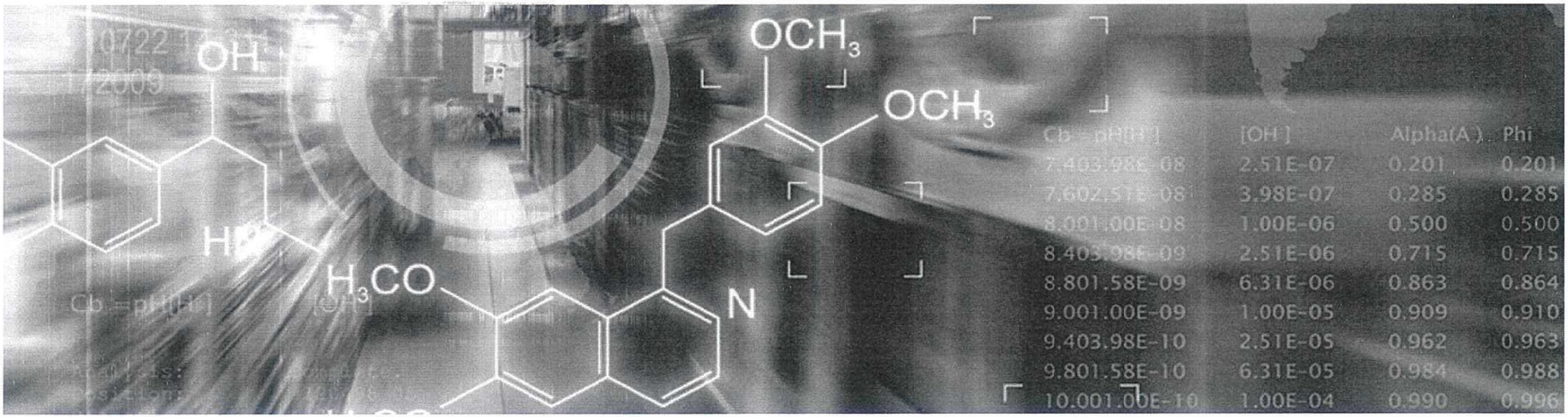

Industry Report on China's Surgical Robot Market

China Insights Consultancy

22 June 2026

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China's medical robot market size grows from RMB25.1 billion in 2025 to RMB115.1 billion by 2031, implying avCAGR of 29.9% from 2026 to 2031

Introduction to medical robots

Medical robot

- Medical robots refer to intelligent service robots that are used in the medical field and **act as assistants for medical staff**. They primarily include surgical robots, rehabilitation robots, and medical assistant robots, among others.
- Compared with traditional methods, robots are capable of performing **high-intensity, high-precision tasks continuously over extended periods.**
- **Offer more intuitive and convenient operation** while building upon the functionalities of conventional medical equipment
- Highly adaptable and safe, capable of supporting the treatment of a variety of diseases
- Enable more personalized and data-driven treatment decisions

History of medical robot

1985

- In 1985, PUMA 560 performed the first robotic surgery
- In 1987, the rehabilitation robot Handy1 was introduced
- in 1997, China's first surgical robot was developed

2000

- In 2000, the first-generation da Vinci surgical robot received FDA approval and was commercialized
- Between 2000 and 2010, companies such as Johnson & Johnson and Stryker entered the medical robotics industry

2010

- In 2010, China's first domestically developed medical robot was successfully registered
- Between 2013 and 2018, several domestically developed robots received registration approval.

2020

- After 2020, the industry entered a rapid growth phase. Various types of surgical robots, rehabilitation robots, and medical assistant robots were approved in large numbers in China. Approved indications continued to expand, and the number of robotics companies kept increasing

Source: China Insights Consultancy

Medical robots can be classified into surgical robots, rehabilitation robots, medical assistant robots, hospital service robots, organ transport robots, and other specialized medical robots

Classification of medical robots

Category	Definition
Surgical Robots	• Integrated systems comprising actuators, imaging and navigation modules, and control and planning system, used under physician supervision or fully automated for minimally invasive procedures, with the aim of improving instrument stability, spatial localization accuracy, and intra-operative visualization.
Organ Preservation Robots	• Maintain transplant organs through ex vivo perfusion and environmental control that continuously monitor and adjust temperature, oxygenation, nutrient delivery, and preservation parameters during transport between medical facilities.
Medical Assistant Robots	• Designed for direct patient interaction and clinical support, and automated testing, medical assistant robots are intelligent robotic systems that comprehensively enhance care quality, operating under the supervision of healthcare professionals.
Hospital Service Robots	• Manage healthcare facility operations and logistics through automated medication delivery and supply distribution, environmental services including UV disinfection and room sanitization, and administrative support for pharmacy automation, inventory management, and workflow optimization.
Rehabilitation Robots	• Robots built around wearable exoskeletons or upper/lower limb training platforms that deliver standardized, repeatable, and personalized gait and limb-function.
Other Specialized Medical Robots	• Emergency response robots, and other specialized systems for various medical demands, in enhancing safety, throughput, efficiency, and quality in hospitals.

Source: China Insights Consultancy

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Surgical robots are sophisticated medical systems that integrate multidisciplinary technologies to assist in minimally invasive procedures

Introduction to surgical robots

- **Surgical Robot Definition:**

  A surgical robot is a multidisciplinary medical device that integrates fields such as medicine, mechanical engineering, biomechanics, and computer science. It is designed to **support or assist doctors during operative procedures in performing clinical minimally invasive surgeries (MIS).**

The classification of surgical robot

Classification	Function	Common Indication	Key Players
Laparoscopic robots	• Assists precise minimally invasive surgery via doctor console, surgical cart and imaging system	• Prostatectomy, myomectomy, cholecystectomy	WEGO 微创, MEDBOT
Orthopedic robots	• High-precision positioning for prosthesis implantation and repair surgeries for spinal surgery, etc.	• Knee replacement, total hip arthroplasty, spinal surgery	佗道医疗, 键嘉
Percutaneous puncture robots	• Image-guided targeting & needle navigation to improve puncture accuracy	• Tissue needle biopsy	TrueHealth, EDDA
Percutaneous ablation robots	• Imaging-based planning guides intraoperative needle placement for percutaneous ablation	• Lung tumor ablation, liver tumor ablation, etc.	TrueHealth
Neurosurgery robots	• Rapid and accurate neurosurgical planning in confined operative spaces	• Intracerebral hemorrhage, brain cyst, epilepsy & Parkinson's disease	Sinovation, Remebot
Natural orifice robots	• Natural orifice access, providing doctors with enhanced visual clarity	• Endoscopic submucosal dissection, bronchoscopy	ROBO, BRONCUS
Pan-vascular robots	• Precise navigation & force feedback during catheter advancement	• Coronary intervention, cerebrovascular intervention	中科鸿泰, WeMed
Other robots	• Include ophthalmic, dental, microsurgical, and other new types of surgical robots	• Dental implantation, prosthodontics, Retinal vascular puncture and drug injection	LANDER, YaKeBo

Source: China Insights Consultancy

Surgical robots have emerged as powerful assistants to doctors and are now widely applied across various clinical departments to address a broad range of indications

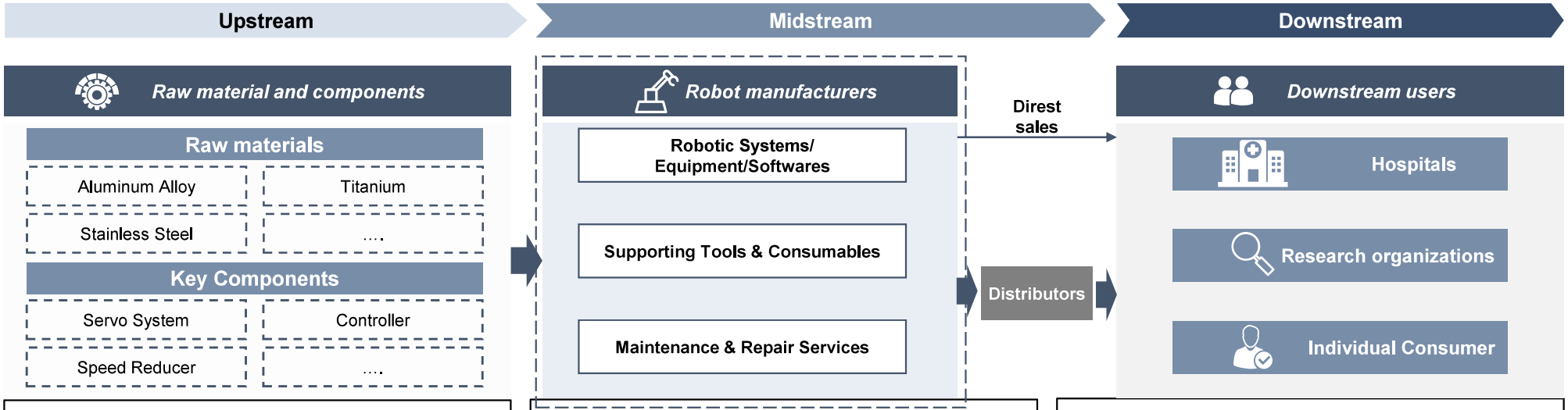
Application departments and indications of surgical robots

	Oncology	General Surgery	Respiratory	Gastroenterology	Urology	Cardiac	Thoracoabdominal	Neurosurgery	Interventional	Gynecology	Orthopedics	Imaging
Percutaneous Puncture Robots	✓	✓	✓	✓	✓		✓	✓	✓			✓
Percutaneous Ablation Robots	✓	✓	✓	✓	✓		✓		✓			
Laparoscopic Robots	✓	✓			✓					✓		
Natural Orifice Robots	✓		✓	✓	✓							
Pan-vascular Robots	✓					✓		✓	✓			
Orthopedic Robots											✓	
Neurosurgery Robots								✓				

Source: China Insights Consultancy

Raw materials and components providers are the upstream of surgical robot, while robot manufacturers serve as the midstream to provide equipment and services to the downstream users

Industrial chain of surgical robots



- The main components with the highest technical barriers might be servo motors, speed reducers, and controllers, which are currently imported from developed countries such as US, Japan, and Germany, **resulting in limited overall bargaining power**
- **China's upstream supply chain remains in its nascent stage.** Surgical robots cannot yet achieve full self-sufficiency, and realizing domestic production of upstream components will require additional time

- The midstream segment primarily encompasses independent design of robot bodies, hardware/software system integration, robot assembly and debugging, and clinical adaptation of functional modules. They primarily sell their products to end customers through distributors in China.
- **Most domestic robotics companies operate in the midstream segment.** They independently design robot bodies and integrate hardware/software systems, though core components still rely on foreign imports

