low cost per sample Portable and low instrument cost 	<ul style="list-style-type: none"> Require advanced algorithms for signal/data processing

Source: Literature review, CIC

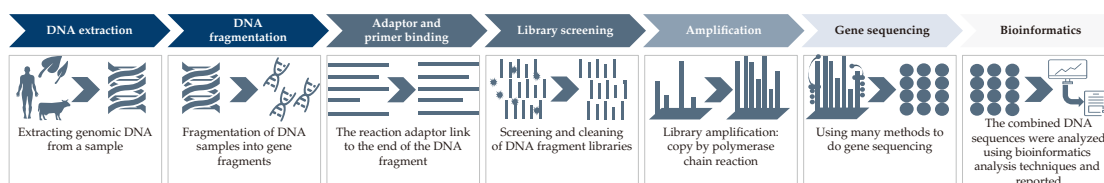
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Among all gene sequencing technologies, EL-NGS stands out as a transformative DNA sequencing technology, delivering exceptional all-around performance by combining the benefits of long-read sequencing, electrochemical-based detection, and SBS with nanopore technology. Built on specially designed nucleotides with polymer tags that produce distinct electrical signals as they pass through nanopores, EL-NGS enables real-time detection of nucleotide incorporation during DNA synthesis, offering both speed and precision while overcoming key limitations of traditional methods. By eliminating the need for optical detection systems and complex sample preparation, EL-NGS simplifies the process and reduces costs. Additionally, its scalable electronic sensors enable higher throughput, further lowering costs. With the potential to revolutionize genome analysis, EL-NGS is poised to advance a wide range of applications, from basic research to clinical diagnostics, and drive progress in personalized medicine and genetic research.

Workflow of Gene Sequencing Technology

The fundamental principles of gene sequencing involve extracting sequence information from DNA samples, capturing signals via electrochemical reactions or optical detection techniques, and processing the resulting data through computer analysis. Depending on the technology employed, additional steps such as DNA fragmentation in next-generation sequencing or DNA amplification in polymerase chain reaction-based sequencing methods may be necessary to optimize the sequencing process.

The below chart illustrates the typical workflow of NGS, including DNA extraction, DNA fragmentation, adaptor and primer binding, library screening, amplification, gene sequencing and bioinformatics.



Source: Literature review, CIC

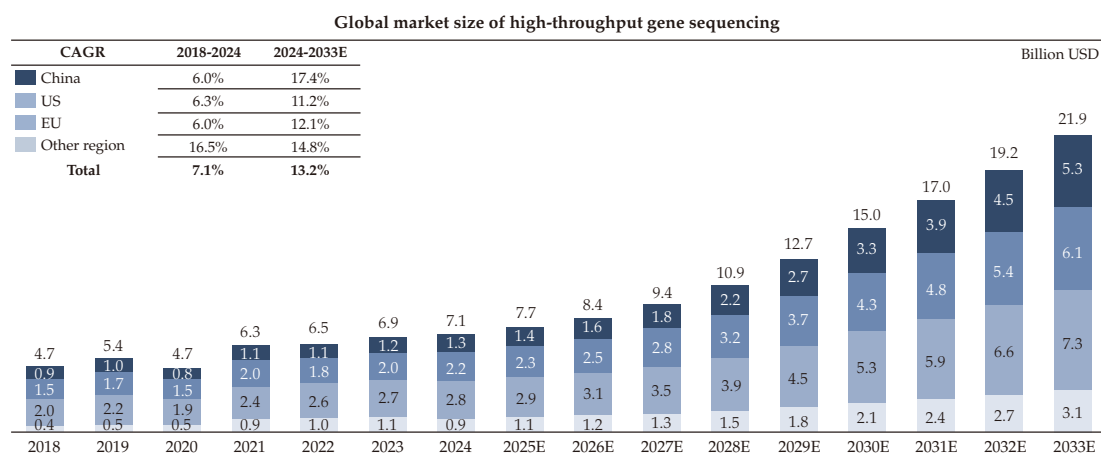
High-Throughput Gene Sequencing Market Size

Recent advances in gene sequencing markets on a global scale have been largely driven by the adoption of next-generation sequencing technologies. Traditional Sanger sequencing, while precise, is significantly limited by its low throughput, generating only a single sequence per reaction. This makes it impractical for large-scale genomic applications where high volume and efficiency are essential. As demand for long-read, more cost-effective, and more comprehensive genomic analysis grows, high-throughput sequencing platforms have emerged as the backbone of this progress, enabling the parallel sequencing of millions of DNA molecules and significantly expanding the scale and efficiency of genomics research and clinical applications.

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Currently, the high-throughput gene sequencing market serves over 20 million target individuals and eligible users worldwide. The high-throughput gene sequencing segment has experienced robust growth in recent years and is projected to accelerate further, positioning itself as one of the most dynamic drivers within the broader gene sequencing landscape. The global high-throughput gene sequencing market grew from US\$4.7 billion in 2018 to US\$7.1 billion in 2024, reflecting a CAGR of 7.1%, which is expected to reach US\$21.9 billion in 2033, with a CAGR of 13.2% between 2024 and 2033. China’s high-throughput gene sequencing market increased from US\$0.9 billion in 2018 to US\$1.3 billion in 2024, reflecting a CAGR of 6.0%, which is expected to reach US\$5.3 billion in 2033, with a CAGR of 17.4% between 2024 and 2033. The U.S. high-throughput gene sequencing market grew from US\$1.5 billion in 2018 to US\$2.2 billion in 2024, reflecting a CAGR of 6.0%, which is expected to reach US\$6.1 billion in 2033, with a CAGR of 11.2% between 2024 and 2033. The EU high-throughput gene sequencing market increased from US\$2.0 billion in 2018 to US\$2.8 billion in 2024, reflecting a CAGR of 6.0%, which is expected to reach US\$7.3 billion in 2033, with a CAGR of 12.1% between 2024 and 2033.

The chart below illustrates the historical and forecast size of the global high-throughput gene sequencing markets for the periods indicated.



