

BIO Collaborate

Mar.2023 & Apr.2023



MEDICAL
ROBOTS

医疗机器人

天府生命科技园
Tianfu Life Science Park

在人工智能高速发展,医疗信息化进程加快的大环境下,医疗行业的智能化升级成为各国极为关注的重点。其中,医疗机器人便是竞争激烈的技术和战略布局关键。

In the context of the rapid development of AI and the accelerated process of medical informatization, the intelligent upgrading of the medical industry has become the focus of attention worldwide. Among them, medical robots have emerged as a competitive technology and a key component of strategic planning.

Bio
Tianfu

VOL. 34

成都高投生物医药园区管理有限公司 编
By CDHT Investment Group Biomedicine Industrial Park
Management Co. Ltd

内部资料 仅供参考

BIO Collaborate

天府生命科技园

Add. / 地址: 成都市高新区科园南路88号

Tel. / 电话: 028-8605 8168 028-8531 1525

成都前沿医学中心一期

Add. / 地址: 成都市高新区新川路2222号

Tel. / 电话: 028-8532 6166 028-6110 8918

成都前沿医学中心二期

Add. / 地址: 成都市高新区新川路2222号东侧

Tel. / 电话: 028-8605 8168 028-8597 6074

成都前沿医学中心三期

Add. / 地址: 成都市高新区新川路2222号西侧

Tel. / 电话: 028-8605 8168 028-8597 6074

成都高投生物医药园区管理有限公司

成都高新区科园南路88号天府生命科技园管理楼 (天府生命科技园办公地址)

成都高新区和民街366号成都前沿医学南中心E1栋 (成都前沿医学中心一期办公地址)



扫码关注园区公众号
获取更多园区新闻、行业动态



INDEX.

01.

Preface

卷首语 02 - 03

02.

Industry News

行业资讯 04 - 07

03.

Industry Insight

行业洞察 08 - 17

04.

In-depth Interview/Corporate Style

深度对话/企业风采 18 - 25

05.

Leading Edge

前沿引领 26 - 29

06.

Park Dynamics

园区动态 30 - 41

07.

Innovation Ecology

创新生态 42 - 49

01

卷首语 Preface

PREFACE



CHAPTER I

MEDICAL ROBOTS

在人工智能高速发展，医疗信息化进程加快的大环境下，医疗行业的智能化升级成为各国极为关注的重点。其中，医疗机器人便是竞争激烈的技术和战略布局关键。医疗机器人融合了医学、机械制造、人工智能、大数据等多学科的知识，是高端智能医疗装备的代表，现已被广泛应用于手术、康复、诊断和服务等场景。

In the context of the rapid development of AI and the accelerated process of medical informatization, the intelligent upgrading of the medical industry has become the focus of attention worldwide. Among them, medical robots have emerged as a competitive technology and a key component of strategic planning. Medical robots integrate knowledge from multiple disciplines such as medicine, mechanical manufacturing, AI, and big data. They represent high-end intelligent medical equipment and have been widely applied in surgery, rehabilitation, diagnosis, service, etc.

我国医疗机器人相对欧美发达国家起步较晚。但近年，我国医疗机器人产业发展较快，产学研结合逐步深入，创新产品不断涌现，应用深度广度持续拓展，市场规模逐步扩大，涵盖二类医疗器械、三类医疗器械与非医疗器械类医疗机器人等范畴，逐步形成以京津冀、长三角、珠三角等地区为引领的产业集聚态势。这离不开我国陆续出台的医疗机器人技术研发、应用推广相关政策。尤其是在《“十四五”机器人产业发展规划》发布后，智慧医院建设所需的全系列医疗机器人开发都得到了重视，我国医疗机器人产业进入飞速发展时期。据不完全统计，2022年，我国机器人行业共发生358起重要投融资事件，已披露融资金额总计约在400亿~500亿元，涉及十多个细分领域，其中医疗机器人相关领域发生的投融资事件较多，位居第二。足见医疗机器人目前已成为医疗器械市场最活跃的一份子。但医疗机器人研发涉及多学科交叉，研发难度大，目前自动化水平尚低，未来我们还需实现交叉学科专业与产业链、创新链、人才链相互匹配、相互促进，进一步推动医疗机器人产业健康稳定发展。

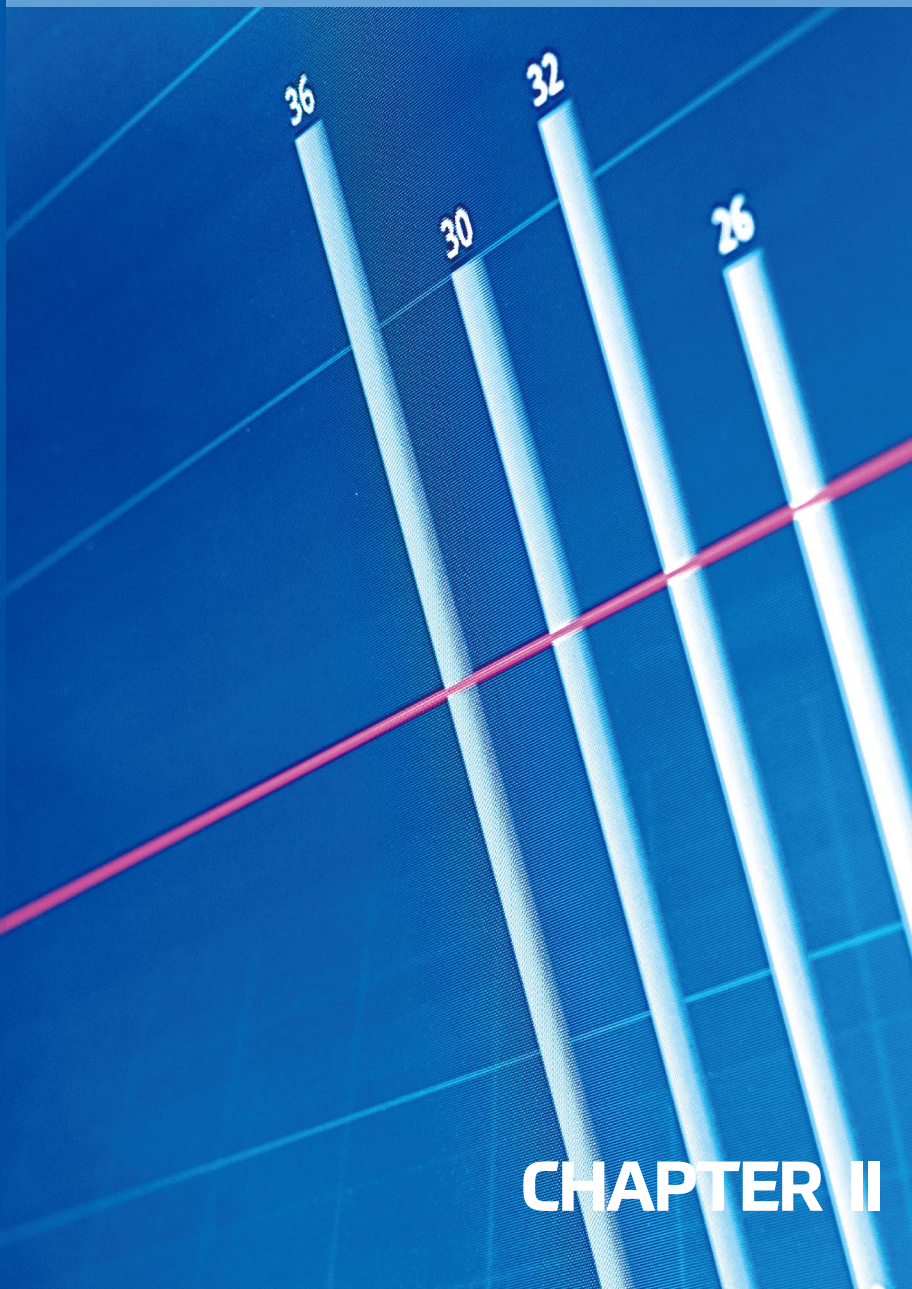
China started relatively late in the field of medical robots compared to developed countries in Europe and the United States. However, in recent years, China's medical robot industry has grown rapidly as the integration of industries, universities, and research institutions has deepened gradually, leading to the emergence of innovative products and the expansion of application scope in depth and breadth. The market size has gradually expanded to include categories such as Class II medical devices, Class III medical devices, and non-medical device medical robots, gradually forming an industrial cluster led by the Beijing-Tianjin-Hebei, Yangtze River Delta, and Pearl River Delta. This progress is inseparable from the policies issued by China in technology R&D and application promotion of medical robots. Especially after the release of the 14th Five-Year Plan for the Development of the Robot Industry, the development of a full range of medical robots required for smart hospital construction has received significant attention, propelling the rapid development of China's medical robot industry. According to incomplete statistics, China's robot industry experienced a total of 358 significant investment or financing events in 2022, with disclosed financing totaling approximately RMB 40-50 billion, covering more than 10 subsectors, with medical robot-related investment and financing events ranking second in frequency. It is evident that medical robots have become the most active players in the medical device market. However, medical robot research and development involve interdisciplinary collaboration, with significant challenges and low levels of automation. In the future, it is necessary to achieve the mutual matching and promotion of interdisciplinary expertise, industrial chains, innovation chains, and talent chains to further promote the healthy and stable development of the medical robot industry.

02

／

行业资讯
Industry News

INDUSTRY
NEWS



CHAPTER II

INDUSTRIAL NEWS

● LIVE

行业资讯

工业和信息化部等十七部门印发“机器人+”应用行动实施方案

17 Departments Including the Ministry of Industry and Information Technology Issue the Implementation Plan for “Robot+” Application Action

2023年1月18日，工信部等十七部门印发《“机器人+”应用行动实施方案》（下称《方案》）。《方案》聚焦经济发展和民生十大应用重点领域，涵盖制造业、农业、医疗健康、养老服务等，提出要突破100种以上机器人创新应用技术及解决方案，推广200个以上具有较高技术水平、创新应用模式和显著应用成效的机器人典型应用场景，打造一批“机器人+”应用标杆企业，建设一批应用体验中心和试验验证中心。

On January 18, 2023, 17 Departments Including the Ministry of Industry and Information Technology issued the Implementation Plan for “Robot+” Application Action (hereinafter referred to as the Plan). The Plan focuses on 10 key application areas in economic development and people’s livelihood, including manufacturing, agriculture, medical health, and elderly care services. It proposes to break through more than 100 innovative robot application technologies and solutions, promote over 200 robot typical application scenarios with high technical levels, innovative application models, and significant effects, and build a group of benchmark enterprises for “Robots +” application, as well as establish a batch of application experience centers and test verification centers.

就医疗健康领域，《方案》提出要研制咨询服务、手术、辅助检查、辅助巡诊、重症护理、急救、生命支持、康复、检验采样、消毒清洁等医疗机器人产品；围绕神经系统损伤、损伤后脑认知功能障碍、瘫痪助行等康复治疗需求，突破脑机交互等技术，开发用于损伤康复的辅助机器人产品。

In the field of medical health, the Plan proposes the development of medical robot products for consultation services, surgery, auxiliary examinations, auxiliary rounds, critical care, emergency treatment, life support, rehabilitation, specimen collection for testing, and disinfection and cleaning. Furthermore, it emphasizes breakthroughs in technologies such as brain-machine interaction to address rehabilitation treatment needs for nervous system impairment, cognitive impairment after traumatic brain injury, and paralysis by developing assistive robot products specifically designed for injury rehabilitation.

《方案》提出，到2025年，国内制造业机器人密度较2020年实现翻番，服务机器人、特种机器人行业应用深度和广度显著提升，机器人促进经济社会高质量发展的能力明显增强。

The Plan sets a goal for 2025, aiming to double the density of domestic manufacturing robots compared to 2020, significantly enhance the depth and breadth of application in the service robot and special robot industries, and visibly strengthen the capability of robots to promote high-quality economic and social development.

“Robot+”

2023中国生物医学工程大会暨创新医疗峰会召开

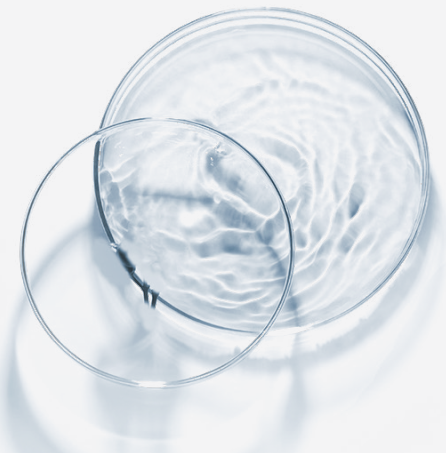
Opening of the 2023 China Biomedical Engineering Conference & Medical Innovation Summit

2023年5月19日，以“医工融合发展 创新引领未来”为主题的2023中国生物医学工程大会暨创新医疗峰会(BME2023)在苏州金鸡湖国际会议中心开幕，第十二届国际医学与生物工程联合会(IFMBE)亚太区医学和生物工程大会同期召开。大会由中国生物医学工程学会主办，东南大学、中国医学科学院系统医学研究院/苏州系统医学研究所等单位承办。大会报告精彩纷呈，探讨的主题包括转化神经科学、纳米显微镜及相关技术、医疗机器人、分子吸收光声层析成像以及中国医疗器械创新研发的挑战与机遇等。



On May 19, 2023, the 2023 China Biomedical Engineering Conference & Medical Innovation Summit (BME2023), themed "Develop with Integration of Medicine and Engineering · Lead the Future through Innovation", opened at the Suzhou Jinji Lake International Convention Center. The 12th IFMBE Asian Pacific Conference on Medical and Biological Engineering (APCMBE2023) was held concurrently. The conference was hosted by the Chinese Society of Biomedical Engineering, and organized by Southeast University and Institute of Systems Medicine, Chinese Academy of Medical Sciences/Suzhou Institute of Systems Medicine. The conference featured exciting presentations and discussions on various topics, including translational neuroscience, nano microscope and related technologies, medical robots, molecular-absorption photoacoustic tomography, and challenges and opportunities in the innovation and development of medical devices in China.

Conference & Medical Innovation Summit



会议设置17个专题论坛，18个分会场，以及多个项目路演和卫星会议，进行广泛深入的学术交流和成果展示。会议特别关注生物医学工程前沿，就包括医学人工智能、医学影像、医用机器人、生物传感器、生物制造、生物医学工程教育、医疗器械全链条发展等热点问题进行深入交流和探讨。发展高端医疗器械，服务国家大健康战略是当前国家重要的发展方向之一。本次大会会有多个论坛涉及医疗器械研发、制造和应用等有关医疗器械创新发展的内容，探讨医疗器械创新发展趋势，推动将最前沿、最合适的科学技术应用于临床。相信将对国内医疗器械企业的发展具有重要的推进意义。

The conference comprised 17 specialized forums and 18 sub-venues, as well as various project roadshows and satellite meetings, with extensive and in-depth academic exchanges and achievement exhibitions. The conference paid special attention to the forefront of biomedical engineering and engaged in in-depth exchanges and discussions on hot topics such as medical artificial intelligence, medical imaging, medical robots, biosensors, bio-manufacturing, biomedical engineering education, and the full-chain development of medical devices. Developing high-end medical devices to serve the national Healthy China strategy is one of the country's important development directions. Several forums at the conference covered topics related to the R&D, manufacturing, and application of medical devices, exploring trends in the innovative development of medical devices and promoting the application of cutting-edge and optimum scientific technologies in clinical practice. It is believed that the conference will have significant implications for the development of domestic medical device enterprises.

歌锐科技“牛顿3D”获批第三类医疗器械注册许可证

Great Robotics' "NewDawn 3D" Obtains Class III Medical Device Registration Certificate



2023年5月24日讯，北京歌锐科技有限公司（以下简称“歌锐科技”）“牛顿3D”（NewDawn 3D）系列智能术中移动影像获得国家药品监督管理局（NMPA）审批的第三类医疗器械注册许可证。该产品为全球首款数字化全电动8轴一体化术中移动影像系统。

It is reported on May 24, 2023, that Great Robotics Co., Ltd. (hereinafter referred to as "Great Robotics") obtained approval from the National Medical Products Administration (NMPA) for the Class III Medical Device Registration Certificate for its "NewDawn 3D" series of intelligent intraoperative mobile imaging. This product is the world's first digital all-electric 8-axis integrated intraoperative mobile imaging system.

歌锐科技“牛顿3D”融合了智能移动机器人和高精度协作机器人的灵巧设计，既可以像智能电动汽车一样，配备高性能电池，支持超长距离纯电行驶，在待机情况下进行快捷手术转场、灵敏手术摆位和精准病灶定位，摆脱了反复连接电源、重新启动的困扰，节省了时间，操作更高效；又可以像高精度协作机器人一样，敏捷、安全、可靠地进行摆位，完成高精度术中高速扫描。同时，歌锐科技还开发了智能远程手术元宇宙软件和专用的远程5G机器人手术操控台，可以让医师在5G通讯技术的支持下，进行远程主从式的精准手术操作。

Great Robotics' "NewDawn 3D" combines the ingenious design of intelligent mobile robots and high-precision collaborative robots. Equipped with high-performance batteries like electric vehicles, it enables long-distance pure electric travel and allows quick surgical transitions, flexible surgical positioning, and precise lesion localization in standby mode, eliminating the hassle of repeatedly connecting to power sources and restarting, saving time, and improving operational efficiency. It also functions as a high-precision collaborative robot, capable of agile, safe, and reliable positioning and high-speed scanning during surgery. Additionally, Great Robotics has developed intelligent remote surgery metaverse software and dedicated remote 5G robot surgical console, enabling surgeons to perform precise remote surgeries in a master-slave mode supported by 5G communication technology.

爱博医疗机器人成功完成1亿元A轮融资

Abrobo Has Successfully Raised RMB 100 Million in Series A Financing



2023年6月1日讯，深圳市爱博医疗机器人有限公司（以下简称“爱博医疗机器人”）宣布成功完成1亿元人民币A轮融资，本次融资由国中资本领投，老股东联想创投超额追加投资，长岭资本连续跟投。

It is reported on June 1, 2023, that Shenzhen Abrobo Medical Robot Co., Ltd. (hereinafter referred to as "Abrobo") announced it had successfully raised RMB 100 Million in Series A Financing. This round of financing was led by Guozhong Capital, with additional investment from existing shareholder Lenovo Capital and continuous participation from Long Hill Capital.