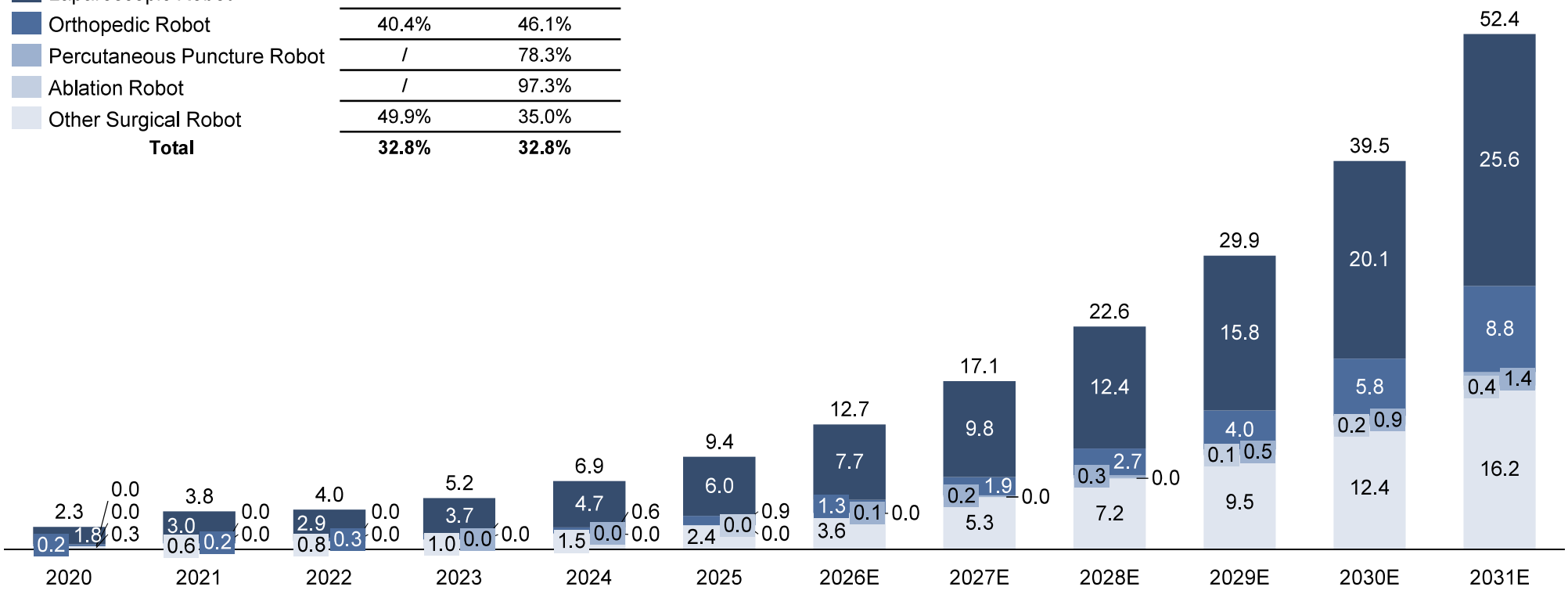
- **The configuration of Class B large medical equipment is subject to strict standards** regarding hospital grade, surgical volume, supporting facilities, qualifications, and professional personnel
- Influenced by factors including regulatory requirements, implementation complexity, and operational costs, surgical robots are currently predominantly deployed in Class III Grade A hospitals, **demonstrating low overall market penetration**

Source: China Insights Consultancy

Surgical robot market size in China, 2020-2031E

Surgical robot market size in China, 2020-2031E

CAGR	2020-2025	2026E-2031E
Laparoscopic Robot	27.6%	27.3%
Orthopedic Robot	40.4%	46.1%
Percutaneous Puncture Robot	/	78.3%
Ablation Robot	/	97.3%
Other Surgical Robot	49.9%	35.0%
Total	**32.8%**	**32.8%**



Source: China Insights Consultancy

China's surgical robot market is rapidly expanding and prospering, driven by the rising clinical demand in surgical robot and advancements in high-level automation technologies

Growth drivers of China's surgical robot market

Rising clinical demand

- Demand for surgical robots continues to grow as patients and clinicians increasingly favor minimally invasive procedures that offer less trauma, lower complication risk and faster recovery. Aging populations, rising cancer and chronic disease burden, and expanding surgical volumes are putting pressure on hospitals to improve operating room efficiency and standardize surgical quality across different surgeons and institutions. Together, these factors are driving steady growth in case volumes and supporting the broader clinical adoption of surgical robots.

Improving affordability

- As pilot reimbursement programmes and other enabling policies reduce system costs and establish clearer, acceptable payment models for robotic-assisted procedures, the economic burden on hospitals and patients is gradually easing. For example, since 2021, Shanghai and Beijing have gradually included surgical robots within the scope of public medical insurance reimbursement. On January 20 2026, the NHSA issued the Guidelines for the Establishment of Items for Surgical and Therapeutic Auxiliary Procedures (Trial)(《手術和治療輔助操作類醫療服務價格項目立項指南(試行)》), providing an official policy basis for robot-assisted surgical fees. Hunan and Guangdong, as pilot provinces, published specific pricing in April, representing a significant positive development for the industry. These measures encourage more hospitals to introduce and routinely use surgical robots, thereby expanding patient access to advanced minimally invasive care.

Source: China Insights Consultancy, Nature

Supported by local policies and rising public awareness, China's surgical robot market continues to grow, with improvements in operational efficiency and expansion of surgical applications

Growth drivers of China's surgical robot market

Policy and regulatory support

- In China, surgical robots have been encouraged at the national level as part of high-end medical equipment and intelligent manufacturing initiatives, including the "Robotics+" application program (《"機器 人+"應用行動實施方案》) and the NMPA announcement on Measures to Optimize Full-Lifecycle Supervision to Support the Innovative Development of High-End Medical Devices (國家藥監局《關於發佈優化全生命週期監管支持高端醫療器械創 新發展有關舉措的公告》), which expressly support adoption of high-precision, minimally invasive robotic systems by medical institutions. Local governments, including Shanghai and Beijing, have also introduced dedicated programs. Shanghai released the Action Plan for Promoting the Medical Robot Industry (2023-2025) (《上海市促進醫療機器人產業發展行動方案(2023-2025年)》), which targets breakthroughs on setting out application demonstration platforms and replicable clinical scenarios, alongside professional public service platforms to accelerate translation into clinical settings. Beijing has launched a Robot Plus Healthcare application promotion program (《北京市經濟和信息化局關於開展"機器人+醫療"應用推廣活動的通知》) that focuses on product innovation and scenario promotion and requires applicants to complete deployment in designated settings, strengthening the visibility of hospital side adoption pathways. Besides, Shanghai's Notice on Matters Concerning Inclusion of Certain Newly Added Medical Service Items in the City's Basic Medical Insurance Payment Scope (《關於部分新增醫療 服務項目納入本市基本醫療保險支付範圍有關事項的通知》) references robot assisted surgical services within their local pricing and reimbursement frameworks.

Technology advancement and AI integration

- Surgical robots are evolving from mechanical assist devices into intelligent surgical platforms. Enhanced arm dexterity and imaging broaden their use in complex, confined and delicate anatomical areas. At the same time, AI is being applied to preoperative image analysis, path planning and intraoperative navigation prompts, improving standardization and reproducibility and laying the groundwork for remote collaboration and assistance models.

Source: China Insights Consultancy, Nature

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Percutaneous puncture surgical robots are integrated systems to achieve precise lesion targeting and needle placement, assisting doctors in minimally invasive diagnostic and therapeutic procedures

Introduction to percutaneous puncture surgical robots

- **Percutaneous puncture surgical robots** are sophisticated systems that utilize imaging technologies such as MRI and CT to identify anatomical targets, formulate surgical plans, and **guide robotic arms to reach predetermined positions**, thereby directing puncture needles to precise locations and assisting physicians in completing percutaneous procedures. These systems are currently deployed in **tumor diagnosis** for conditions including lung cancer (including pulmonary nodules), liver cancer, and prostate cancer.
- Percutaneous puncture surgical robots are large-scale precision mechanical systems primarily applied in minimally invasive surgeries, with a standard configuration comprising **a console, robotic arm system, and vision system.**

Key components of percutaneous puncture surgical robot

Navigation System

- Using tracking technology, such as optical and electromagnetic, a three-dimensional coordinate system encompassing the patient, lesion, and robotic arm is established to enable **high-precision tracking and localization** of both the lesion and patient position. The respiratory tracking system rapidly detects **breathing motion and captures the optimal puncture timing** in real time.

Software Planning Module

- The system automatically identifies lesions and performs anatomical segmentation, **accurately pinpointing target locations.** It also recognizes and extracts anatomical structures such as bones, blood vessels, and the trachea, **reconstructing them in 3D to allow interactive planning of the puncture path.**

Robotic Arm System

- Based on preoperative path planning, the multi-degree-of-freedom robotic arm **reaches the designated position.** With its high flexibility, the robotic arm **enables precise positioning of surgical instruments** through collision detection of the robotic arm and vision-based automatic obstacle avoidance.

Source: China Insights Consultancy

Compared to traditional percutaneous puncture surgery, percutaneous puncture surgical robots improve surgical accuracy and stability, reduce surgery time, shorten learning curve, and decrease complications

Comparison between percutaneous puncture surgical robots and traditional percutaneous puncture surgery

	Accuracy & Stability	Surgical Duration	Learning Curve	Postoperative Complications	Cost	Operating room integration and workflow adaptation
Percutaneous Puncture Surgical Robot	• Mean accuracy 3~5 mm, delivering consistent results across operators	• **Predefined needle paths** • Shortening procedure time **(10-25 mins)**	• Automated needle positioning reduce the technical threshold and reliance on individual operator experience, although **structured training is required** during the early adoption stage	• High first-pass success, resulting in fewer complications and faster recovery at a severe complication rate **<5%**	• Relatively high **upfront and maintenance costs**, **amortized** over a multi-year service life with increasing utilization	• Limited by **inadequate system integration and workflow adaptation**, as well as **compatibility issues** with existing tools
Traditional Puncture Surgery	• Relies heavily on **physician experience** • Accuracy **~7 mm**	• Repeated angle adjustments and rescanning • Prolonging surgery to around **25–40mins**	• **High entry barrier**, relying on highly experienced physicians	• Multiple needle attempts increase the risk of bleeding, infection and pneumothorax, and are associated with a complication rate of **~10%**	• Primarily relies on **existing** equipment and **standard** consumables	• The workflow is **well established**, with stable and standardized team coordination models

- Compared with traditional manual puncture procedures, robotic-assisted percutaneous systems integrate imaging guidance, navigation, and automated positioning technologies to enhance procedural precision and operational stability. The use of pre-planned trajectories and mechanical assistance reduces intraoperative adjustments and procedure time, while lowering dependence on individual physician experience
- In clinical practice, these systems have demonstrated improved targeting accuracy and consistency, fewer needle insertions, and reduced postoperative complication rates. Overall, robotic-assisted puncture represents a standardized and efficiency-oriented advancement within image-guided minimally invasive interventions

Source: Ultrasound-guided needle insertion robotic system for percutaneous puncture; China Insights Consultancy

The percutaneous puncture surgical robot enhances the accuracy and safety of biopsy procedures for pulmonary nodules, abdominal tumors, and prostate cancer

Application of percutaneous puncture surgical robots

Indication		Description	Pain Point	Advantage
Pulmonary nodules		A puncture needle is inserted through the skin and chest wall into the pulmonary lesion	• Movement due to respiratory motion • Multiple CT scans • Frequent needle adjustments • Complications such as pneumothorax and hemoptysis	• Plans the optimal puncture path • Improves puncture success rate • Reduces the risk of complications • Minimizes radiation exposure for both doctors and patients
Abdominal tumor	Liver tumors Kidney lesions Pancreatic cysts Other masses	A puncture needle is inserted through the upper abdominal cortex into the lesion for biopsy and localization	• Technically challenging and carries a high risk due to the dense distribution of adjacent organs and blood vessels • Steep learning curves • Frequent needle adjustments • Increased radiation exposure	• Accurately locates lesions • Protects important structures such as blood vessels and nerves • Shortens operation time • Reduces bleeding and unnecessary damage
Prostate cancer		A puncture needle is inserted through the rectal wall or perineum into the prostate to target the lesion	• Requires the cooperation of two or more doctors • Uneven puncture • Higher rate complications • Certain rate of missed diagnoses	• Reduces puncture complexity • Enhances doctors' puncture accuracy • Increases the positive detection rate in patients • Lowers missed and incorrect diagnoses • Alleviate patient suffering
Retroperitoneal lesions		A percutaneous needle is advanced via a posterior paraspinal or flank retroperitoneal approach to target deep lesions	• Deep target, narrow window • Close to major vessels, ureter, nerves • Motion causes target shift and re-aiming • Limited ultrasound; more CT and radiation	• 3D preplanning of safe corridor and entry • Motion compensation and stable guidance • Higher success and diagnostic yield • Fewer complications, less time and radiation