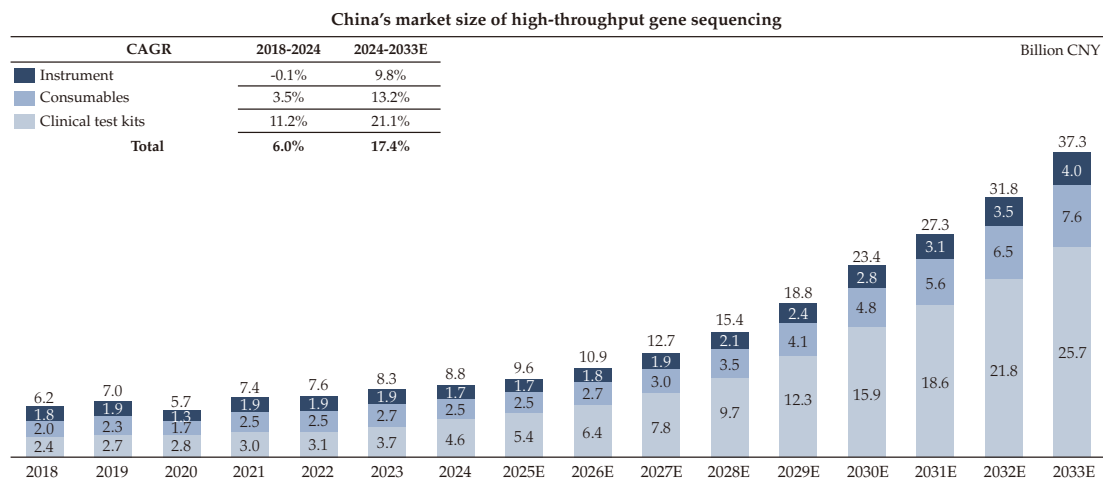
Note:

- (i) This market size includes high-throughput gene sequencing instruments, consumables, and clinical test kits (excluding the products employing Sanger sequencing technologies) across all applications.

Source: WHO, FDA, NMPA, annual reports of listed companies, expert interviews, CIC

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The chart below illustrates a breakdown of China's high-throughput gene sequencing market by product type, including instrument, consumables and clinical test kits, for the periods indicated.



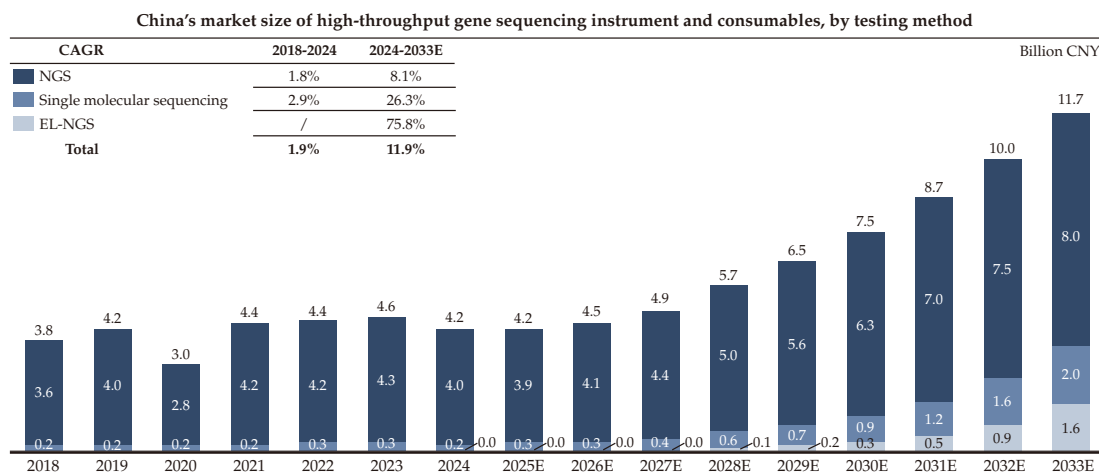
Note:

- (i) This market size includes high-throughput gene sequencing instruments, consumables, and clinical test kits (excluding the products employing Sanger sequencing technologies) across all applications.

Source: NMPA, National Health Commission (NHC), NBSC, GACC, annual reports of listed companies, expert interviews, CIC

High-Throughput Gene Sequencing Instrument and Consumables Market

Technology lies at the heart of the high-throughput gene sequencing instrument and consumables market, underpinning advancements in efficiency, accuracy, and scalability. The chart below illustrates a breakdown of China's high-throughput gene sequencing instrument and consumables market by testing method for the periods indicated.

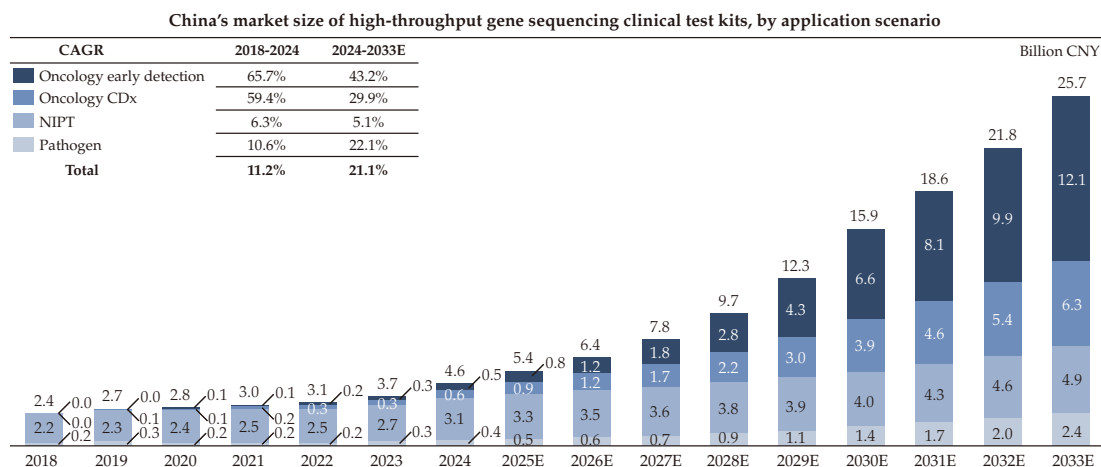


Source: CIC

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High-Throughput Gene Sequencing Clinical Test Kit Market

Clinical test kits are typically used alongside corresponding instruments and consumables. Their primary applications include oncology early detection, oncology CDx, NIPT and pathogen detection. The chart below presents the market breakdown of China's high-throughput gene sequencing clinical test kits by application for the periods indicated.



