

# A medical robotics revolution

A pioneer in orthopaedic robotics, **WEI TIAN**, from **BEIJING JISHUITAN HOSPITAL**, outlines the industry's development in China, and highlights the importance of interdisciplinary collaboration.

## What led to the growth of medical robotics?

The emergence of several devices in the 1950s, led to a revolution in medical technologies, broadening options, and transforming diagnosis and treatment. Despite advances, in treating bone fractures, for example, plaster fixation took three to six months to heal, causing great patient discomfort, and usually bringing unsatisfactory results. Medical innovations in recent decades have seen treatment time shortened to three to six days in some cases. Reliable internal fixation can even allow patients to start walking within hours after surgery.

Rapid technological development brought opportunities, as well as new challenges. The vast amount of data made available by advanced medical equipment has put doctors' analytical capabilities to the test. Under these circumstances, a new medical revolution dominated by AI and robotics emerged. It will come to be seen as a milestone in medical history.

## What needs does medical robotics address?

Relying on doctors' capabilities alone can no longer meet

societal needs. As the scope of medical services expands, from surgery to rehabilitation, and for the changing needs of an ageing society, the demand for robot-assisted medicine is growing, leading to a shortage of human resources, and high medical labour costs. Meanwhile, people have increasing expectations for quality medical care, anticipating that all surgery should be error free. These needs drive the development of robotic and AI-assisted technologies.

## How is it best to drive the development of medical robotics?

A prominent feature of this medical revolution is the interdisciplinary collaboration between medicine, engineering, and industry. Only through collaboration can top experts from different fields bring their best to create a solution. We require more medical experts who know about clinical needs, and are willing to use AI or robotic technologies to compensate for deficiencies in diagnosis and treatment. The engineering field also needs more innovations, in basic materials science and technologies, which are lacking in our country.



Wei Tian, president of Beijing Jishuitan Hospital, explains how orthopaedic robots have improved safety and accuracy for surgical procedures.

And as many enterprises in the field are just starting, greater support from the government is required to lead the capital market. We hope that more capital will be invested to support longer-term goals, to allow these start-ups to grow.

## What progress has been achieved?

In 10 years, we have conducted more than 3,000 experiments, from prototyping original designs to commercializing the equipment. From a single frame, with one function, we've developed a hybrid drive, leading to a multi-module product which allows multi-site surgery, safe for clinical use. In 2004, we completed China's first robot-assisted orthopaedic surgery, and in 2010, gained China's first registration certificate for a medical robotic device. In 2012, the second-generation navigation robot for orthopaedic surgery was

launched. In 2015, the third-generation general-purpose orthopaedic robot was released, which integrates 3D imaging, real-time navigation and robotic technologies. The first of its kind, it represents major technical breakthroughs in clinical accuracy and adaptability. Next, we'll focus on more flexible robotic structures, more efficient human-computer interaction technologies, and remote robotic operation.

Medical robots are not to replace doctors, but to provide a tool to extend their capabilities. With joint efforts, I believe China's future in medical robotics is promising. ■

**JST** 北京积水潭医院  
BEIJING JISHUITAN HOSPITAL  
北京大学第四临床医学院

<http://www.jst-hosp.com.cn>  
+86-10-58516688  
kyc\_JST@163.com