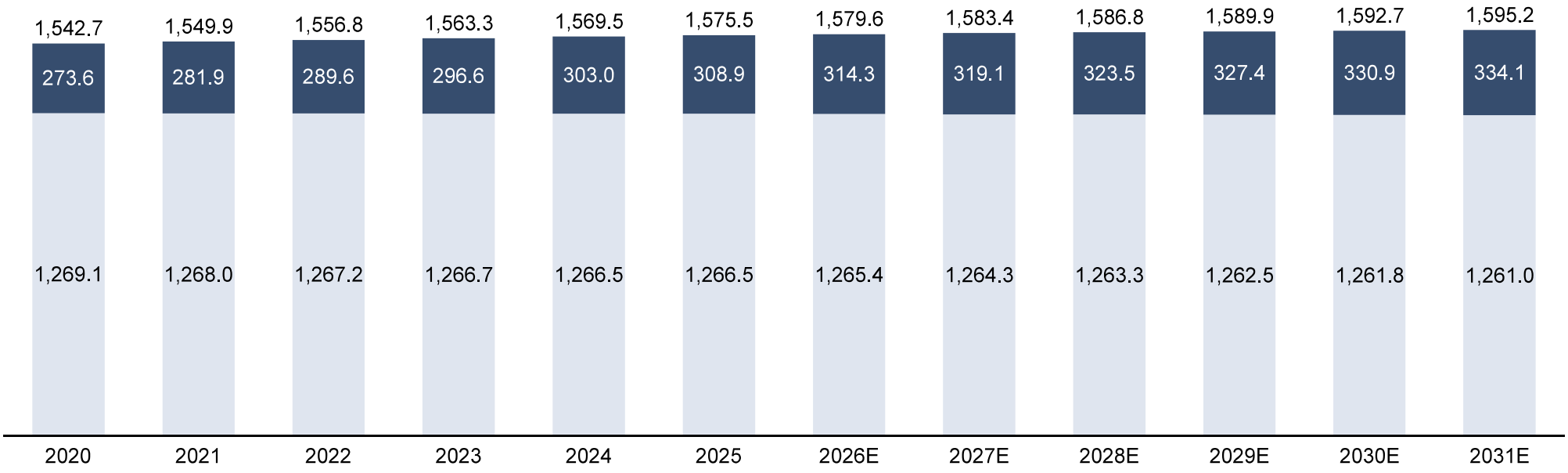
Source: Robotic navigation-assisted percutaneous liver puncture: a pilot study, China Insights Consultancy

The global number of people with pulmonary nodules is expected to grow steadily from 2020 to 2031, reaching approximately 1.6 billion people in 2031

Global and China's epidemiology of pulmonary nodules, 2020-2031E

CAGR	2020-2025	2026-2031E
China	2.5%	1.2%
Other region	0.0%	-0.1%
Total	**0.4%**	**0.2%**

Million People



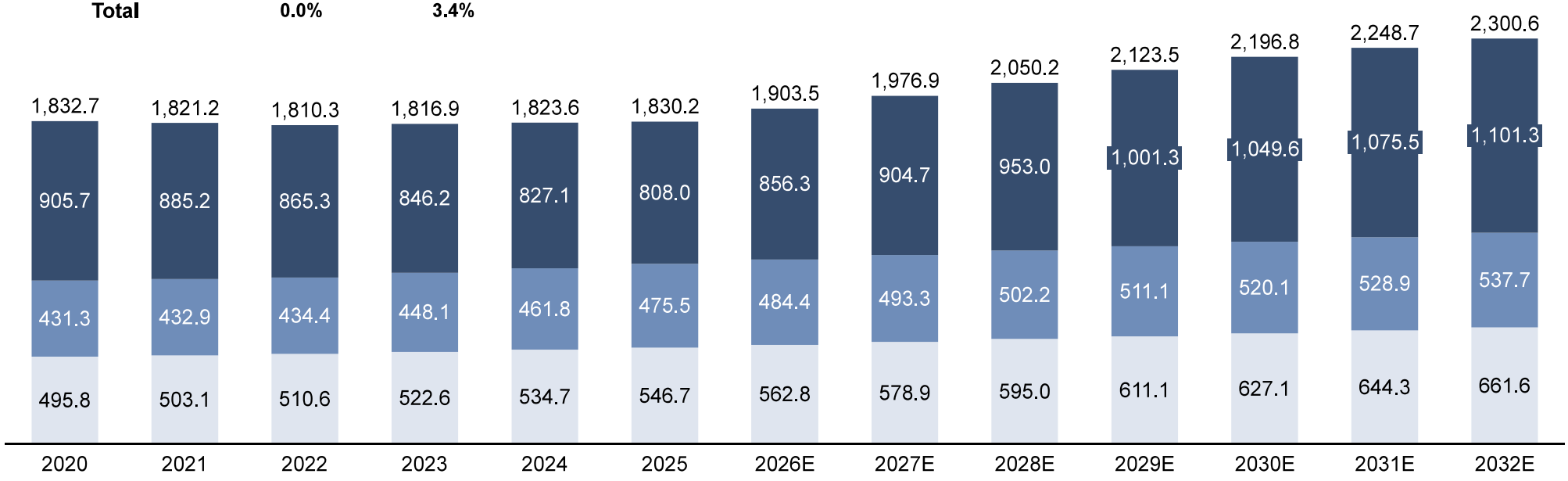
Source: China Insights Consultancy

Global incidence of liver, kidney and pancreatic cancer, 2020-2032E

Global incidence of liver, kidney, and pancreatic cancers, 2020-2032E

CAGR	2020-2024	2024-2032E
Liver	-2.3%	4.7%
Kidney	2.0%	1.8%
Pancreatic cancer	2.0%	2.7%
Total	**0.0%**	**3.4%**

Thousand People



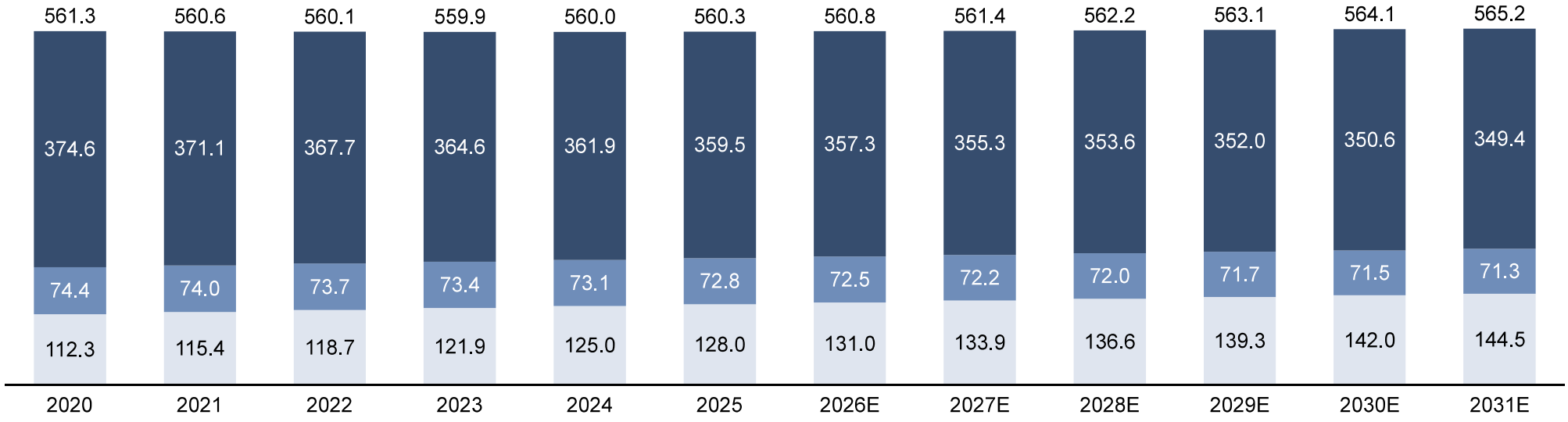
Source: China Insights Consultancy

China's incidence of liver, kidney and pancreatic cancer, 2020-2031E

China's incidence of liver, kidney, and pancreatic cancers, 2020-2031E

CAGR	2020-2025	2026-2031E
Liver	-0.8%	-0.4%
Kidney	-0.4%	-0.3%
Pancreatic cancer	2.7%	2.0%
Total	**0.0%**	**0.2%**

Thousand People

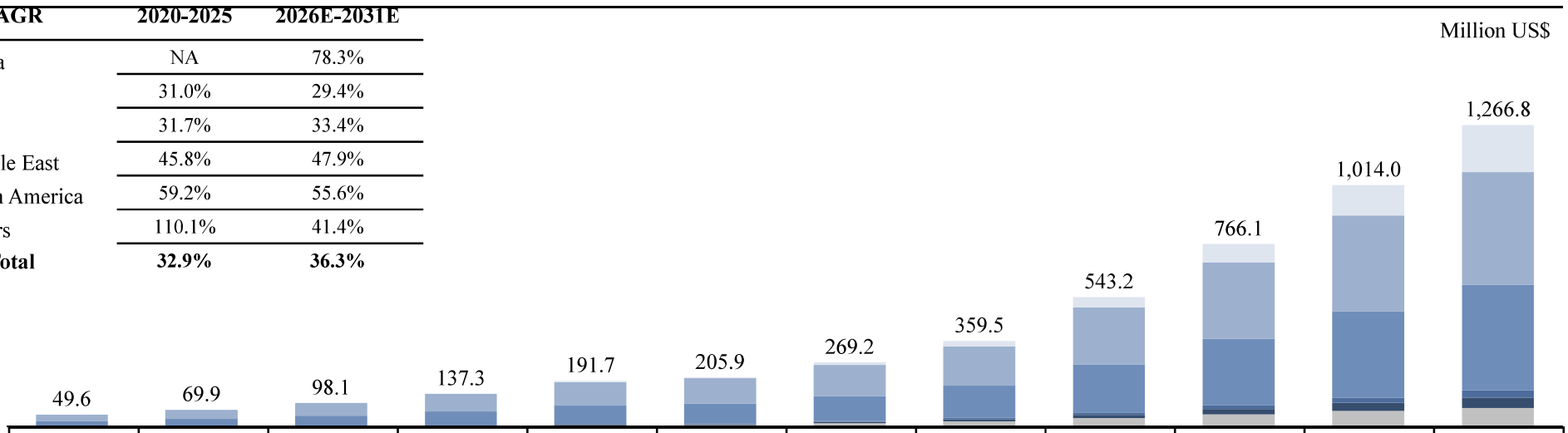


Source: China Insights Consultancy

Global percutaneous puncture surgical robot market size, 2020-2031E

Global percutaneous puncture surgical robot market size, 2020-2031E

CAGR	2020-2025	2026E-2031E
China	NA	78.3%
US	31.0%	29.4%
EU	31.7%	33.4%
Middle East	45.8%	47.9%
South America	59.2%	55.6%
Others	110.1%	41.4%
Total	**32.9%**	**36.3%**