爱博医疗机器人凭借原研技术和医工融合产品，在成立后三年内完成四轮融资。公司从成立之初便将神经介入等临床需求作为手术机器人研发的重点，并研发出具有完全自主知识产权的泛血管介入机器人。其第一代产品已进入人体临床试验阶段，第二代产品即将进入型式检验阶段；另外，公司已经布局了368项国内外专利（含美国、欧盟、日本、印度、俄罗斯等），已授权专利达134项。爱博医疗机器人将利用本轮融资所得资金，加快新一代泛血管介入机器人的临床入组，推动智能化血管介入机器人技术平台的建设，并加强人才团队的综合能力建设，持续提升公司的综合竞争力。

With its original research technology and integration of medical engineering products, Abrobo has completed four rounds of financing within three years of its establishment. Since its establishment, the company has prioritized the development of surgical robots for clinical needs such as neuro-intervention and has successfully developed a vascular intervention robot with completely independent intellectual property rights. Its first-generation product has entered the human clinical trial phase, and the second-generation product is about to enter the prototype testing phase. Additionally, the company has filed for 368 patents at home and abroad (including the United States, European Union, Japan, India, Russia, etc.), with 134 patents already granted. With the funds raised in this round of financing, Abrobo will accelerate the clinical enrollment of the next-generation vascular intervention robot, promote the development of an intelligent vascular intervention robot technology platform, and strengthen the comprehensive capacity building of its talent team, continuously enhancing the company's overall competitiveness.

03

行业洞察
Industry Insight

INDUSTRY
INSIGHT

CHAPTER III



INDUSTRY INSIGHT

医疗机器人
Medical robots

01

医疗机器人概述
Introduction of medical robots

1.1 医疗机器人的概念

1.1 Concept of medical robots

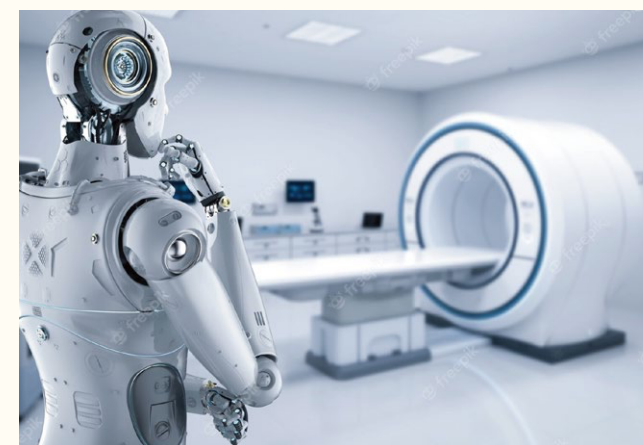
医疗机器人是指在诸如医院一类或其它需要诊疗服务的场所中，用于辅助或自主完成医疗任务的服务型智能机器人。这类机器人可以依据具体的场景，人为或自行编制所需的操作方案及动作程序，然后再转化为各操作机构的协同运作，最终完成相关任务。例如，外科手术中的医疗机器人——手术机器人，可用更精准、侵入性更小的方式进行手术，外科医生在另一端控制手术端的操作效果。

Medical robots are service-oriented intelligent devices that help or autonomously complete medical tasks in places, such as hospitals or others that require medical services. According to the specific scenes, these robots can work out required operation plans and action programs by themselves or through manual operation, and transform them into the cooperative operation of all operating mechanisms to finally complete the tasks. For example, surgical robots, the type of medical robots used in surgery, can perform surgery in a more precise and less invasive way, with the surgeon controlling the operation on the other end.



医疗机器人作为一种新型的交叉研究领域，它集成了多学科知识体系，如医学、生物力学、力学、材料科学、计算机图形学、计算机视觉、数学分析、机器人学和其他学科。医疗机器人在诊疗环境中的应用有助于提高医学治疗的精确度，减轻医生体力劳动，提高患者的生活质量，以及患者参与社会活动的的能力。根据用途，医疗机器人大致可以分为手术、康复、医疗辅助/服务三大类。

As a type within a new field of cross research, medical robot integrates a multidisciplinary body of knowledge such as medicine, biomechanics, mechanics, materials science, computer graphics, computer vision, mathematical analysis, and robotics. The use of medical robots in the diagnosis and treatment scenarios can help improve the accuracy of medical treatment, reduce physicians' physical labor, improve patients' quality of life, and patients' ability to participate in social activities. Medical robots can be divided into three categories depending on their application, including surgical robots, rehabilitation robots, and medical assistance/service robots.



1.2 医疗机器人的分类

1.2 Classification of medical robots

一级分类 Grade I category	二级分类 Grade II category	说明和举例 Description and examples
手术机器人 Surgical robot	腔镜手术机器人 Laparoscopic surgery robot	胆囊切除术、前列腺癌根治术 Cholecystectomy, and radical prostate cancer treatment
	骨科手术机器人 Orthopaedic surgery robot	膝关节置换术、髋关节置换术 Knee arthroplasty, and hip arthroplasty
	神经外科手术机器人 Neurosurgery robot	脑出血、脑肿瘤、帕金森病、癫痫 Brain hemorrhage, brain tumor, Parkinson's disease, and epilepsy
	血管介入手术机器人 Vascular interventional surgery robot	冠脉支架术、颈动脉支架术、房颤消融术 Coronary stenting, carotid stenting, and atrial fibrillation ablation
康复机器人 Rehabilitation robot	康复治疗机器人 Rehabilitation therapy robot	运动功能康复、认知功能（如孤独症/自闭症）辅助治疗 Motor function rehabilitation, cognitive function (e.g. autism/autistic disorder) assistive therapy
	功能辅助机器人 Functional assistive robot	智能假肢、智能辅助机械臂、智能轮椅、外骨骼机器人、导盲机器人、智能护理床、喂食机器人、陪护机器人等 Intelligent prosthesis, intelligent assistive robotic arm, intelligent wheelchair, exoskeleton robot, guide robot, intelligent nursing bed, feeding robot, escort robot, etc.
医疗辅助/服务 服务机器人 Medical assistance/ service robot		胶囊胃镜、活检、采血、输液调配、物流配送、消毒杀菌、导医咨询 Capsule gastroscopy, biopsy, blood collection, infusion deployment, logistics and distribution, sterilization, and medical guide consultation

表 1 医疗机器人分类

Table 1 Classification of Medical Robots

1.2.1 手术机器人

1.2.1 Surgical robots

全球手术机器人的发展历史已有30余年，国外在该领域的研发起步较早。1985年，美国加州放射医学中心的研究人员用PUMA560工业机器人完成了机器人辅助神经外科活检，这是机器人技术首次应用于医疗手术，标志着医疗机器人发展的开始，1992年，首个获得美国食品药品监督管理局（FDA）批准的骨科手术机器人ROBODOC诞生。此后，随着机器人技术在医疗领域的不断发展，医疗机器人技术已在神经外科、腹腔外科、胸外科、骨外科、血管介入、颅面外科等手术中得到了广泛的应用。目前，由美国直观医疗公司研发的达芬奇手术系统是国际上技术最为成熟和完备的外科机器人系统，受到了许多国家和地区的青睞。大量患者受益于达芬奇手术这一先进的微创技术。

Surgical robots have developed for over 30 years globally, and the study started earlier abroad. In 1985, researchers at the California Center for Radiology and Medicine completed a robot-assisted neurosurgical biopsy with the PUMA560 industrial robot, which was the first application of robotics to medical surgery and marked the beginning of the development of medical robotics. In 1992, the first orthopedic surgery robot, ROBODOC, approved by the U.S. Food and Drug Administration (FDA), was born. Since then, with the continuous development of robotics in the medical field, medical robotics has been widely used in neurosurgery, abdominal surgery, thoracic surgery, orthopedic surgery, vascular intervention, craniofacial surgery and other procedures. Currently, the Da Vinci Surgical System developed by Intuitive Surgical, Inc. is the most technologically mature and complete surgical robotic system in the international arena, favored in many countries and regions. A large number of patients have benefited from the advanced minimally invasive technique of Da Vinci.

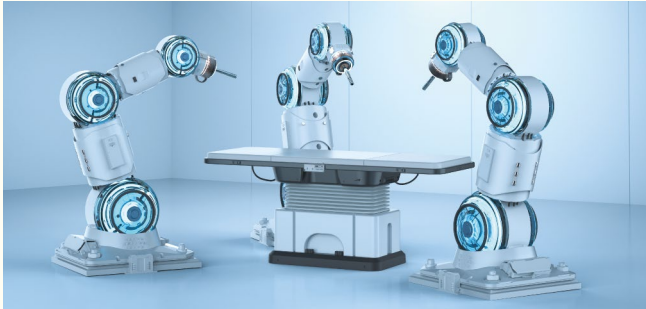
我国在手术机器人领域的发展也十分迅速，已经具备了一定自主研发能力，多款腔镜手术机器人获国家药品监督管理局（NMPA）批准。其中，北京术锐技术有限公司基于连续体蛇形臂技术研发的单孔腔镜手术机器人可实现精准的切割和缝合，于2021年完成了亚洲首台纯单孔机器人前列腺癌根治术，据报道在相同手术效果下，与达芬奇多孔系统相比切口数量更少、面积更小；山东威高手术机器人有限公司自主研发的妙手手术机器人可以精准地复现医生的手术动作，并实现远程操作，于2020年完成了世界首台5G远程机器人辅助人体腹腔镜手术，并在2021年10月获得NMPA批准；2022年1月，上海微创医疗研发的图迈机器人成为首个由中国企业研发并获批的四臂腔镜手术机器人，适用于多种术式体位和单孔腔镜手术，并搭载了全球首个腔镜手术机器人力感知组件沉浸式防护，保障系统安全；苏州康多机器人有限公司自主研发的腹腔内窥镜手术系统于2022年4月完成了世界首次跨运营商、跨网域的“5G+固网专线”多点协同远程临床实时交互教学手术，并在2022年6月获NMPA批准。

1.2.2 康复机器人

1.2.2 Rehabilitation robots

辅助性康复机器人主要应用于康复护理、康复器具（假肢）和康复治疗等方面，可以有效地帮助老年人群、残疾人群、慢性病患者、亚健康人群。最早出现的康复机器人是由英国Mike Topping公司在1987年研制的Handy1，它的诞生成功帮助了一名患有脑瘫的11岁男孩独立地用餐。目前，最先进的康复机器人是可穿戴外骨骼机器人，它穿戴于患者的肢体，患者佩戴后可以确保机器人的运动模式和人体自由度同轴，实现更有效的康复训练。

Assistive rehabilitation robots are mainly used in rehabilitation care, rehabilitation apparatus (prosthesis) and rehabilitation treatment, which do the elderly group, disabled group, chronic disease patients and sub-healthy people great favors. The first rehabilitation robot, Handy1, was developed by Mike Topping in the UK in 1987. It helped an 11-year-old boy with cerebral palsy have meal independently. Currently, the most advanced rehabilitation robot is the wearable exoskeleton robot, which is worn on the patient's limb. The patient wears it to align the robot's movement with the human's, thus enabling more effective rehabilitation training.



China's surgical robots have also rapidly developed. The country has a certain capacity of independent research and development, with many lumpectomy robots approved by the National Medical Products Administration (NMPA). Among them, the single-hole lumpectomy robot developed by Beijing Surgenii Robotics Co., Ltd. based on the continuum serpentine arm technology can achieve precise cutting and suturing, which completed Asia's first pure single-hole robotic radical prostate cancer surgery in 2021. Reportedly it features a smaller number of incisions and smaller areas than the Da Vinci multi-hole system under the same surgical effect; the Mythical Hand Surgical Robot, independently developed by Shandong WEGO Group, can precisely reproduce the surgeon's surgical movements and enable remote operation, which completed the world's first 5G remote robot-assisted human laparoscopic surgery in 2020 and was approved by NMPA in October 2021; in January 2022, the Toumai developed by Shanghai MicroPort Scientific Corporation became the first four-arm lumpectomy robot developed and approved by a Chinese company. Equipped with the world's first lumpectomy robot human perception component for immersive protection to guarantee the system safety, it is applicable to a variety of surgical positions and single-hole lumpectomy; the laparoscopic endoscopic surgery system independently developed by Suzhou Kangduo Robotics Co., Ltd. completed the world's first cross-operator and cross-domain "5G+fixed line" multi-point collaborative remote clinical real-time interactive teaching surgery in April 2022, and was approved by NMPA in June 2022.

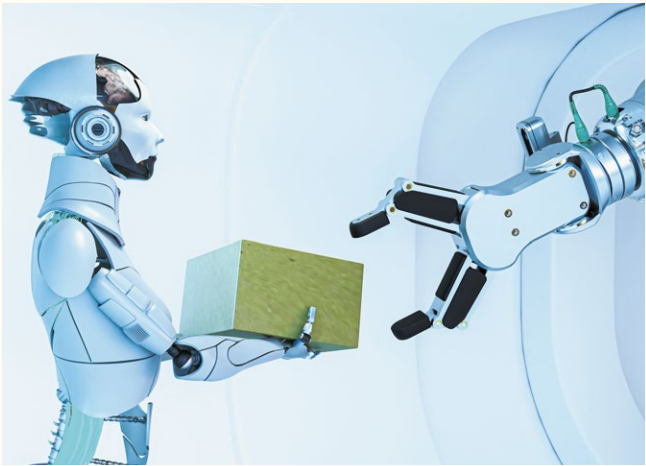
我国许多企业和大学也一直在对康复机器人进行研究，并取得了一定成效。康复辅具开发公司钱璟康复联合多所国内院校，历时多年开发出的Flexbot多体位智能康复训练机器人，具有机器人步态训练、虚拟行走互动训练、步态分析和康复评定等功能，打破了国外企业对该产品的市场垄断。北京软体机器人科技公司的SRT软甲手部康复机器人可通过对患肢的反复运动训练，直接改善手指痉挛、无力等症，间接训练反射脑部神经及血管，增强脑部损伤或神经损伤后保守治疗效果和缩短手术后的康复周期，适用于受伤后患者的手指关节恢复或由脑损伤、脑卒中、脑瘫、脊髓损伤、骨科术后、多发性硬化等引起的肢体障碍后遗症患者，在家庭及机构中的康复训练。

Many Chinese companies and universities have also been conducting research on rehabilitation robots and have achieved some success. The Flexbot multi-position intelligent rehabilitation training robot, developed through years by the rehabilitation aids development company Qianjing Rehabilitation together with a number of domestic institutions, features the functions of robotic gait training, virtual walking interactive training, gait analysis and rehabilitation assessment, breaking the monopoly of foreign enterprises in the field. The SRT Soft Armor Hand Rehabilitation Robot, developed by Soft Robot Tech Co., Ltd., can improve the finger spasm and weakness directly through repeated movement training of the affected limbs, train the reflex brain nerves and blood vessels indirectly, enhance the effect of conservative treatment after brain injury or nerve injury, and shorten the rehabilitation cycle after surgery. It is suitable for rehabilitation training at home and in institutions for patients recovering from finger joints injury or for patients with sequelae of limb disorders caused by brain injury, stroke, cerebral palsy, spinal cord injury, post-operative orthopedics, multiple sclerosis, etc.

1.2.3 医疗辅助/服务机器人

1.2.3 Medical assistance/service robot

医疗辅助/服务机器人包括用于医学检查的胶囊胃镜和活检机器人、采血机器人、输液调配机器人、护理机器人、救援机器人和转运机器人等。这些机器人在机器人技术方面差异很大，比如用于活检的机器人与胶囊胃镜机器人分属机器人技术的不同领域，却与手术机器人更为相似。目前，欧美和日本在该领域机器人市场中处于主导地位。日本机械工程研究所开发的MELKONG护理机器人可平稳地将病人从床上运送到卫生间、浴室等。美国Vecna公司研发的救援机器人Vecna's Bear可以抱起受伤士兵行走长达50分钟。燕山大学王洪波教授和日本Fumio Kasagami教授共同研制的C-Pam转运机器人不需患者移动身体，就可以将患者移动到床板上。日本软银公司的Pepper机器人能识别20种人类语言，还可以通过形象扫描，识别出目标的一定属性，在分诊环节根据目标的性别、年龄和诉求作出更有效、准确的反馈，陪同患者前往正确的科室，帮助医院提高诊疗效率，提升患者体验。



Medical assistance/service robots include capsule gastroscopy and biopsy robots for medical examinations, blood collection robots, infusion dispensing robots, nursing robots, rescue robots, and transfer robots. These robots differ greatly in terms of robotics. For example, the biopsy robot and the capsule gastroscopy robot are used in

different fields, but are more similar to surgical robots. Currently, Europe, the United States and Japan dominate the market for these robots. The MELKONG nursing robot developed by the Japan Mechanical Engineering Research Institute can smoothly transport patients from their beds to the toilet and bathroom, etc. Vecna's Bear, a rescue robot developed by the U.S. company Vecna, can pick up injured soldiers and walk for up to 50 minutes. The C-Pam transfer robot developed by Prof. Wang Hongbo of Yanshan University and Prof. Fumio Kasagami from Japan can move the patients to the bedpan without their moving of bodies. Japanese SoftBank's Pepper robot can recognize 20 human languages and identify certain attributes of the target through image scanning. It sends more effective and accurate feedback in the triage session based on the target's gender, age and demands, accompanies the patients' going to the correct department, helps hospitals improve the efficiency of treatment and enhances the patient experience.

现阶段，我国多家企业和高校在医疗辅助/服务机器人领域开展自主研发及应用拓展。以天津大学为首的科研团队提出了活检胶囊机器人的新型活检采样策略，在采样中，结直肠软组织可以被高速旋转的锋利刀片取走，避免组织撕裂。北京冬残奥会火炬手杨淑亭穿戴的外骨骼机器人——艾动，由北京大艾机器人科技有限公司企业研发，以自然行走步态方式，支撑并带动下肢运动功能障碍患者进行康复训练，发挥康复疗效。成都市第一人民医院全品种智能化静配中心配备有19个输液配药机器人，改变了医院传统的输液配药模式，达到了解放医护劳动力，加快智慧医院的建设步伐的目的。

At this stage, several enterprises and universities in China are carrying out independent research and development and application expansion in the field of medical assistance/service robots. A research team led by Tianjin University has proposed a new biopsy sampling strategy with biopsy capsule robots, in which soft colorectal tissue can be removed by a sharp blade rotating at high speed to avoid tissue tearing. The exoskeleton robot worn by Beijing Winter Paralympic torchbearer Yang Shuting - Allegs, developed by Beijing AI-robotics Technology Co., Ltd., supports and drives the rehabilitation training of patients with lower limb motor dysfunction in a natural walking gait manner, and thus helps with the patient's rehabilitation. The all-species intelligent static dispensing center of Chengdu First People's Hospital is equipped with 19 infusion dispensing robots, which has changed the hospital's traditional infusion dispensing mode and achieved the purpose of liberating medical and nursing labor and accelerating the construction of an intelligent hospital.

