

# 医学影像技术装备自主创新与转化

## Indigenous Innovation and Industrialization of Medical Imaging Equipment

### 成果简介:

医学成像设备属于以信息技术为核心的多学科交叉和高门槛技术领域，是重大疾病诊疗的核心手段，也是我国高端医疗器械产业瓶颈所在。团队历时10余年突破了高场人体超导快速磁共振、功能超声成像和调控等医学影像装备的高分辨成像方法、高速成像电子学、核心部件制备和关键技术，研发成功国际上最大视场3.0T人体磁共振高分辨成像系统、最大功率梯度功放和世界首台影像引导无创超声辐射力深部脑刺激仪器。授权发明专利160余项，美国专利10项，已转化80余项。系列高端医学影像设备实现了产业化，有力带动了国产高端医疗器械自主创新发展，打破了国外垄断，改变了医疗设备国际产业格局，造福民生福祉。

### Introduction:

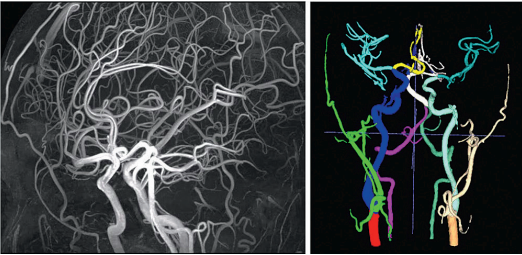
Medical imaging, with information technology as the core, is a multi-disciplinary and high-threshold technology field. The medical imaging systems are important tools for diagnosis and treatment of major diseases, which are the bottlenecks of Chinese advance medical device industry. Over the past 10 years, the medical imaging team has made breakthroughs in high-resolution imaging methods, fast imaging electronics, core components and key technologies of medical imaging systems. The team successfully developed a 3.0 T human magnetic resonance imaging with high resolution and the largest field of view, gradient amplifiers with the maximum power and the world's first non-invasive image-guided ultrasonic radiation force deep brain stimulation instrument. The team has been authorized more than 160 invention patents and 10 United States patents. More than 80 patents have been purchased. A series of advance medical imaging systems with indigenous innovation have been achieved industrialization, which has promoted the indigenous innovation and development of domestic manufactured medical devices, broken foreign monopoly, reshaped the international medical equipment industry business, and benefited people's well-being.



牵头建设国家高性能医疗器械创新中心  
Lead the construction of the National Innovation Center for Advanced Medical Devices



我国首型号 3.0T MR  
Chinese first model 3.0 T MR



高分辨高场磁共振脑血管成像  
High field magnetic resonance cerebrovascular imaging with high resolution



2021年5月18日，中国科学院院长、党组书记侯建国调研深圳先进院参观高端医学影像实验室  
On May 18, 2021, Hou Jianguo, President and Party secretary of the Chinese Academy of Sciences, visited the advance medical imaging laboratory in Shenzhen Institute of Advanced Technology



世界首台磁共振引导超声脑刺激仪器  
The world's first magnetic resonance guided ultrasonic brain stimulation system

### 推荐单位 / Recommended Unit

中国科学院深圳先进技术研究院  
Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences

### 完成单位 / Accomplished Unit

中国科学院深圳先进技术研究院  
Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences

### 合作单位 / The Main Cooperation Units

上海联影医疗科技股份有限公司  
Shanghai United Imaging Healthcare Co., Ltd.  
深圳迈瑞生物医疗电子股份有限公司  
Shenzhen Mindray Bio-Medical Electronics Co., Ltd.  
中科绿谷（深圳）医疗科技有限公司  
GreenValley BrainTech (Shenzhen) Medical Technology Co., Ltd.