Source: CIC

Competitive Landscape of High-Throughput Gene Sequencing Market

The global high-throughput gene sequencing instrument and consumables market is highly concentrated and dominated by a few multinational biotechnology companies. In 2024, the top five players accounted for an aggregate market share of 94.9%, with Illumina alone capturing a significant share of 71.8%, in terms of their respective revenue in the same year. The table below sets forth the top five players in the global high-throughput gene sequencing instrument and consumables market, as well as their revenues and corresponding market shares in 2024.

Company	Revenue (billion USD)	Market share (%)
Illumina	3.5	71.8%
Thermo Fisher Scientific	0.4	8.3%
MGI	0.3	7.1%
Oxford Nanopore Technologies	0.2	4.6%
Pacific Biosciences	0.1	3.0%

Notes:

- (i) Market share represents each company's revenue from gene sequencing instruments, compatible consumables, and after-sales maintenance service in the global high-throughput gene sequencing instrument and consumables market.

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Source: Annual reports of listed companies, JPM conference, expert interviews, CIC

The competitive landscape of China’s high-throughput gene sequencing instrument and consumables market shares the same pattern as the global market, with similar dominant players and level of market concentration. As of the Latest Practicable Date, there were a total of 38 high-throughput gene sequencing instruments and 57 high-throughput gene sequencing clinical test kits that have been approved for market entry by the NMPA in China. In 2024, the top five players collectively secured 95.8% of the market share by revenue in the same year. While Illumina leads both globally and in China, the market share distribution in China is more balanced than that globally due to MGI’s significant presence as a prominent local player. The table below sets forth the top five players in China’s high-throughput gene sequencing instrument market, as well as their revenues and corresponding market shares in 2024.

Company	Revenue (billion RMB)	Market share (%)
Illumina	2.0	47.0%
MGI	1.7	39.0%
Thermo Fisher Scientific	0.2	4.3%
Oxford Nanopore Technologies	0.1	3.2%
Pacific Biosciences	0.1	2.2%

Note:

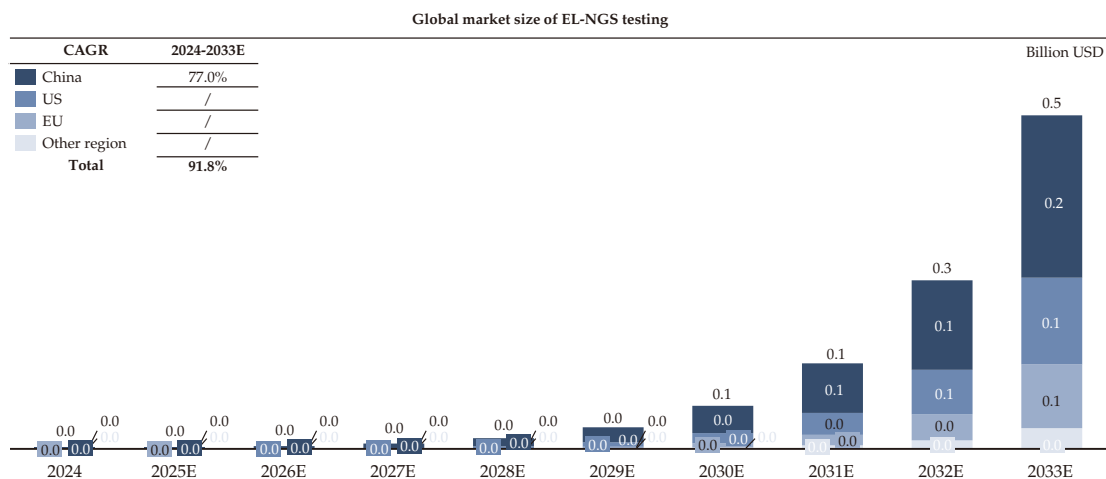
- (i) Market share represents each company’s revenue from gene sequencing instruments, compatible consumables, and after-sales maintenance service in China’s high-throughput gene sequencing instrument and consumables market.

Source: Annual reports of listed companies, JPM conference, expert interviews, CIC

Overview of EL-NGS Testing

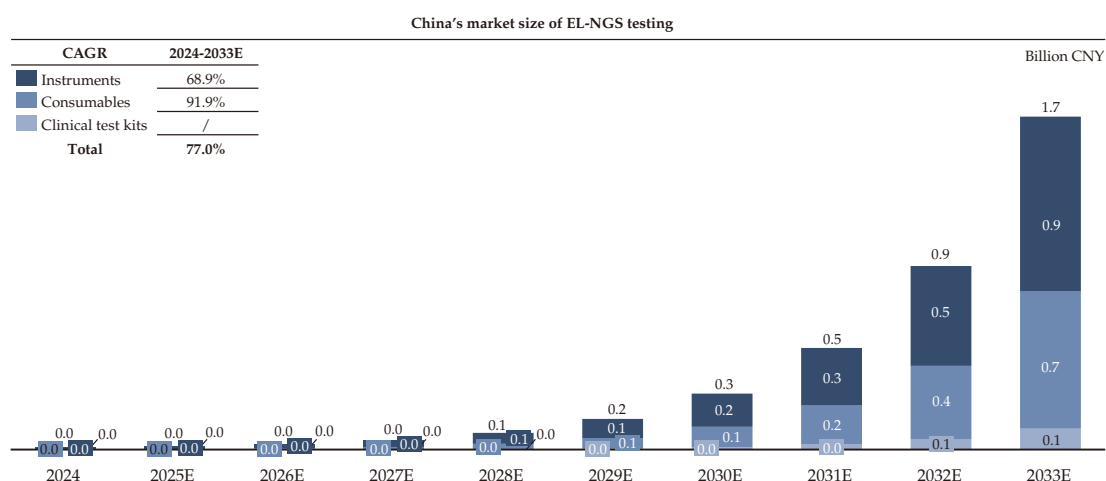
EL-NGS pairs massively parallel sequencing with optimized chemistry to deliver higher throughput, lower cost, and superior accuracy than Sanger sequencing, early-generation NGS, or single-molecule platforms. Its integrated instruments and clinical test kits create a true sample-to-answer workflow that scales easily for routine genomic diagnostics. The chart below illustrates the historical and forecast size of the global EL-NGS testing market for the periods indicated.

