



PRESS RELEASE

ZEROING IN ON POPULATION EYE HEALTH CARE

The new Centre for Innovation and Precision Eye Health at NUS Medicine aims to improve the overall eye health of the population through bringing greater eye care accessibility to the community, tapping on AI and data science to understand and detect eye diseases and investing in gene and cell therapy to treat rare eye diseases

Singapore, 25 March 2023 — As Singaporeans age, the increasing incidence of eye disease calls for community-based eye healthcare to more effectively prevent, detect and treat vision problems in the population.

Such an approach would draw on large scale population health metrics to proactively and preemptively spot patterns and trends in Singaporeans' general eye health. These metrics, powered by novel medical devices, artificial intelligence (AI) and drawing on population-based data, will help doctors and health care planners to marshal and site the necessary resources where they are needed.

At the same time, the comprehensive picture provided by the database will help guide research work that is aimed at bringing the most effective screening and treatment options for patients, according to disease severity and the risk of developing chronic eye conditions. These are the aims of the newly established **Centre for Innovation and Precision Eye Health** that is being set up by the Yong Loo Lin School of Medicine at the National University of Singapore (NUS Medicine), and the National University Health System (NUHS).

Said Dean of NUS Medicine, Professor Chong Yap Seng, Lien Ying Chow Professor in Medicine, "This Centre is an example of the translational research work that we believe will help to transform the current healthcare ecosystem in Singapore to one that prioritises preventive care. We want to do this by detecting and identifying early stages of eye diseases, particularly when the population of Singapore is rapidly ageing and more are at risk of developing chronic diseases. Through the use of evidence-based innovation, AI-powered digital infrastructure and scalable community-based care models, this Centre will help to meet the increasing demands of eye care in our ageing population."

Creating greater accessibility to community-based eye health care

Currently, the early detection and identification of eye diseases means that patients will require access to tertiary ophthalmic care—which is typically available in acute or specialist care centres like the National University Hospital (NUH). In addition, the costliness and bulkiness of the gold-standard diagnostic eye equipment typically used in hospitals or specialist eye clinics poses another difficulty for efficient eye disease screening.

To address this, the Centre has introduced the development of novel, portable eye screening and monitoring medical devices for people to get eye check-ups more regularly and

conveniently in the primary care settings such as polyclinics or optometrists at the optical shops in the future.

These medical devices are **AVAT or Automated Visual Acuity**, which measures eye ability to distinguish shapes at a distance, **SUPRA or Smart, User-friendly Portable Reliable Automated perimetry device** which tests visual fields, and **STOP or Self-Tonometry device for monitoring of Intra-ocular pressure** that measures eye pressure through the eyelids. These devices address the unmet needs of increasing demand to decentralise the current care model of conducting eye screening and monitoring of eye diseases, and scale up the testing phase with minimal costs and manpower resources.

Funded by Temasek Foundation, these portable medical eye screening devices were developed by the Department of Ophthalmology at NUS Medicine and have undergone multiple refinements at NUH. Currently, there is an ongoing pilot programme that conducts community-based eye screening using these novel devices in Pioneer Polyclinic, with plans underway to scale up to more polyclinics. To date, there are more than 230 elderly participants involved in this pilot programme. Compared to conventional screening, these eye screening devices are able to detect the major chronic eye diseases affecting the elderly population, and streamline the evaluation process to increase efficiency. Importantly, these novel devices bring the assurance that detection and close monitoring of the onset of eye diseases can now be done outside the hospital setting, at the primary care level.

A key part of these new initiatives is the involvement of optometrists in the community, who are an important group of eye care professionals that can work together with ophthalmologists to provide primary eye care for our elderly population. As such, the new Centre will also focus its efforts in providing certified standardised training and promoting continuous learning opportunities for community-based optometrists. Associate Professor Victor Koh, Head of Department of Ophthalmology, NUS Medicine, said, "Through upskilling courses and pathways, optometrists will be equipped with the necessary skill sets to detect early signs of eye diseases as first responders in the community."