02

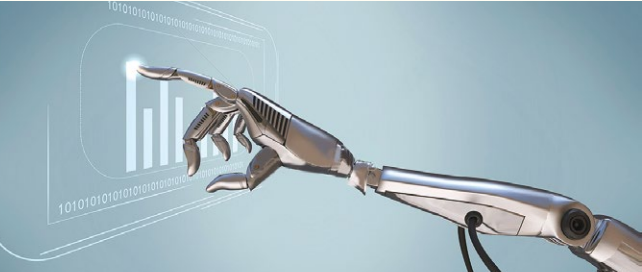
医疗机器人发展现状
Development status quo of medical robots

2.1 医疗机器人的研究现状

2.1 Research status quo of medical robots

在医疗机器人相关研究领域，学者们主要从各类医疗机器人的功能设计或案例分析、医疗机器人的发展现状和前景两个角度开展研究。

In the research related to medical robots, scholars have mainly conducted research from two perspectives: the functional design or case study of various types of medical robots, and the development status quo and prospect of medical robots.



在医疗机器人功能设计或案例分析方面，有学者团队通过实操探究达芬奇手术系统进行膀胱切除术的安全性；有学者通过分析多训练模式下的康复机器人运动，指出系统设计应多考虑患者跟理疗师之间的交互；有学者通过设计多维力传感器并研究其解耦方法来优化微创手术机器人在手术过程中的力反馈功能；有学者结合达芬奇手术系统实操经验总结出“3+2”模式，用于普及达芬奇手术系统介入的远端胃癌根治术。

Regarding the functional design or case studies of medical robots, some scholars have explored the safety of cystectomy with the Da Vinci Surgical System through practical exercises; some scholars have analyzed the motion of rehabilitation robots in multiple training modes and pointed out that the interaction between patients and physiotherapists should be considered more in system design; some scholars have designed multi-dimensional force sensors and studied their decoupling methods to optimize the force feedback function of minimally invasive surgical robots during surgery; some scholars have summarized the “3+2” model for popularizing the Da Vinci Surgical System for distal gastric cancer radical resection.

在医疗机器人发展现状、应用前景及发展趋势方面，有学者对医学机器人的重要研究和已有的商业系统进行分析，指出未来的机器人应用仍存在仪器化和手术室集成、人机交互、形状和力传感三大挑战；有学者借助文献和专家访谈分析中国医疗机器人在发热门诊的使用情况，提出要突破专利壁垒，采取更精细化的发展战略；有学者通过分析论文和专利数据研究全球医疗机器人技术领域的发展态势，指出各国的技术领域分布各有不同；有学者从建模、交互、协调和优化4方面对人工智能技术展开论述并进行了总结和展望；有学者通过分析论文和专利数据研究当前微创手术机器人在各国的发展情况和前沿热点，指出美国在该领域的产出能力远高于其他国家，而且手术机器人领域的论文和专利的研究重点也不同。

In terms of the current development, application prospects and development trends of medical robots, some scholars have analyzed the major researches on medical robots and existing commercial systems to point out that there are still three major challenges for future robotic applications: instrumentation and operating room integration, human-machine interaction, and shape and force sensing; some scholars have analyzed the use of medical robots in fever clinics in China with the help of literature and expert interviews, and proposed to break through patent barriers and adopt more refined development strategies; some scholars have analyzed the global development trend of medical robotics by analyzing papers and patent data to point out that the technological focuses varied among countries; some scholars have discussed and summarized the four aspects of human-robot intelligence technology, namely modeling, interaction, coordination and optimization; some scholars have studied the development and frontier hotspots of minimally invasive surgical robots in various countries by analyzing the data of papers and patents to point out that the output capacity of the United States is much higher than that of other countries, and the research focuses of papers and patents in the field of surgical robots differ greatly.

2.2 医疗机器人未来发展趋势

2.2 Future development trend of medical robots

现阶段，市场认可度、接受度不断提升，医疗机器人迎来发展机遇期。医疗机器人市场需求日渐旺盛。随着医疗机器人整体技术水平的提升，人们对高品质医疗服务需求的增长，医患对医疗机器人接受程度逐步提升，医疗机器人拥有巨大的发展潜力，商业化、市场化步伐将不断加快。我国医疗机器人产业将迎来更多发展机遇。目前，虽然国产医疗手术机器人产品数量相对较少，市场集中度较高，但国产的医疗康复、医疗服务机器人产品类型较多，具备性价比优势，不断加速迭代创新。国内医院应用的医疗机器人大多依靠进口，但高昂费用限制了其临床推广，而国产医疗机器人不断增强的研发、生产和服务能力，有望逐步在手术机器人等高端领域成为国际市场的有力竞争者。

At this stage, with increasing market recognition and acceptance, medical robots are entering in a period filled with development opportunities. The market demand for medical robots is growing day by day. With the improvement of the overall technological level of medical robots, people's demand for high-quality medical services, and doctors and patients' acceptance of medical robots are gradually increasing. Facing great development potential, medical robots will have a quicker pace of commercialization and marketization. China's medical robotics industry will usher in more development opportunities. At present, although there are a relatively small number of China-made medical and surgical robots and the market is highly concentrated, there are many types of medical rehabilitation and medical service robots made at home, which feature the cost-effective advantage, and continuing iterative innovation. Most of the medical robots used in domestic hospitals are imported, and the high cost has limited their clinical promotion. With the continuous enhancement of research and development, production and service capabilities, domestic medical robots are expected to gradually become strong competitors in the international market in high-end fields such as surgical robots.

DEVELOPMENT STATUS

随着医疗机器人技术的迭代升级，医疗服务效率及质量的提升将得到有力助推。医疗机器人基于机器人硬件，将人工智能、脑机接口、大数据等前沿技术与医疗诊疗手段结合，对数据、物体和环境等有更精准的感知能力，推理、语态等认知能力和学习能力也将不断提高。医疗机器人产品更趋小型化、柔性化，人机交互、感知认知能力也将全面增强，医生、患者之间的交互水平有望提升。医疗机器人愈发深度地参与到医疗的全部流程，涵盖咨询、诊疗、配药、手术、康复、医废处理等各个环节。医疗机器人的推广应用将促进医学创新，医疗机器人大量推广应用有望通过持续产品迭代，衍生出机器人的新领域应用。

With the iterative upgrade of medical robot technology, the efficiency and quality of medical services will be strongly boosted. Based on robotic hardware, medical robots combine cutting-edge technologies such as artificial intelligence, brain-computer interface, and big data with medical treatment means to feature a more accurate perception of data, objects and environment, and the cognitive ability and learning ability such as reasoning and speech patterns will also improve. While the medical robot products are becoming more miniaturized and flexible, and the human-computer interaction, perception and cognitive ability are being comprehensively enhanced, the interaction between doctors and patients is expected to be improved. Medical robots are more deeply involved in the entire medical process, covering the consultation, diagnosis & treatment, dispensing, surgery, rehabilitation, and waste disposal. The promotion and application of medical robots will promote medical innovation, and the massive promotion and application of medical robots is expected to give rise to new areas of robot applications through continued product iteration.

未来，医疗机器人发展环境持续优化，医疗机器人的安全性与市场性将得到更好的平衡。医疗机器人属于机器人产品，同时也属于医疗设备产品，面临严格的医疗产品准入机制，认证时间较长，同一种类医疗机器

人在国际、国内需要不同的认证体系（美国FDA、欧洲CE、中国NMPA等）。因此，形成统一国家标准或行业标准将加快医疗机器人产业化进程，加快产品认证流程。医工结合也将更加深入，共同推动医疗机器人产业发展。医疗机器人跨多学科，尤其在医学和工学方面的交叉十分复杂，研发周期长，门槛高。医疗机器人的研发人员将与医生深度沟通，将临床需求转化为工程语言，双方共同参与迭代与完善。医疗机器人将呈现多种资源融合发展形态，有望建立政、产、学、研、医结合平台，提高资源间联系的紧密度以及合作深度，合力推动产业发展。

In the future, the development environment for medical robots will continue to be optimized, and the safety and marketability of medical robots will be better balanced. Medical robots are robots and medical instruments, which feature a strict market access mechanism and entail a long certification time. A single kind of medical robots needs different certifications (U.S. FDA, European CE, Chinese NMPA, etc.) for sales in international and domestic markets. Therefore, we need to form a unified national standard or industrial standard to accelerate the industrialization of medical robots and speed up the product certification process. The medical-industrial combination will also be deepened to jointly promote the development of medical robotics industry. Medical robots cross multiple disciplines, especially the medicine and engineering fields, which feature a long research and development cycle and a high threshold. The medical robot's developers will communicate deeply with physicians, and translate clinical needs into engineering language, and both parties will participate in the iteration and refinement. Medical robots will develop upon integration of various resources. A platform combining politics, industry, academia, research and medicine is expected to be established to improve the linkage and cooperation of resources and jointly promote the industrial development.

03

医疗机器人代表性企业
Representative manufacturers of medical robots

3.1 直观医疗

3.1 Intuitive Surgical

就手术机器人赛道而言，创立于1995年的美国直观医疗公司（Intuitive Surgical，以下简称“直观医疗”）占据着绝对的统治地位。据国际市场研究机构Marketsand Markets统计，2022年全球手术机器人市场规模为85亿美元，其中直观医疗收入62.22亿美元，按照收入计算全球的市场份额超过73%。直观医疗的成功源于专注于手术机器人这一利基市场，公司成功的把军事领域的战地远程手术和航天领域的太空舱遥控机械手转化为民用，使微创手术进入到机器人时代。公司明星产品达芬奇手术机器人作为引领微创手术发展方向的革命性产品，在全球各地已被广泛认可和应用。

Intuitive Surgical, Inc. (hereinafter referred to as "Intuitive Surgical"), founded in 1995, dominates the surgical robotics segment. According to statistics of the international market researcher Marketsand Markets, the global surgical robotics market reached a scale of \$8.5 billion in 2022, with \$6.222 billion earned by Intuitive Surgical, occupying 73% of the global market. Intuitive Surgical's success stems from its focus on the niche market of surgical robots. The company has successfully transformed the battlefield remote surgery in the military field and the space capsule remote-controlled robots in the aerospace field into civilian use, bringing minimally invasive surgery into the robotic era. The company's star product, the Da Vinci Surgical Robot, has been widely recognized and used around the world as a revolutionary product that leads the innovation in minimally invasive surgery.

INTUITIVE

2017年5月，直观医疗与复星医药强强联合，共同注资1亿美元，成立了直观复星医疗器械技术（上海）有限公司（IntuitiveFosun，以下简称“直观复星”），复星医药持股40%，用以研发、生产和销售针对肺癌的早期诊断及治疗的基于机器人辅助导管技术的创新产品，其宗旨是打造中国本土化精准医疗龙头企业，造福全球患者。2022年8月，直观医疗宣布投资超7亿元在上海建设一个制造和研发基地，预计将于2025年建成，为中国市场生产第四代达芬奇手术机器人。可见，随着近几年国产手术机器人的陆续入场，直观医疗公司也开始加强本地化布局。2023年6月14日，在NMPA官网的医疗器械批准证明文件送达信息中，出现了直观复星的“胸腹腔内窥镜手术控制系统”，注册证编号“国械注准20233010800”。这意味着本土化生产的达芬奇手术机器人正式获批上市，这无疑会对尚处于商业化前期的国产品牌带来新一轮冲击。

In May 2017, Intuitive Surgical and Fosun Pharmaceuticals jointly invested US\$100 million in establishing the IntuitiveFosun Medical Instrument and Technology (Shanghai) Co., Ltd. (hereinafter referred to as "IntuitiveFosun"), in which Fosun Pharmaceuticals holds a 40% stake, to develop, manufacture and market innovative products based on robotic-assisted catheter technology for the early diagnosis and treatment of lung cancer. It aims to build a local precision-medicine leader in China for the benefit of patients worldwide. In August 2022, Intuitive Surgical announced an investment of over ¥700 million in building a manufacturing and R&D base in Shanghai. Expected to be completed by 2025, it's built to produce the fourth generation Da Vinci Surgical Robot for the Chinese market. It can be seen that with the release of China-made surgical robots one after another in recent years, Intuitive Surgical also started to strengthen their localization layout. On June 14, 2023, according to the delivery status of medical device approval document on NMPA's official website, there is the "thoracic and abdominal endoscopic surgery control system" of IntuitiveFosun, with a registration certificate of "GXZZ 20233010800". This means that the locally produced Da Vinci surgical robots are officially approved for marketing, which undoubtedly brings a new impact on the domestic brands that are still in the pre-commercialization stage.

3.2 美敦力

3.2 Medtronic

美敦力（Medtronic）在全球脊柱和神经外科领域，处于绝对龙头地位，拥有全球领先的技术与完整的产品线。它对手术机器人的布局正是围绕自己的优势领域展开，通过收购以色列骨科机器人公司Mazor Robotics切入。Mazor Robotics被认为是机器人辅助脊柱手术的领导者之一，公司代表产品有脊柱外科手术导航定位系统Mazor X和骨科机器人Mazor Renaissance两款产品。自2016年起，美敦力开始对Mazor Robotics公司进行股权投资，2017年又成为Mazor X系统的全球独家经销商。到2018年，美敦力最终以16.4亿美元的价格将Mazor Robotics完全收购。其后，美敦力对Mazor Robotics的技术进行了消化，并于2019年9月推出Hugo RAS腹腔镜手术机器人辅助系统，迈出向软组织手术机器人进军的第一步，一度被看做是达芬奇手术机器人的有力竞争者。2021年10月，Hugo RAS获得欧盟CE认证，批准其用于泌尿和妇科手术。这两类手术约占目前所有机器人手术的一半，并且也是使用达芬奇手术机器人频率最高的手术。

Medtronic is a global leader in spine and neurosurgery, thanks to its state-of-the-art technology and a complete product line. Its layout in surgical robots is centered around its own areas of strength, starting from the acquisition of Israeli orthopedic robot manufacturer Mazor Robotics. Mazor Robotics is considered one of the leaders in robot-assisted spine surgery, which features two representative products - Mazor X, a navigation and positioning system for spine surgery, and Mazor Renaissance, an orthopedic robot. Since 2016, Medtronic has been making an equity investment in Mazor Robotics, and became the exclusive global distributor of the Mazor X system in 2017. By 2018, Medtronic eventually fully acquired Mazor Robotics for \$1.64 billion. Subsequently, Medtronic digested Mazor Robotics' technology and launched the Hugo RAS laparoscopic surgical robotic assist system in September 2019, taking the first step to reach the soft tissue surgical robotics. It was once seen as a strong competitor to the Da Vinci surgical robot. In October 2021, Hugo RAS received CE certification from the European Union, approving it for use in urological and gynecological procedures. These two types of surgery account for approximately a half of all robotic procedures currently done, and are the two most frequently performed with the Da Vinci surgical robot.

Medtronic

中国作为美敦力手术机器人战略布局版图中的重要市场，也得到了美敦力极大的重视。目前，美敦力的Mazor Renaissance和Mazor X均已在中国及海外上市。事实上，美敦力很早就已经看好国产手术机器人技术发展。在2021红杉全球医疗产业峰会上，美敦力全球高级副总裁、大中华区总裁顾宇韶曾公开表示，手术机器人是中国企业有望实现弯道超车的一个细分赛道。未来，在相关同类产品的国产化进程中，国产品类不可避免将与美敦力的优势产品形成竞争格局。

As an important spot in Medtronic's target surgical robotics market, China has also been attached great attention. Currently, Medtronic's Mazor Renaissance and Mazor X are both available in Chinese and overseas markets. In fact, Medtronic has long been optimistic about the development of surgical robot technology in China. On the 2021 Sequoia Healthcare Summit, Gu Yushao (Alex), Senior Vice President of Medtronic Global and President of Medtronic Greater China, once publicly stated that surgical robotics was a segment where Chinese companies were expected to achieve a corner overtaking. In the future, in the process of domestication of related similar products, domestic products will inevitably form a competitive pattern with Medtronic's superior products.

3.3 上海微创医疗

3.3 MicroPort Scientific Corporation

上海微创医疗机器人(集团)股份有限公司（以下简称“微创机器人”）是微创医疗科学有限公司旗下子集团，2014年启动研发图迈腹腔镜手术机器人（作为微创集团的内部孵化项目），2015年在中国成立公司，开始公司化运营，并启动研发鸿鹄骨科手术机器人。2021年11月2日，微创机器人在香港联交所主板成功上市。公司三款主要产品图迈、蜻蜓眼、鸿鹄先后进入绿色通道并获得NMPA上市批准。旗下自研图迈四臂腹腔镜手术机器人已完成300例机器人辅助临床验证手术。2023年2月，其明星产品——图迈Toumai腹腔镜手术机器人，成功完成中国首例机器人辅助下超远程5G肝胆外科手术，创造了我国肝胆外科手术史的里程碑。这是图迈机器人继去年6月完成两例超远程泌尿外科手术后，再次突破时空限制、成功开展新科室手术，证明国产机器人远程5G手术能力正在逐步走向成熟。

Shanghai Microport Medbot (Group) Co., Ltd. (hereinafter referred to as Microport Medbot) is a subgroup of MicroPort Scientific Corporation, which started to develop its Toumai lumpectomy robot (as an internal incubation project of the group) in 2014, and established a company in China in 2015 to start its corporate operation and develop the SkyWalker orthopedic surgery robot. On November 2, 2021, Microport Medbot was successfully listed on the Main Board of the Hong Kong Exchanges. The company's three major products, Toumai, DF Vision and SkyWalker, have entered the green channel and received NMPA listing approval in a row. Its self-developed Toumai four-arm lumpectomy robot has completed 300 robotic-assisted clinical validation procedures. In February 2023, its star product, Toumai lumpectomy robot, successfully completed China's first robot-assisted ultra-long-range 5G hepatobiliary surgery, erecting a milestone of hepatobiliary surgery in China. This is another breakthrough of time and space limitation and successful operation in new departments by Toumai robot after completing two cases of ultra-remote urology surgery in June last year. This proves that the remote 5G surgery capability of domestic robots is gradually coming to maturity.