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Source: Annual reports of listed companies, expert interviews, CIC

The chart below illustrates a breakdown of the China's EL-NGS testing market by product type, including instruments, consumables and clinical test kits, for the periods indicated.



Source: NMPA, CMA, NBSC, GACC, annual reports of listed companies, expert interviews, CIC

As of the Latest Practicable Date, all gene sequencing instruments adopting EL-NGS technology are still in development or categorized as research use only (RUO), and no related clinical test kits have yet progressed to clinical trials. The table below sets forth the major EL-NGS gene sequencing instruments globally as of the Latest Practicable Date.

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Major EL-NGS gene sequencing instruments

Company	Product name	Technical Approach	Development stage	
Axio	AXP-100	Single-Base Nanopore Sequencing Technology (Nanopore Sequencing-by-Synthesis)	RUO	
Geneus Technologies	G-seg500 G-seg1M	Single-Base Nanopore Sequencing Technology (Nanopore Sequencing-by-Synthesis)	RUO	
Roche	Genia Technologies Stratos Genomics	/	Sequencing by expansion (SBX)	Under development
	INanoBio Inc.	/	Semiconductor nanopore technology for sequencing	Under development
	Electronic BioSciences (EBS)	/	Low noise electronics design and novel nanopore platforms	Under development

Source: Company official websites, literature review, CIC

Growth Drivers of Gene Sequencing Market

The growth of the gene sequencing market is expected to be driven by the following factors:

- Continuous technological advancements.** Rapid advancements in sequencing technologies have greatly enhanced accuracy, speed, and cost-effectiveness in this sector, reducing both time and costs compared to traditional methods. As more affordable sequencing platforms emerge, healthcare professionals can adopt genetic testing on a larger scale, fueling the continued growth of the gene sequencing market.
- Regulatory and investment support.** Governments and regulatory bodies are increasingly recognizing the importance of genetic testing in healthcare. For example, China's 14th Five-Year Plan (《「十四五」規劃》) highlights gene sequencing as a strategic industry, and the 21st Century Cures Act in the U.S. supports genomic technology development through policies and funding. Additionally, significant investments from governments, private organizations, and academic institutions are advancing genomics, making sequencing more precise, affordable, and innovative.
- Rising demand for personalized medicine.** Personalized medicine, which customizes treatment based on an individual's genetic profile, is emerging as a major force in healthcare. By enabling the comprehensive identification of genetic variants in both monogenic and polygenic diseases, gene sequencing technologies are playing a critical role in this shift. Therefore, the rising demand for personalized medicine is driving the adoption of these technologies and fueling market expansion.
- Expansion of POCT market.** The rapid expansion of the POCT market is driving the adoption of portable, cost-effective, and efficient sequencing technologies across diverse healthcare settings. This growth is accelerating the integration of gene sequencing into clinical practice, enabling faster disease detection, more precise treatment decisions, and broader applications in precision medicine.

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Future Trends of Gene Sequencing Market

The gene sequencing testing market is expected to be shaped by the following factors:

- ***Expansion on bioinformatics.*** Leading companies have expanded their operations beyond sequencing equipment to encompass reagents, consumables, and bioinformatics tools, aiming for greater control over the supply chain. In particular, bioinformatics plays a crucial role in interpreting the vast volumes of sequencing data, and as sequencing technology advances, the ability to extract meaningful insights from raw genetic data is becoming a key competitive advantage.
- ***Massive data set and the "Gene + Cloud" solution.*** The enhanced accessibility of gene sequencing due to the cost reduction, as well as the widespread adoption of NGS and advanced omics technologies drive the production of massive datasets. Considering the vast amounts of data generated by gene sequencing, plenty of cloud service providers create one-stop gene sequencing solutions for customers. Meanwhile, some leading sequencing companies select to increasingly invest in cloud-based platforms to integrate their sequencing services with computational tools.
- ***Further adoption of EL-NGS.*** EL-NGS excels in resolving repetitive genetic regions, such as centromeres and telomeres, which are difficult to sequence with traditional methods. With its electrochemical detection mechanism, enhanced throughput, and the elimination of costly optical components, EL-NGS significantly reduces sequencing costs, making it an attractive option for advancing genome analysis. The integration of biochip technology with EL-NGS systems offers significant advantages in miniaturization, paving the way for portable sequencing devices that maintain high accuracy while substantially reducing sequencing costs.
- ***Integration of AI into gene sequencing.*** The AI capabilities, supported by machine learning models, deep learning algorithms, AI-powered quality control systems, predictive analytics, and natural language processing, will fundamentally transform the gene sequencing field. This integration will enhance accuracy, reduce errors, and optimize sequencing processes.

OVERVIEW OF PROTEIN TESTING MARKET

Overview of Protein Testing Technology

Protein testing technology refers to a range of techniques used to measure and analyze protein levels in biological samples, such as blood, plasma, serum, or urine, providing valuable insights into the underlying mechanisms of diseases and enabling diagnosis with higher accuracy and personalized treatment strategies. Drawing on years of extensive research in the field of proteomics, a range of protein testing methods has emerged to assess a patient's protein levels and inform appropriate treatment strategies.

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Widely utilized techniques include enzyme-linked immunosorbent assay (ELISA), chemiluminescence, immunofluorescence, Western blot, mass spectrometry, and protein-microarray. The following table provides an overview of the principles and a comparative analysis of the key parameters of these protein testing methods.

