MEDIA RELEASE

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LAUNCH OF NATIONWIDE PREVENTIVE HEART HEALTH TRANSLATIONAL RESEARCH PROGRAMME FOR SINGAPORE

Funded by a newly awarded S$25 million grant, Project RESET will bring together public healthcare clusters, medical schools, as well as industry and community partners to empower Singaporeans to take charge of their heart health through the roll out of new technologies

SINGAPORE — While many people believe they are in good health, an estimated one in three Singaporeans may have underlying early heart disease that remains undetected. An ambitious, large-scale study involving more than 10,000 individuals from the general population aims to gather evidence to map the extent of the disease, identify new biomarkers, as well as develop innovative preventive measures that Singaporeans could adopt.

Heart disease is a complex condition influenced by a range of factors that are not exclusively age-related. These include sedentary lifestyles, unhealthy diets, genetic predisposition and socioeconomic conditions. In Singapore, 23 people die every day from cardiovascular disease[1]. More than one out of three deaths in Singapore are due to heart diseases or stroke.

According to a recent paper published by researchers from the Cardiovascular-Metabolic Disease Translational Research Programme (CVMD TRP) at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine) and the Department of Cardiology at the National University Heart Centre, Singapore (NUHCS) under the National University Health System (NUHS) in the Lancet Regional Health-Western Pacific, the number of heart attacks in Singapore is projected to rise nearly three-fold (194.4%) from 482 cases per 100,000 population in 2025 to 1,418 per 100,000 population in 2050[2]. In 2025, it is predicted that four in 1,000 Singaporeans will have a heart attack. With the current forecast analysis based on the present metabolic burden in Singapore, one in 100 Singaporeans will have a heart attack in 2050. Researchers say that the upward projected heart attack trajectory can be halted by reducing upstream metabolic risks through the early detection and treatment of subclinical diseases, such as high blood pressure and high blood cholesterol, in vulnerable groups. Nationwide programmes focused on strengthening heart health can also potentially critically change the course of cardiovascular disease deaths.

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[1] https://www.myheart.org.sg/health/heart-disease-statistics/
[2] https://www.thelancet.com/journals/lanwpc/article/PIIS2666-6065(23)00121-9/fulltext

Unmasking a hidden disease

Supported by a newly awarded S$25 million grant from the National Research Foundation, Singapore and the Singapore Ministry of Health's National Medical Research Council[3], Project RESET will bring together NUS Medicine, NUHS, NUHCS, National Heart Centre Singapore (NHCS), National Heart Research Institute Singapore (NHRIS), Duke-NUS Medical School, Nanyang Technological University, Singapore (NTU Singapore), A*STAR's Bioinformatics Institute (BII), Genome Institute of Singapore (GIS) and Singapore Institute for Clinical Sciences (SICS), as well as industry and community partners, to study and implement the best ways to tackle heart disease in Singapore.

More than 10,000 Singaporeans will be invited to participate in the project, and have their heart, liver and metabolism assessed. Of these participants, 3,000 will be selected for a five-year follow-up programme where new technologies will be deployed and piloted.

Professor Roger Foo, Corresponding Principal Investigator of Project RESET, and Director of the CVMD TRP at NUS Medicine and the Cardiovascular Research Institute under NUHCS, said, "The different factors that contribute to heart disease will be investigated by capturing a variety of data points – from lifestyle information down to genetic variations – to provide a full diagnostic picture for each patient. This has never been achieved at this scale elsewhere before. Project RESET will also leverage artificial intelligence to develop effective preventive strategies and make preventive heart health more accessible and relevant to individuals." Professor Foo is also Senior Consultant in the Department of Cardiology at NUHCS, and the Zayed Bin Sultan Al Nahyan Professor in Medicine.

Associate Professor Calvin Chin, Deputy Director of NHRIS and Senior Consultant, Department of Cardiology, NHCS, shared, "Singapore is in a unique and well-placed position to advance cardiovascular research, as its population comprises different ethnicities that broadly represent large parts of Asia. With the collective expertise from institutions across Singapore, Project RESET aims to increase our understanding of the complexities of cardio-metabolic disease and provide insights of different ethnic backgrounds, which will help us unlock research discoveries and develop new strategies to aid in early detection and prevention of cardiovascular disease, potentially benefitting local and the wider Asian populations."