Developing new models for detecting eye diseases via AI-powered Research

In addition to new portable devices, the Centre will leverage state-of-art big data analytics and AI technologies to develop more cost-effective algorithms to screen and detect eye diseases. Professor Cheng Ching-Yu, the Centre's Director and his team have developed retinal photo-based AI algorithms to detect visual impairment and cataract and to predict biological age and the risks of cardiovascular diseases. The Centre will be conducting clinical trials in the community to evaluate the real-world performance of these AI models. "We aim to deliver precision population health for major age-related eye diseases by providing the right intervention to the right population at the right time. With advances in AI and digital technology, we now have better capabilities and infrastructure to devise and adopt AI algorithms which will bring about important insights into the hidden pattern of diseases, that may otherwise be obscured by limitations of traditional analytic tools," said Prof Cheng.

Introducing precision gene and cell therapy for blinding retinal diseases

At the same time, research at the Centre will draw on genomic data to develop precision gene and cell therapy for currently untreatable and blinding retinal degenerative eye diseases. Over one billion people globally suffer from visual impairment, making it a major health burden. The World Health Organization (WHO) identifies age-related macular degeneration (AMD) and Inherited retinal dystrophies (IRDs) as the most critical retinal eye diseases, which affects an estimated 196 million people and two million people per year respectively.

"Visual impairment is ranked as one of the top disease burdens, aside from obesity, diabetes and hypertension. We hope to introduce new collaborations and create ground-breaking

advancement in precision medicine, specifically gene and cell therapies to provide effective treatments for those suffering from visual impairment to recover their sight, and regain their independence and confidence again,” said Assistant Professor Su Xinyi, Co-Director of the new Centre and consultant ophthalmologist at NUH. Asst Prof Su also actively works on stem cell therapeutics in the treatment of degenerative eye diseases.

There are limited treatments for advanced AMD and IRD currently. This presents a significant opportunity to introduce new gene and cell therapies to patients in Singapore, fostering a thriving research ecosystem through partnerships with industry and other research organisations. The Centre has an established partnership with RxCell, a United States biotech company that utilises stem cell regenerative technologies to improve health outcomes. This partnership offers potential for vision restoration in patients with end-stage retinal disease. “To benefit Singapore patients, we have plans to conduct the first-in-man clinical trial using stem cell regenerative technologies,” added Asst Prof Su.

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 16 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 our NUS Overseas Colleges programme in more than 15 cities 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 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 Asia's leading medical schools and ranks among the best in the world (Times Higher Education World University Rankings 2023 by subject and the Quacquarelli Symonds (QS) World University Rankings by subject 2022).

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

Chinese Glossary

Centre for Innovation and Precision Eye Health	创新与精准眼科研究中心
Yong Loo Lin School of Medicine, National University of Singapore	新加坡国立大学杨潞龄医学院
National University Health System	国立大学医学组织
Professor Cheng Ching-Yu Director, Centre for Innovation and Precision Eye Health	程景煜 教授 主任, 创新与精准眼科研究中心
Associate Professor Victor Koh Head of Department, Ophthalmology, National University Hospital Head of Department, Ophthalmology, Yong Loo Lin School of Medicine, National University of Singapore Lead, Community Eye Care, Centre for Innovation and Precision Eye Health	许德彰 副教授 眼科系主任, 新加坡国立大学医院 眼科系主任, 国大杨潞龄医学院 社区眼科护理主任
Assistant Professor Su Xinyi Co-Director, Centre for Innovation & Precision Eye Health	苏心怡 助理教授 同席主任, 创新与精准眼科研究中心
Professor Chong Yap Seng Lien Ying Chow Professor in Medicine Dean, Yong Loo Lin School of Medicine, National University of Singapore	鍾業成 连瀛洲医学教授 院长, 新加坡国立大学杨潞龄医学院