Classification	ELISA	Chemiluminescence	Immunofluorescence	Western Blot	Mass Spectrometry	Protein-microarray
Working principles	Antigens or antibodies are immobilized on polystyrene microplates. Specimens are added, and the presence, absence, or quantity of the target antigen or antibody is indicated by the color development from enzyme-labeled substances	Chemiluminescent substances, catalyzed and oxidized, form excited intermediates that emit photons (hv) upon returning to ground state. This light is measured by a luminometer. In immunoassays, these substances are labeled on antigens or antibodies, or enzymes act on chemiluminescent substrates	Based on antigen-antibody reactions, known antigens or antibodies are labeled with fluorescent groups to detect their counterparts in cells or tissues. Fluorescence microscopy visualizes their location, determining nature and localization. Quantitative techniques measure content	Western Blot uses PAGE to separate proteins by size, transferring them to a solid-phase carrier (e.g. nitrocellulose membrane). Proteins, serving as antigens, react with primary antibodies and enzyme- or isotope-labeled secondary antibodies for detection	Mass spectrometry for protein analysis involves sample preparation, protein digestion with trypsin, ionization using MALDI or ESI, and determining peptide mass-to-charge ratios in a mass spectrometer. The spectra are then compared to databases for protein identification	Protein-microarrays work by immobilizing proteins or antibodies on a solid surface, then detecting target proteins through specific binding interactions, without using labeled probes for visualization
Applications	Detection of the concentration and physicochemical properties of antigens or antibodies	Detection of the presence of antibodies and inference of an unknown antibody (or antigen) based on a known antigen (or antibody)	Visualize proteins in cells/tissues for disease diagnosis and pathophysiology understanding	Identifies specific proteins in complex mixtures, providing semi-quantitative estimates. It is used in medical diagnostics, such as HIV and BSE testing	Mass spectrometry in clinical protein detection identifies and quantifies proteins, aiding in disease diagnosis and biomarker discovery	High-throughput detection of proteins and autoantibodies acquires biological info in samples with high accuracy

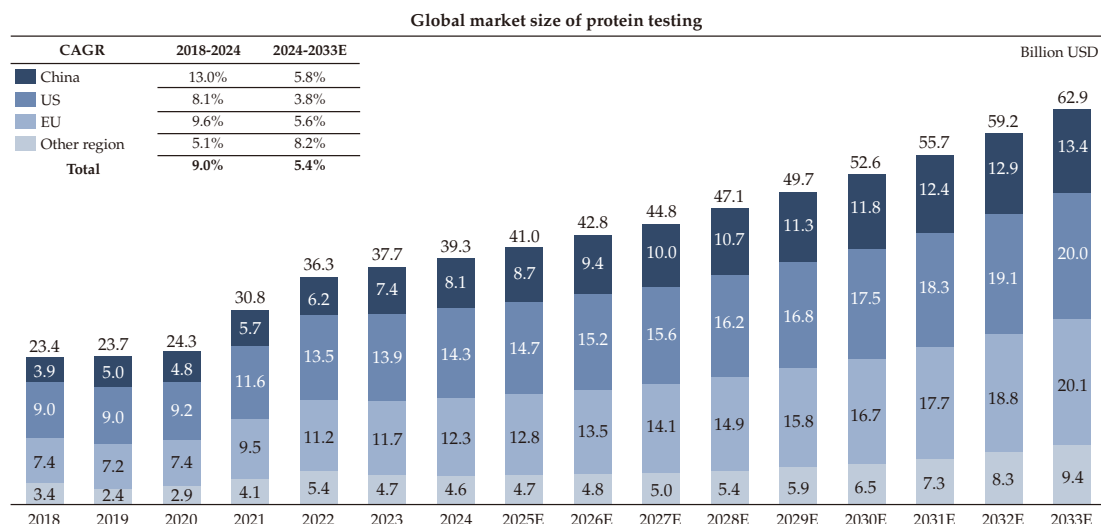
Item	ELISA	Chemiluminescence			Immunofluorescence	Western Blot	Mass Spectrometry	Protein-microarray
		Indirect	Direct	Electrochemical				
Sensitivity	10 ⁻¹¹ mol/L	10 ⁻⁶ -10 ⁻²² mol/L	10 ⁻⁶ -10 ⁻²² mol/L	10 ⁻⁶ -10 ⁻²² mol/L	10 ⁻¹² mol/L Susceptible to interference	100-1,500 µg/mL	10 ⁻⁶ -10 ⁻¹⁶ mol/mL	10 ⁻¹¹ mol/L
Qualitative/Quantitative	Qualitative/Quantitative	Quantitative	Quantitative	Quantitative	Qualitative/Quantitative	Qualitative/Quantitative	Qualitative/Quantitative	Qualitative/Quantitative
Quantitative Accuracy								
Time-consuming								
Cost								
Operative Difficulty Index								
Situation of application	Gradually being replaced by automated chemiluminescent devices	Widely used in labeled immunoassays, becoming a mainstream immunodiagnostic technique	Widely used in labeled immunoassays, becoming a mainstream immunodiagnostic technique	Roche patented technology, patent expires in 2016	Few applications at present	Widely used in clinical settings for the detection and analysis of specific proteins	Few applications at present	Neurological diseases — Alzheimer's, Dementia, Parkinson's. Cardio — early detection of heart attack

Source: Literature review, CIC

Protein Testing Market Size

The global protein testing market grew from US\$23.4 billion in 2018 to US\$39.3 billion in 2024, reflecting a CAGR of 9.0%, which is expected to reach US\$62.9 billion in 2033, with a CAGR of 5.4% between 2024 and 2033. China's protein testing market increased from US\$3.9 billion in 2018 to US\$8.1 billion in 2024, reflecting a CAGR of 13.0%, which is expected to reach US\$13.4 billion in 2033, with a CAGR of 5.8% between 2024 and 2033. The U.S. protein testing market grew from US\$9.0 billion in 2018 to US\$14.3 billion in 2024, reflecting a CAGR of 8.1%, which is expected to reach US\$20.0 billion in 2033, with a CAGR of 3.8% between 2024 and 2033. The EU protein testing market increased from US\$7.1 billion in 2018 to US\$12.4 billion in 2024, reflecting a CAGR of 9.6%, which is expected to reach US\$20.1 billion in 2033, with a CAGR of 5.6% between 2024 and 2033. The chart below illustrates the historical and forecast size of the global protein testing markets for the periods indicated.