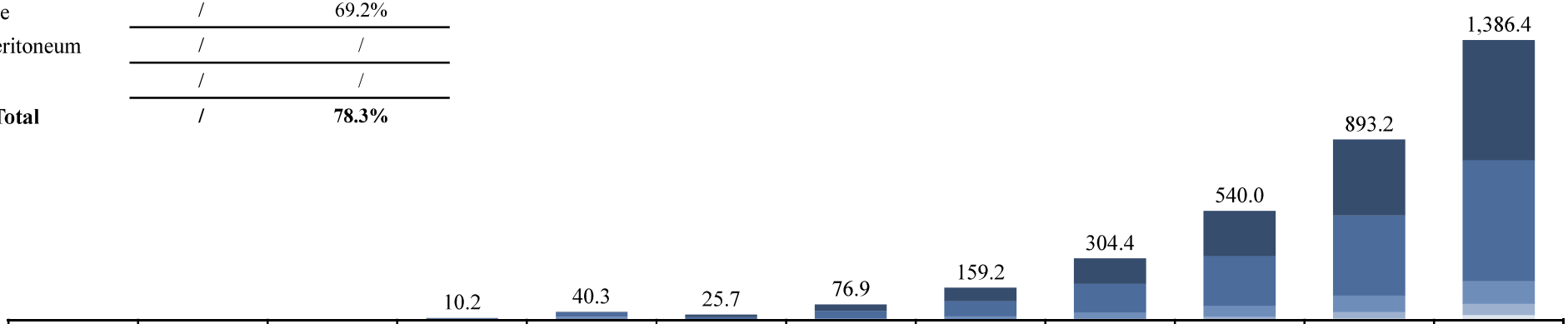
	2020	2021	2022	2023	2024	2025	2026E	2027E	2028E	2029E	2030E	2031E
China	0.0	0.0	0.0	1.5	5.8	3.7	11.0	22.7	43.5	77.1	127.6	198.1
US	27.6	38.8	53.7	73.0	98.8	106.8	130.7	165.8	239.5	321.5	402.9	473.9
EU	21.1	29.3	41.0	56.2	76.9	83.4	104.9	135.9	201.4	278.7	362.0	443.8
Middle East	0.4	0.7	1.1	1.6	2.5	2.9	4.2	6.2	10.2	15.8	22.8	29.8
South America	0.3	0.5	0.9	1.4	2.4	3.0	4.9	7.6	13.6	22.9	33.5	44.3
Others	0.1	0.6	1.5	3.6	5.3	6.1	13.6	21.3	34.9	50.1	65.3	77.0

Percutaneous puncture surgical robot market size in China by application, 2020-2031E

Percutaneous puncture surgical robot market size in China by application, 2020-2031E

CAGR	2020-2025	2026E-2031E
lung	/	79.0%
abdomen	/	75.1%
prostate	/	69.2%
retroperitoneum	/	/
others	/	/
Total	**/**	**78.3%**

Million RMB



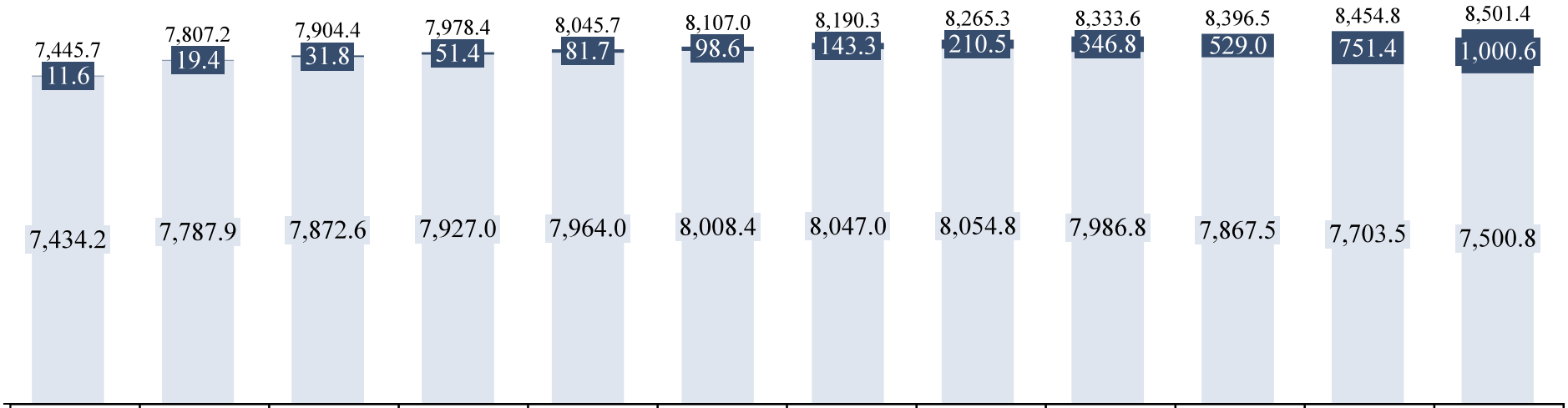
	2020	2021	2022	2023	2024	2025	2026E	2027E	2028E	2029E	2030E	2031E
Lung	/	/	/	2.1	3.3	11.2	32.3	65.6	124.6	222.6	374.3	595.0
Abdomen	/	/	/	4.7	20.7	11.9	36.4	75.3	141.9	246.7	397.7	598.5
Prostate	/	/	/	3.4	16.2	2.6	8.1	17.0	31.8	53.4	81.4	113.0
Retroperitoneum	/	/	/	/	/	/	/	1.2	6.1	17.3	32.2	55.4
Others	/	/	/	/	/	/	/	/	/	/	7.6	24.4

Number of percutaneous puncture procedures performed globally, 2020-2031E

Number of percutaneous puncture procedures performed globally, 2020-2031E

CAGR	2020-2025	2026E-2031E
R-PP	53.5%	47.5%
M-PP	1.5%	-1.4%
Total	**1.7%**	**0.7%**

Thousand ppl



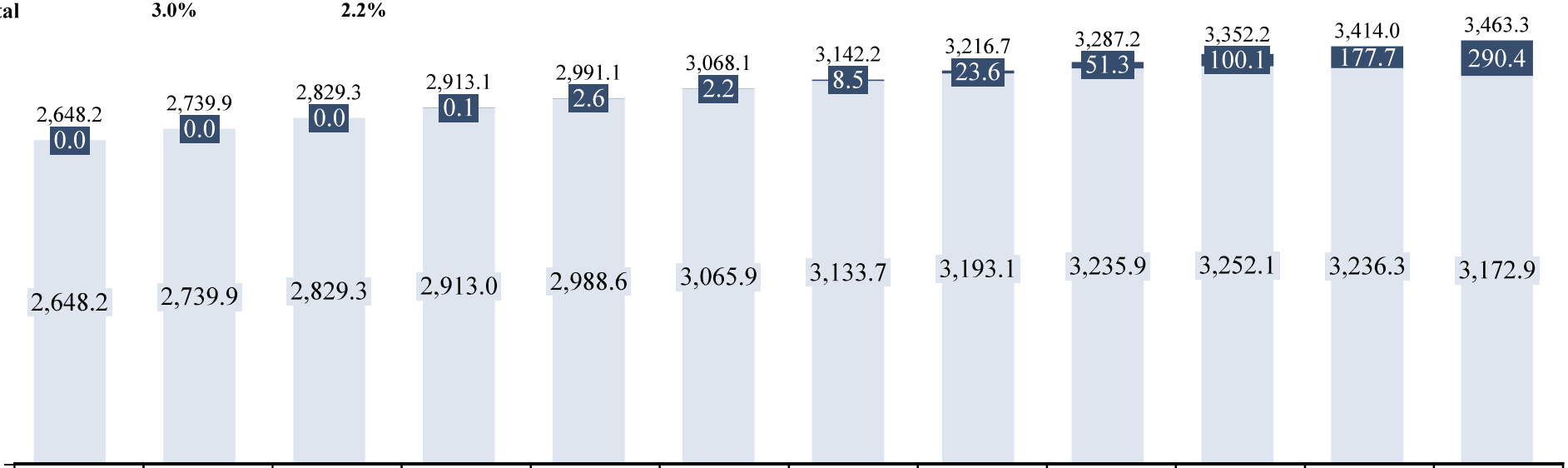
	2020	2021	2022	2023	2024	2025	2026E	2027E	2028E	2029E	2030E	2031E
Penetration rate	0.2%	0.2%	0.4%	0.6%	1.0%	1.2%	1.7%	2.5%	4.2%	6.3%	8.9%	11.8%

Number of percutaneous puncture procedures performed globally, 2020-2031E

Number of percutaneous puncture procedures performed in China, 2020-2031E

CAGR	2020-2025	2026E-2031E
R-PP	/	102.6%
M-PP	3.0%	0.2%
Total	**3.0%**	**2.2%**

Thousand ppl



	2020	2021	2022	2023	2024	2025	2026E	2027E	2028E	2029E	2030E	2031E
Penetration rate	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.3%	0.7%	1.6%	3.0%	5.2%	8.4%

Competitive landscape of percutaneous puncture surgical robot market in China

Registration Certificate Number	Company	Type	Product name	Approval date	Application	Number of Approval
国械注准20223010624	**TrueHealth**	**Domestic**	**TH-S1**	**05/13/2022**	**Lung and abdomen**	**5**
国械注准20233010810			**TH-S**	**06/15/2023**		
国械注准20243012455			**TH-P Elite/ TH-P/ TH-P Plus**	**12/05/2024**		
国械注准20243012643			**TH-S Pro**	**12/30/2024**		
国械注准20253012595			**TH-SA**	**12/15/2025**		
国械注进20233010199	Biobot Surgical Pte Ltd	Imported	iSR'obot Mona Lisa	05/12/2023	Prostate	1
国械注进20233010365	Quantum Surgical	Imported	30-0001	08/16/2023	Abdomen	1
国械注准20233011291	Tuodao Medical	Domestic	NP100	09/06/2023	Lung and abdomen	2
国械注准20253011264			PB100	06/27/2025	Prostate	
国械注准20243010229	Ariemedi	Domestic	ARMD-PN-201	01/31/2024	Lung and abdomen	1
国械注准20243010387	Simple Touch	Domestic	RC 120	02/21/2024	Lung	1
国械注准20243010922	Curaway Medical	Domestic	CR-NAV100	05/16/2024	Lung and abdomen	1
国械注准20243011118	WeiDe Precisely	Domestic	WD-Lung-Navi I	06/18/2024	Lung and abdomen	2
国械注准20263011087			WD-Lung-Navi I b	05/26/2026	Lung and abdomen	
国械注准20243011560	EDDA	Domestic	IQQA-Guide SI-ROBOT	08/23/2024	Lung and abdomen	1
国械注准20253010073	Amit	Domestic	FARE-OC-P	01/10/2025	Abdomen	1
国械注准20253010487	Zoye Medical	Domestic	ZY-TU-6	03/06/2025	Lung and abdomen	1
国械注准20253010707	United Imaging	Domestic	UInterv C550-A/ C550-B/ C550-C	04/01/2025	Lung and abdomen	1
国械注准20253012369	Hanglok-Tech	Domestic	HLT-SGNIO-A	11/25/2025	Liver	1
国械注准20263010655	Panier Medical	Domestic	ZZ-DJ-S1	03/27/2026	Lung and abdomen	1
国械注准20263010665	Precision MedTech	Domestic	M1P1	03/27/2026	Lung and abdomen	1

Source: China Insights Consultancy

Top five domestic manufacturers of percutaneous puncture surgical robots by installation

