Ethical Guideline for Human Genome Editing Research Issued

Policy

By WANG Jing

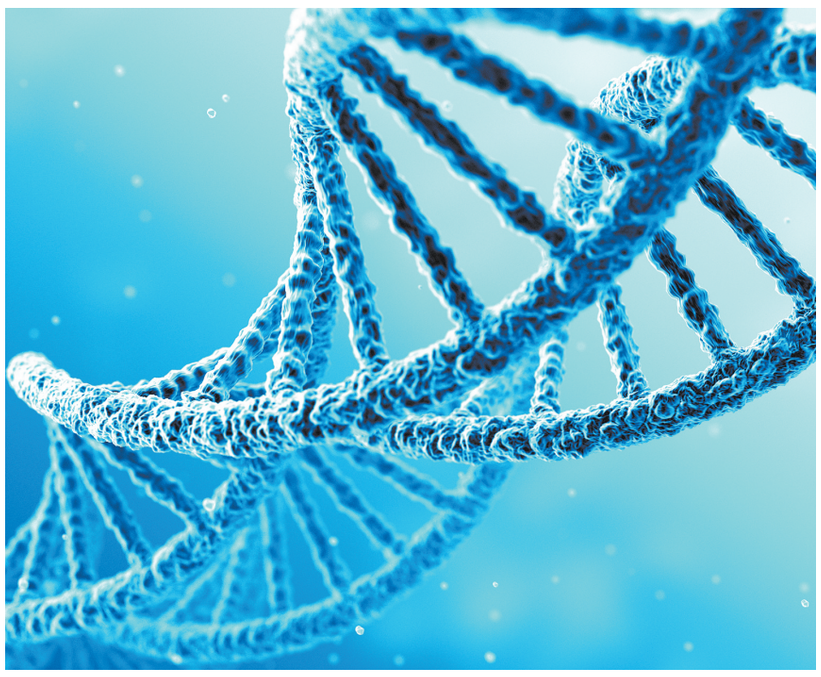
China's Ministry of Science and Technology has published an ethical guideline for human genome editing research, clarifying the purpose, basic principles and general requirements for conducting human genome editing research. The guideline, announced by the medical ethics sub-committee of the National Science and Technology Ethics Commission on July 8, clearly states that any current clinical research involving germline genome editing is irresponsible and is not allowed.

To better understand the guideline, *Science and Technology Daily (S&T Daily)* interviewed Professor Zhai Xiaomei, a member of the World Health Organization (WHO) Expert Advisory Committee on Developing Global Standards for Governance and Oversight of Human Genome Editing.

"Genome editing's potential to alter human genetic material holds promise for the prevention and treatment of many genetic diseases, but also raises many ethical, legal and social issues," said Zhai. She said the guideline clarifies the "can do's" and "can't do's" of gene editing technology, with "improving human welfare" as the first principle of editing. It also says human genome editing research should be developed for the good.

Significance of the guideline

In July 2021, WHO issued new recommendations on human genome editing for public health, with the aim of helping the world consider the safety, efficacy, and ethical use of human genome editing as a public health tool. As Dr. Soumya Swaminathan, chief scientist of WHO, said, "As global research delves deeper into the human genome, we must minimize risks and leverage ways that science can drive better health for everyone, everywhere."



3D digital model of the double-helix structure of DNA. (PHOTO: VCG)

The guideline was issued in this context. "It highlights the significant scientific value of genome editing and emphasizes that the academic community should fully consider the potential risks of this technology to individuals, society and humanity," Zhai said.

To ensure this, the guideline sets out the basic ethical principles that human genome editing research should uphold and the special ethical requirements, and makes the analysis of the risks that may arise from genome editing as clear as possible, Zhai added.

Highlights of the guideline

According to Zhai, the guideline is significant as it clarifies the general and special requirements for human genome editing. It also highlights that in clinical research it's necessary to fully evaluate and address the severity of the disease and potential risks to strike a balance between action and prevention. Most importantly, it says it is irresponsible and impermissible to conduct any clinical research on germline genome editing at this time.

"Basic and preclinical research is necessary to understand the development of the human embryo, as well as research into diseases associated with the early development of the human embryo, and should continue," Zhai told *S&T Daily*. Even basic research or preclinical research needs to pay attention to ethical issues. For example, when research uses human biological material that has the potential to develop into human individuals, its origin and disposal after research should be ethically regulated.