3.4 北京大艾机器人

3.4 Beijing AI-robotics Technology Co., Ltd.

北京大艾机器人科技有限公司（以下简称“大艾机器人”）是一家从外骨骼机器人切入市场的康复机器人企业，相比于其他外骨骼机器人，大艾机器人的特点在于除了真实步态辅助行走外，还增加了多进程、多模式的康复训练功能，进行步态矫正，能够为因脊髓损伤、脑损伤、骨折术后、人工关节置换、脑肿瘤术后等原因造成的下肢运动功能障碍的患者提供整个康复过程中评估、诊断、训练等所需的装备与系统。公司的研发团队由清华、北航等院校博士后及博士组成，并拥有清华大学机器人实验室技术支撑平台。创始人帅梅为北航教授、清华博士后，北航医疗机器人实验室领头人。在医疗机器人领域，大艾机器人成为国内第一个拿到医疗器械注册证的外骨骼机器人企业，帮助下肢不良于行的人通过穿戴外骨骼机器人的方式，实现直立行走的梦想。

Medtronic

MEDBOT

北京大艾机器人

Beijing AI-robotics Technology Co., Ltd. (hereinafter referred to as "AI Robotics") is a rehabilitation robot manufacturer that started from exoskeleton robots. Compared with its counterparts, AI Robotics' robots are characterized by the addition of multi-process and multi-mode rehabilitation training functions for gait correction in addition to the real gait-assisted walking, which can provide the equipment and systems required for assessment, diagnosis and training in the entire rehabilitation process for patients with lower limb motor dysfunction caused by spinal cord injury, brain injury, post-operative fracture, artificial joint replacement, post-operative brain tumor, etc. The company's R&D team consists of post-docs and PhDs from Tsinghua and Beihang universities. It also has a technical support platform from Tsinghua University's robotics laboratory. The founder, Shuai Mei, is a professor at Beihang University, a postdoctoral fellow at Tsinghua University, and the leader of Beihang's medical robotics lab. In the field of medical robotics, AI Robotics has become the first exoskeleton robot manufacturer in China to get the medical device registration certificate, vowing to help people with poor lower limbs to fulfill their dream of walking upright by wearing an exoskeleton robot.

北京大艾机器人

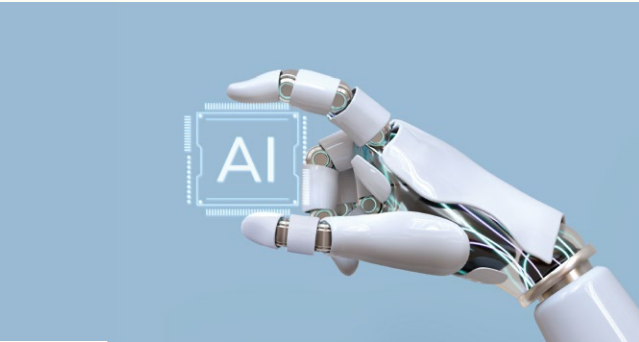
04

小结 Brief Summary

医疗机器人作为一个具有人工智能与医疗技术交叉特性的新兴技术领域，无论是基础研究还是产业化进程，它都将持续保持高质量快速发展。只有这样，才能满足医疗领域日益复杂化、多元化和个性化的技术创新需求。同时，医疗机器人的发展还面临着诸多技术挑战，并与相关学科的发展存在着广泛的交叉和相互促进，尤其需要多方向并同发力。比如远程手术机器人，作为需要长期进行攻关的研究课题，其与5G通讯、VR/AR、遥操作等技术的融合共现还需进一步加强。软体机器人是机器人领域的一个新方向，近年来在康复机器人和手术机器人应用中的巨大潜力引起了高度重视。医疗机器人的安全性也是一个重要的新课题，如何保证数据安全，建立产品标准与安全标准体系值得重点探讨。此外，在精准医疗的大趋势下，微创机器人赛道也进入人们的视野，尤其在药物靶向运输、生物传感和细胞修复中具有良好应用前景。另外，在较为前沿的脑机接口技术等的助力下，未来患者有望更方便、更高效地控制康复机器人的动作，从而显著提高康复机器人的康复治疗和功能替代的效果。



As an emerging technology with crossover characteristics of artificial intelligence and medical technology, medical robots will continue to maintain a high-quality and rapid development in both basic research and industrialization process. Only in this way can we meet the demand for increasingly complex, diverse and personalized technological innovation in the healthcare field. Besides, the development of medical robots also faces many technical challenges, and there is a wide crossover and mutual promotion with the development of related disciplines. Especially, it needs simultaneous efforts from diversified directions. Taking remote surgery robot as an example, it still needs to further strengthen its integration with 5G communication, VR/AR, teleoperation and other technologies while it acts



as a hot topic under long-term research. Soft robots mark a new direction in the field of robot. It has attracted great attention in recent years for its great potential in the rehabilitation robotic and surgical robotic applications. The safety of medical robots is also a major new topic. How to ensure data security, and how to establish product standards and safety standards are worth discussion. In addition, under the general trend of precision medicine, the micro/nano robot segment is also catching our attention. It especially features promising application prospect in targeted drug delivery, biosensing and cell repair. In addition, with help of the cutting-edge brain-machine interface technology, patients are expected to control the movements of rehabilitation robots more conveniently and efficiently in the future, thus significantly improving the effectiveness of rehabilitation and functional replacement of rehabilitation robots.

未来，医疗机器人与新材料、5G、大数据、人工智能、脑机接口等新技术加速融合应用，助力医疗技术变革性升级，高质量地服务好人民的高品质生活。在需求导向下，医疗机器人的市场规模将逐步扩大，相关应用也将加速推进。相信在国家监管政策的完善和深化下，我国医疗机器人行业将稳健快速发展，产业化进程进一步提速。

In the future, medical robots and new materials and new technologies (e.g. 5G, big data, artificial intelligence, and brain-machine interface) will be further combined to help with the transformative upgrades in medical technology and serve the people's life with high quality. Driven by the demands, the market scale of medical robots will gradually expand, and the promotion of related applications will be accelerated. It is believed that with the improvement and deepening of the national regulatory policies, China's medical robot industry will develop steadily and rapidly, and the industrialization process will further speed up.

04

深度对话

In-depth Interview

IN-DEPTH INTERVIEW
CORPORATE STYLE

CHAPTER IV

IN-DEPTH INTERVIEW

专访

华西医疗机器人研究院
院长 李康

Interview | Li Kang, Dean of the West China Medical Robotics Research Institute

专家简介：

PROFILE OF THE EXPERT

李康，成都市高新区揭榜挂帅型研发机构“岷山计划”华西医疗机器人研究院（以下简称“研究院”）院长，华西精创医疗科技（成都）有限公司（以下简称“华西精创”）董事长，四川大学华西医院研究员、博士生导师，四川大学匹兹堡学院科研副院长，华西医院-商汤科技联合实验室主任。主要从事生物力学、人机交互和医疗机器人、人工智能、医学影像分析和医疗器械创新领域的研究。

Li Kang is currently Dean of the West China Medical Robotics Research Institute (hereinafter referred to as the Institute), an R&D institution under the "Minshan Action" plan for leading R&D institutions launched by Chengdu Hi-tech Zone. He is also Chairman of West China Precision Innovation Medical Technology (Chengdu) Co., Ltd. (hereinafter referred to as WEST CHINA PITECH), a researcher and doctoral supervisor at West China Hospital of Sichuan University, Associate Dean of Sichuan University-Pittsburgh Institute, and Director of the Joint Laboratory of West China Hospital and SenseTime. He mainly conducts research in the fields of biomechanics, human-machine interaction, medical robots, artificial intelligence, medical image analysis, and medical equipment innovation.

从医疗机器人起步
缔造医工融合全链条创新范式Starting with the Medical Robots and Creating an Innovation
Paradigm for the Entire Medical-Engineering Integration Chain

当前全球科技创新密集活跃，科学交叉融合不断发展，医工融合力量在临床价值上进一步凸显。随着人口老龄化社会程度加深，医疗机器人、护理机器人和家居机器人也迎来新的发展风口；人工智能等一系列新技术的发展，也让医疗机器人产业面临新机遇。本期，我们邀请到华西医疗机器人研究院院长、医疗机器人研究专家李康研究员，围绕医疗机器人目前的发展现状，华西医疗机器人研究院的行业优势及未来布局等进行介绍和分享。

At present, there is a strong global trend towards technological innovation, with continuous development in the cross-fusion of sciences. Medical-engineering integration is proving to have tremendous clinical value. As the population keeps aging, medical robots, care robots, and home robots have ushered in new development opportunities. The development of a series of emerging technologies, such as artificial intelligence, has also brought new opportunities to the medical robot industry. In this issue, we invite Li Kang, Director of the West China Medical Robotics Research Institute and a medical robot researcher, to introduce and share the current development status of medical robots, the industry advantages of the West China Medical Robotics Research Institute, and its future layout.



当下，医疗健康领域迎来了数智化发展浪潮，医疗机器人作为这一浪潮中医工融合的典型应用，为医疗行业带来了什么样变革？

BioCollaborate: What kind of transformation has medical robots brought to the healthcare industry as a typical application of medical-engineering integration within the current wave of digitalization in the healthcare sector?

BIO Collaborate



李康 LiKang

根据应用场景，医疗机器人可分为手术机器人、康复机器人、服务机器人三大类。目前，临床逐渐向微创化、智能化、精准化发展的大趋势使医疗机器人在临床中得到广泛应用。医疗机器人有助于实现复杂手术简单化、标准化、规范化、同质化，能够有效避免由医生临床经验和手术操作的差异造成的手术瑕疵和处置不当、同时能够通过医疗机器人康复训练，改善患者的身体功能，减轻疾病状态，提高健康水平等。

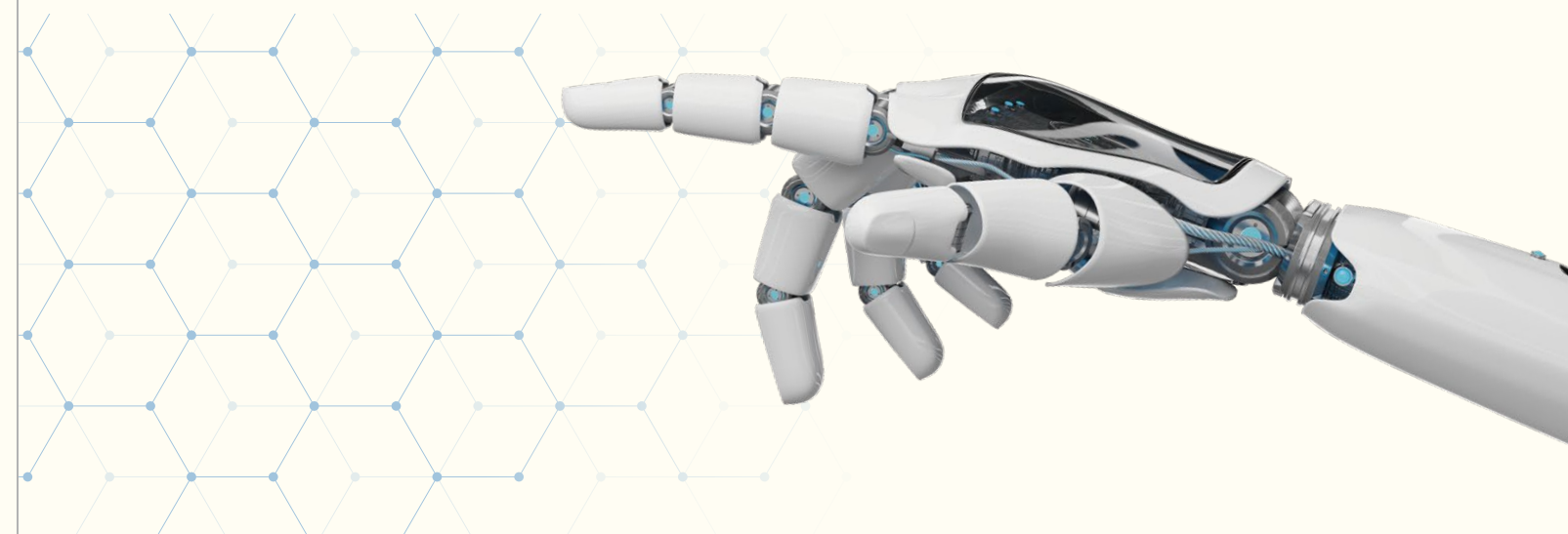
Medical robots can be divided into three categories depending on their application, including surgical robots, rehabilitation robots, and service robots. The growing trend towards minimally invasive, intelligent, and precise clinical treatment has made medical robots widely used in clinical treatment. Medical robots are expected to help to simplify, standardize, normalize, and homogenize complex surgical procedures, effectively avoiding surgical defects and improper handling caused by differences in doctors' clinical experience and surgical operations. By also facilitating rehabilitation training, medical robots help to improve patients' physical function, alleviate disease symptoms, and raise their overall level of health.

尤其在我国的，患者人数众多，医疗资源紧缺，医生的手术排班密度大，手术时间长，有时经常会连续十几个小时站在手术台前。医疗机器人的出现，为医生提供了一双操作精准且不知疲倦的双手，使医生通过内镜系统就可以开展很多以往难以完成的柔性工作。此外，不同地区和级别的医院的医疗水平不可避免有所差异。尤其是基层医院和城市的三甲医院相比，患者对基层医院开展手术的信赖度要低很多。但如果在基层医院部署手术机器人，由于标准化、规范化、精确化的机器操作，手术的质量得到了保障，患者也能安心地在基层医院接受治疗。远隔千里也能实施高难度复杂手术，这对于优质医疗资源下沉，对于偏远地区的优质医疗资源覆盖都提供了新的可能。

Especially in our country, where the number of patients is large and medical resources are scarce, doctors are subject to intensive surgical scheduling and long operating hours, sometimes often standing in front of the operating table for more than ten hours straight. Fortunately, the advent of medical robots has provided doctors with a pair of hands that operate with precision and tirelessness, allowing them to carry out many flexible tasks that were previously difficult to perform, through endoscopic systems. In addition, the standard of medical care inevitably varies among hospitals of different levels and regions. In particular, patients have much less trust in grassroots hospitals to perform surgery compared to tertiary Grade A hospitals in cities. But if surgical robots are deployed in grassroots hospitals, due to standardized, normalized, and precise machine operation, the quality of surgery is guaranteed, and patients can also trustingly receive treatment at grassroots hospitals. The ability to perform difficult and complex surgeries even from thousands of miles away offers new possibilities for easier access to high-quality medical resources and for the coverage of high-quality medical resources in remote areas.

目前医疗机器人的智能化程度还远达不到自主开展手术的水平。类比具有自动驾驶功能的汽车，我们现阶段的医疗机器人就像是处于早期的手动挡汽车，还需要踩离合来换挡，还没有达到自动挡汽车的程度。虽然我们现阶段开发的机器人的自动化水平还远低于已有的自动驾驶汽车，但我们正在持续就如何提升医疗手术机器人的自主性开展相关研究，未来我们的长远目标是开发能够独立开展手术的全自动手术机器人。

The current level of intellectualization of medical robots is still far from being able to perform surgery autonomously. By analogy with a car with autonomous driving function, our current medical robots are like early stick-shift cars that require shifting gears with a clutch and are not yet at the level of automatic transmission cars. Although the robots we are developing are still far less automated than the self-driving cars we have, we are continuing our research on how to improve the autonomy of our medical-surgical robots, and our long-term goal is to develop fully-automatic surgical robots that can perform surgery on their own.



能否请您介绍一下华西医疗机器人研究院的发展情况以及其成果转化的模式？

BioCollaborate: Can you tell us about the development of the West China Medical Robotics Research Institute and its model of achievement transformation?

BIO Collaborate



李康 LiKang

“

华西医疗机器人研究院得到高新区政府的大力支持，得到了“岷山行动”计划的资助，是由高新区政府、四川大学华西医院、四川大学匹兹堡学院等多元主体参与，内部分工合理，相互协同支撑的新型研发机构体系，聚焦“产教融合”及产业孵化。我们研究院具备自主研发的能力，在医工融合领域开展着研发和转化工作，同时我们也对参与进来的多元主体产生的研究成果进行落地推广。

The West China Medical Robotics Research Institute is greatly supported by the Government of the High-Tech Zone and funded by the “Minshan Action” plan. It is a new type of research and development institution with a rational division of labor and mutual synergy, involving multiple subjects like the Government of the High-Tech Zone, the West China Hospital of Sichuan University, and the Sichuan University-Pittsburgh Institute. It focuses on the “integration of production and education” and industrial incubation. Our Institute is capable of conducting independent R&D and achievement transformation in the field of medical-engineering integration, and we also popularize and apply the research results produced by multiple subjects.

根据“岷山行动”计划要求，我们依托研究院进行技术研发，将陆续孵化十余家企业，涉及医疗机器人上下游产业链，计划开发的产品管线覆盖从手术、康复到服务三大类医疗机器人。目前，已成功孵化一家智能中医诊疗康复企业，3D医疗打印以及医院辅助诊断设备即将孵化成型，我们已经推出的康复机器人和手术机器人在未来也将成果转化落地。

Under the “Minshan Action” plan, we are relying on the Institute for technology R&D and will be giving birth to more than ten companies throughout the upstream and downstream medical robot industry chain, with a planned product pipeline covering three major types of medical robots, from surgery, rehabilitation to service. At present, an intelligent Chinese medical treatment and rehabilitation company has been successfully incubated, and 3D medical printing and hospital-assisted diagnostic equipment will be incubated soon. In addition, the rehabilitation robots and surgical robots we have already launched will also be widely applied in relevant fields.