"Much of our understanding of health and disease comes from non-Asian sources. We are trying to change that at NUS Medicine. By delving deeper and getting a better understanding of how biology, natural history, lifestyles, genetic susceptibility affect therapeutic responses to diseases in Singapore, such as cardiovascular-metabolic diseases, we can potentially reverse disease trajectories not just in Singapore but Asia. I am confident that Project RESET will be a game-changer in advancing Asian heart health," said Chong Yap Seng, Lien Ying Chow Professor in Medicine, Dean of NUS Medicine, and Deputy Chief Executive (Education & Research) at NUHS.

"One of the key aims of Project RESET is to reverse disease and empower individuals with holistic health insights from diverse data sources. Leveraging A*STAR's expertise

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[3] The Open Fund – Large Collaborative Grant (MOH-001325) is supported by the National Research Foundation, Singapore and administered by the Singapore Ministry of Health's National Medical Research Council.

in data science and infrastructure, the team will integrate big datasets such as those from clinical records, genomics and smartwatches, to provide a multi-dimensional view of health in Project RESET study participants. With the collaborative strength of our ecosystem partners, we're developing a data platform that will enable AI-powered predictions for a healthier future. We will also be profiling metabolic flexibility and investigating how it impacts heart health to alleviate the burden of disease and improve lives," said Professor Dennis Wang, Theme Principal Investigator for Project RESET and Senior Principal Scientist from A*STAR.

Combining research excellence with real-world impact

Launched by Mr Ong Ye Kung, Minister for Health, on 27 September 2023, Project RESET is one of the initiatives that will be piloted at Health District @ Queenstown, where the study team will work closely with policymakers, urban planners and community leaders to create spaces that support the community's physical, social and mental well-being, and reduce environmental factors that contribute to heart disease.

Professor Aaron Thean, Deputy President (Academic Affairs) and Provost, NUS, said, "Through Project RESET, we strive to bridge the gap between academia and clinical practice, combining research excellence with real-world impact. By synergising expertise from various disciplines, we aim to create a transformative framework that will revolutionise heart disease prevention and care in Singapore."

Chinese Glossary

National University Health System (NUHS)	国立大学医学组织 (国大医学组织)
National University of Singapore (NUS)	新加坡国立大学
NUS Yong Loo Lin School of Medicine (NUS Medicine)	新加坡国立大学杨潞龄医学院（国大杨潞龄医学院）
National University Heart Centre, Singapore (NUHCS)	新加坡国立大学心脏中心 (国大心脏中心)
Cardiovascular-Metabolic Disease Translational Research Programme (CVMD TRP), NUS Yong Loo Lin School of Medicine (NUS Medicine)	心血管代谢疾病转化研究项目 国大杨潞龄医学院
Cardiovascular Research Institute (CVRI), National University Heart Centre, Singapore (NUHCS)	心血管研究所 国大心脏中心
National Medical Research Council (NMRC)	全国医学研究理事会
National Heart Centre Singapore (NHCS)	新加坡国家心脏中心
National Heart Research Institute Singapore	新加坡国家心脏研究所
Duke-NUS Medical School	杜克—新加坡国立大学医学院
Nanyang Technological University, Singapore (NTU Singapore)	新加坡南洋理工大学
A*STAR	新加坡科技研究局
Genome Institute of Singapore (GIS), A*STAR	新加坡基因组研究院 新加坡科技研究局

Singapore Institute for Clinical Sciences (SICS), A*STAR	新加坡临床科学研究院 新加坡科技研究局
Bioinformatics Institute (BII), A*STAR	生物资讯研究院 新加坡科技研究局
Health District @ Queenstown	女皇镇保健区
Professor Aaron Thean Deputy President (Academic Affairs) and Provost, National University of Singapore (NUS)	程文耀教授 常务副校长 (学术事务) 兼教务长 新加坡国立大学
Professor Chong Yap Seng Dean, NUS Yong Loo Lin School of Medicine (NUS Medicine) Deputy Chief Executive (Education & Research), National University Health System (NUHS) Lien Ying Chow Professor in Medicine	钟业成教授 院长 国大杨潞龄医学院 副首席执行官 (教育与研究) 国立大学医学组织 连瀛洲医学教授
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Professor Dennis Wang Senior Principal Scientist, A*STAR's Singapore Institute for Clinical Sciences (SICS) and Bioinformatics Institute (BII)	王奕青教授 高级首席科学家 新加坡临床科学研究院 生物资讯研究院 新加坡科技研究局

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About the National University Health System (NUHS)

The National University Health System (NUHS) aims to transform how illness is prevented and managed by discovering causes of disease, development of more effective treatments through collaborative multidisciplinary research and clinical trials, and creation of better technologies and care delivery systems in partnership with others who share the same values and vision.

