



# Win-win cooperation for advancing medical innovation

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Scientific and technological advancements in medicine have always been highly esteemed worldwide. According to statistics published by the Organization for Economic Cooperation and Development (OECD), global health spending accounted for 9.6% of GDP in 2021. Research and development expenses incurred in "health and environmental projects" comprised 30% to 50% of the total R&D funds available in major developed countries such as the United States and the United Kingdom in 2019.<sup>1</sup>

Novel scientific and technological advancements in medicine will be key areas for innovation and capital investments globally over the next 30 years. These medical innovations are expected to generate new preventative, diagnostic, and treatment methods, as well as health monitoring techniques, new

drugs, and devices for managing diseases. These advancements in medicine will not only accelerate existing medical and commercial processes to address people's ever-changing health demands but also enhance the ability to respond effectively to future emergencies, such as pandemics. Ultimately, the benefits will extend to the entire global community. Achieving this goal requires global cooperation across all levels: governments, medical companies, hospitals, and scientific research institutes must collaborate to create a favorable ecosystem for medical innovation. Governments and companies must partner to tackle the critical challenge of ensuring that innovative products benefit as many individuals as possible.



Figure 1. Multidiscipline cooperation is the right way for medical innovation.

## THREE KEY DIMENSIONS OF A MEDICAL INNOVATION SYSTEM

The construction of a strategic medical innovation system hinges on three key dimensions: body, resources, and ecology.

The body of a medical innovation system comprises core facilities, including hospitals, universities, research institutes, and enterprises where scientific and technological talent can be found. It can be considered the "supply side" of medical innovation. To enhance the capacity for medical innovation

in science and technology, it is necessary to expand the scope of the supply side. Talented individuals located in hospitals are at the heart of the body. They identify clinical problems, coordinate and integrate other disciplines into the R&D process, and play crucial roles in clinical transformation and the future application of innovative products.

Managers within the organization must seek, mobilize, coordinate, and rely on external resources, the second key dimension. These resources support

the medical innovation system by providing funding, policies, evaluation mechanisms, a talent nurturing system, resource allocation, commercialization of scientific and research findings, and income distribution.

The third dimension, ecology, encompasses a conducive environment for the sustainable development of medical innovation. A favorable ecology will foster a positive circular environment. It is characterized by an achievement-sharing mechanism, mutual benefits, and win-win outcomes (Figure 1). Within a sustainable medical innovation system, an ecosystem can gradually expand from small-scale to large-scale.

## TWO EXAMPLES ILLUSTRATING THIS SYSTEM

### Xueyuan Road Medical Innovation Alliance

Hospitals are the most dynamic and appropriate places for cultivating medical innovation. Peking University Third Hospital, located near Xueyuan Road in Haidian District of Beijing, is in close proximity to many leading Chinese universities and research institutes, such as Peking University, Tsinghua University, and Beihang University. These institutions naturally constitute the core of medical innovation, creating a multidisciplinary and multi-directional research community with innate advantages that position it at the forefront of China's medical innovation efforts.

In 2019, Peking University Third Hospital spearheaded the establishment of the Beijing Xueyuan Road Clinical Collaborative Innovation Alliance (referred to as "the Alliance"). The Alliance pioneered a reform of the entire medical innovation system and its mechanisms, from top-level design to platform construction. These efforts effectively combined resources and stimulated the personal initiatives and creativity of the medical staff. The Alliance brought together major universities and institutes located on Xueyuan Road, thereby expanding the core body and opening up avenues to medical innovation.

Since its establishment three years ago, the Alliance has achieved significant breakthroughs in medical innovation. It has introduced a series of major scientific and technological advancements, such as customized 3D printed knees in sports medicine and an ovarian reserve assessment tool in reproductive medicine<sup>2-4</sup>, which have been successfully applied in clinical settings. It is noteworthy that the Alliance was established systematically and did not emerge overnight. In the future, the Alliance will serve as the initiator, promoting collaboration among hospitals, universities, and institutes in Beijing to foster medical innovation. As active R&D participants within the core body, doctors will play a leading role in exploring better ways to transfer medical achievements and addressing the medical challenges facing humanity.

Chaozi Lei, Director of the Department of Science and Technology at the Ministry of Education stated that "Institutes with top-tier innovative talent will have an advantage in scientific and technological innovation." He also emphasized that his department would grant more autonomy to local universities and scientific researchers, allowing them to make decisions regarding medical innovation while ensuring compliance with ethical standards. Referring to his department's actions, he stated that commercialization of scientific and research findings would continue to be recognized. Transformation bases would also be established inside universities and institutes to increase the efficiency of intellectual property transfers.

Dr. Chunli Song, Vice Dean of Peking University Third Hospital, expressed optimism, stating "The ideal state for individuals is when you buy me a drink, and I buy you a steak, and we can achieve mutual benefit." It is hopeful that more clinicians will join the Alliance, collaborating to solve clinical problems and sharing success stories that benefit all parties involved.

### Joint centers between Peking University Third Hospital and enterprises

In May 2021, the General Office of the State Council of China released "Opinions on Promoting the High Quality Development of Public Hospitals"<sup>5</sup>,

which outlines the direction for the future development of hospitals. Seizing this opportunity, Peking University Third Hospital has established 18 collaborative centers, integrating its cutting-edge clinical, R&D, and talent resources with the resources of multiple renowned companies in certain fields. The objective is to explore new modes of scientific and technological innovation in medicine by collaborating with commercial resources and others to establish a mutually beneficial "hospital-company-research-marketing" ecological cycle.

These collaborative centers have introduced a new organizational mechanism, cooperative mode, and ecological chain. Accordingly, clinical problems are considered the direction and human demand is the driving force. The centers have made significant contributions to establishing policy guarantees, a positive environment, and continued efforts to strengthen the three key dimensions of medical innovation: body, resources, and a favorable ecology. On one hand, they strengthen enterprises' R&D and technological advancement capabilities; on the other hand, they enhance the efficiency of the hospital's new innovation system.

Through proactive efforts and intensive changes in layout, Peking University Third Hospital has established a system designed to sustain innovation and transformation. This includes creating top-level designs and innovative mechanisms, integrating resources, streamlining operational and service processes, and improving internal management. With the collaboration of the medical innovation community, including hospitals, universities, institutes, and companies, our hospital hopes to identify and solve clinical problems, achieving technological advancements in medicine, and fostering win-win successes and mutual development among collaborators that ultimately benefit humanity.

On August 20th, 2019, Peking University Third Hospital signed a contract for the transformation of research achievements related to "Semi-personalized and Fully Personalized Artificial Joints and Minimally Invasive Precision Surgical Instruments for Total Knee Replacement." The transfer amount was 50 million yuan. A year later, the same research group's "Peripheral Blood Stem Cells and Related Tissue Engineering Scaffold Technology" was transferred for 30 million yuan. These are just two examples of the many successful innovations developed by the collaborative centers.

An important consideration is that hospital-based collaboration is an end-to-end process. Hospitals are positioned centrally within the collaboration chain and must independently seek support from multiple platforms while analyzing and assessing the strength and development potential of the targets of cooperation. This, to some extent, limits the efficiency of the body's development. Ensuring the sustainable implementation of policies is the cornerstone of the long-term development of medical innovation.

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## DECLARATION OF INTERESTS

The author declare no competing interests.