PRESS RELEASE

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NUS Co-leads Push to Build First Global Medical AI Foundation Model

Singapore, 9 Sep 2025 - A global research consortium of over 100 study groups in more than 65 countries has launched the Global RETFound initiative, a collaborative effort to develop the first globally representative Artificial Intelligence (AI) foundation model in medicine, using 100 million eye images.

As described in *Nature Medicine,* the initiative is one of the largest medical AI collaborations ever undertaken, producing one of the most geographically and ethnically diverse medical datasets assembled for AI training purposes. The data will span Africa, the Middle East, South America, Southeast Asia, the Western Pacific, and the Caucasus region.

Led by researchers from the National University of Singapore Yong Loo Lin School of Medicine (NUS Medicine), Moorfields NHS Foundation Trust, University College London (UCL), and the Chinese University of Hong Kong (CUHK), the consortium will develop its model using an unprecedented dataset of over 100 million color fundus photographs (photos of the back of the eye), sourced from more than 65 countries. The global initiative builds on the success of RETFound, the first foundation model for retinal and systemic disease detection. Published in Nature in 2023, RETFound was originally developed by researchers at Moorfields Eye Hospital and UCL Institute of Ophthalmology in London. The proof-of-concept study involved a smaller scale of 1.6 million fundus photographs curated by the INSIGHT Health Data Research Hub at Moorfields.

While RETFound demonstrated potential for medical AI applications, the next global model will expand the training data to encompass every continent except Antarctica. "Current foundational models are trained on data that is geographically and demographically 'narrow', which limits their effectiveness and can perpetuate existing health inequalities," explained Dr. Yih Chung Tham, Assistant Professor at NUS Medicine, and a NUS Presidential Young Professor, one of the project key leads. "The Global RETFound Consortium addresses this challenge through innovative approaches that enable broad international participation at unprecedented scale, while maintaining data privacy protections."

A key innovation of the project is its flexible, two-pronged data sharing framework, designed to accommodate varying technical capacities and regulatory requirements across participating institutions. The first approach involves local fine-tuning of generative AI models at individual institutions, with only model weights shared centrally, ensuring no patient data leaves the originating site. The second pathway enables direct sharing of de-identified data through secure infrastructure for institutions that do not have local GPU resources or technical expertise.

"This dual approach allows participation from research groups regardless of their resource levels," noted Pearse Keane, Professor of Artificial Medical Intelligence at UCL. "By combining real and synthetic data generation techniques, we can build a diverse, globally representative dataset without compromising security."

Prof. Carol Cheung from The Chinese University of Hong Kong emphasised the broader implications: "This initiative has the potential to establish new international benchmarks for generalisability and fairness in medical AI. By providing researchers worldwide with access to a "globally-trained" foundation model, we can accelerate development of AI tools tailored to local clinical needs with substantially reduced data and computational requirements."

Dr Tham added, "The Global RETFound model will undergo comprehensive evaluation across multiple ophthalmic and systemic diseases, including diabetic retinopathy, glaucoma, age-related macular degeneration and cardiovascular diseases. The model will be released under a Creative Commons license, making it freely and publicly available for non-commercial research use worldwide."

While ophthalmology serves as the initial blueprint for such a collaborative framework, the researchers aim to share their methodologies widely, laying the groundwork for similar global initiatives across other medical specialties.

The project addresses growing concerns about AI bias in healthcare while demonstrating how international collaboration can advance medical AI development in an equitable way. The consortium welcomes additional researchers and institutions to join their collaborative effort towards more inclusive medical AI development.

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About National University of Singapore (NUS)

The National University of Singapore (NUS) is Singapore's flagship university, which offers a global approach to education, research, and entrepreneurship, with a focus on Asian perspectives and expertise. We have 15 colleges, faculties, and schools across three campuses in Singapore, with more than 40,000 students from 100 countries enriching our vibrant and diverse campus community. We have also established more than 20 NUS Overseas Colleges entrepreneurial hubs around the world.

Our multidisciplinary and real-world approach to education, research and entrepreneurship enables us to work closely with industry, governments, and academia to address crucial and complex issues relevant to Asia and the world. Researchers in our faculties, research centres of excellence, corporate labs and more than 30 university-level research institutes focus on themes that include energy; environmental and urban sustainability; treatment and prevention of diseases; active ageing; advanced materials; risk management and resilience of financial systems; Asian studies; and Smart Nation capabilities such as artificial intelligence, data science, operations research, and cybersecurity.