### 社会效益和经济效益:

团队主导研发的高场超导磁共振快速成像技术、超声定量弹性成像与神经调控系统已在企业实现了产业化，并形成了具有自主知识产权的医学成像技术体系，增强了我国在该领域的核心技术能力。截至2020年底，主要合作单位上海联影磁共振产品累计销售1300余台，国内市场占有率第1，出口美国等16国；功能超声弹性成像系统已在上千家医院应用，销售总额逾10亿人民币。高端国产设备的推广应用迫使国外同类产品大幅降价，节省了医疗成本，提升了公共医疗水平。团队与深圳迈瑞和联影等行业龙头发起建设国家高性能医疗器械创新中心，引领产业走向高端，助力健康中国的医疗设备保障。

### Social and Economic Benefits:

The team led the research and development of high field superconducting magnetic resonance rapid imaging technology, ultrasonic quantitative elastography imaging system, ultrasonic neural modulation system, which have been industrialized in the enterprises. The team has formed a medical imaging technology system with indigenous intellectual property, and enhanced the core technical capabilities in this field in China. By the end of 2020, the main cooperator of the team, Shanghai United Imaging Healthcare, has sold more than 1,300 magnetic resonance products, ranking first in the domestic market share, and exported to 16 countries including the United States. Functional ultrasound elastography systems have been used in thousands of hospitals and sold with a sales volume exceeding 1 billion RMB. The promotion and application of advance domestic manufactured medical imaging systems has prompted a substantial price reduction of similar foreign products, which has saved medical costs and improved the public health care. The team initiated the construction of National Innovation Center for Advanced Medical Devices with Shenzhen Mindray and Shanghai United Imaging Healthcare, leading the industry to advance and providing a guarantee for a healthy China.



磁共振研发团队部分核心成员  
Core members of MRI research team



超声弹性成像技术转为产品的产线（深圳）  
The production line of ultrasonic elastography technologies and the products (Shenzhen)



超导磁共振成像产品产线（上海联影）  
The production line of superconducting Magnetic resonance Imaging products (Shanghai United Imaging Healthcare)



团队成员 / Team Members:



郑海荣  
Zheng Hairong

中国科学院深圳先进技术研究院  
主要贡献：团队负责人，发明核心关键技术，组织技术研发与推动产业化。

Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences  
Main contributions: Team leader, major inventor of core key technologies, organized technology research and development and industrialization.



李 烨  
Li Ye

中国科学院深圳先进技术研究院  
主要贡献：射频开发。

Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences  
Main contributions: RF Development.



梁 栋  
Liang Dong

中国科学院深圳先进技术研究院  
主要贡献：快速成像。

Shenzhen Institute of Advanced Technology,Chinese Academy of Sciences  
Main contributions: Fast MR Imaging.



刘 新  
Liu Xin

中国科学院深圳先进技术研究院  
主要贡献：临床转化。

Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences  
Main contributions: Clinical Translation.



朱燕杰  
Zhu Yanjie

中国科学院深圳先进技术研究院  
主要贡献：心脏成像。

Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences  
Main contributions: MRI Cardiac Imaging.



邱维宝  
Qiu Weibao

中国科学院深圳先进技术研究院  
主要贡献：超声电子。

Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences  
Main contributions: Ultrasonic Electronics.



牛丽丽  
Niu Lili

中国科学院深圳先进技术研究院  
主要贡献：超声神经调控。

Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences  
Main contributions: Neuromodulation.



隆晓菁  
Long Xiaojing

中国科学院深圳先进技术研究院  
主要贡献：成像技术。

Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences  
Main contributions: Imaging Technology.



邹 超  
Zou Chao

中国科学院深圳先进技术研究院  
主要贡献：定量成像。

Shenzhen Institute of Advanced Technology,Chinese Academy of Sciences  
Main contributions: Quantitative Imaging.



王丛知  
Wang Congzhi

中国科学院深圳先进技术研究院  
主要贡献：弹性成像算法。

Shenzhen Institute of Advanced Technology,Chinese Academy of Sciences  
Main contributions: Ultrasound Elastography Algorithms.