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ASIA EDITION

South Korea poised to become Medical AI Powerhouse

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When it comes to AI (Artificial Intelligence) in medical sciences - China and the USA dominate the field. However, South Korea has been steadily catching up. Home to renowned tech giants such as Samsung and LG Electronics, South Korea is positioning itself as a significant player in the medical AI domain. The country is making remarkable strides in deploying AI for medical imaging, diagnostics, drug development and healthcare. Let's look at South Korea's efforts in becoming a medical AI powerhouse.



South Korea is ramping up efforts to bolster AI development in life sciences.The country is implementing strategic initiatives, with a key focus on robust regulations. The country is actively revising its regulations in the AI domain to foster progress in this field. In May 2023, the Ministry of Food and Drug Safety of the Republic of Korea (MFDS) and the United States Food and Drug Administration (USFDA) signed an MoU to accelerate medical product development using AI. In April 2023, the Ministry of Health and Welfare in South Korea introduced 'The 1st Comprehensive Plan for Development and Support for the Medical Devices Industry (2023~2027). The plan's key objectives include facilitating market entry for innovative technologies such as AI and digital solutions, rationalising regulations and systems, and promoting innovation among corporations in the medical devices sector.

South Korea along with experts from the UK and Singapore released a global guide for the use of artificial intelligence in medical care in 2021. The guide is designed to act as a benchmark for the liable use of AI, and enhance clarity and high standards for technological applications in the healthcare sector.

"Korea boasts a well-structured healthcare system, fostering active endeavours to enhance it through AI technology and expedite the adoption of precision medicine. Notably, major companies from various fields other than the healthcare industry have begun investing significant capital in bio-health and medical technology innovations. Moreover, both established pharmaceutical and medical device companies, as well as rapidly emerging medical startups, are fervently engaged in research and development (R&D) for innovative technologies and services. As a result, Korea's medical AI market is experiencing rapid growth," said **Seungman Han, CEO, Bertis, South Korea**.

Bertis, specialises in the development of proteomics-based precision medicine technology. The firm is currently working on an innovative health information interpretation model (SAN, Spectrum is All You Need), utilising deep learning technology to read protein data in spectrum form and derive health information, such as the presence of target diseases, solely from protein data.

Korea harnessed the AI effectively, especially during the COVID-19 pandemic. Innovative AI-driven strategies emerged such as smart quarantine information systems, health apps for contact tracing etc.

“In the height of the COVID-19 pandemic, Korea enacted a number of measures with the use of AI to help flatten the curve. Specifically, AI was used to quickly develop testing kits (in under three weeks) when regularly the testing kits would take up to three months. Additionally, Korea implemented a smart quarantine information system for inbound travellers to collect information about their travels and health, which would then be accessible to hospitals and healthcare professionals. They also used mobile health apps to collect data and for contact tracing, as well as AI in medical imaging to help with COVID-19 diagnoses,” said **Alexandra Murdoch, Medical Analyst at GlobalData, Canada**

Booming medical imaging

A lot of medical AI firms have received regulatory approval in recent times. In June 2023, MEDICAL IP, an AI-based digital twin company, announced that CT-based automatic body composition analysis AI software DeepCatch received US FDA 510(k) clearance. During the same month, SpassMed too received the USFDA510(k) clearance for its AI-powered sepsis detection software. In April 2023, South Korean startup Neurophet's AI brain imaging device got approval in Singapore. In March 2023, Korea approved Coreline Soft’s brain haemorrhage image detection and diagnosis assistance software.

Lunit and Vuno are the trailblazers in this field. Vuno, an AI medical software company, pioneers data-driven solutions using deep learning. From X-rays and CT scans to biosignal monitoring, Vuno's services enable disease diagnosis through data analysis. As of July 2023, the firm has received 12+ MFDS approval and PMDA/CE certification and 500+ Hospitals have deployed VUNO’s AI solutions. Lunit provides AI-powered solutions for cancer diagnostics and therapeutics. As of July 2023, Lunit’s AI has been adopted by over 2000 healthcare institutions globally in a major achievement.

Korea approved its first-ever AI-based medical imaging device, VUNOmed-BoneAge in 2018. This innovative tool utilises a deep learning engine to analyse X-ray scans of a person's left hand and instantly determine their bone age or skeletal age. Since then the country has witnessed a boom in this space. According to PAREXEL, a significant portion of the innovative medical device designation comprises AI-based medical image diagnostic software. Out of the 18 innovative devices listed 10 of them fall under this category (as of March 21, 2022).

