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MAPPING TRENDS IN HEALTH RESEARCH AND MEDICAL INNOVATION

A conversation with **JIAOFENG PAN**, president of the Institutes of Science and Development at the Chinese Academy of Sciences (CASISD) in Beijing



The health industry is developing at great speed. CASISD researchers and their collaborators conducted a bibliometric analysis on global patterns of growth in research and technology transfer in 'big health', hinting at future trends and prospects. Project leader, Jiaofeng Pan, shares his insights and the key findings.

Why did you focus on big health?

'Big health' is a comprehensive concept to encapsulate the changing world, evolving social needs, and the spectrum of new disease threats. Health-related industries have become a hotspot and focus for global development. Many countries and regions have released policies and initiatives to accelerate innovation and the application of big health technologies.

We systematically analysed progress, prospects, changes in industry as well as trends in promising areas of big health research and technology transfer. We have also conducted a comparative analysis of China's competitiveness in this arena to provide a reference to help academia and industry identify future directions for research.

What are the key findings?

By analysing scientific publications, patents, clinical trials and funding across five major areas of technology, and 20 sub-themes, and combining this data with in-depth interviews and expert assessment, we see that health-related research is now booming. The five major themes are: disease prevention and health promotion, disease screening and diagnosis, disease treatment, disease

management, and public health.

In particular, chemotherapy, surgical treatment and infectious disease control were some of the most promising technological themes with substantial research outputs. Chemotherapy, preventive vaccines and biotherapy are also seeing relatively high industrial transfer rate, while anti-tumour and anti-inflammatory drugs are R&D hotspots in China, and globally. We also found that a large proportion of funding goes to development of chemotherapy and biotherapeutic drugs to treat cancer and infectious diseases.

Big data and artificial intelligence are driving the continual upgrades in health-related industries, and the focus of medicine is shifting from disease treatment to disease prevention, while diagnosis is becoming more precise, portable and intelligent. Public health services will be further improved.

How does China perform in 'big health'?

China published 549,526 academic papers in the field of big health between 2017 and 2021, accounting for 16.7% of the global total. In complementary and alternative therapy, China is leading the world with 41.3% of global publications. In terms of research impact, China is

higher than the global average, with the best performance in public health, followed by disease prevention and health promotion, and disease management. When it comes to the number of publications involving international cooperation, China excelled in chemotherapy and infectious disease control, both of which accounted for more than 95% of its total publications.

China, the United States, Japan, Germany and South Korea took the top five places in patent applications and licenses in all five technology areas, with China ranking top in disease prevention and health promotion, public health and disease management. This reflects the nation's strength in transferring research results in these fields. However, compared with the United States and other developed countries, China lagged relatively behind in terms of average citations per paper in most research areas, which means it needs to further improve the quality and efficiency of its basic research.

How can we advance the transfer of big health technologies?

Industry and the research community need to work together more closely. We need to further reduce barriers between basic

research, clinical application, translational medicine and industrial transfer to drive innovation, and we should encourage more effective collaboration between industry, universities, research institutes and hospitals to accelerate the transfer of basic medical research and clinical results.

What opportunities do you see for the big health industry?

In the post-pandemic era, the big health industry is facing unprecedented opportunities. By evaluating the number of publications, the growth rate and the number of top 1% papers, we see that chemotherapy, surgical treatment, infectious disease control, nutritional health, mental health, healthy environment, preventive vaccines, diagnostic markers and health education will be the most promising topics in the future.

We also predict that new technologies such as biotechnology, nanotechnology, information technology, and advanced manufacturing technology will give a strong impetus for innovation in the field of big health.



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Big health research and technology transfer: TRENDS AND PROSPECTS

Many countries are promoting the development of the 'big health' industry by increasing investments in key technologies. This research report is a collaborative effort between two institutes under the Chinese Academy of Sciences (CAS) — the Institutes of Science and Development (CASISD), and the Shanghai Information Center for Life Sciences of the Shanghai Institute of Nutrition and Health (SINH). It reviews the landscape of big health research and technology transfer, attempting to identify opportunities and challenges.



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