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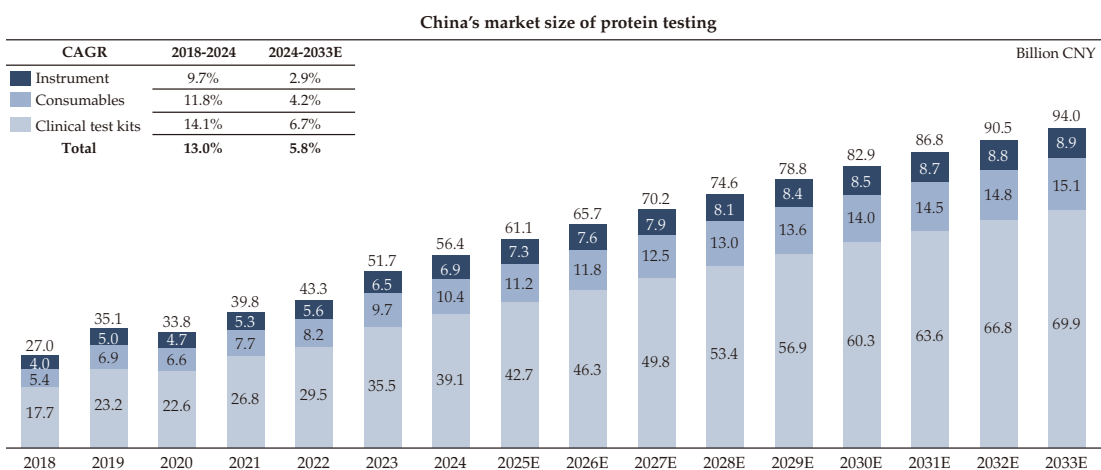


Note:

- (i) This market size includes protein testing instruments, consumables, and clinical test kits across all applications.

Source: WHO, FDA, NMPA, annual reports of listed companies, expert interviews, CIC

The chart below illustrates a breakdown of China's protein testing market by product type, including instrument, consumables and clinical test kits, for the periods indicated.



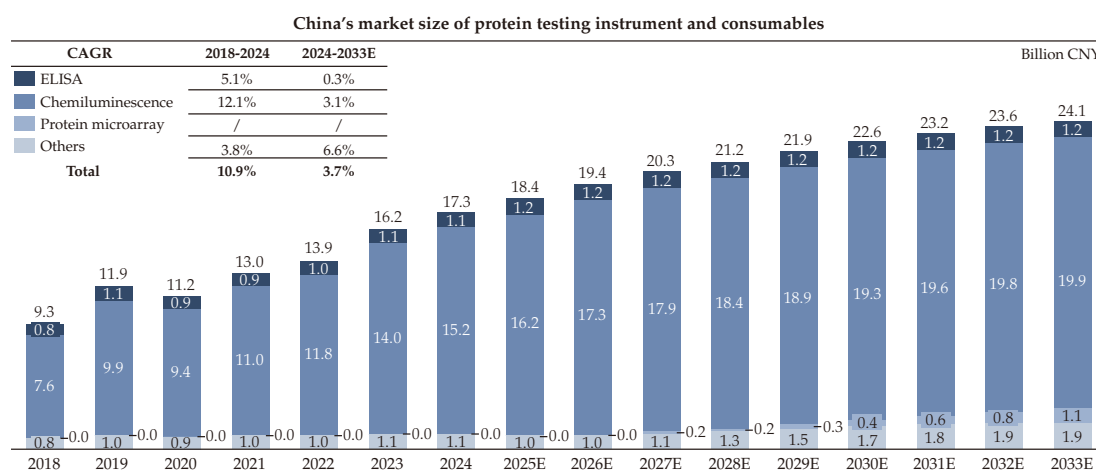
Note:

- (i) This market size includes protein testing instruments, consumables, and clinical test kits across all applications.

Source: NMPA, NHC, annual reports of listed companies, expert interviews, CIC

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By testing method, chemiluminescent immunoassays now dominate protein testing instrument and consumables market in China, accounting for the large majority of spending, while ELISA remains a sizeable but clearly smaller segment; protein microarrays and other niche methods together make up a sliver of the market. Given the inherent advantages of protein microarray testing, our Company plans to extend the clinical application of AxiLona EL-100 by incorporating this capability, enabling us to tap into the broader protein testing market. The chart below illustrates a breakdown of China’s protein testing instrument and consumables market by testing method for the periods indicated.



Source: WHO, FDA, NMPA, annual reports of listed companies, expert interviews, CIC

Growth Drivers and Future Trends of Protein Testing Market

The growth of the protein testing market is expected to be driven and shaped by the following factors:

- ***Growing Prevalence of Chronic Diseases.*** Chronic diseases associated with elevated C-reactive protein levels, such as rheumatoid arthritis, inflammatory bowel disease, cancer, and cardiovascular conditions, are becoming increasingly prevalent. The growing incidence is driving the use of proteomic profiling for the discovery and validation of disease-specific biomarkers, thereby fueling demand for advanced protein testing and sequencing technologies.
- ***Technological Advancements.*** Innovations in bioinformatics tools are significantly improving the accuracy of protein analysis. In addition, the integration of artificial intelligence and big data technologies is streamlining protein structure prediction and functional analysis, thereby shortening research and development timelines of protein testing and sequencing.

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- Multi-omics integration.** Integrating data from genomics, transcriptomics, epigenetics, and metabolomics offers a comprehensive view of disease at the molecular level. Proteomics, as a key part of multi-omics research, is becoming more important. With advancements in high-throughput technologies and large-scale clinical research, using machine learning to analyze and interpret multi-omics data is crucial for the future of precision medicine.
- Pursue of sustainable development.** Degradation enzymes play a key role in sustainable development by offering great potential to address plastic waste. However, for enzymatic polyethylene terephthalate (PET) recycling to work effectively, the enzyme must remain stable near the glass transition temperature of PET. Therefore, environmental microbial protein sequencing is essential for identifying and optimizing novel degradation enzymes that can withstand these challenging conditions and enhance the recycling process.

