PRESS RELEASE

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NUS Medicine study finds key blood proteins which predict future cognitive decline

Singapore, 16 June 2025 — In a study that holds significance for individuals with cerebrovascular disease, scientists from the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), have found proteins in the blood that predict future cognitive decline and dementia.

Led by Professor Christopher Chen, Deputy Chair of the Healthy Longevity Translational Research Programme (TRP) at NUS Medicine, this first-of-its-kind study in Singapore analysed more than 1,000 proteins in the blood of a local patient cohort. The study was conducted on 528 patients from memory clinics at the National University Hospital (NUH) and St Luke's Hospital in Singapore.

Professor Arthur Mark Richards, co-senior author of the paper published in *Alzheimer's and Dementia*, said, "One of our findings was the characterisation of a blood protein signature for future cognitive decline. Using advanced proteomic technologies, we profiled over a thousand blood proteins tied to neurodegeneration, inflammation, and vascular dysfunction, which are key contributors to dementia." Prof Richards is from the Cardiovascular-Metabolic Diseases TRP at NUS Medicine.

The team found that people with dysregulated levels of these proteins were more likely to develop future dementia and cognitive deterioration, even after accounting for age and other health conditions. These proteins are also linked to changes in brain structure, such as shrinkage in brain volume and signs of small vessel disease, which are early warning signs of dementia. When these biomarkers were combined with clinical risk factors, prognosis of cognitive decline was significantly enhanced, highlighting the potential of integrating blood-based tests with routine clinical assessments for earlier and more accurate diagnosis.

The team further validated these findings in a separate group of patients of Caucasian descent, using cerebrospinal fluid—which refers to fluid that surrounds the brain and spinal cord. The replicated protein markers remained strong predictors of cognitive decline, suggesting these biomarkers may be reliable across different biological fluids and diverse populations.

Prof Chen said, “The objective of our research was to identify better ways to detect and predict dementia, especially in Southeast Asian populations, who may present with unique risk profiles due to higher rates of co-existing conditions such as cerebrovascular disease.” Prof Chen is also from the Department of Pharmacology at NUS Medicine, and is the Director of the Memory, Ageing and Cognition Centre at the National University Health System (NUHS).

Dr Sim Ming Ann, first author of the paper, added, “We hope that the outcomes of this work will lead to better prediction models for identifying individuals at risk of cognitive deterioration. With the ability to detect key blood protein changes early, doctors could be better equipped to intervene before significant cognitive decline occurs, potentially slowing disease progression and improving quality of life for patients.” Dr Sim is a PhD candidate at the Healthy Longevity TRP at NUS Medicine, and the Memory, Ageing and Cognition Centre at NUHS, as well as Associate Consultant at the Department of Anaesthesia, NUH.

In addition to predictive potential of longer-term cognitive health, the team’s findings may help uncover the biological mechanisms behind dementia, offering new possibilities for targeted therapies. These advances could greatly benefit healthcare outcomes for countries with ageing populations, helping doctors tailor care to individual needs and manage health risks more effectively. The next steps for the research team involve exploring how these blood proteins function in the body, and whether they can be harnessed for the development of novel treatments for dementia.

This research is supported by the Singapore Ministry of Health through the National Medical Research Council (NMRC) Office, MOH Holdings Pte Ltd under the NMRC Clinician Scientist Award (NMRC/CSASI/0007/2016), NMRC Clinician Scientist – Individual Research Grant (NMRC/CIRG/1485/2018), NMRC Singapore Translational Research Investigator Award (MOH-000707), NMRC Centre Grant (NMRC/CG/M009/2017), NMRC Research Training Fellowship (MOH-001403), and the National Research Foundation, Singapore (NRF) under the NMRC Open Fund – Large Collaborative Grant (MOH-000500) administered by the Singapore Ministry of Health through the NMRC Office, MOH Holdings Pte Ltd, as well as the National University Health System (NUHS) Clinician Scientist Academy (NCSP2.0/2023/NUHS/SMA).

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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 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 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.

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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 the National Medical Research Council (NMRC)

The NMRC was established in 1994 to oversee research funding from the Ministry of Health and support the development and advancement of biomedical research in Singapore, particularly in the public healthcare clusters and medical schools. NMRC engages in research strategy and planning, provides funding to support competitive research grants and core research enablers, and is responsible for the development of clinician scientists through awards and fellowships. The council's work is supported by the NMRC Office which is part of MOH Holdings Pte Ltd. Through its management of the various funding initiatives, NMRC promotes healthcare research in Singapore, for better health and economic outcomes.

About the National Research Foundation

The National Research Foundation, Singapore (NRF), set up on 1 January 2006, is a department within the Prime Minister's Office. The NRF sets the national direction for research and development (R&D) by developing policies, plans and strategies for research, innovation and enterprise. It also funds strategic initiatives and builds up R&D capabilities by nurturing research talent.

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