For more information on NUS, please visit http://www.nus.edu.sg/

About the NUS Yong Loo Lin School of Medicine (NUS Medicine)

The NUS Yong Loo Lin School of Medicine is Singapore's first and largest medical school. Our enduring mission centres on nurturing highly competent, values-driven, and inspired healthcare professionals to transform the practice of medicine and improve health around the world.

Through a dynamic and future-oriented five-year curriculum that is inter-disciplinary and inter-professional in nature, our students undergo a holistic learning experience that exposes them to multiple facets of healthcare and prepares them to become visionary leaders and compassionate doctors and nurses of tomorrow. Since the School's founding in 1905, more than 12,000 graduates have passed through our doors.

In our pursuit of health for all, our strategic research programmes focus on innovative, cutting-edge biomedical research with collaborators around the world to deliver high impact solutions to benefit human lives.

The School is the oldest institution of higher learning in the National University of Singapore and a founding institutional member of the National University Health System. It is one of the leading medical schools in Asia and ranks among the best in the world (Times Higher Education World University Rankings 2025 by subject and the Quacquarelli Symonds (QS) World University Rankings by subject 2025).

For more information about NUS Medicine, please visit https://medicine.nus.edu.sg/

About Moorfields Eye Hospital NHS Foundation Trust
Moorfields Eye Hospital NHS Foundation Trust is one of the leading providers of eye health services in the UK and a world class centre of excellence for ophthalmic research and education. Our main focus is the treatment and care of NHS patients with a wide range of eye problems, from common complaints to rare conditions that require treatment not available elsewhere in the UK. Our unique patient case mix and the number of people we treat mean that our clinicians have expertise in discrete ophthalmic sub-specialties.

We treat people in 20 locations in and around London, the south east and Bedford, enabling us to provide expert treatment closer to patients' homes. We also operate commercial divisions that provide care to private patients in both London and the Middle East.

With our academic partners at the UCL Institute of Ophthalmology, Moorfields is recognised as a leading centre of excellence in eye and vision research. Together we form one of the largest ophthalmic research sites in the world, with the largest patient population in Europe or the USA. We publish more scientific papers than any other eye and vision research site and have an extensive joint research portfolio.

About the INSIGHT Health Data Research Hub
INSIGHT is the world's largest ophthalmic imaging bioresource, with over 30 million eye images linked to clinical data. An NHS initiative led by Moorfields, INSIGHT makes routinely collected patient eye data available for approved research that could lead to improvements in diagnosis, care and treatment of eye diseases, as well as systemic disease such as stroke and Alzheimer's. INSIGHT's mission is to improve healthcare by making it simpler for researchers to use large, anonymised sets of patient data in a safe and ethical way.

For more information, please visit https://www.insight.hdrhub.org/

About UCL Institute of Ophthalmology
The UCL Institute of Ophthalmology is one of a number of specialised research centres within UCL (University College London) and is, together with Moorfields Eye Hospital, one of the leading centres for eye research worldwide. The combination of the institute's research with the resources of Moorfields Eye Hospital opens the way for advances at the forefront of vision research. Close collaboration with other academic partners and with industry extends its impact. The institute has been named as the best place to study ophthalmology in the 2017 Centre for World University Rankings (CWUR).

For more information, please visit www.ucl.ac.uk

About the Faculty of Medicine, Chinese University of Hong Kong (CU Medicine)

Established in 1981, CU Medicine has achieved international recognition in teaching, research, and clinical practice and is the youngest medical school ranked among the world's top 25 in many global rankings.

Our Faculty comprises 14 clinical departments and five schools, delivering a world-class environment for teaching and research with a strong emphasis on interdisciplinary, interprofessional, and international collaboration. To date, we have cultivated over 6,000 medical graduates who are making an impact across local and global healthcare systems. We are dedicated to driving innovation by translating groundbreaking research into real-world clinical applications. Our contributions have reshaped medicine — evidenced by the filing of 3,000 patents, strategic patent acquisitions, and the establishment of more than 20 start-ups. Our pioneering research has not only rewritten international clinical guidelines but also revolutionised the prevention, diagnosis, and treatment of numerous diseases.

For more information, please visit http://www.med.cuhk.edu.hk