Institutions in the NUHS Group include the National University Hospital, Ng Teng Fong General Hospital, Jurong Community Hospital and Alexandra Hospital; three National Specialty Centres – National University Cancer Institute, Singapore (NCIS), National University Heart Centre, Singapore (NUHCS) and National University Centre for Oral Health, Singapore (NUCOHS); the National University Polyclinics (NUP); Jurong Medical Centre; and three NUS health sciences schools – NUS Yong Loo Lin School of Medicine (including the Alice Lee Centre for Nursing Studies), NUS Faculty of Dentistry and NUS Saw Swee Hock School of Public Health.

With member institutions under a common governance structure, NUHS creates synergies for the advancement of health by integrating patient care, health science education and biomedical research.

As a Regional Health System, NUHS works closely with health and social care partners across Singapore to develop and implement programmes that contribute to a healthy and engaged population in the Western part of Singapore.

For more information, please visit www.nuhs.edu.sg.

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.

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 2023).

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

About the National University Heart Centre, Singapore (NUHCS)

The National University Heart Centre, Singapore (NUHCS) is an academic, national specialist centre under the National University Health System (NUHS). NUHCS brings together the resources, expertise and capabilities in the areas of Cardiology, Cardiothoracic and Vascular Surgery to better meet the needs of the growing number of patients with heart disease and raise the future generation of medical professionals.

As one of two national heart centres in Singapore for the treatment and management of complex cardiovascular diseases, NUHCS offers six core clinical programmes including Heart Failure & Cardiomyopathy, Structural Heart Disease, Acute Coronary Syndrome, Heart Rhythm, Congenital & Structural Heart Disease and Women's Heart Health. The centre has been awarded two institutional Peaks of Excellence for its Minimally-invasive Cardiothoracic Surgery and Aortic Centre Programme, and has been ranked top in Singapore for three consecutive years in 2022, 2023 and 2024 for the specialty of Cardiac Surgery in Newsweek's "World's Best Hospital" Award.

Comprising a team of internationally-recognised cardiologists and surgeons from the cardiothoracic and vascular specialties, NUHCS serves as a referral national centre for cardiothoracic and vascular conditions and provides a comprehensive approach to

the treatment of these patients. The holistic patient-care approach is backed by leading translational research at the Cardiovascular Research Institute (CVRI) and Cardiovascular Metabolic Translational Program, all of which complements these advanced quaternary clinical services to deliver state-of-the-art treatment solutions to the most challenging heart, lung and circulatory diseases.

NUHCS services span across four locations to serve the western and central locations in Singapore:
- NUHCS at National University Hospital (NUH), Kent Ridge - Main Operations
- NUHCS Heart Clinic @ Ng Teng Fong General Hospital (NTFGH)
- NUHCS Heart Clinic @ Jurong Medical Centre (JMC)
- NUHCS Heart Clinic & NUHCS Vein Clinic @ Alexandra Hospital (AH)

For more information, visit: https://www.nuhcs.com.sg.

About the National Heart Centre Singapore

The National Heart Centre Singapore (NHCS) is a 185-bed national and regional referral centre for cardiovascular diseases, and the only heart and lung transplantation centre in Singapore. Providing a comprehensive range of cardiac care services from preventive to rehabilitative, NHCS' clinical outcomes for heart attack treatment, balloon angioplasty with stenting, and coronary bypass surgery, are comparable to international benchmarks.

An academic medical institution, NHCS actively trains and educates healthcare professionals to continuously raise the standards of cardiac care, and conducts translational medical research with local and international collaborators to bring about better cardiac health for the community.

The National Heart Research Institute Singapore (NHRIS) established in 2013 in collaboration with Duke-NUS Medical School, aims to transform cardiovascular outcomes through patient-centred research, and to create a vibrant translational research environment for basic scientists and clinicians.
For more information, please visit: www.nhcs.com.sg

About Duke-NUS Medical School

Duke-NUS is Singapore's flagship graduate entry medical school, established in 2005 with a strategic, government-led partnership between two world-class institutions: Duke University School of Medicine and the National University of Singapore (NUS). Through an innovative curriculum, students at Duke-NUS are nurtured to become multi-faceted 'Clinicians Plus' poised to steer the healthcare and biomedical ecosystem in Singapore and beyond. A leader in ground-breaking research and translational innovation, Duke-NUS has gained international renown through its five signature research programmes and 10 centres. The enduring impact of its discoveries is amplified by its successful Academic Medicine partnership with Singapore Health Services (SingHealth), Singapore's largest healthcare group. This strategic alliance has spawned 15 Academic Clinical Programmes, which harness multi-disciplinary research and education to transform medicine and improve lives.