华西医疗机器人研究院发展模式是全链条覆盖，各个点位突破。企业性质决定了其所聚焦的管线一定是能在两年内进入转化阶段，产生实际商业价值，转化成上市产品的，所以我们在前沿技术和落地转化之间还是划分的较为明确。对于在短期内看不到产业化价值的前沿技术，我们通过评估会将它留在医院实验室继续开展研究工作。比如脑机接口这样的细分领域，我们也早有布局，但它还处于实验室研究阶段，从企业视角下来看，对它的孵化我们还是持比较谨慎的态度。一是脑机接口目前受到媒体的广泛关注，获得的投资也非常多，但目前我们的资金情况和发展规划，不益过早进入；二是，我们更重视的工作是在企业发展的第一阶段集中资金和精力做出几个有代表性的成功案例。

MEDICAL ROBOTICS RESEARCH

The development model of the West China Medical Robotics Research Institute is to cover the whole chain and achieve breakthroughs at each point. The nature of our enterprise determines that the pipeline we focus on must be able to experience the transformation stage within two years, generate actual commercial value and transform into marketable products, so we still have a clear division between cutting-edge technology and its implementation and commercial implementation. For cutting-edge technologies that fail to bring about industrialization value in the short term, we evaluate them and continue research on them in hospital labs. For example, we have already laid out the layout of such a subdivision field as brain-computer interface, but it is still in the stage of laboratory research. From the perspective of enterprises, we are still cautious about its incubation. For one thing, brain-computer interfaces are currently receiving a lot of attention from the media and have received a lot of investment, but given our current funding situation and development plans, it is not advisable for us to prematurely conduct research on it; for another, we attach more importance to taking advantage of funds and energy to bring about a few representative successful cases in the first stage of enterprise development.

”

华西医疗机器人研究院获批建设已有三年时间，目前它在人才引进和培养方面的力度如何？

BioCollaborate: The West China Medical Robotics Research Institute has been approved for construction for three years. How is its effort in talent recruitment and development at present?

BIO Collaborate



李康 LiKang

“

华西医疗机器人研究院是一个面向全球的新型研发机构，落成在成都。不管是合作团队还是招徕人才，我们都不局限在国内。研发团队之间的沟通和协作可以是远程的，到进入孵化流程时，才会落到成都。目前，研究院已经建成了一支80余人的团队，作为一个完全开放的平台，研究院的吸引力和竞争力在国际上日益凸显，未来也会源源不断有各个细分方向的国际化团队加盟，将更快加速研究院对医疗机器人中的关键“卡脖子”技术的攻关，进一步发挥产业转化平台的全链条孵化功能。

The West China Medical Robotics Research Institute is a new international R&D institution, based in Chengdu. We always take an international approach to both team collaboration and talent recruitment. Communication and collaboration between R&D teams can be conducted online, and will only land in Chengdu when it enters the incubation stage. The Institute has already built a team of more than 80 people, and as a fully open platform, the attractiveness and competitiveness of the Institute are increasingly gaining prominence internationally, with a steady stream of international teams joining the Institute in various sub-divisions in the future, which will accelerate the Institute's efforts to tackle key “stranglehold” technologies in medical robots and further perform the incubation function of the whole chain of industrial transformation platform.

我们同时还依托华西医院和四川大学匹兹堡学院来聚集高端人才。华西医院位列全球医疗卫生机构前茅，它能连线到国际一流的领域人才；四川大学匹兹堡学院作为西部地区唯一且教育部正式批准的中美一流高校联合办学机构，有着完整医工交叉学科教育培养体系，设立的五大专业覆盖了医疗机器人开发相关的所有知识体系，能够帮助我们很好地实现产教融合。

We are also relying on the West China Hospital and the Sichuan University-Pittsburgh Institute to gather high-end talents. The West China Hospital is one of the top healthcare institutions in the world, which can connect us to world-class talents in the field. The Sichuan University-Pittsburgh Institute, as the only joint institution in Western China and officially approved by the Ministry of Education, has a complete education and training system for medical-engineering interdisciplinary disciplines. The five majors it set up cover all knowledge systems related to medical robot development, which can help us better achieve integration of production and education.

在“产学研用”的全链条上，我们畅通无阻，不仅仅是布局医疗机器人大模块下单个专一方向，我们更倾向全面铺开，各个击破。无论是在学界还是产业界，放眼全国，也鲜少有华西医疗机器人研究院这样的新型研发机构，能聚集“产学研用”的全链条上的所有多元主体，且实现各主体之间的有机配合。其他地区面临的最大问题是产、学、研、用都分布在不同的地方，协调工作难以开展好。研究院已形成医工融合全链条创新范式，成为全国独树一帜的新型研究转化平台。

In the whole chain of “industry, academia, research, and application”, not only do we focus on the R&D of medical robots, but also extend the reach of our research to all relevant subdivisions and make substantial breakthroughs in them. In both academia and industry, there are a few new types of research and development institutions like the West China Medical Robotics Research Institute that can bring together all the multiple subjects in the chain of “industry, academia, research, and application” and achieve organic cooperation among them. The biggest problem faced by other regions is that institutions involved in “industry, academia, research, and application” are all located in different places, making it difficult to coordinate their work properly. The Institute has formed an innovation paradigm for the entire medical-engineering integration chain and has become a unique new research and transformation platform in China.

”

就医疗健康产业的发展，您如何看待成都的区位环境或者产业环境？

BioCollaborate: How do you see the location or industrial environment of Chengdu in terms of the development of the healthcare industry?

BIO Collaborate



李康 LiKang

”

西南人口数量大约在两亿，有着旺盛且不断增长的医疗需求；同时西南地区的基层的医院条件远不比东部地区。在这里，医疗机器人的需求缺口还很大，同时对医疗服务的成本也有着不小挑战。成都在西南片区影响力和辐射力巨大，我们坐落在这里，有着天时地利人和的产业环境。现阶段我们已成功开发出了脊柱微创手术导航系统、穿刺手术机器人等具有引领性的产品。还有我们的高速3D打印机，已经取得了超100台的订货量，预计今年将达到200台。随着我们的进一步发展以及和国内外优势团队的深度合作，研究院面向国家重大需求，将加速推进医疗机器人关键核心技术攻关，未来势必在西南地区建成医疗机器人“产学研用”的创新高地，形成一个上中下游完整的医疗机器人产业体系和适宜医工融合发展的有机生态环境，领航我国医疗机器人技术的创新研究、技术转化和产业发展。

With a population of around 200 million, there is a huge and growing demand for healthcare in Southwest China, and the conditions of hospitals at the grassroots level in Southwest China lag far behind those in East China. There is a huge demand gap for medical robots in Southwest China, which poses a great challenge to the cost of medical services. Chengdu has an enormous influence and radiance in Southwest China, and we are fortunate to be situated here, enjoying the advantages of a favorable industrial setting. At this stage, we have successfully developed advanced products such as a minimally invasive spinal surgery navigation system and a puncture surgery robot. We also have successfully unveiled our high-speed 3D printer, which has already achieved over 100 units on order and is expected to reach 200 units this year. With further development and in-depth cooperation with domestic and international advantageous teams, the Institute will step up efforts to make breakthroughs in core technologies for medical robots to meet the major needs of the country, and build an innovative highland of medical robots, where the four links, including industry, academia, research, and application, are given equal priority, in Southwest China, creating a complete medical robot industry system covering upstream, midstream, and downstream industries, as well as an organic ecological environment conducive to medical-engineering integration. By doing so, we aim to lead the innovative research, technology transformation, and industrial development of medical robots in China.

”

CORPORATE STYLE

企业风采

ABOUT WEST CHINA PITECH

关于华西精创



华西精创医疗科技(成都)有限公司是华西岷山医疗机器人研究院的工商注册实体，是成都市高新区政府以及四川大学华西医院在面临新的医疗设备国际竞争中积极引入国内外顶尖科技创新团队或科研机构，依托国家级科研平台“转化医学国家重大科技基础设施平台”，围绕医疗机器人产业技术方向，建设的西部第一家集产学研为一体，以产业孵化为核心的新型综合研发型企业。

WEST CHINA PITECH is a registered entity of West China Medical Robotics Research Institute, an R&D institution under the “Minshan Action” plan. It was established as a new type of comprehensive R&D enterprise that integrates production, academia, research, and application with a focus on developing medical robots technologies. The company was jointly initiated by the government of the Chengdu High-Tech Zone and the West China Hospital of Sichuan University to actively introduce top domestic and foreign technological innovation teams or research institutions to compete on the international stage of medical equipment. Relying on the national scientific research platform “National Major Science and Technology Infrastructure Platform for Translational Medicine”, WEST CHINA PITECH is the first comprehensive R&D enterprise in Western China with industry incubation at its core.

公司主要开展医疗机器人领域的技术研发，突破医疗机器人中配准与空间映射技术、图像处理技术以及人机交互技术等技术瓶颈，目前已落地近10个项目，包括：医疗3D高速打印系统、神经可视化脊柱微创手术导航系统、智能中医诊疗系统、体适能/助老机器人、康复助力机器人、医疗级触觉传感与智能设备、穿刺手术机器人、骨科手术机器人、多模态智能神经及骨肌康复助力系统、有限元公共技术平台等。研究院围绕医疗机器人产业技术方向，项目团队突破了医疗机器人中配准与空间映射技术、图像处理技术以及人机交互技术等技术瓶颈，形成跨学科、跨机构、跨国界的协同创新体系，有效弥补了国内在胸腔穿刺手术、关节手术、脊柱手术、康复科以及放射检验科机器人产品上的空白，实现关键技术与国际一流水平同步。

The company mainly focuses on technology R&D in the field of medical robots and has made breakthroughs in technology bottlenecks such as registration and spatial mapping technology, image processing technology, and human-computer interaction technology. Currently, they have implemented nearly 10 projects including the Medical 3D High-speed Printing System, Neural Visualization Minimally Invasive Spinal Surgery Navigation System, Intelligent Traditional Chinese Medicine Diagnosis and Treatment System, Physical Fitness/Assisted Living Robot, Rehabilitation Assistance Robot, Medical-Grade Tactile Sensing and Intelligent Equipment, Puncture Surgery Robot, Orthopedic Surgery Robot, Multi-Modal Intelligent Neurological and Musculoskeletal Rehabilitation Assistance System, and Finite Element Public Technology Platform. The Institute has formed a collaborative innovation system that spans disciplines, institutions, and national borders with a focus on medical robotics technology. The project team has effectively addressed technology bottlenecks such as registration and spatial mapping technology, image processing technology, and human-computer interaction technology, filling the gaps in domestic robotics products applied to chest puncture surgery, joint surgery, spinal surgery, rehabilitation, and radiologic examination departments, achieving synchronization of critical technologies with international standards.



05

前沿引领
Leading Edge

LEADING
EDGE

CHAPTER V



医疗机器人引领智慧医疗发展 我国加快推进医疗机器人产业科技进步

Medical Robots Lead the Development of Smart Healthcare
China is Accelerating the Technological Advancement of the Medical Robot Industry



MEDICAL ROBOTS
INDUSTRY

美国是全球最早部署机器人研究的国家，早在上世纪60年代就开始研发制造工业机器人，在80年代启动了医疗机器人的相关研发。几十年来，美国在医疗机器人研究和应用方面积累了大量的经验，美国企业垄断着医疗机器人领域的核心技术。近年来，美国各行业有感于我国相关行业的迅速发展，为保持其领先地位，对我国进行了一系列的技术封锁，比如阻止我国获取和使用被美国企业垄断的光刻机技术，从而限制我国在芯片领域的发展，在医疗机器人领域也是如此。

The United States, the country that first launched robotic research in the world, commenced the manufacturing and R&D of industrial robots as early as the 1960s and started related research and development of medical robots in the 1980s. Over the past few decades, the US has accumulated a wealth of experience in medical robot research and applications, and US companies have a monopoly on the core technologies of medical robots. In recent years, in response to the rapid development of related industries in China, and to maintain their leading position in the global market, various industries in the US have blocked China's access to and use of a series of cutting-edge technologies, such as lithography technology monopolized by US companies, thereby restricting the development of China's chip industry. The same is true in the field of medical robots.

2017年以来，为提升我国智能机器人基础前沿技术储备，增强国产机器人的国际竞争力，科技部和国家自然科学基金委员会启动了重点研发计划“智能机器人”重点专项，按照“围绕产业链部署创新链”的要求，从机器人基础前沿技术、共性技术、关键技术与装备、应用示范四个层次，围绕智能机器人基础前沿技术、新一代机器人、关键共性技术、工业机器人、服务机器人、特种机器人六个方向部署实施。“十三五”专项实施期间累计设立专项150余个，基本囊括了国内各个机器人细分领域的院士专家团队、行业企业和示范应用单位。

Since 2017, in order to improve China's core technological reserves in intelligent robots and enhance the international competitiveness of domestic robots, the Ministry of Science and Technology of the People's Republic of China and the National Natural Science Foundation of China have initiated "Intelligent Robots" Key Special Project in the key research and development program. According to the requirement of "deployment of innovative chains centered around the industry chain", this program is deployed at four levels, including basic forefront technology of robots, common technology, key technology and equipment, and application demonstration, and around six dimensions, including basic forefront technology of intelligent robots, new-generation robots, key common technologies, industrial robots, service robots, and special robots. During the implementation of the 13th Five-Year Plan, more than 150 special projects were set up. These projects mainly involved academicians and expert teams, industrial enterprises, and application demonstration institutions in various domestic robot segments.



2022年是“十四五”重点专项执行首年，共立项37个项目，近三分之一专项属于医疗手术和康复机器人方向，支持攻克医疗机器人关键技术，深化医疗机器人应用，加速推进医疗机器人技术与产业快速发展。在最新发布2023年度“智能机器人”重点专项的申报指南中，被列入四大研究方向的“服务机器人”主要聚焦医疗机器人，拟启动10项指南任务，预估投入国拨经费8000万元，涉及脑机智能融合、药物靶向递送、自然腔道复杂操作柔性技术、自主缝合作业技术、弱能老人高相容性照护康复技术等相关的医疗机器人研发。足见，我国对推进医疗机器人产业科技进步，树立机器人产业核心影响力的决心。

In 2022, the first year of execution of the 14th Five-Year Plan Key Special Project, 37 projects were founded, of which almost one-third related to medical surgery and rehabilitation robots and supported the development of core technologies for medical robots, furthering the application of medical robots and speeding up the rapid development of medical robot technology and industry. In the latest application guidelines for the 2023 "Intelligent Robots" Key Special Project, the "Service Robots" included in the four major research directions mainly focus on medical robots. It is planned to launch 10 guidance tasks, with an estimated investment of RMB 80 million from national funds, involving brain-machine intelligent integration, targeted drug delivery, flexible technology for complex natural cavity operations, autonomous suturing technology, and high-compatibility care and rehabilitation technology for elderly people with limited abilities. All of these demonstrate China's determination to promote the technological advancement of the medical robot industry and ensure the core influence of the robot industry.

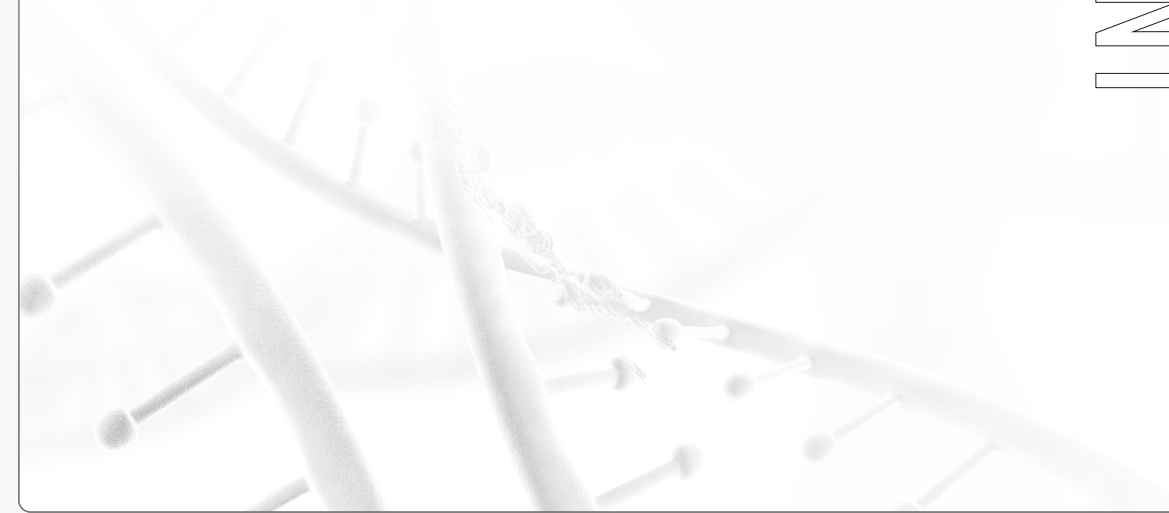
在以“构建国家医学卫生健康战略科技力量”为主题的2022年中国医学发展大会上，多位专家就医疗机器人发展发表了相关看法。中国医学科学院学部委员、中国工程院院士田伟表示，机器人和AI技术一定是引领未来医学革命性改变的方向，在机器人升级换代的过程中，不应以模仿和替代医生为目的，要坚持机器人和AI对于医学的正向帮助。中国工程院院士赵敏民也表示，机器人的作用是拓展提升人的能力，而非替代人。我国企业在相关产品的布局和研究上也秉持着这一理念，在政策导向和专项资金支持下，不断取得突破，逐步获得国际市场认可。

At the 2022 Chinese Medical Development Conference, themed "Building National Scientific and Technological Strength in Medical Health Strategy", several experts shared their views on the development of medical robots. Tian Wei, an academicians of the Chinese Academy of Medical Sciences and a member of the Chinese Academy of Engineering, stated that robots and AI technology are bound to lead revolutionary change in the medical sector in the future. In the process of upgrading and updating robots, emulating and replacing doctors should not be the goal. Rather, robots and AI should be used for the positive assistance of medicine. Zhao Yimin, an academicians of the Chinese Academy of Engineering, also stated that the role of robots is to expand and enhance human abilities, not to replace them. Domestic companies in China adhere to this concept in the layout and research and development of related products. Under the guidance of relevant policies and with special funding support, breakthroughs have been continuously achieved, and recognition from the international market has gradually been obtained.