Protein Sequencing

As a specialized approach within the broader protein testing segment, protein sequencing is the process of determining the amino acid sequence of all or part of a protein or peptide, which has become an essential tool to advance both medicine and biology. In medical research, protein sequencing, especially the precise analysis of protein primary structure, enables the development of protein-based antibodies to fight viral and bacterial infections. In industrial biotechnology, protein sequencing helps identify key protein modification sites, design efficient enzymes, and optimize biosynthetic pathways, boosting process efficiency and profitability.

Key protein sequencing methods include Edman degradation sequencing, mass spectrometry-based sequencing, next-generation protein sequencing, and electrochemical long-read next-generation protein sequencing. The following table provides an overview of the principles of these methods.

Classification	Edman Degradation Sequencing	Mass Spectrometry-based Sequencing	Next-generation Protein Sequencing	Electrochemistry long-reading Next-generation protein sequencing
Working principles	The Edman degradation method sequentially identifies amino acids from a protein's N-terminus. It uses phenyl isothiocyanate (PITC) to form a phenylthiocarbonyl derivative, which is then cleaved to release the N-terminal amino acid as a phenylthiohydantoin for identification. This cycle repeats to determine the protein sequence	Mass Spectrometry-based Sequencing ionizes molecules, generating charged ions. These ions are separated by their mass-to-charge ratio in an electric or magnetic field. The resulting mass spectrum is analyzed to determine the molecular weight and structure of the analytes, enabling sequence determination	Capture the fluorescent signal from each N-terminal amino acid (NAA) binding event. Aminopeptidases cleave each N-terminal amino acid, exposing the next N-terminal amino acid for recognition. The process repeats until the entire peptide is sequenced	Electrochemistry long-reading Next-generation protein sequencing involves threading modified single molecule protein strands into a nanopore and using electrophoresis to control their movement. The ionic current changes as each amino acid passes through the pore are detected and analyzed to determine the protein sequence
Applications	Protein structure and function studies, biopharmaceutical development, and protein engineering and mutation analysis	Used for identifying proteins, sequencing novel ones, discovering biomarkers, and diagnosing diseases like dementia, diabetes, multiple myeloma, and celiac disease	Used for high-throughput sequencing single-cell proteomics, dynamic proteomics, and disease diagnosis, but its application is still low due to challenges such as sensitivity and cost	Protein sequencing high-throughput drug development Biomarkers discovery Longevity evaluation

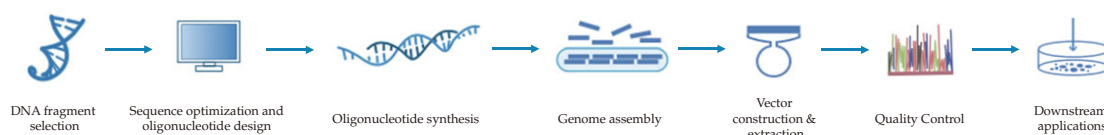
Source: Literature review, CIC

INDUSTRY OVERVIEW

OVERVIEW OF GENE SYNTHESIS MARKET

Overview of Gene Synthesis

Gene synthesis is the process of artificially creating a gene or a DNA sequence in the laboratory using chemical or enzymatic methods. This technique allows for the design and construction of custom genes with precise nucleotide sequences, enabling applications across various fields, including basic research, biotechnology, gene therapy, and synthetic biology. The following chart illustrates the process of gene synthesis.



Source: Literature review, CIC

Type of Gene Synthesis

The major types of gene synthesis include column-based synthesis, microarray-based synthesis, and enzymatic synthesis.

- Column-based synthesis is a traditional method where DNA fragments are attached to a solid support, typically a column. Reagents flow through the column, building the oligonucleotide sequence step by step on the surface of the beads. Since each column synthesizes a specific sequence, high-throughput synthesizers are needed to work with multiple columns simultaneously. This method is widely used and reliable for creating custom genes in both research and industrial applications.
- Microarray-based synthesis synthesizes multiple oligonucleotides in parallel on a microarray chip. This technique allows for high-throughput gene synthesis, generating large quantities of custom DNA sequences on a small scale. Microarray synthesis technologies, such as photolithography, electrochemical methods, and ink-jet printing, each offer unique advantages for different synthesis needs.
- Enzymatic synthesis uses enzyme catalysis to synthesize DNA oligonucleotides without relying on natural templates, offering precise control over the sequence and length of the DNA. Although enzymatic synthesis has advanced in recent years, challenges such as enzyme stability and the cost of large-scale production still limit its industrial use.

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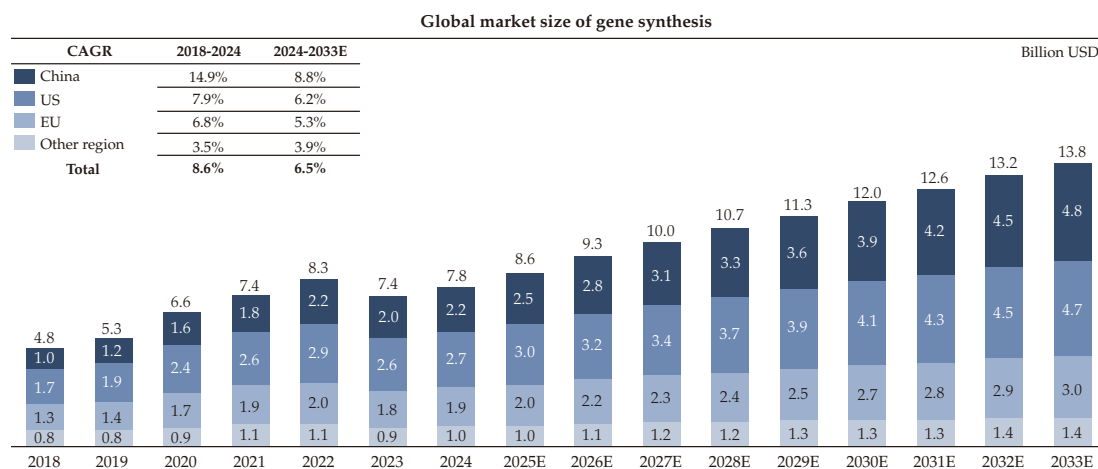
The following table illustrates a comparison of different types of gene synthesizer.