Top Five Domestic Manufacturers of Percutaneous Puncture Surgical Robot by Actual Shipment, in 2025

Rank	Name	Background	Volume in 2025	*Market share by shipments in 2025*	*Market Share by Revenue*
1	TrueHealth	Founded in 2015, headquartered in Shanghai and listed in 2021 on HKEX, MicroPort MedBot's product portfolio covers laparoscopic, orthopedic, pan-vascular, natural orifice and percutaneous puncture surgical robot.	**4**	36.4%	28.0%
2	MicroPort MedBot	Founded in 2019, headquartered in Shenzhen, WeiDe Precisely engaged in the R&D of medical surgical robots. It has developed percutaneous interventional surgical robots for lung and kidney procedures.	**2**	18.2%	27.2%
3	WeiDe Precisely	Founded in 2019, headquartered in Shanghai, Simple Touch is a medical technology company focused on independent R&D of high-performance surgical robots. Through its industry-unique CT-guided core technology and products, it assists doctors in performing surgery safely, efficiently and accurately.	**2**	18.2%	14.8%
4	United Imaging Surgical	Founded in 2015, headquartered in Shanghai and listed in 2021 on HKEX, MicroPort MedBot's product portfolio covers laparoscopic, orthopedic, pan-vascular, natural orifice and percutaneous puncture surgical robot.	**1**	9.1%	7.0%
5	Simple Touch	Founded in 2019, headquartered in Wuhan, United Imaging Surgical primarily engages in the research and development, manufacturing and sale of intelligent diagnostic and therapeutic equipment and software, as well as related instruments and consumables.	**1**	9.1%	5.5%

Driven by aging population and primary level market demand, percutaneous surgical robot are expected to accelerate the leap in China's market penetration rate by virtue of their clinical universality

Growth drivers and future trends of China's percutaneous surgical robot market

Aging population and rising chronic disease burden

- According to National Bureau of Statistics, as of 2024, people aged 65 and above accounted for about 15.6% of China's total population, and the aging trend is expected to continue over the coming decades. Older patients generally face higher surgical risk, driving demand for safer and more efficient percutaneous puncture solutions. In parallel, the prevalence of major solid tumours, such as prostate, lung and liver cancers, is expected to increase, which is anticipated to translate into further growth in robot-assisted percutaneous procedures.

Penetration increase

- In recent years, robot-assisted surgery in China has developed steadily on the back of technological progress and accumulating clinical evidence. The first percutaneous puncture surgical robot received NMPA approval in 2022, marking the start of commercialization. Although adoption remains at an early stage, percutaneous robots streamline procedural workflows by automating complex localization steps and lowering the technical threshold, which is expected to drive accelerated growth in installed base and procedure volumes.

Primary-level market demand

- As China deepens healthcare reform and rolls out a tiered diagnosis and treatment system, policy emphasises primary-care first contact, two-way referral and differentiated management of acute and chronic conditions. This requires primary institutions to strengthen capabilities in managing common diseases and postoperative rehabilitation. With their precision, minimal invasiveness and relatively tractable learning curves, percutaneous surgical robots are well placed to serve as enabling tools for primary hospitals, while ongoing trends toward system miniaturization are expected to further enhance their suitability for space- and resource-constrained primary settings, supporting standardized workflows and helping to promote a more balanced regional allocation of medical resources.

Source: China Insights Consultancy, NIH

Percutaneous surgical robots are highly adaptable and suitable for a variety of patients. The gradual institutionalization of the doctor education system makes them an important infrastructure

Growth drivers and future trends of China's percutaneous surgical robot market

Indication expansion

- China has a large and growing population eligible for percutaneous interventions, including an estimated 560.0 thousand new cases of liver, kidney and pancreatic cancers and about 1,144.9 thousand incident cases of lung cancer in 2024, as well as an increasing number of detected pulmonary nodules, thyroid and breast nodules through normalized screening and imaging-based early diagnosis. As utilization deepens in other high-incidence organs, penetration is expected to progressively extend to more technically challenging sites and multi- disciplinary settings.

Technology and education diffusion

- As percutaneous surgical robot technologies continue to mature, structured physician training and standardized operating protocols are expected to drive faster penetration. Looking ahead, AI is set to be the primary catalyst of the next adoption wave, with AI-assisted image segmentation and registration, automated trajectory planning and collision avoidance, adaptive control during needle insertion and outcome-prediction decision support expected to reduce learning curves and variability. In parallel, AI-powered simulators for credentialing, digital-twin rehearsal and fleet-level predictive maintenance are anticipated to accelerate clinical uptake and scaled deployment of percutaneous surgical robots.

Favorable policy support

- Policy support is expected to drive the development and adoption of percutaneous puncture surgical robots in China by improving the innovation, regulatory and clinical application environment for robot-assisted procedures. For example, in January 2026, the NHSA issued the Guidelines for the Establishment of Items for Surgical and Therapeutic Auxiliary Procedures (Trial) (《手術和治療輔助操作類醫療服務價格項目立項指南(試行)》), which established a unified national framework for robot-assisted procedure pricing and standardized categories based on the robot's level of participation. This helps address the historical lack of medical service fee items for surgical robot-assisted percutaneous puncture procedures. Such policy developments are expected to facilitate commercialization, improve hospital adoption conditions and accelerate the broader penetration of percutaneous puncture surgical robots in China.

Source: China Insights Consultancy, NIH

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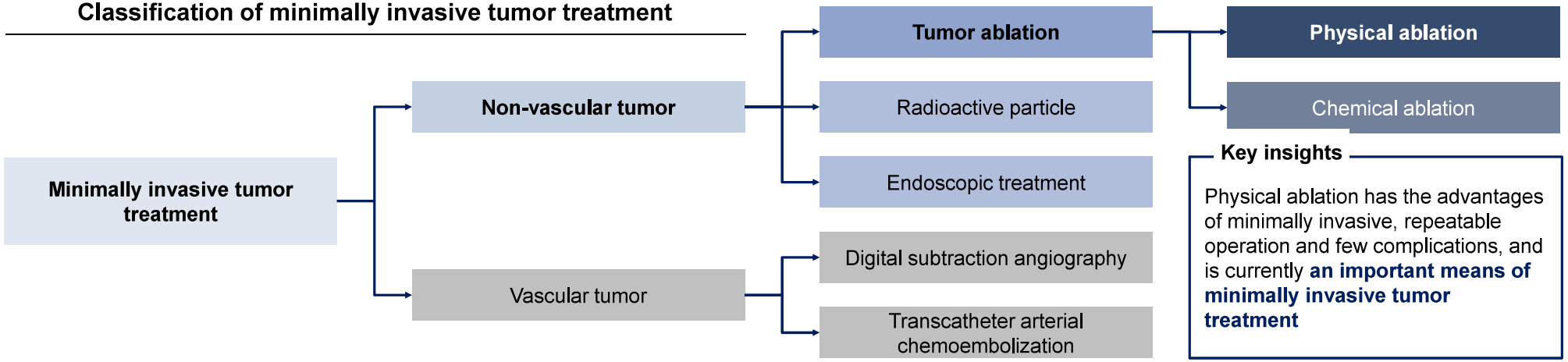
Among various minimally invasive treatment methods for tumors, physical ablation is emerging as the main treatment approach due to its few complications and small trauma

Introduction to minimally invasive tumor treatment

- Minimally invasive treatment of tumors refers to the use of minimally invasive techniques to deliver therapeutic instruments to the tumor site through small incisions or natural cavities. Under the guidance of imaging, local tumor ablation or drug therapy is carried out
- Compared with traditional open surgery, it has the advantages of **less trauma, fewer complications and faster recovery**, and has become an important part of the comprehensive tumor treatment system

Classification of minimally invasive tumor treatment



Key insights

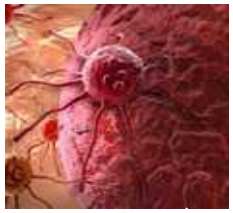
Physical ablation has the advantages of minimally invasive, repeatable operation and few complications, and is currently **an important means of minimally invasive tumor treatment**

Source: China Insights Consultancy

Tumor ablation can be divided into chemical and physical methods, physical ablation includes RF, MW, HIFU, Cryoablation, IRE and Laser, with respective mechanisms

Introduction to tumor ablation

Tumor ablation



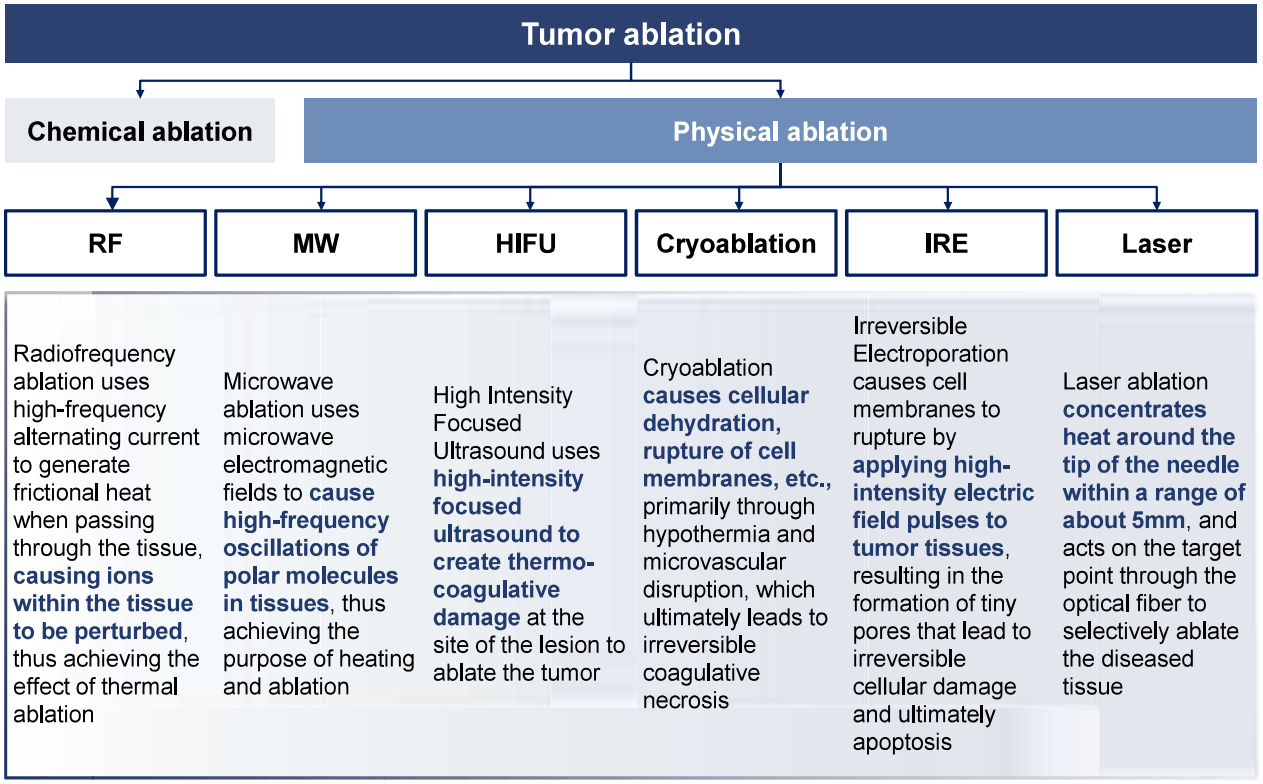
Tumor ablation is a minimally invasive technique that **destroys cancer cells by applying chemicals or energy directly to the area**, and is commonly used to treat tumors of the liver, kidneys, bones, and lungs. Energy is delivered directly to the tumor to freeze, burn or chemically destroy the cancer cells