2018年，上海傅利叶智能科技公司自主研发的上肢康复机器人成为中国首次出口美国的康复机器人。2022年，上海微创机器人公司的鸿鹄骨科手术机器人获得美国食品药品监督管理局（FDA）510(k)认证，成为国内首款获得FDA认证的手术机器人。未来，医疗机器人应用场景持续拓展，市场成长空间广阔，我国也将持续发力推动医疗机器人产业高质量发展，全面实现医疗机器人自研自产，在该领域掌握国际话语权。

In 2018, the upper limb rehabilitation robot independently developed by Shanghai Fourier Intelligence Co., Ltd. became the first rehabilitation robot exported from China to the United States. In 2022, the Honghu Orthopedic Surgery Robot developed by MicroPort (Shanghai) MedBot Co., Ltd. obtained the U.S. Food and Drug Administration (FDA) 510(k) Certification and became the first surgical robot in China to obtain FDA certification. In the future, with the increasing application scenarios of medical robots, the market potential for medical robots will also continue to grow. China will continue to promote the high-quality development of the medical robot industry and achieve comprehensive self-reliance in the R&D and production of medical robots, aiming to grasp international discourse power in the field.

MEDICAL DEVELOPMENT



06

园区动态
Park Dynamics



CHAPTER VI

PARK DYNAMICS

● LIVE

园区动态

精准医学产业创新基金揭牌！ “BT+IT”专场路演举行

Launch of Precision Medicine Industry Innovation Fund!
Holding of “BT+IT” Special Roadshow

四川省首个国家级产业创新中心——国家精准医学产业创新中心建设迎来新进展，3月2日精准医学产业创新基金揭牌暨项目路演在成都高新区举行，由国家精准医学产业创新中心联合成都市、高新区两级国有投资平台共同发起成立的精准医学产业创新基金正式启动，将打造包括成果转化基金、股权投资基金、风险补偿基金在内的投融资服务体系。

The construction of the National Industrial Innovation Center of Precision Medicine (NIICPM), the first national-level industrial innovation center in Sichuan Province, has gained momentum. On March 2, the Unveiling Ceremony of the Precision Medicine Industry Innovation Fund & Project Roadshow took place in Chengdu Hi-tech Zone. The Precision Medicine Industry Innovation Fund, jointly initiated and established by NIICPM and state-owned investment platforms of both Chengdu and Chengdu Hi-tech Zone, has been officially launched. It aims to build an investment and financing service system covering technology transfer funds, equity investment funds, and risk compensation funds.

精准医学产业创新基金首期规模10亿元，旨在通过基金投资，支持优秀项目、团队和合作伙伴，加快攻克“卡脖子”关键技术，全力建设“政医产学研资用”创新生态，推动科技成果转化，助力精准医学产业创新发展。



活动现场 Event Site



搭建路演交流平台，持续提升医药健康产业创新策源力
A roadshow exchange platform was built to continuously enhance the innovation capacity of the pharmaceutical and health industry

The initial scale of the Precision Medicine Industry Innovation Fund totals RMB 1 billion, which is aimed at expediting the breakthrough of “bottlenecks” in key core technologies through fund investment and supporting excellent projects, teams, and partners. Meanwhile, it tends to fully build an innovative ecosystem featuring the integration of “government, medicine, industry, university, research, fund, and application”, and promote the transformation of scientific and technological achievements, in a bid to give strong support to the innovative development of the precision medicine industry.

"Leading BioTalent 领航者计划 中高端人才专场招聘"(重庆场)举办

Holding of "Leading BioTalent · Mid-to-High-End Talent Recruitment" (Chongqing)

为进一步优化高新区生物医药产业人才结构，精准引进产业急需紧缺人才，着力推进“建圈强链”及生物医药产业结构优化升级，3月11日，“Leading BioTalent领航者计划--中高端人才专场招聘”（重庆场）在渝中区顺利举办。这也是2023年成都高新区生物医药类企业首次出川组团招聘的重头活动。

To further optimize the talent structure of the biopharmaceutical industry in Chengdu Hi-tech Zone, accurately introduce talents urgently needed for the development of the biopharmaceutical industry, promote the optimization and upgrade of the initiative of "building the industrial circle and strengthening the industrial chain" and the biopharmaceutical industry structure, the "Leading BioTalent · Mid-to-High-End Talent Recruitment" (Chongqing) was successfully held on March 11 in Yuzhong District. This is also the flagship event of biopharmaceutical companies in the Chengdu Hi-tech Zone jointly recruiting relevant talents in Chongqing for the first time in 2023.



本次活动由成都高新技术产业开发区生物产业局指导，成都高投生物医药园区管理有限公司及成都天府国际生物城管理委员会联合主办，活动吸引了华西精准医学产业创新有限公司，成都倍特药业，华西海圻，地奥制药等17家高新区生物医药重点及优质企事业单位参与，提供了超过100个针对中高端人才的优质岗位，面向重庆招引优秀人才。

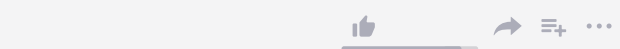
Guided by the Biological Industry Bureau of Chengdu High-tech Industrial Development Zone and jointly organized by CDHT Investment Group Biomedicine Industrial Park Management Co. Ltd. and Chengdu Tianfu International Bio-town Management Committee, the event brought together 17 key and high-quality biopharmaceutical enterprises and institutions in Chengdu Hi-tech Zone, including West China Precision Medicine Co., Ltd., Brilliant Pharmaceuticals, WestChina-Frontier PharmaTech Co., Ltd., and DIAO Group. Over 100 high-quality positions for mid-to-high-end talents were provided, targeting the recruitment of outstanding talents from Chongqing.

为培优做强高端人才链，推动产业释放人才红利。在“BioTalent人才招聘”主品牌的基础上，区内知名生物医药产业园区天府生命科技园和成都前沿医学中心运营服务公司成都高投生物医药园区管理有限公司2023特别打造专属于高层次人才（团队）招引和交流的子品牌“Leading BioTalent领航者计划”，本次活动现场发布了“Leading BioTalent 领航者计划”品牌及宣传视频。

To optimize and strengthen the high-end talent chain and further unleash industrial talent dividends, Based on the main brand of "BioTalent Recruitment", CDHT Investment Group Biomedicine Industrial Park Management Co. Ltd., the operation management company of Tianfu Life Science Park, a well-known biopharmaceutical industrial park in Chengdu Hi-tech Zone, and Chengdu Advanced Medical Science Center, specially created the sub-brand of 2023 "Leading BioTalent" dedicated to attracting and communicating with high-level talents (teams). The event released a brand and promotional video of the "Leading BioTalent" on-site.

当天，招聘现场异常火爆，到场人数近500人，初步达成就业意向人数达200人，本科及以上学历占比95%，硕博占比超过30%；近6000人通过线上直播观看现场招聘情况，线上收到有效简历近300份。

On that day, the recruitment scene was extremely lively, with nearly 500 attendees. The number of people with preliminary employment intentions reached 200, with 95% of them having a bachelor's degree or above and over 30% having a master's or doctoral degree. Nearly 6,000 people watched the live online broadcast of the recruitment, and nearly 300 valid resumes were received online.



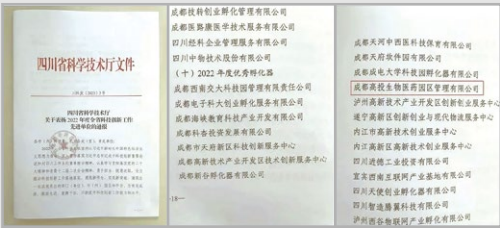
BIOTALENT
LEADING

两项殊荣！2022优秀科技企业孵化器、
成都市劳动关系和谐园区5A称号

Two Honors, including Sichuan Excellent Technology Business Incubator in 2022 and 5A Rating for Chengdu Harmonious Labor Relations Park!

● 成都高投生物医药园区管理有限公司，获评四川省2022年度优秀科技企业孵化器

CDHT Investment Group Biomedicine Industrial Park Management Co. Ltd. Is Awarded Sichuan Excellent Technology Business Incubator in 2022



● 天府生命科技园荣获成都市劳动关系和谐园区5A称号

Tianfu Life Science Park Is Awarded 5A Rating for Chengdu Harmonious Labor Relations Park



成都市人力资源和社会保障局
成都市总工会
成都市企业联合会
成都市工商业联合会

成人社办发〔2022〕179号

成都市人力资源和社会保障局等四部门
关于发布第三届成都市模范劳动关系和谐单位
名单的通知

各区（市）县人社部门、总工会、企业联合会、工商联，市级各部门、各有关单位：
按照市委、市政府《关于构建和谐劳动关系实施意见》（成

— 1 —

二、园区

天府生命科技园

青羊区工业创新设计功能区

成都锦江工业园区

锦江区白鹭湾新经济总部功能区

成都金牛高新技术产业园区

成都市龙潭工业机器产业功能区

成都国际铁路港经济技术开发区

青白江区欧洲产业城

成都市高性能纤维材料产业功能区

新都区智能家居产业城

新都区城北新消费活力区



天府生命科技园+成都前沿医学中心是西部地区乃至中国的标杆生物医药产业园区之一，作为知识密集型、技术密集型的医药类园区代表，已成为中国有重要影响的生物医药研发创新中心和产业孵化中心。近年来，为园区企业营造和谐干事创业环境，先后获得国家级科技企业孵化器优秀（A类）、四川省科技孵化载体服务联盟先进集体等，成为四川省唯一连续2年获评A类的生物医药类孵化器。园区扎实推进人才服务、安全环保、企业资讯等各项保障服务工作，搭建企业与劳动者之间的连心桥，努力构建和谐发展园区。

Tianfu Life Science Park, along with Chengdu Advanced Medical Science Center, is one of the benchmark biopharmaceutical industry parks in Western China and even in China. As a knowledge-intensive and technology-intensive pharmaceutical park, it has grown into a biopharmaceutical R&D innovation center and industrial incubation center with enormous influence in China. In recent years, having been fostering a harmonious environment for enterprises in the park, it has successively obtained the Excellent National Technology Business Incubator (Class A), the Advanced Collective of Technology Incubation Carrier Service Alliance of Sichuan, and has become the only A-class biopharmaceutical incubator in Sichuan Province for two consecutive years. The park has made solid progress in various supporting services, including talent services, safety and environmental protection, and enterprise information services, building a bridge between enterprises and workers, and striving to construct a park of harmonious development.

未来，成都高投生物医药园区管理有限公司将继续以技术创新能力提升为行业发展和技术进步贡献力量，也将进一步提升构建和谐劳动关系能力，作好企业和园区的表率。

In the future, CDHT Investment Group Biomedicine Industrial Park Management Co. Ltd. will continue to contribute to industrial development and technological progress by enhancing its technological innovation capabilities. It will also further enhance its ability to build harmonious labor relations and set a good example for enterprises and parks.



(HONORABLE) REPUTATION

赛璟生物、海博为研发频传捷报！

CYNOGEN and Hyperway Have Achieved Remarkable Success in Their Research and Development Efforts!

园区企业赛璟生物、海博为先后传出研发捷报！成都赛璟生物医药科技有限公司,首个产品熊去氧胆酸胶囊成功入选第八批国家药品集中采购。成都海博为药业建立脑透药物开发中试平台。

CYNOGEN and Hyperway, two bio-pharmaceutical enterprises in the park, have achieved remarkable success in their research and development efforts! Ursodeoxycholic Acid Capsules, the first drug product of CYNOGEN, has been successfully included in the eighth batch of the national centralized drug procurement list. Hyperway has established a brain permeation drug development pilot platform.

01 赛璟生物 CYNOGEN



成都赛璟生物医药科技有限公司专注于原创小分子创新药及高端仿制药的研发。3月29日，成都赛璟生物医药科技有限公司首个产品熊去氧胆酸胶囊成功入选第八批国家药品集中采购，该产品是成都赛璟生物自主研发的首个仿制药品种，是目前唯一经过规范临床试验验证，用于治疗胆汁淤积性肝病、胆汁反流性胃炎等的药物，目前尚无其他临床治疗替代药物。此次进入国家集采后，预计年销售额超亿元，或将改变原研制剂垄断中国市场的格局，为国内患者提供高品质、优疗效、低价格的优质药物。

CYNOGEN has been committed to the R&D of original small molecule innovative drugs and high-end generic drugs all along. On March 29, Ursodeoxycholic Acid Capsules, the first drug product of CYNOGEN, has been successfully included in the eighth batch of the national centralized drug procurement list. This product is the first generic drug independently developed by CYNOGEN and the only one that has undergone standardized clinical trials for the treatment of diseases such as cholestatic liver disease and bile reflux gastritis. Currently, there are no other alternative drugs available for clinical treatment. After being included in the national

procurement list, this drug product is expected to achieve annual sales exceeding RMB 100 million, potentially changing the monopoly of original preparation in the Chinese market and providing high-quality, effective, and affordable medications for domestic patients.



02 海博为药业 Hyperway



由成都海博为药业有限公司建设的脑透药物开发中试平台,力求全面覆盖小分子创新药从化合物分子设计到临床前研究的全过程,集中研发资源,快速高效的开发出具有深厚潜力的创新药。

The brain permeation drug development pilot platform established by Hyperway Pharmaceutical Co., Ltd. aims to comprehensively cover the entire process of small molecule innovative drug development, from compound molecular design to preclinical research. By concentrating research and development resources, the platform aims to efficiently develop innovative drugs with significant potential.

2022年，平台已为2家企业进行创新药开发服务，一项已依据合作协议顺利交付，一项将于2023年提交IND申请。该平台通过中国合格评定国家认可委员会（CNAS）的认可，荣获成都市和高新区的“重大产业平台”认定。

In 2022, the platform has provided innovative drug development services to two companies, one of which has been successfully delivered based on the cooperative agreement, and the other is set to submit an IND application in 2023. This platform has been recognized as a "Major Industrial Platform" by Chengdu and Chengdu Hi-tech Zone, with accreditation from the China National Accreditation Service for Conformity Assessment. (CNAS).

全国首家“罗氏诊断数字PCR创新中心”在天府生命科技园正式挂牌成立

China's First "Digital PCR Innovation Center" Is Officially Established in Tianfu Life Science Park

3月，园区企业佳医医学检验实验室有限责任公司，与罗氏诊断中国宣布达成战略合作，全国首家“罗氏诊断数字PCR创新中心”在天府生命科技园正式挂牌成立。双方将基于罗氏诊断数字PCR整体解决方案，展开全方位合作共同推动精准医疗领域科研成果的临床转化与应用。

In March, Jiayi Medical Laboratory Co., Ltd., in strategic cooperation with Roche Diagnostics (China), officially established the first "Digital PCR Innovation Center" in China, which is located in Tianfu Life Science Park. Both parties will collaborate extensively using Roche Diagnostics' digital PCR overall solution to promote the clinical transfer and application of research achievements in precision medicine.



“罗氏诊断数字PCR创新中心”揭牌仪式
Unveiling Ceremony of Digital PCR Innovation Center



战略合作签约仪式
Signing Ceremony for Strategic Cooperation



嘉宾合影
Guests Group Photo



成都高新区卫健局副局长刘赵峰表示：
Liu Zhaofeng, Deputy Director of the Chengdu Hi-tech Zone Health Bureau, stated:

此次佳医实验室与罗氏诊断共建的全国首家“罗氏诊断数字PCR创新中心”落户成都高新区，积极响应了高新区医药卫生建圈强链的产业发展政策，丰富了我区优质的医疗资源，填补了高新区乃至成都市的检验技术空白，将助力成都市精准医疗的发展与创新。希望合作双方以此为契机，不断引进转化更多的医疗检测技术服务，造福更多的人民群众。

China's first "Digital PCR Innovation Center", established by Jiayi Medical Laboratory in collaboration with Roche Diagnostics, has settled in Chengdu Hi-tech Zone and responds positively to Chengdu Hi-tech Zone's development policies for the medical and healthcare industry, which emphasize building the industrial circle and strengthening the industrial chain, enriches local high-quality medical resources, fills the technical gap in inspection technology in Chengdu Hi-tech Zone and even Chengdu, and will contribute to the development and innovation of precision medicine in Chengdu. It is hoped that this cooperation will continuously introduce and transform more medical testing technology services to benefit more people.

重磅！北京大学成都前沿交叉生物技术研究
院落户成都前沿医学中心二期

Breaking News! Peking University Chengdu Academy for
Advanced Interdisciplinary Biotechnologies Settles in
Chengdu Advanced Medical Science Center Phase II

4月13日，北大、成都携手共建的北京大学成都前沿交叉生物
技术研究院在成都正式揭牌，并落地于成都前沿医学中心二期。

On April 13, Peking University Chengdu Academy for Advanced Interdisci-
plinary Biotechnologies, jointly established by Peking University and
Chengdu, was officially unveiled in Chengdu and settled in Chengdu
Advanced Medical Science Center Phase II.



此次揭牌的北京大学成都前沿交叉生物技术研究 院由成都高新
区联合北京大学共建，是北大在全国唯一的前沿交叉生物技
术研究院，致力于解决生物技术领域关键问题、突破关键技术，
建设产业牵引下的从科学到技术、从项目到公司的转化高地，
培育具有国际竞争力的生物产业集群，力争建设成为前沿生
物技术领域的国家技术创新中心。

The Peking University Chengdu Academy for Advanced Interdisciplinary
Biotechnologies unveiled this time is jointly built by Chengdu Hi-tech Zone and
Peking University. It is Peking University's only advanced interdisciplinary
biotechnology research institute in China. Meanwhile, it is committed to solving
key problems, making breakthroughs in key technologies, constructing a
highland characterized by the effective alignment of scientific and technological
transformation and enterprise projects, building internationally competitive
biotechnology industry clusters, and striving to become a national technological
innovation center in the field of advanced biotechnology.



北京大学成都前沿交叉生物技术研究 院选址成都前沿医学中
心二期A2栋，将采取新型研发事业单位运作模式，实行理事
会领导下的院长负责制，首任理事长由中国科学院院士汤超
担任，首任院长由北京大学来鲁华教授担任。

The Peking University Chengdu Academy for Advanced Interdisciplinary
Biotechnologies is located in Building A2 of Chengdu Advanced Medical
Science Center Phase II. It will adopt a new R&D institution operational
model, implement the dean responsibility system under the leadership
of a council, and the first chairman of the council will be academician
Tang Chao from the Chinese Academy of Sciences, while the first dean
will be Professor Lai Luhua from Peking University.