Type of synthesizer	Technical principle	Error rate	Flexibility	Scalability	Cost	Toxic chemicals	Development constraints
Column-based synthesizer	Phosphoramidite	🌙	🌙	🌙	🌙	🌙	High synthesis cost; difficult to develop synthesis instruments
Microarray-based synthesizers	Photolithography						High technology threshold; patent threshold
	Electrochemical	🌙	🌙	🌙	🌙	🌙	
	Ink-jet printing						
Enzymatic Synthesizers	Enzyme catalysis	🌙	🌙	🌙	🌙	🌙	Low technology maturity

Source: Literature review, CIC

Gene Synthesis Market Size

The global market size of gene synthesis grew from US\$4.8 billion in 2018 to US\$7.8 billion in 2024, reflecting a CAGR of 8.6%, which is expected to reach US\$13.8 billion in 2033, with a CAGR of 6.5% between 2024 and 2033. China's market size of gene synthesis increased from US\$1.0 billion in 2018 to US\$2.2 billion in 2024, reflecting a CAGR of 14.9%, which is expected to reach US\$4.8 billion in 2033, with a CAGR of 8.8% between 2024 and 2033. The U.S. market size of gene synthesis grew from US\$1.7 billion in 2018 to US\$2.7 billion in 2024, reflecting a CAGR of 7.9%, which is expected to reach US\$4.7 billion in 2033, with a CAGR of 6.2% between 2024 and 2033. The EU market size of gene synthesis increased from US\$1.3 billion in 2018 to US\$1.9 billion in 2024, reflecting a CAGR of 6.8%, which is expected to reach US\$3.0 billion in 2033, with a CAGR of 5.3% between 2024 and 2033. The chart below illustrates the historical and forecast size of the global gene synthesis markets for the periods indicated.



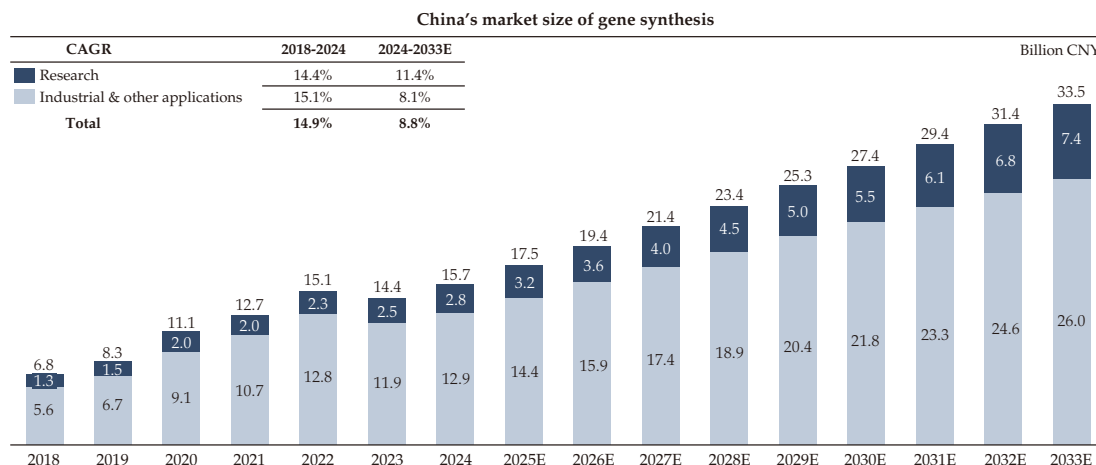
Note:

- (i) This market size includes global oligo synthesis, gene synthesis, and gene synthesis sequencing.

Source: Annual reports of listed companies, expert interviews, CIC

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The chart below illustrates a breakdown of the China's gene synthesis market by application for the periods indicated.



Note:

- (i) This market size includes global oligo synthesis, gene synthesis, and gene synthesis sequencing.

Source: Annual reports of listed companies, expert interviews, CIC

Growth Drivers and Future Trends of Gene Synthesis Market

The growth of the gene synthesis market is expected to be driven and shaped by the following factors:

- **Technology innovation.** Innovations such as gene editing technologies, standardization of genetic components, microbial chassis engineering, and the development of cell factories are expanding the capabilities of gene synthesis. Furthermore, the integration of AI and machine learning is significantly reducing design time and accelerating progress in synthetic biology, enabling more precise and efficient gene synthesis methods.
- **Policy support.** As synthetic biology becomes increasingly important, China has been providing increasing support for the industry, expected to foster innovation and ensure a supportive environment for gene synthesis advancements. National-level programs, such as the "Synthetic Biology" special research initiative and key projects, along with provincial-level support for synthetic biology enterprises, are providing a strong foundation for the industry's growth.
- **Rising demand from research and industrial market.** The growing application of biotechnologies like synthetic biology, liquid biopsy, and cell immunotherapy is driving an industrial shift. As research capabilities and innovation grow, the demand for gene synthesis in research markets is expanding. Additionally, the needs of pharmaceutical companies, especially for gene therapy and vaccines, are boosting demand for gene synthesis, particularly in designing vectors and gene fragments.

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SOURCE OF INFORMATION

We engaged CIC, a market research consultant, to prepare the CIC Report for use in this document. The information from CIC disclosed in this document is extracted from the CIC Report and is disclosed with the consent of CIC. In preparing the CIC Report, CIC collected and reviewed publicly available data such as government-derived information, annual reports, trade and medical journals, industry reports and other available information gathered by not-for-profit organizations as well as market data collected by conducting interviews with industry key opinion leaders. The CIC Report assumes a stable regulatory environment and presumes that no major geopolitical events will significantly disrupt global supply chains during the forecast period. CIC further assumes stable economic growth in China and worldwide and presumes that no pandemic or similar public health emergency will occur during the forecast period.

CIC has exercised due care in collecting and reviewing the information so collected and independently analyzed the information, but the accuracy of the conclusions of its review largely relies on the accuracy of the information collected. We agreed to pay CIC a fee of RMB780,160 for the preparation and update of the CIC Report, which is not contingent on the [REDACTED] proceeding.