Chemical ablation

Chemicals such as **PEI, acetic acid and dilute hydrochloric acid** are injected directly into the interior of the tumor to induce necrosis of the tumor tissue through a chemical reaction

Physical ablation

Physical ablation mainly uses **physical energy to generate thermal effect or other physical effects to directly ablate and kill local tumor tissues**, so as to achieve the purpose of tumor treatment



Source: China Insights Consultancy

Different methods have their own advantages. Generally, radiofrequency and microwave remain the main choices for tumor ablation due to their better surgical outcomes and ease of operation for doctors

Comparison of different methodologies for tumor ablation

Classification	Advantages	Disadvantages
Radiofrequency	• Precise and minimally invasive, with good conformability and reduced impact on surrounding tissues, leading to improved overall safety	• Requires a grounding pad, has relatively long ablation time, and is affected by the heat-sink effect.
Microwave	• Non-current conduction and therefore less affected by tissue drying/charring • **Rapid ablation, good results, wide ablation zone**	• Charring zones may affect absorption and energy deposition in the target area
Cryoablation	• No general anesthesia needed, **ablation zone clearly visible on imaging** • Adaptable to tumor shape with multi-probe use, activates anti-tumor immunity	• Risk of lethal complications (e.g., extreme hypothermia, cryoshock), postoperative bleeding and seeding metastasis
Irreversible Electroporation	• Tissue selectivity with minimal heat-based ablation restrictions, avoiding collateral damage to surrounding organs caused by heat conduction	• Difficult needle placement, muscle twitching • Requires general anesthesia
High Intensity Focused Ultrasound	• Minimally or non-invasive • Suitable for deep-seated tumors	• Long treatment time • Irregularly shaped tumors may lead to off-target ablation • Not suitable for air-containing organs
Laser	• Minimal damage to surrounding tissues, short ablation time, and small puncture injury	• Limited ablation range
Chemical	• Simple operation, low cost • Effective for liver tumors <2cm in diameter	• Requires repeated treatments • Difficult to achieve complete ablation for large tumors

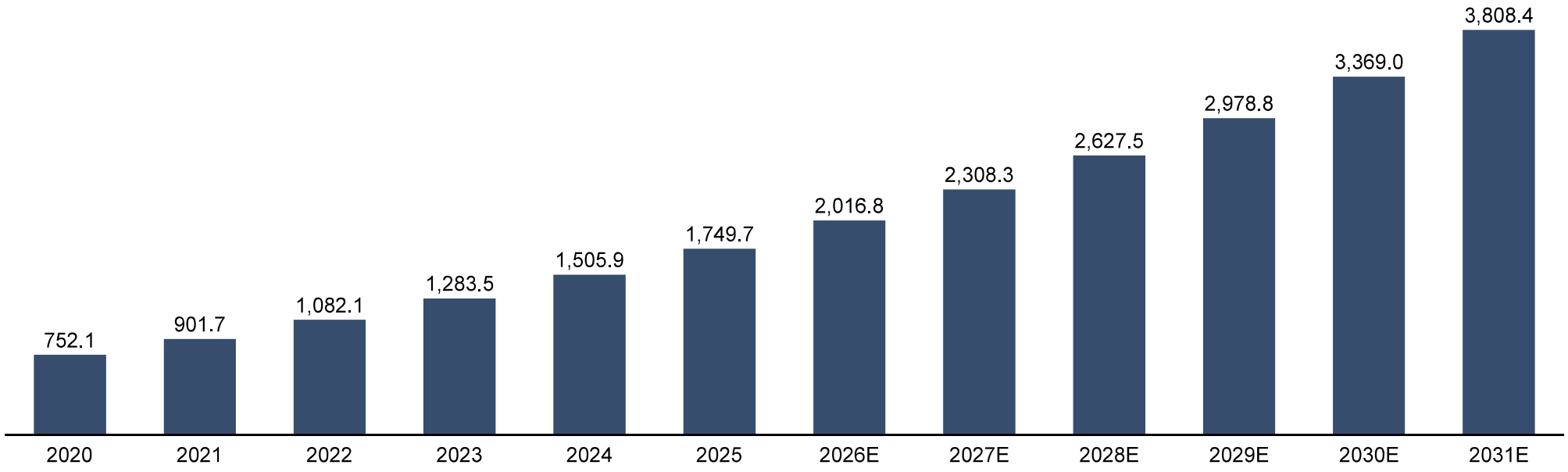
Source: China Insights Consultancy

With the maturity of various ablation technologies, their popularity in China's tumor ablation market has increased year by year, achieving rapid expansion of the tumor ablation market

Market size of tumor ablation in China

CAGR	2020-2025	2026-2031E
Tumor ablation	**18.4%**	**13.6%**

Million RMB



Note: *Calculate In terms of treatment cost*

Source: China Insights Consultancy

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Ablation surgical robot can achieve precise guidance and precise control of the robotic arm through real-time imaging, and realize minimally invasive, high-precision lesion ablation treatment

Definition of percutaneous ablation surgical robots

Percutaneous ablation surgical robot

- The percutaneous ablation surgical robot is an intelligent platform with an **energy generator** (radio frequency or microwave, cryoablation, etc.) **as its core, integrating image navigation and precise execution systems**.
- Its main function is to assist doctors in completing tumor ablation surgery **through real-time spatial positioning and automatic path planning**.

1 Planning Software

- Automatically analyzes CT/MRI images and generates optimized ablation plans

2 Navigation System

- Provides real-time tracking of instruments and tumor targets for precise guidance.

3 Robotic Arm Execution System

- Automatically adjusts the puncture needle position or laparoscope movement according to the planned path

4 Ablation Treatment Module

- Performs controlled thermal ablation to destroy targeted tumor tissue.

Improved accuracy

- Eliminate the hand shaking error of manual puncture

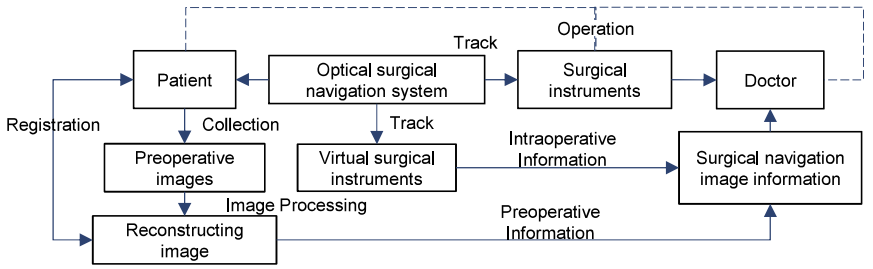
Radiation protection

- Reduce the exposure time of doctors and patients under CT/ultrasound guidance

Standardization of surgical procedures

- Reduce the dependence on doctor experience and improve the repeatability of surgery

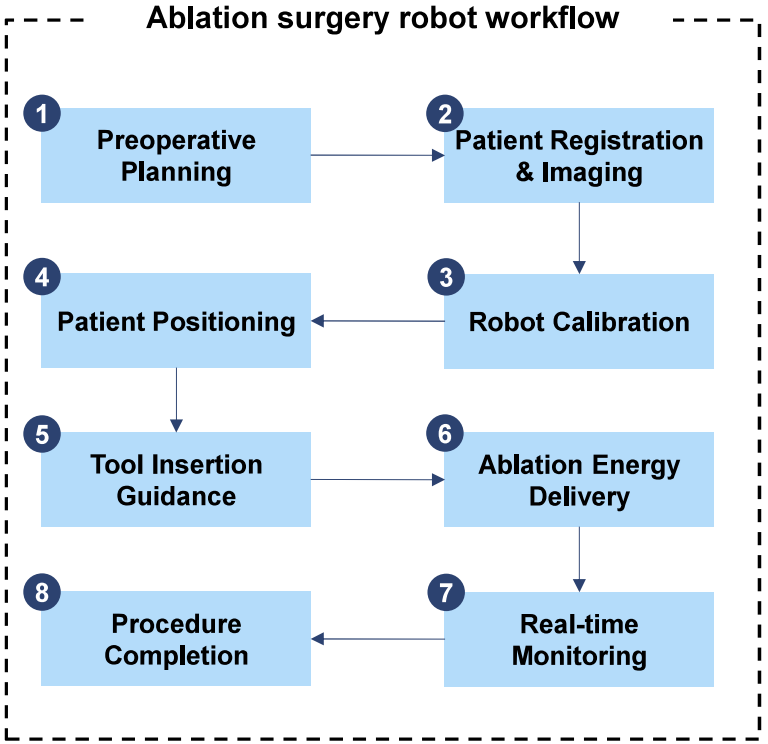
Working principle diagram of the Navigation System



Source: China Insights Consultancy, Chinese Journal of Medical Instrumentation

Percutaneous ablation robots have optimized the entire surgical process, enhanced ablation accuracy, reduced surgical difficulty, and improved the overall level of minimally invasive surgery

Introduction to percutaneous ablation robots



Improve operational precision and accuracy

- The robotic system can **filter out the natural physiological tremor of the doctor's hands**, which is crucial in operations that require millimeter-level precision.

Improving minimally invasive surgery capabilities

- For ablation surgeries on organs that move with breathing, such as liver and kidney tumors, **the robotic system can better track, compensate, and even predict these movements.**
- It can **avoid the need for multiple punctures that could cause harm to the human body**, while keeping the catheter or needle in relatively stable contact with the target tissue, improving the ablation effect.

Shorten the learning curve and improve accessibility

- For some complex ablation surgeries that are highly dependent on hand-eye coordination and spatial perception, the robotic system can lower the technical barrier of operation through an **intuitive control interface and navigation assistance, allowing more doctors to master it.**

Source: China Insights Consultancy

Percutaneous ablation robots have many different types according to the different energy sources of ablation devices, but their core purpose is to provide more advanced ablation methods

Classification of percutaneous ablation surgical robots

	Radiofrequency (RF) Ablation Robot	Microwave Ablation Robot	Cryoablation Robot	Irreversible Electroporation Robot	Laser Ablation Robot
Energy Source	High-frequency alternating current	Electromagnetic waves (915 MHz–2.45 GHz)	Argon/helium gas	Pulsed electric fields	Laser
Mechanism of Action	Heat generation (50–100° C) via ionic agitation	Dielectric heating (tissue water molecules)	Freezing (-40° C to -100° C) → cellular necrosis	Non-thermal cell membrane perforation	Photothermal coagulation
Clinical Applications	Liver, kidney, bone, lung tumors	Liver, lung, thyroid, soft tissue tumors	Prostate, breast, renal tumors	Pancreatic, liver tumors near vessels	Brain, liver, small tumors
Advantages	Precise control, mature technology	Faster heating, larger ablation volumes	Minimal pain, real-time ice-ball imaging	Preserves vessels/bile ducts	Ultra-precise, minimal invasiveness
Limitations	Limited ablation zone, heat sink effect	Potential collateral thermal damage	Risk of cracking adjacent tissues	Requires general anesthesia	Limited penetration depth
Approval	×	✓	×	×	×

Source: China Insights Consultancy

China's percutaneous ablation robot market is still in the early stages of commercialization, with only a few companies entering the field; Among them, only TrueHealth has obtained certification from the NMPA

The percutaneous ablation surgical robot approval list by NMPA

Registration Certificate Number	Company	Type	Product name	Approval date
国械注准20243011651	TrueHealth	Domestic	TH-X MW	2024-09-02
国械注准20253012212	TrueHealth	Domestic	TH-X HMW	2025-11-04