研究院揭牌当天宣布，目前已确定首批设立七个研究中心，分
别是定量系统生物学研究、合成生物技术创新、基因检测与编
辑技术创新、免疫治疗技术创新、化学生物学前沿技术创新、
解码衰老研究、生物分子智造研究等，已明确由汤超院士、来
鲁华教授以及杰青、海外高层次人才引进人才等领衔建设。

On the day of the institute's unveiling, it was announced that the first
batch of seven research centers would be established, including
quantitative systems biology research, synthetic biotechnology
innovation, gene testing and editing technology innovation, immuno-
therapy technology innovation, cutting-edge technology innovation in
chemical biology, aging research, and biomolecular intelligence
manufacturing research. And it was explicitly reported that Academi-
cian Tang Chao, Professor Luhua Lai, and young talents as well as
high-level talents introduced from overseas will lead the construction of
these research centers.

当前，成都正在抢抓“一带一路”建设、成渝地区双城经济圈建
设等重大历史机遇，加快建设具有全国影响力的科技创新中
心，打造具有全国影响力的增长极和动力源。研究院的成立，
对成都创新能级提升、产业建圈强链具有重要支撑作用。

Currently, Chengdu is seizing major historical opportunities such as the
“Belt and Road” initiative and the construction of the Chengdu-Chongq-
ing economic circle, accelerating the construction of a nationally
influential scientific and technological innovation center, and striving to
create a nationally influential growth pole and driving force. The
establishment of the institute provides important support for the
enhancement of Chengdu's innovation capacity and building the
industrial circle and strengthening the industrial chain.



“2022成都硬科技扑克牌榜单”出炉园区4家企业荣耀上榜

The “2022 Chengdu Hard Technology Poker Card Ranking List” Is Released with Four
Enterprises from the Park on the List

2023成都硬科技年会暨成都硬科技扑克牌发布会举行年会，发布“2022成都硬科技扑克牌榜
单”，展现了成都最具代表性的54家硬科技扑克牌企业：他们在各自的领域内拥有核心技术、
领先产品、优秀团队和良好口碑，为成都乃至全国的经济社会发展作出了重要贡献。

The 2023 Chengdu Hard Technology Annual Conference & Chengdu Hard Technology Poker Card Release
Conference is held, unveiling the “2022 Chengdu Hard Technology Poker Card Ranking List”. It showcased the
most representative 54 hard technology poker card enterprises in Chengdu, all of which possess core technolo-
gies, leading products, excellent teams, and a favorable reputation, making significant contributions to the
economic and social development of Chengdu and even the whole country.

其中，天府生命科技园和成都前沿医学中心有4家企业上榜，分别是：迈科康生物、海博为
药业、成都瞿灵生物以及四川康德赛。

Among them, Tianfu Life Science Park and Chengdu Advanced Medical Science Center had four enterprises on
the list, namely: MAXVAX, Hyperway, Chengdu Zenitar Bio, and Sichuan Cunde Therapeutics Co., Ltd.



ENTERPRISE HONOR ON THE LIST

红桃企业

牌面	企业名称	企业家	产业链	细分赛道
♥ A	威斯津	宋相喜	创新药(含中医药)	mRNA创新药物
♥ K	锦江电子	李慧文	高端医疗器械	心脏电生理创新医疗器械
♥ Q	齐碳科技	胡庚	高端医疗器械	基因测序
♥ J	鼎辰光翼	张皓	高端医疗器械	基因检测
♥ 10	美创医疗	王晨	高端医疗	低温等离子手术系统
♥ 9	美富特	李群英	生态环保	综合环境服务
♥ 8	至善唯新	董璐	创新药(含中医药)	rAAV基因药物
♥ 7	迈科康	陈德祥	创新药(含中医药)	创新疫苗和新型佐剂
♥ 6	康景生物	寇大匡	高端医疗	细胞技术
♥ 5	海博为	李英富	创新药(含中医药)	小分子创新药
♥ 4	瞿灵生物	夏文	创新药(含中医药)	小分子创新药
♥ 3	康德赛	丁平	高端医疗	疫苗研发
♥ 2	贝施美	鄢新章	高端医疗器械	口腔生物医学材料

迈科康生物
MAXVAX



迈科康生物成立于2016年，由国际疫苗专家陈德祥博士创立，专注于创新人用和兽用（含宠物）疫苗的研发、生产和商业化，基于国际领先的新型佐剂、重组蛋白平台及免疫评价平台，搭建了一系列重大创新疫苗品种管线。拥有近20种佐剂原材料，打造了3类成熟的传送系统，开发了10多种复合配方，形成了从佐剂原材料研发、生产到佐剂配方开发与应用的垂直化产业链。先后获得国家级高新技术企业、四川省专精特新“小巨人”企业认定，连续入选GEI中国（潜在）独角兽企业榜单。

MAXVAX, founded in 2016 by international vaccine expert Dr. Chen Dexiang, focuses on the research, production, and commercialization of innovative human and veterinary (including pets) vaccines. It has built a series of pipelines for major innovative vaccine varieties based on internationally leading adjuvants and recombinant protein platforms, and immunological evaluation platforms. With nearly 20 types of adjuvant raw materials, it has developed three mature delivery systems and more than 10 compound formulations, forming a vertically integrated industrial chain from adjuvant raw material research and production to adjuvant formulation development and application. It has been recognized as a national high-tech enterprise and a “Little Giant” enterprise characterized by specialized, refined, distinctive, and novel development in Sichuan Province and has been continuously selected for the GEI China (Potential) Unicorn Enterprise List.

海博为药业
Hyperway



成都海博为药业有限公司成立于2019年1月，是一家专注于做小分子靶向创新药研发的新型生物医药企业。公司以临床需求为导向，以源头创新为驱动力，建立了科学规范的研发体系，覆盖从靶点开发、化合物筛选、临床前研究、临床研究、注册上市的新药开发全过程，立志以科学严谨的研究态度，专业高效的研发速度，开发出具有国际领先水平的创新药，让患者再现活力，让生活更有动力。

Hyperway Pharmaceutical Co. Ltd., established in January 2019, is a new biopharmaceutical enterprise dedicated to the research and development of small molecule targeted innovative drugs. With clinical needs as its guidance and source innovation as its driving force, the enterprise has established a scientifically standardized research and development system covering the entire process of new drug development, from target development, compound screening, pre-clinical research, and clinical research, to registration and listing. It aims to develop world-class innovative drugs in a scientifically rigorous, professional, and efficient manner, rejuvenating patients and bringing more vitality to life.



ENTERPRISE HONOR ON THE LIST

成都瞿灵生物
Chengdu Zenitar Bio



成都瞿灵生物医药科技有限公司成立于2019年，是一家专门从事创新药物研究及产业化的国家高新技术企业、全国中小科技型企业。公司背靠四川大学华西医院生物治疗国家重点实验室、吸收贵州百灵集团上市公司优质资源、依托一流专家技术团队。公司研发管线涵盖肿瘤（实体瘤及血液瘤）、自身免疫性疾病、新型冠状病毒性肺炎引起的细胞因子风暴等创新药物研发。公司品种注射用甲磺酸普依司他获得中国临床试验通知书及美国FDA临床批件，马来酸氟诺替尼片获得中国临床试验通知书。累计申请发明专利27件，已授权21件，其中中国专利7件，美国、欧洲、日本等国际专利14件，商标2件。

Chengdu Zenitar Bio, founded in 2019, is a national high-tech enterprise and a national small and medium-sized science and technology enterprise specializing in innovative drug research and industrialization. With the support of the State Key Laboratory of Biotherapy at West China Hospital of Sichuan University and the absorption of high-quality resources from Guizhou Baoling Group, the enterprise relies on a top-notch expert technical team. Its research pipeline covers the R&D of innovative drugs for tumors (solid tumors and hematologic malignancies), autoimmune diseases, cytokine storms caused by COVID-19, etc. The enterprise's injection formulation of Purinostat Mesylate obtained the clinical trial notification from China and clinical approvals from the US FDA, and its Flonoltinib Maleate Tablet obtained the clinical trial notification from China. It has applied for 27 invention patents, of which 21 have been granted, including 7 in China and 14 international patents from the United States, Europe, Japan, and other countries, as well as 2 trademarks.

四川康德赛
Sichuan Cunde Therapeutics Co., Ltd.



四川康德赛医疗科技有限公司成立于2016年，整合重庆莱美、北控医疗及华大基因等多家上市生物医药公司优势资源，借助国内外知名高校的雄厚科研力量，致力于新型细胞治疗技术在恶性肿瘤、中晚期肝硬化等人类重大疾病领域的开发、转化及应用。其自主研发的Cunde技术平台是新一代个性化肿瘤疫苗开发平台。根据病人个体化的肿瘤新抗原，以自体树突状细胞为载体，提高人体免疫系统对于肿瘤细胞的识别性，提高肿瘤细胞的免疫原性和对效应细胞杀伤的敏感性，激发和增强机体抗肿瘤免疫应答；同时多维度调节肿瘤免疫微环境，协同机体免疫系统杀伤肿瘤，抑制肿瘤生长，减少肿瘤的复发。

Sichuan Cunde Therapeutics Co., Ltd. was founded in 2016. The enterprise has assimilated the advantageous resources of several listed biopharmaceutical enterprises, including LUMMY, Beijing Health (Holdings) Limited, and BGI Genomics Co., Ltd. With the strong research power of renowned domestic and international universities, the enterprise is dedicated to the development, transformation, and application of innovative cell therapy technologies applied to the cure of major human diseases such as malignant tumors and intermediate-to-late-stage liver cirrhosis. Its independently developed Cunde technology platform is a new-generation personalized tumor vaccine development platform. According to individualized neoantigens of patients, it takes the autologous dendritic cells as carriers, improves the recognition of the human immune system to tumor cells, improves the immunogenicity of tumor cells and the sensitivity to the killing of effector cells, stimulates and enhances the anti-tumor immune response. At the same time, it can regulate the tumor immune microenvironment in multiple dimensions, cooperate with the immune system to kill the tumor, inhibit tumor growth, and reduce tumor recurrence.



07

创新生态
Innovation EcologyINNOVATION
ECOLOGY

CHAPTER VII

“岷山行动”引领科技成果转化新模式
天府生命科技园+成都前沿医学中心助力区域创新成果转化跑出“加速度”

“Minshan Action” Leads a New Model for the Transformation of Scientific and Technological Achievements, and the “Tianfu Life Science Park + Chengdu Advanced Medical Science Center” Accelerates the Transformation of Regional Innovation Achievements

当前，在国家政策、资金等多方发力的推动下，以“创新”为核心的生物医药企业、校地联合的创新研发项目等如雨后春笋般涌现而出，但其中真正能够实现转化并最终落地于市场，造福于人们健康的科技成果却寥若晨星。

Currently, driven by national policies, funding, and other factors, innovation-oriented biomedical enterprises and university-locality collaborative innovative R&D projects are springing up like mushrooms. However, among them, the scientific and technological achievements that can truly undergo transformation and eventually land in the market to benefit people's health are few and far between.

因此，为进一步提升区域科技创新能力，加速创新成果落地，将医药健康产业打造成为下一个万亿级产业，近年来，成都市将科技成果转化作为全市创新工作的“一号工程”，接连出台了多项生物医药产业专项支持政策。

Therefore, to further enhance the regional capacity for technological innovation, accelerate the commercialization of innovation achievements, and develop the biomedicine and health industries into the next trillion-yuan-level industry, Chengdu has designated the transformation of scientific and technological achievements as the city's "No.1 Project" for its innovative work and has issued multiple special policies to support the biomedical industry.

其中，成都高新区作为国家自主创新示范区及西部生物医药产业重镇，更是启动“岷山行动”计划，通过揭榜挂帅的形式，为揭榜团队提供科研载体、企业孵化等全生命周期支持，而由成都高投生物医药园区管理有限公司（以下简称“高投生物医药园公司”）运营的“天府生命科技园+成都前沿医学中心”，作为成都市生物医药产业发展的核心载体，自然而然也成为了这些“创新项目”的最佳孵化器。

Among them, Chengdu Hi-tech Zone, as a national independent innovation demonstration zone and a key hub for the biomedical industry in Western China, has launched the “Minshan Action” Plan to provide comprehensive support throughout the entire lifecycle, from research carrier to enterprise incubation, for teams capable of

solving the challenges and taking the lead through “selection of leading institutions”. As a core carrier for the development of Chengdu's biomedical industry, the “Tianfu Life Science Park + Chengdu Advanced Medical Science Center”, operated and managed by CDHT Investment Group Biomedicine Industrial Park Management Co., Ltd. (hereinafter referred to as CDHT Investment Biopark Company), naturally becomes the ideal incubator for these innovative projects.



近期，红星新闻记者走进成都前沿医学中心，与“岷山行动”首批揭榜挂帅的项目之一——成都岷山细胞工程技术研究院项目负责人展开了交流，透过此次深度对话，我们将了解这类新型研发机构在加速推动科技成果转化落地过程中取得了哪些进展与突破？在此过程中，一直致力于给区域生物医药创新发展提供良好生长环境的“天府生命科技园+成都前沿医学中心”又是如何培育创新土壤，为成都打造带动全国高质量发展的重要增长极和新的动力源贡献力量呢？

Recently, a reporter from Hongxing News visited the Chengdu Advanced Medical Science Center and engaged in an in-depth dialogue with the head of Chengdu Minshan Cell Engineering Technology Research Institute, one of the first batch of leading projects of the “Minshan Action” Plan. Through this in-depth dialogue, we will gain insights into the progress and breakthroughs achieved by such new-type R&D institutions in accelerating the implementation of the transformation of scientific and technological achievements. Furthermore, we will explore how the “Tianfu Life Science Park + Chengdu Advanced Medical Science Center”, which has been committed to providing a favorable growth environment for regional biomedicine innovation, nurtures an innovative ecosystem and contributes to Chengdu's role as a crucial growth pole and a new driving force for high-quality development in China.

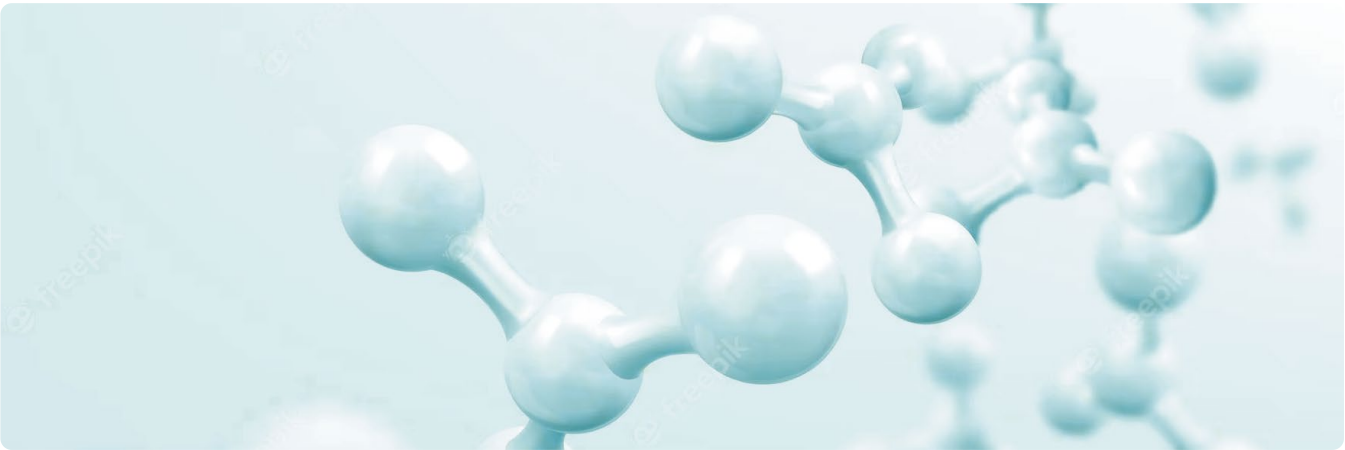
“岷山行动”计划：探索科技成果转化新路径，从源头引导创新成果落地市场
"Minshan Action" Plan: Exploring New Pathways for Transformation of Scientific and Technological Achievements and Guiding Innovation Achievements to the Market from the Source

2021年，为进一步激活区域创新活力，成都高新区正式启动揭榜挂帅型研发机构（新型研发机构）“岷山行动”计划，明确未来5年将投入300亿元聚焦成都高新区电子信息、生物医药、新经济三大主导产业，建设50个新型研发机构，解决产业链细分领域“卡脖子”问题，搭建公共技术平台，促进科技成果转化，成都高新区将为揭榜团队，提供初创资金、科研载体、企业孵化等支持和服务。

In 2021, to further stimulate regional innovation vitality, Chengdu Hi-tech Zone officially launched the "Minshan Action" Plan for leading R&D institutions (new-type R&D institutions), which outlined a commitment of RMB 30 billion over the next five years to the three dominant industries in Chengdu Hi-tech Zone, namely electronic information, biomedicine, and the new economy, with the establishment of 50 new-type R&D institutions. It aims to address bottlenecks in various segments of the industrial chain, create public technology platforms, and promote the transformation of scientific and technological achievements. Chengdu Hi-tech Zone will provide support and services, including startup funding, research carriers, and enterprise incubation, to the leading teams of the "Minshan Action" Plan.

位于成都前沿医学中心的成都赛恩吉诺生物科技有限公司，便是新型研发机构成都岷山细胞工程技术研究院的运营实体，也是入选成都高新区“岷山行动”计划（揭榜挂帅型研发机构）的首批项目。

Located in the Chengdu Advanced Medical Science Center, Chengdu Saien Jinuo Bio-tech Co., Ltd. is the operating entity of the new-type R&D institution Chengdu Minshan Cell Engineering Technology Research Institute and is also one of the first batch of projects selected for Chengdu Hi-tech Zone's "Minshan Action" Plan (leading R&D institutions).



在入选“岷山行动”计划首批项目后，成都赛恩吉诺生物科技有限公司在成都高新区提供的资金政策支持下，迅速汇集国内外的免疫细胞、干细胞和基因编辑等领域的知名技术专家和临床专家，联合产业专家和资深管理专家组成了核心团队，并落地于成都前沿医学中心。

Following its selection into the "Minshan Action" Plan's first batch of projects, Chengdu Saien Jinuo Bio-tech Co., Ltd., with the financial support provided by Chengdu Hi-tech Zone, rapidly gathered renowned technical and clinical experts in fields such as immune cells, stem cells, and gene editing at home and abroad and formed a core team in collaboration with industry specialists and seasoned management experts at Chengdu Advanced Medical Science Center.