The guideline also highlights that there are different ethical issues involved in basic research, preclinical research, clinical trials and clinical application transformation of human genome editing, Zhai said. She explained that the guideline analyzes the corresponding ethical requirements according to different characteristics, and strives to have stronger operability in practice.

In the future, with the development and progress of technology, clinical research on germline genome editing can be carried out under strict supervision after rigorous and prudent evaluation, if it complies with the regulatory framework of ethical and legal norms, according to Zhai.

Case Study

Policy-driven Digital Economy Highlights

By LIN Yuchen

Enhancing policy supply, accelerating the construction of data systems, advancing industrial digital transformation, and fostering digital industry innovation were some of the significant policy announcements made at the 2024 Global Digital Economy Conference, held from July 2 to 5 in Beijing. These policies were outlined by the Cyberspace Administration of China, the National Data Administration, the Ministry of Industry and Information Technology, and other relevant departments.

Eight new regulatory documents concerning data property rights, data circulation, benefit distribution, security governance, and data infrastructure construction are set to be introduced this year. The continuous rapid growth of the digital economy was also highlighted during the conference.

The China Academy of Information and Communications Technology released the *2024 Global Digital Economy White Paper*, which reported that projections indicate a recovery in the growth rate of global digital industry revenue from 2024 to 2025.

Liu Liehong, director of the National Data Administration, said that the added value of China's core digital economy industries in 2023 was estimated to exceed 12 trillion RMB, accounting for approximately 10 percent of the GDP, potentially achieving the 14th Five- Year Plan targets ahead of schedule.

The conference also displayed a range of new technologies and products that showcased the digital world.

Highlights included rapid 3D digital avatar creation, the integration of multimodal large models with smartphones and smart robots, and advanced VR iris recognition for user identification in the metaverse.

According to the *2024 Global Digital Economy White Paper*, as of the first quarter of this year, there were nearly 30,000 AI companies globally, with China accounting for 15 percent.

Liu said that the new technological revolution and industrial transformation are profoundly reshaping economic and social operations. AI and other emerging technologies are poised to create trillion-dollar pillar industries, empowering various sectors and driving economic growth.

Meanwhile, vice minister of industry and information technology, Xin Guobin, emphasized accelerating the innovative development of strategic emerging industries like big data and AI, and enhancing R&D in frontier technologies such as blockchain and digital twins. He said the importance of developing data element industry policies was to ensure high-quality data flow and application.

Of particular note is that the rapid development of the digital industry hinges on robust new infrastructure. As of the end of May, China had built 3.837 million 5G base stations, accounting for over 60 percent of the global total, with 2.465 billion cellular IoT terminal users.

Visitors interact with AI digital people at the 2024 Global Digital Economy Conference, Beijing, July 5, 2024. (PHOTO: VCG)

Plan to Improve Tech-Finance Services

By LIN Yuchen

On June 28, a comprehensive plan to advance tech-finance was released by the People's Bank of China (PBC) and the Ministry of Science and Technology, along with five other government departments. The plan aims to enhance the financial services provided to technology- related innovations across their entire lifecycle.

Several key areas have been highlighted for targeted support: major national scientific tasks, the development of tech- based enterprises, strategic emerging industries, the transformation and upgrading of traditional industries, and the construction of national and regional innovation hubs.

Over the years, financial departments have been making efforts to support sci- tech innovation. However, the high input, high risk, and long cycles characteristic of tech innovation demand specialized and adaptable financial services.

The new plan lays out a clear roadmap for a diversified financial service landscape for tech- finance, guiding financial capital to invest early, invest small, invest long- term, and invest in hard technology.

There are several measures to foster a supportive financial market ecosystem for technological innovation.

These include strengthening the professional capabilities of financial services, encouraging banks to establish dedicated tech- finance structures and risk control mechanisms, and enhancing internal systems such as performance evaluation and liability exemptions.

Additionally, the plan proposes establishing a green channel for the issuance of bonds by tech-based enterprises to facilitate financing through mechanisms like credit enhancement and ratings.

It also emphasizes reinforcing the roles of stock markets, the New Third Board or National Equities Exchange and Quotations, and regional equity markets in supporting tech innovation, and strengthening policies to aid tech companies in cross- border financing. Small and medium-sized tech enterprises are a focal point, with tailored credit and insurance products to support their unique growth phases.