Key Insights

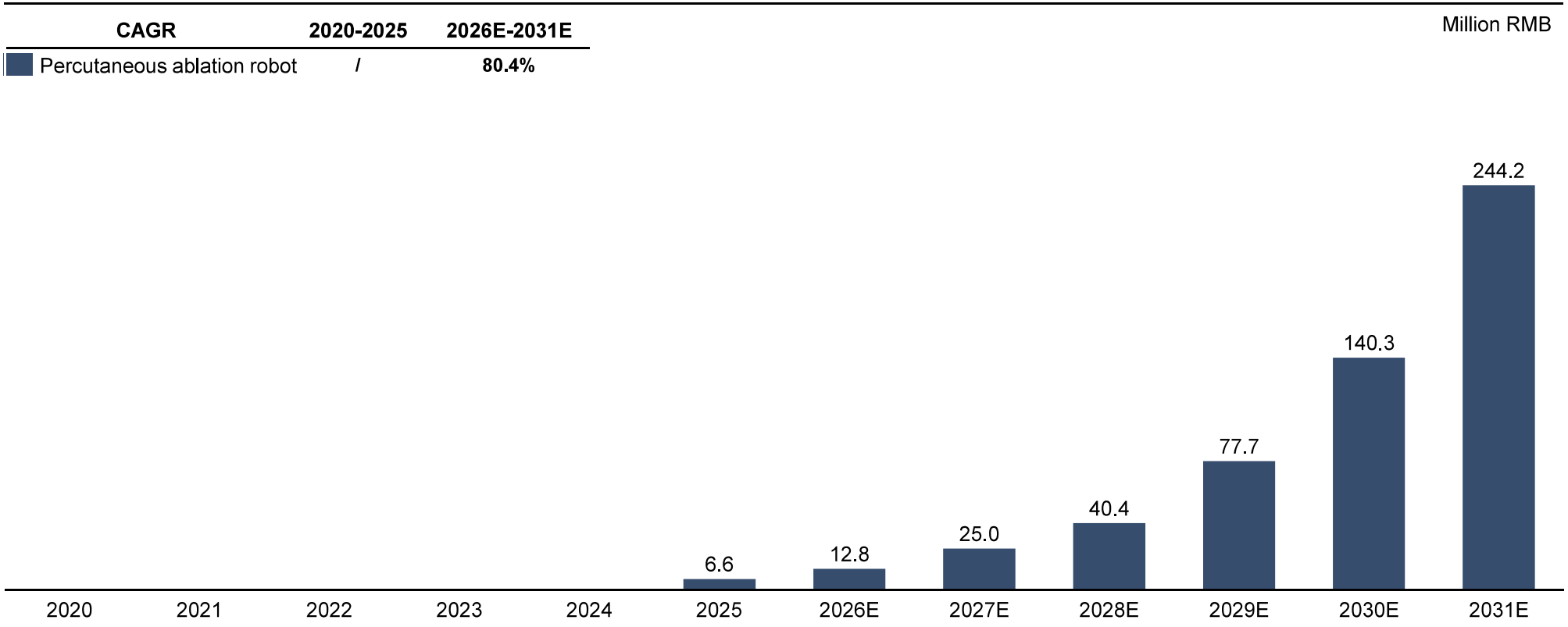
- At present, several cleared percutaneous puncture robots can be used in microwave ablation workflows when paired with compatible microwave generators and probes. Representative examples include XACT ACE and Quantum Surgical Epione®. These products operate as navigation and robotic insertion platforms and are used together with third-party microwave energy devices rather than providing an integrated ablation module. In contrast, our company's Navigational Positioning Microwave Ablation System in China is described as an integrated solution that combines puncture navigation and microwave energy delivery, and has been designated by the NMPA as "the first system of its kind worldwide". Aside from our company's products, no approved percutaneous microwave ablation surgical robot has been identified that natively integrates both puncture navigation and microwave ablation within a single platform.

Source: China Insights Consultancy, NMPA

With the maturity of various ablation technologies, their popularity in China's tumor ablation market has increased year by year, achieving rapid expansion of the tumor ablation market

China's percutaneous microwave ablation surgical robot market size, 2020-2031E

CAGR	2020-2025	2026E-2031E
Percutaneous ablation robot	/	**80.4%**



Source: China Insights Consultancy

Due to the impact of multiple forces on the demand side and application side, China's percutaneous ablation surgical robot market is developing into systematic medical solutions

Growth drivers and future trends of China's percutaneous ablation surgical robot market

Broader access and indications

- China's uneven distribution of medical resources is driving demand for standardized, minimally invasive tumor treatments that can be supported remotely, with percutaneous ablation surgical robots expected to help extend specialist care to less-developed regions. At the same time, clinical use is anticipated to expand beyond historically concentrated liver and thyroid indications to additional anatomical sites and into broader multidisciplinary care settings. As new indications are validated and incorporated into routine practice, the addressable patient population and procedure volumes are expected to increase, supporting a larger installed base of percutaneous ablation surgical robots.

Technology iteration-driven integrated ablation upgrade

- With continued technology iteration, percutaneous ablation surgical robots are shifting from stand-alone navigation platforms paired with separate energy devices to integrated systems that combine puncture planning, robotic execution and microwave energy delivery within a unified architecture. Integrated robots can better align the actual ablation zone with the planned target volume, and reduce reliance on manual coordination between different devices.

1:Uribe Rivera, A. K., Seeliger, B., Goffin, L., García-Vázquez, A., Mutter, D., & Giménez, M. E. (2024). Robotic Assistance in Percutaneous Liver Ablation Therapies: A Systematic Review and Meta-Analysis. Annals of Surgery Open, 5(2), e406.

Source: China Insights Consultancy

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Organ transport robot is technologically revolutionary, with its real-time monitoring and adaptive perfusion system helping to extend the critical time window for life-saving transplants

Introduction of organ transport robots

Organ transport

Organ transport refers to the process of safely and quickly **transferring human organs for transplantation such as hearts, livers, kidneys, lungs, pancreas, etc.**, from the medical institution where the donor is located to the medical institution where the recipient is located through specific transport methods and procedures

Organ transport robot

Organ transport robots refer to robots that are no longer limited conventional mechanical perfusion preservation, but rather, through real-time monitoring of key physiological indicators of the organ, the algorithm **dynamically adjusts the perfusate to continuously provide a microenvironment close to the physiological state for the isolated organ**

Organ extraction

Organ donation

Workflow of organ transplantation

Post-operation follow-up

Organ transplantation

Organ Preservation & Transport

Conventional organ transport	Organ transport robot
Specialized organ carriage unit	Support multiple organs
Rely on clinical decisions made by medical staff	Big data multimodal algorithm
Low temperature	Sub-ambient /normal temperature

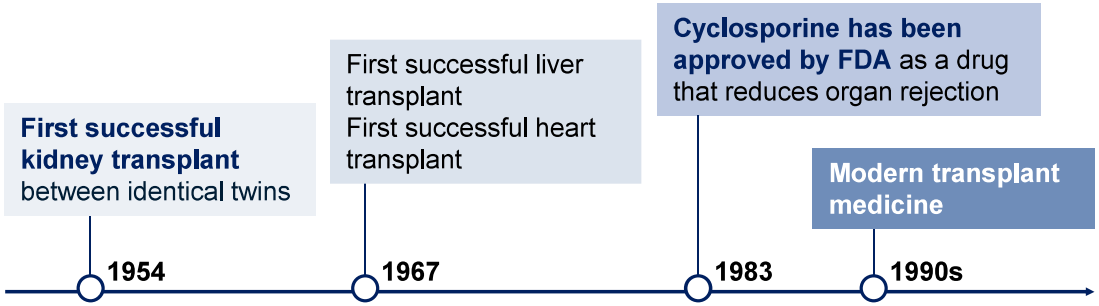
Source: China Insights Consultancy

Organ transplantation can significantly improve the quality of life of recipients and even give them a second life; therefore, organ transplantation is receiving increasing attention as a treatment method

Reason of organ transplantation

Organ transplantation

- Organ transplantation refers to a therapeutic approach that involves surgically transplanting an individual's organs **as a whole or in part into their own body or a specific part of another individual**
- A donor is an individual who provides an organ in a transplant surgery
- A recipient is an individual who receives the graft in a transplant surgery
- **Both the donor and the recipient can be autologous or allogeneic**



Needs of organ

- **Disease**: Many diseases can damage organs, such as cancers, leading to failure. Examples include kidney failure, liver failure, heart failure, lung failure and etc.
- **Injury**: Trauma or accidents can cause severe organ damage, necessitating transplantation
- **Genetic Conditions**: Certain genetic disorders, like cystic fibrosis or heart defects, can lead to organ failure
- **Other Factors**: Chronic conditions like diabetes and hypertension can also contribute to organ damage and eventual failure

Organ Transplantation

Improvement of recipient life

- **Saving Lives**: For those with end-stage organ failure, transplantation is often the only way to survive
- **Improving Quality of Life**: Transplantation can eliminate the need for dialysis, improve breathing, restore vision, and allow for a more normal lifespan
- **Providing a Second Chance**: It can offer a fresh start for individuals with life-threatening conditions
- **Treating Chronic Illnesses**: Transplantation can be a curative therapy for conditions like end-stage liver disease or severe diabetes

Source: The history of organ transplantation; Why Is Organ Transplantation Clinically Important; China Insights Consultancy