“我们的本质就是一个实现科技成果转化的孵化平台，目前已经配备了超过1000万人民币的仪器设备，并以此搭建了多个技术平台，开展以解决临床问题为目标的前沿技术研究和产业转化工作。”赛恩吉诺董事长杨寒朔教授向记者介绍到，成都岷山细胞工程技术研究院的本质是孵化类平台，依托研究院的力量汇集科学和技术、人才、资金、创新机制体制等要素，助力科研成果转化更加贴近市场。

"We are essentially an incubation platform for transforming scientific and technological achievements. Equipped with over RMB 10 million worth of instruments and equipment, we have established multiple technical platforms to conduct cutting-edge research and industrial transformation with the goal of addressing clinical issues," said Professor Yang Hanshuo, Chairman of Chengdu Saien Jinuo Bio-tech Co., Ltd., while briefing the reporter. He emphasized that Chengdu Minshan Cell Engineering Technology Research Institute is essentially an incubation-type platform, aiming to facilitate the transformation of research results to align closely with market needs by leveraging the resources of the research institute, such as science and technology, talents, funds, and innovative mechanisms.

据悉，杨寒朔教授不仅是成都赛恩吉诺生物科技有限公司的董事长、成都岷山细胞工程技术研究院项目负责人，同时也是四川大学华西医院生物治疗国家重点实验室教授，从事疾病发生机制及生物治疗研究工作已二十余年，曾主持国家重大专项等多项国家级研究课题及四川省重点课题，熟悉科学研究前沿和产业发展趋势，在提到“岷山行动”计划的创新亮点时，他表示，“以前项目多以科学家兴趣为主，以在科学上的创新和突破为主要考虑，但从产业的角度，也许在10个项目中，能产业化并解决临床问题的有1个就很不错了，而我们这类研究院是从立项开始就邀请相关科学家、产业专家，从临床问题出发，保证每个项目都有比较高的可行性和可转化性，希望从源头上解决科研项目的市场前景和产业化方向的问题。”

It is reported that Professor Yang Hanshuo is not only the Chairman of Chengdu Saien Jinuo Bio-tech Co., Ltd. and the project leader of Chengdu Minshan Cell Engineering Technology Research Institute, but also a professor at the National Key Laboratory of Biotherapy at West China Hospital of Sichuan University. Familiar with the forefront of scientific research and industrial development trends, he has been involved in disease mechanisms and biotherapy research for over two decades and once led multiple national and Sichuan provincial research projects, including major national R&D projects. "Previously, projects were driven mainly by scientists' interests, focusing on scientific innovation and breakthroughs. However, from an industrial perspective, if one out of 10 projects can be successfully industrialized and address clinical issues, it would already be a good achievement. In contrast, our research institute, from its inception, invites relevant scientists and industry experts, taking a clinical-problem-oriented approach to ensure the high feasibility and convertibility of each project. We hope to tackle the issues concerning the market prospects and industrialization directions for research projects from the very beginning," said Yang Hanshuo, while referring to the innovative highlights of the "Minshan Action" Plan.

记者了解到，目前成都岷山细胞工程技术研究院旗下的首个孵化公司已经与国内头部投资机构达成协议，完成首轮融资。研究院首批启动项目进展顺利，多个新型免疫细胞治疗产品正按中外双报的策略推进、多个免疫治疗产品获得临床伦理批件，正在开展的临床研究（IIT），已表现出令人振奋的治疗效果，在晚期肿瘤患者观察到完全缓解（CR）的病例，其中一项临床研究已产生国际影响力，吸引了一位英国病人来国内治疗，目前正在跟临床医生沟通治疗细节。

The reporter learned that the first incubation company under Chengdu Minshan Cell Engineering Technology Research Institute has already reached an agreement with a leading domestic investment institution and completed its first round of financing. The first batch of projects of the research institute is progressing smoothly, with several new immune cell therapy products being strategically advanced for both domestic and foreign applications. Multiple immune therapy products have received ethical approval for clinical trials, and ongoing Investigator-Initiated Trials (IIT) have shown encouraging therapeutic effects. Complete Remission (CR) has been observed in advanced cancer patients, and one of the clinical studies has gained international attention and attracted a patient from the UK for treatment in China. Currently, the research institute is communicating treatment details with clinical doctors.

依托“岷山行动”计划所成立的新型研发机构，不仅给予初创项目全方位的支持，更始终坚持以“满足临床需求”为研发导向，以“创新成果落地”为目标，因此通过借力研究院平台，入驻平台的企业一方面能够节约硬性硬件成本的投入，另一方面也能够与研究院的科学家进行及时的沟通，保证项目研发的科学性。此外，得益于研究院的项目专家团队，也能够引导创业项目真正面向市场需求，解决临床问题。



As a newly established new-type R&D institution based on the "Minshan Action" Plan, it not only provides comprehensive support for start-up projects, but also consistently adheres to the development orientation of "meeting clinical needs" with the aim of achieving "the transformation of innovation achievements". Thus, the platform provided by the research institute allows the enrolled enterprises to save hardware investment costs while maintaining timely communication with the institute's scientists to ensure the scientific rigor of project development. Furthermore, benefiting from the project expert team of the research institute, the entrepreneurial projects are guided towards meeting market demands and solving clinical issues.

专业化园区：围绕创新链布局产业链，培育生物医药创新项目孵化器

Professional Park: Building an Industrial Chain around the Innovation Chain and Cultivating an Incubator for Biomedical Innovation Projects

“岷山行动”计划推动建立以顶尖团队为核心、成果转化为导向的新型研发机构，支持构建“研发机构+孵化公司+转化基金”运营模式，探索“财政投入补贴+创投基金引导+社会资本参股+团队现金持股”投入机制，并始终聚焦‘技术先进性、产业化实现性、团队落地成都可能性’对项目进行研判，为揭榜团队提供全方位的支持。这在国内无疑是一次突破性的创新，而要完成这次创新成功落地，则离不开专业化园区一站式科技服务。

The “Minshan Action” Plan aims to establish new-type R&D institutions centered around top-tier teams and guided by the transformation of scientific and technological achievements. It supports the construction of an operation model combining “R&D Institutions + Incubation Companies + Transformation Funds” and explores an investment mechanism that involves “Financial Input Subsidies + Venture Capital Fund Guidance + Social Capital Participation + Team Cash Holdings”. Throughout the project assessment, the focus remains on “Technological Advancement, Achievability of Industrialization, and Feasibility of Landing in Chengdu”, providing comprehensive support for the leading teams. Undoubtedly, it represents a breakthrough innovation in China. However, to successfully realize this innovation, it is inseparable from the support of the one-stop science and technology services provided by the professional park.

目前，在政策、资源纷纷加大倾斜力度的支持下，汇集了高能级产业项目和政策支持的“天府生命科技园+成都前沿医学中心”已成长为了成都生物医药产业创新发展新极核和策源地，作为天府生命科技园和成都前沿医学中心的运营管理公司，高投生物医药园公司定位为国内顶尖生物产业高品质科创空间整合运营商，向企业提供“全生命周期一站式科技服务体系”，包括CRO、CMO、CSO等3大类14项“企业产品全生命周期专业服务”，以及人才服务、安全环保等19大类40项“企业成长全生命周期专业服务”。

With the strong support of policies and resources, the “Tianfu Life Science Park + Chengdu Advanced Medical Science Center”, which gathers high-level industrial projects and policy support, has grown into a new core and source of innovation for the development of the biomedical industry in Chengdu. As the operating management company of the Tianfu Life Science Park and the Chengdu Advanced Medical Science Center, CDHT Investment Biopark Company positions itself as a high-quality integrated operator of the domestic biotech industry, providing enterprises with a “one-stop science and technology service system throughout their entire lifecycle”, including 14 “professional services for the entire lifecycle of enterprise products” under three categories, namely CRO, CMO, and CSO, as well as 40 “professional services for the entire lifecycle of enterprise growth” under 19 categories, such as talent services, safety, and environmental protection.



当记者问到，对于像成都赛恩吉诺生物科技有限公司这类初创企业而言，“天府生命科技园+成都前沿医学中心”具备哪些鲜明优势时？杨寒朔教授表示“初创企业的发展都是从小到大、从无到有，而园区能够在企业发展早期就提供各方面的大力支持。”

When asked about the distinctive advantages of the “Tianfu Life Science Park + Chengdu Advanced Medical Science Center” for start-up enterprises like Chengdu Saien Jinuo Bio-tech Co., Ltd., Professor Yang Hanshuo said, “The development of start-up enterprises starts from small to large, from nothing to something, while the park can provide comprehensive support to enterprises in their early stages.”

一方面，成都前沿医学中心作为激发创新动能的连接器，为初创项目搭建了聚焦企业产品全生命周期以及企业成长全生命周期的一站式科技服务体系，包括3大类14项“企业产品全生命周期专业服务”，以及19大类40项“企业成长全生命周期专业服务”。杨寒朔教授对园区为企业提供的全生命周期服务链条深有感触：“在企业入驻后，园区不仅提供了场地、安全方面的支持，还进一步提供了产业和资金支持，帮助初创企业对接资本，进一步驱动企业成长。此外，对于初创企业而言，园区也对企业免费开放了大量的产业化平台，解决了生物医药创新链和产业链的堵点、难点、痛点，为初创企业解决了成本难题。”

On the one hand, the Chengdu Advanced Medical Science Center, serving as a linker of stimulating innovation, has established a one-stop science and technology service system focusing on the entire lifecycle of enterprise products and enterprise growth for startup projects, including 14 “professional services for the entire lifecycle of enterprise products” under three categories and 40 “professional services for the entire lifecycle of enterprise growth” under 19 categories. Professor Yang Hanshuo has deep feelings about the services for the entire lifecycle provided by the park to enterprises: “After enterprises settle in, the park not only provides support in terms of venues and safety but also offers industrial and financial support, helping start-up enterprises connect with capital and further driving their growth. Additionally, the park also provides start-up enterprises with numerous industrialization platforms free of charge, effectively addressing the bottlenecks, difficulties, and pain points in the biomedical innovation chain and industrial chain as well as the cost issues for start-up enterprises.”

另一方面，成都前沿医学中心也提供了高科技的人才队伍支持，为生物产业厚植发展沃土。杨寒朔教授提到，“成都前沿医学中心作为与四川大学的合作项目，具有高密度的创业氛围和学术氛围，通过与国际知名生物医药企业和科研机构进行多维度合作，构筑了科学家、企业家、创业者的创新共同体。”

On the other hand, the Chengdu Advanced Medical Science Center also provides high-tech talent support, fostering a fertile ground for the development of the biotech industry. Professor Yang Hanshuo mentioned, “As a cooperative project with Sichuan University, the Chengdu Advanced Medical Science Center has a high-density entrepreneurial and academic atmosphere. Through multidimensional cooperation with internationally renowned biotech enterprises and research institutions, it has built a collaborative community of scientists, entrepreneurs, and innovators.”



此外，天府生命科技园+成都前沿医学中心已经形成了以园区为中心的产业生态圈和涵盖产业上下游的生态链，进一步为初创企业的科研成果转化提供了落地场景。目前，园区累计孵化培育超过200家生物医药创新型企业，聚集了华西医院、阿斯利康西部总部、倍特药业研发中心、贐灵生物、睿智化学、博腾药业、海博为药业、西岭源药业、今是科技等一批深耕生物医药产业的代表性研发平台、企业，截至目前，已成功培育成都先导、海创药业、康诺亚、圣诺科肽母公司等多家上市或拟上市企业，4家独角兽（潜在）企业，17家瞪羚企业，13家雏鹰企业，18家“专精特新”企业以及53家高新技术企业。

Furthermore, the “Tianfu Life Science Park + Chengdu Advanced Medical Science Center” has formed an industrial ecosystem centered around the park and ecological chain covering the upstream and downstream industries, further providing a landing scenario for the transformation of research results for start-up enterprises. Currently, the park has incubated and nurtured more than 200 innovation-based biomedical enterprises, gathering a batch of representative R&D platforms and enterprises deeply involved in the biomedical industry, such as West China Hospital, AstraZeneca Western Headquarters, Brilliant Pharmaceuticals R&D Center, Zenitar Bio, ChemPartner, Porton Pharma Solutions, Hyperway, Xiling Lab, and Geneus Tech. Up to now, it has successfully cultivated several listed or potential listed enterprises such as HitGen, Hinova, KeyMed Biosciences, and the parent company of ShengNuo Peptide, as well as four unicorn (potential) enterprises, 17 gazelle enterprises, 13 eagle enterprises, 18 “professional, refined, special and novel” enterprises, and 53 high-tech enterprises.

“岷山行动”计划按照“揭榜挂帅”的方式，推动建立了以顶尖团队为核心、成果转化为导向的新型研发机构，探索出了一条创新成果转化的新路径，截至目前，“岷山行动”计划已发布三批需求榜单。而在具体实践中，“天府生命科技园+成都前沿医学”通过整合“医政产学研资”优质资源，以聚焦企业产品全生命周期以及企业成长全生命周期的一站式科技服务体系为支撑，以更灵活的机制配置市场资源，推动了园区内像成都赛恩吉诺生物科技有限公司这类初创企业加速成果转化的进程。

The “Minshan Action” Plan, following the “selection of leading institutions” approach, promotes the establishment of new-type R&D institutions centered around top-tier teams and guided by the transformation of scientific and technological achievements. It has explored a new path for the transformation of innovation achievements. So far, the “Minshan Action” Plan has released three batches of demand lists. In practical application, the “Tianfu Life Science Park + Chengdu Advanced Medical Science Center”, has accelerated

the process of transforming achievements for start-up enterprises like Chengdu Saien Jinuo Bio-tech Co., Ltd. within the park, by integrating high-quality resources from “medicine, government, industry, academia, research, and funding” and creating a one-stop science and technology service system focusing on the entire lifecycle of enterprise products and enterprise growth, with a more flexible mechanism for allocating market resources.

可以预见，在软实力“岷山行动”计划和硬支撑天府生命科技园+成都前沿医学中心的合力下，将助力造福于人们健康的科技成果转化，跑出“加速度”。

It is foreseeable that with the joint efforts of the soft power of the “Minshan Action” Plan and the strong support of the “Tianfu Life Science Park + Chengdu Advanced Medical Science Center”, the transformation of scientific and technological achievements that benefit human health will achieve “acceleration”.

[Conclusions]

总结 Summary

近年来，伴随着我国生物医药产业逐步迈入“高质量发展阶段”，如何提高原始创新能力、加速创新成果落地，赋能产业提档升级，已成为了各级政府重点投入的方向之一。

In recent years, as China’s biomedical industry has gradually entered the “high-quality development stage”, how to enhance original innovation capabilities and how to accelerate the implementation of the transformation of scientific and technological achievements to empower the industry’s upgrading have become key focuses of investment of governments at all levels.

成都作为全国第七个迈入2万亿俱乐部的超大城市，不仅是成渝地区双城经济圈成为中国经济第四极的重要支撑点，更是服务战略大后方建设的创新策源地，日前，为进一步推动科技成果转化，“转”动高质量发展新动能，成都再度重磅出台28条政策，可见创新之决心。

Chengdu, as the seventh city in China to join the “Two-Trillion-Yuan Club”, not only serves as a crucial support point for the Chengdu-Chongqing Economic Circle to be the fourth economic pole in China, but also acts as an innovative source for the strategic rear area construction. Recently, Chengdu has unveiled 28 new policies to further promote the transformation of scientific and technological achievements and stimulate new momentum for high-quality development, demonstrating its determination in fostering innovation.

而成都高新区作为成都科技创新核心区域，近年来一直坚持创新驱动发展战略，岷山行动便是高新区自主创新的一项激励科技创新的政策，在政策推动的过程中，高投生物医药园公司一直紧跟国家及区域发展的战略方向、精准把握生物医药产业发展的底层规律的天府生命科技园+成都前沿医学中心，而是以更广泛的维度陪伴企业成长周期，提供聚焦企业产品全生命周期以及企业成长全生命周期的一站式科技服务，在加速科技成果转化的路上起到了放大叠加倍增的作用，并通过不断引进各类高能级创新平台，进一步激发了区域创新源动力，逐渐成长为了成都乃至西南生物医药经济领域的重要增长极。

As the core area for technological innovation in Chengdu, Chengdu Hi-tech Zone has been committed to the strategy of innovation-driven development in recent years. The “Minshan Action” is Hi-tech Zone’s policy initiative for encouraging scientific and technological innovation. Throughout the policy implementation, CDHT Investment Biopark Company has closely followed the national and regional strategic direction for development and the “Tianfu Life Science Park + Chengdu Advanced Medical Science Center” which accurately grasps the underlying principles of the biomedical industry’s development. With a broader perspective, it accompanies enterprises through their growth cycles by offering one-stop science and technology services focusing on the entire lifecycle of enterprise products and enterprise growth, which has played a significant role in accelerating the transformation of innovation achievements, leading to amplified and multiplying effects. Additionally, by continuously introducing various high-level innovative platforms, the company has further stimulated regional innovation dynamics, gradually establishing itself as a vital growth engine in the biomedicine economy, not only for Chengdu but also for the entire Southwest China.



目前，成都高新区正加快构建“链主企业、公共平台、产业基金、领军人才、中介机构”5+N产业生态体系，在产业园区和优质政策的支持下，众多高能级企业和平台得以孵化，并由此为成都生物医药产业注入了新的活力，为成都连续取得佳绩提供了关键驱动力，也为成都打造西南生物医药创新高地培育了新动能。

Currently, Chengdu Hi-tech Zone is speeding up the construction of a 5+N industrial ecosystem of “chain-leading enterprise, public platform, industry fund, leading talents, and intermediary organizations”. With the support of the industrial park and favorable policies, numerous high-level enterprises and platforms have been incubated, thus injecting new vitality into Chengdu’s biomedical industry, providing a critical driving force for the city’s continuous achievements, and cultivating new momentum for Chengdu to build itself as a biomedicine innovation highland in Southwest China.