The plan advocates establishing tech- finance alliances and encourages cooperation among various financial institutions and tech service organizations to offer diverse, relay-style financial services to tech firms.

Moreover, it calls for building robust foundational systems and mechanisms for tech- finance operations. This includes optimizing incentive policies, refining policy tools such as re-loans for technological innovation, and establishing an evaluation mechanism for the effectiveness of tech-finance services.

The PBC said the next steps will involve establishing a collaborative working mechanism with relevant departments, enhancing information sharing and policy coordination, and launching initiatives to improve tech- finance service capabilities.

Financing Boost for Sci-tech Innovation

By LI Linxu

As sci-tech innovation becomes ever more crucial in driving new quality productive forces, China's capital market plays an increasingly more important role in facilitating tech enterprises' access to financing.

The country vows to further strengthen the role of stock markets, the New Third Board, and the regional equity markets in serving sci-tech innovation, while enhancing policy support for tech firms with cross- boarder financing, as per a recent working plan jointly released by seven government bodies, including the People's Bank of China and the Ministry of Science and Technology.

In recent years, tech companies have logged a stellar performance in the country's capital market, pooling financial resources in their innovation push.

According to a recently released IPO report by Ernst & Young, hard-tech companies remain the mainstay of the country's IPOs. In the first half of 2024, China's leading IPOs went to hard-tech industries, with industrial, technological and material sectors taking the top three spots. In terms of the number of IPO deals and the amount of IPO proceeds, these top three sectors accounted for 89 percent and 88 percent of the total respectively.

The Shanghai Stock Exchange. (PHOTO: VCG)

For specialized and sophisticated enterprises that produce novel and unique products, their IPO numbers and proceeds held 48 percent and 33 percent of the total respectively in the first half this year, both registering a year- over- year growth, as per the report. The number of such companies amounted to 73 percent of the listed companies in the Chinext, China's NASDAQ-style board.

In the latter half of the year, companies with key technologies will continue to be the mainstay of IPOs in China's A-share market, Li Kang, TMT sector co-leader of Ernst & Young Greater China, told *Science and Technology Daily*, adding that with a series of targeted policies being rolled out, eligible high-quality enterprises with strong technological innovation capabilities are expected to receive more financing from the capital market.

Boosted by various forms of financing support, the listed companies are better positioned to invest in R&D, innovation, and the transformation of sci-tech achievements.

Statistics show that the listed companies have become one of the leading contenders for the country's top sci-tech prizes.

At this year's National Science and Technology Award Conference, more than 100 listed enterprises have made their mark on the prize list.

Their innovation covers a wide range of fields, such as electronic information, advanced manufacturing, and health and medicine, demonstrating a virtuous cycle between the capital market and sci-tech innovation.

National Industrial Standards for AI Announced

By CHEN Chunyou

By 2026, China expects to develop more than 50 new national and industrial standards for AI development, and participate in the development of over 20 international AI standards. This process is aimed at accelerating the establishment of a standard system that meets the high- quality development of this industry.

That's according to a guideline for the construction of a national comprehensive AI industry standard system, jointly released by the Ministry of Industry and Information Technology (MIIT), the Cyberspace Administration of China, the National Development and Reform Commission and the Standardization Administration.

In recent years, China's AI industry has achieved rapid development in technological innovation, product creation, and industrial applications, forming a large market scale and presenting new features with the rapid growth of new technologies like large models. This expansion urgently requires improving the AI industry standard system, said the MIIT.

The guidelines specified seven key parts for developing the AI standard system, such as standards for key technologies, new industrialization, intelligent products and services, and industry applications.

Among them, key technology standards mainly specify technical requirements for AI in text, speech, images, as well as technologies such as human-machine hybrid enhancement intelligence, intelligent bodies, cross- media intelligence, and embodied intelligence, promoting AI technological innovation and applications.

In the 2024 government work report, China unveiled an AI Plus initiative to propel the digital economy's expansion and the transformation and modernization of manufacturing sectors.

The guideline standards for enabling new industrialization specify the technological requirements for allowing full- process intelligence in manufacturing and intelligent upgrades in key industries.

In addition, standardization research institutes are encouraged to develop and bring in high- end experts in this field.

Currently, China is home to more than 4,500 AI companies, with its core AI industry reaching a scale of more than 578 billion RMB in 2023, up 13.9 percent year-on-year, according to MIIT data.