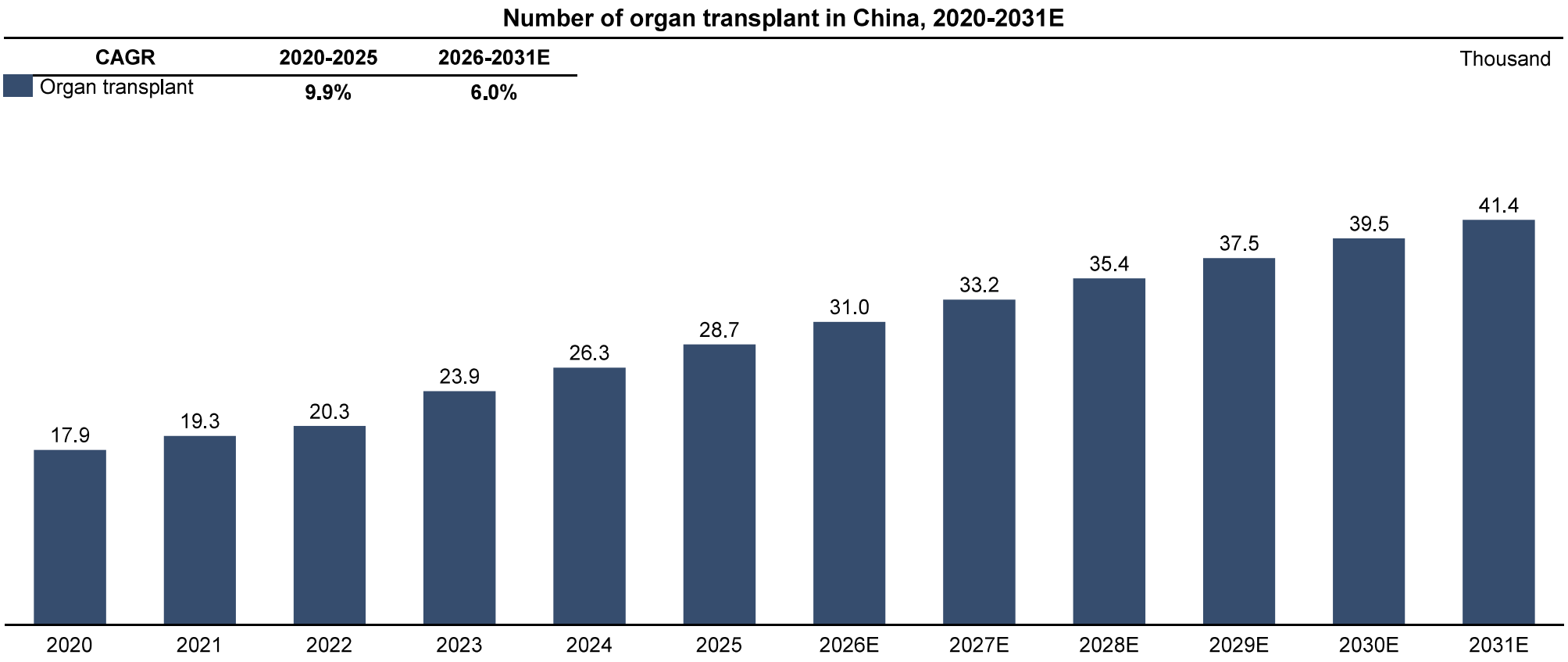
Needs of Organ Preservation

Needs of Organ Preservation

Needs	Description
Reducing ischemic injury and maintaining organ viability	• Cold static storage and low oxygen supply leading to function decline. Under conventional cold static storage, organs experience low oxygen supply, and their function progressively declines due to cold ischemia.
Stabilizing the physical environment and lowering the risk of mechanical damage during transfer	• With standard boxes, repeated handovers and long-distance transport can expose organs to vibration, compression and impact. There is a clinical need for carrier systems that provide stable support and dampen external shocks across ground transport, flights and handovers, helping to keep organ conditions consistent and reduce quality loss from physical damage.
Improving the controllability of preservation duration	• In real-world transport, traffic delays, flight waiting times and mismatches between transport and surgical schedules can cause organs to exceed the intended cold-storage window. Clinicians therefore need preservation systems that can maintain near-physiological or sub-physiological temperatures for longer periods and continuously monitor perfusion and oxygenation, rather than relying solely on cold immersion and passive insulation, so as to slow irreversible functional decline and extend the transplantable window.
Enabling real-time preoperative assessment to improve transplant success	• Under current practice, organs often lack continuous, quantitative functional evaluation before arrival, and transplant teams must quickly decide whether an organ remains usable. Clinical demand is therefore shifting from simple preservation to full-process monitoring and dynamic assessment, with continuous recording of perfusion, viability and functional indicators during transport to determine in advance whether the organ is still suitable for transplantation.

Source: Pursell, A., & Kumar, D. (2024). Impact of machine perfusion on transplant infectious diseases: New challenges and opportunities. Transplant infectious disease: an official journal of the Transplantation Society, 26 Suppl 1; China Insights Consultancy

Number of organ transplant in China, 2020-2031E



Source: China Insights Consultancy

Driven by the critical organ shortage, policies support and technological advancements, hospitals will increasingly adopt organ transport robots to protect the organs and improve transplant outcomes

Growth drivers of organ transport robot market

Critical Organ Shortage

- The severe global shortage of viable organs for transplantation creates urgent demand for technologies that can salvage and repair damaged organs. With over 100,000 Americans on organ waiting lists and only about 40,000 transplants performed annually, there's a massive gap between supply and demand. In China, a total of 160,767 patients with organ failure were waiting for organ transplants in 2023. Organ transport robots **represent a crucial solution by potentially converting previously unusable organs into viable transplant candidates, effectively expanding the donor pool without requiring additional donors**

Healthcare Policies Support

- Government initiatives like the U.S. HRSA's organ procurement and transplantation network funding , *China's Guidelines on Promoting the Healthy Development of Human Organ Donation Work* (《关于促进人体器官捐献工作健康发展的意见》) and the EU's Horizon Europe health research programs **provide substantial financial support for medical device innovation**.
- During the 2024 National Two Sessions conferences, the submission of the proposal *Promoting the Development of High-tech Fields in Organ Mechanical Perfusion Preservation and Repair in China* (《推动我国器官机械灌注保存与修复高新技术领域发展的提案》) will **strengthen the research layout related to organ mechanical perfusion preservation and repair and increase support**

Technological advancements

- Integrating machine learning algorithms with real-time sensor data enables robots to continuously optimize organ conditions and restore the internal environment as much as possible. Meanwhile, the AI model can detect the subtle changes in perfusion parameters and **dynamically adjust the settings to enhance the organ's viability and reduce the risk of injury**
- Combining machine perfusion with regenerative reagents such as mesenchymal cells allows for **improved organ function during transport, expanding the number of transplantable grafts, facilitating their acceptance after transplantation**, which may revolutionize the practice in the field of solid organ transplantation in the future

Source: Combination of mesenchymal stromal cells and machine perfusion is a novel strategy for organ preservation in solid organ transplantation, China Insights Consultancy, NIH

Confirmation (1/2)

#	Confirmed content
1	As of the Latest Practicable Date, according to publicly available information from the ICTRP, ClinicalTrials.gov and ChiCTR databases, 5 products from 5 companies were under clinical trials or in the process of obtaining relevant medical device registration certificates in relation to percutaneous puncture surgical robots.
2	Historically, from 2020 to 2025, the average procurement price of the UR robotic arm ranged from approximately RMB130,000 to RMB153,000 per unit, with a price increase in 2025 primarily attributable to the procurement of a higher-specification model. During the same period, the average procurement price of the optical vision system host ranged from approximately RMB120,000 to RMB148,000 per unit, influenced by procurement volume, supplier changes, and model upgrades or replacements. In particular, the procurement price was relatively higher in 2023 due to a model update and relatively low procurement volume, but as procurement volume increased thereafter, the average price gradually decreased. The Company expects these cost fluctuations to remain manageable and does not anticipate significant volatility, and intends to mitigate any impact through supplier management, procurement planning, and evaluation of alternative solutions. Regarding labor costs, the average cost attributable to manufacturing the surgical robot ranged from approximately RMB11,000 to RMB33,000 from 2020 to 2025, with a significant decrease in 2024 mainly due to increased production volume improving per-unit labor allocation. Labor costs are expected to rise moderately over time in line with general wage inflation and the growing need for skilled personnel, but such increases are not expected to materially affect the overall cost structure given the gradual pace and relatively limited proportion of labor costs compared with total system costs.
3	Favorable policy support: Policy support is expected to drive the development and adoption of percutaneous puncture surgical robots in China by improving the innovation, regulatory and clinical application environment for robot-assisted procedures. For example, in January 2026, the NHSA issued the Guidelines for the Establishment of Items for Surgical and Therapeutic Auxiliary Procedures (Trial) (《手術和治療輔助操作類醫療服務價格項目立項指南(試行)》, which established a unified national framework for robot-assisted procedure pricing and standardized categories based on the robot's level of participation. This helps address the historical lack of medical service fee items for surgical robot-assisted percutaneous puncture procedures. Such policy developments are expected to facilitate commercialization, improve hospital adoption conditions and accelerate the broader penetration of percutaneous puncture surgical robots in China.
4	Manual percutaneous puncture remains the predominant approach for manminimally invasive procedures in current clinical practice, and robot-assisted percutaneous puncture still at a nascent stage of adoption. As a result, the current addressable market for percutaneous puncture surgical robots is small, notwithstanding expectations of significant long-term growth.
5	Globally, favourable policies and regulatory developments are also supporting surgical robotics. In the US, the FDA has recognized consensus standards relevant to robotically assisted surgical devices, including IEC 80601. In Saudi Arabia, the SFDA's Recognized Standards also include IEC 80601-2-77, which specifies the particular requirements for the basic safety and essential performance of robotically assisted surgical equipment. The EU supports the development of medical robotics and AI-enabled medical devices through research funding programmes such as Horizon Europe. In South America, Brazil's decision to incorporate robot-assisted radical prostatectomy into the Brazilian Unified Health System (SUS), signals growing public reimbursement support for selected robot-assisted procedures.

Source: China Insights Consultancy

Confirmation (2/2)

#	Confirmed content
6	For the overall surgical robot market, the entry barriers are broader and more platform-based. Market participants are required to develop multidisciplinary capabilities across robotic control, surgical instruments, software systems, imaging integration, human-machine interaction and system safety, while ensuring that the robotic platform can operate reliably and accurately in complex surgical environments. The development and commercialization of surgical robots also require substantial capital investment and long development cycles, covering product design, engineering validation, clinical evaluation, regulatory approval, manufacturing scale-up and post-market support. In addition, companies need to establish comprehensive surgeon training systems to support clinical adoption, as physicians generally require structured training and hands-on experience before routinely using robotic systems in surgical procedures. After commercialization, companies must also build after-sales service networks capable of providing installation, maintenance, technical support, consumables supply and timely troubleshooting to hospitals. As surgical robots typically involve significant hospital procurement expenditure and are closely associated with surgical safety and clinical outcomes, brand recognition, physician trust and hospital relationships are also important factors affecting market entry and long-term competitiveness.
7	Prostate cancer, one of the more common malignancies among men in China, was estimated at 171.3 thousand cases in 2025 and is expected to reach 253.6 thousand by 2031, implying a CAGR of 6.6% from 2026E to 2031E. In addition, retroperitoneal diseases, a category encompassing neoplastic and non-neoplastic conditions arising in the retroperitoneal space and its structures, were estimated to have an incidence of about 24.5 thousand people in 2025, increasing to 25.4 thousand by 2031.
8	The percutaneous puncture surgical robot market is a relatively nascent and highly specialized segment of the surgical robotics industry and is subject to relatively high entry barriers. Products in this segment typically involve high-precision navigation, imaging coordination and clinical intervention during puncture procedures, and are therefore subject to stringent regulatory approval requirements, including product registration, technical review, clinical evaluation and, where applicable, clinical trials. As this is an emerging market with relatively low market awareness, market participants also need to accumulate sufficient clinical data and obtain recognition from physicians and hospitals, with the safety, effectiveness and compatibility of their products with clinical workflows subject to validation. Furthermore, new entrants face hospital procurement and commercialization barriers, as procurement decisions are typically influenced by factors such as regulatory status, clinical evidence, physician acceptance, pricing, after-sales service, training support and hospital budget cycles. Current policy initiatives in China support the broader surgical robot market, but do not appear to provide direct national-level subsidies specifically for percutaneous puncture surgical robots. As such, these policies are not expected to materially reduce entry barriers for new entrants in this market. Accordingly, companies that have obtained product approvals, accumulated clinical experience, established physician networks and secured hospital access are generally better positioned than new entrants in this market.
9	China's target patients for percutaneous microwave ablation surgical robots are defined as individuals who, after completing diagnostic evaluation in accordance with clinical practice guidelines, are deemed clinically eligible for percutaneous microwave ablation. Examples include patients who, after imaging assessment and percutaneous biopsy, are confirmed to have positive liver nodules presenting as a single tumor with a diameter 5 cm, or 2–3 tumors with a maximum diameter 3 cm, or who are found intra-operatively to be unsuitable for surgical resection, as well as patients with malignant pulmonary nodules whose cardiopulmonary function cannot tolerate surgical resection. According to this definition, the potential target patients for percutaneous microwave ablation surgical robot in China increased from 2.9 million in 2020 to 4.4 million in 2025, representing a CAGR of 8.6%. It is projected to rise further to 5.8 million by 2031, implying a CAGR of 4.3% from 2026 to 2031. Ongoing normalization of screening for liver, pulmonary and breast nodules and improved imaging availability contribute to earlier detection and a higher proportion of patients suitable for minimally invasive local therapy.

Source: China Insights Consultancy