“The application of AI technology in analysing medical images such as X-rays, CT scans, and MRIs has been increasingly utilised as a supportive tool in clinical settings. Solutions like AI Image Interpretation have been developed for various purposes, such as chest CT interpretation (VUNO Med-Lung CT) and early diagnosis of dementia through brain MRI image analysis (VUNO Med-DeepBrain). Furthermore, AI software (Lunit Insight CXR) designed to detect abnormalities in chest X-rays and aid medical professionals in their diagnoses has officially obtained health insurance reimbursement eligibility in Japan,” said Seungman Han.

He further observed that the diagnostic industry is gaining significant attention. AI-based software is being utilised for the interpretation and analysis of medical images, leading to improved interpretation speed and detection rates. Additionally, AI technology is being applied to genetic and protein analysis within blood, forming the foundation for the development of blood tests for disease diagnosis. The Korean government has also announced plans to support the overseas expansion of innovative medical devices, including AI-powered diagnostic aid software, to promote the export of bio-health industries.

AI drug discovery partnerships

Korean firms, both large corporations and smaller startups, are incorporating AI into their drug discovery process. Some have partnered with AI platform companies, while others are developing their own AI platforms.

In June 2023, HanAll Biopharma and Daewoong Pharmaceutical co-invested in US based Vincere Biosciences. Vincere's AI platform, which ranges from tools to accelerate drug discovery to algorithms that assist with subject selection in clinical trials.

Daewoong Pharmaceutical is making great strides in AI-driven drug discovery by partnering with key institutions like Ulsan National Institute of Science and Technology (UNIST), A2A Pharmaceuticals, and AzothBio.

Several Korean firms such as Standigm are building their own platform. In April 2023, Standigm and Institut Pasteur Korea teamed up for AI-driven drug discovery and developed new lead compounds for treating resistant tuberculosis (TB). In June 2022, the startup also inked a deal with Merck Korea for drug discovery research.

Innovative AI healthcare revolution

Besides applying AI in drug discovery research and imaging areas, Korea is using AI in healthcare to create treatment plans for patients through predictive models.

Korean hospitals are embracing digital transformation. In May 2023, HIMSS (Healthcare Information and Management Systems Society) and the Korean Hospital Association signed an MoU to advance digital transformation in South Korea's healthcare sector. Samsung Medical Center achieved the highest stage for the HIMSS Infrastructure Adoption Model in March 2023, becoming the world's first healthcare provider to do so.

The Korea Advanced Institute of Science and Technology (KAIST) researchers developed AI-based drug interaction prediction technology in March 2023, to predict adverse drug reactions with Pfizer's Paxlovid. A team of researchers at the Pohang University of Science and Technology (POSTECH) designed a machine learning model in July 2022, to predict immunotherapy response in cancer patients. Several companies are also using the technology at the organisational level to enhance both employee and the customer experiences.

“Korea has been using AI in healthcare for a while now to equip their hospitals and healthcare workers with additional support. Noncommunicable diseases make up most of the diseases in Korea and the country has begun to invest in AI to combat some of these diseases, specifically through leveraging AI in medical imaging and using AI to create treatment plans for patients through predictive models,” said Alexandra.

Sharing more on the application of AI, a spokesperson from the Kore.ai team that claims to be building the world’s best conversational AI platform pointed out that Hanmi Pharmaceutical is harnessing the potential of AI in its HR operations, encompassing time-off management, employee directory, benefits administration, and FAQ information management. This initiative notably enhances the employee experience, particularly among the younger generation. Similarly, DRX Solution presents another instance where AI is making a significant impact. As a pharmacy chain company, DRX Solution employs AI to efficiently address consumer FAQs, including precise details about medicines and product usage guidelines. Additionally, they integrate this technology into their mobile app for aiding self-medication. This multi-faceted approach elevates patient satisfaction, refines communication channels, and enhances accessibility to crucial information.

South Korea's AI In Healthcare Market is projected to grow from $0.1 billion in 2022 to $2.11 billion by 2030, registering a CAGR of 46.22 per cent during the forecast period of 2022-2030, according to Insights10, a market research firm. As the nation takes lead in advancing medical AI, we can expect to witness groundbreaking innovations that will not only benefit the citizens of South Korea but also contribute to the global progress of healthcare technology.

Ayesha Siddiqui