For more information, please visit www.duke-nus.edu.sg

About Nanyang Technological University, Singapore

A research-intensive public university, Nanyang Technological University, Singapore (NTU Singapore) has 33,000 undergraduate and postgraduate students in the Engineering, Business, Science, Medicine, Humanities, Arts, & Social Sciences, and Graduate colleges.

NTU is also home to world-renowned autonomous institutes – the National Institute of Education, S Rajaratnam School of International Studies, Earth Observatory of Singapore, and Singapore Centre for Environmental Life Sciences Engineering – and various leading research centres such as the Nanyang Environment & Water Research Institute (NEWRI) and Energy Research Institute @ NTU (ERI@N).

Under the NTU Smart Campus vision, the University harnesses the power of digital technology and tech-enabled solutions to support better learning and living experiences, the discovery of new knowledge, and the sustainability of resources.

Ranked amongst the world's top universities, the University's main campus is also frequently listed among the world's most beautiful. Known for its sustainability, NTU has achieved 100% Green Mark Platinum certification for all its eligible building projects. Apart from its main campus, NTU also has a medical campus in Novena, Singapore's healthcare district.

For more information, visit www.ntu.edu.sg

About the Agency for Science, Technology and Research (A*STAR)

A*STAR is Singapore's lead public sector R&D agency. Through open innovation, we collaborate with our partners in both the public and private sectors to benefit the economy and society. As a Science and Technology Organisation, A*STAR bridges the gap between academia and industry. Our research creates economic growth and jobs for Singapore, and enhances lives by improving societal outcomes in healthcare, urban living, and sustainability. A*STAR plays a key role in nurturing scientific talent and leaders for the wider research community and industry. A*STAR's R&D activities span biomedical sciences to physical sciences and engineering, with research entities primarily located in Biopolis and Fusionopolis. For ongoing news, visit www.a-star.edu.sg.

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Annex A – Project RESET Institutions technology showcase

Name of Partner	Description of technology
National University of Singapore (NUS)	The HaptGlove is a wireless pneumatic glove for realistic haptic feel in a virtual reality world. The ability to sense and feel in the virtual reality (VR) world can provide a highly immersive experience, allowing users to engage with digital content in a way that feels more life-like. This can be particularly beneficial for activities such as gaming or training, where a high degree of realism can enhance the learning or entertainment value of the experience. To achieve this, we have invented the HaptGlove, a wireless lightweight haptic glove that accurately monitors finger movements and provides kinesthetic and cutaneous feedback to the user's five fingers. This enables "physical" touching of virtual objects to realistically feel the shape, size and stiffness. The HaptGlove can be implemented in VR gaming to improve gaming immersion or to create a more realistic and effective VR medical training programme. It provides touch and grip sensations when interacting with VR objects in the metaverse, for example when the user is checking for a pulse on a digital avatar or performing medical palpations. The gloves are also wireless and lightweight, needing no cables or bulky accessories to power them. Importantly, the haptic feedback module provides realistic kinesthetic and cutaneous sensations to the skin, which enables our brain to differentiate the physical properties of a digital object, whether it is soft or hard, rough or smooth.
National University Health System (NUHS)	1. **NUHS Holomedicine Programme** The NUHS Holomedicine Programme is a strategic programme in NUHS that aims at developing a programmatic approach to the deployment of mixed reality (MR) technology for patient care. Since its initiation in Jan 2021, the NUHS Holomedicine Programme has made significant advancements, including its use in over 100 cases across 12 specialties, designation as a Holomedicine Centre of Excellence under the international Holomedicine Association, and having multiple partnerships and collaborations with institutes around the world. The Holomedicine technology is currently used in the following areas in NUHS: 1. Pre-surgical planning for patients undergoing surgery

	2. Image reference and guidance during surgery 3. Patient education 4. Surgical training 5. Undergraduate teaching (Both the NUS Yong Loo Lin School of Medicine and the Alice Lee Centre for Nursing Studies deploy mixed reality technology for procedure skills training) ***Application in Project RESET*** In Project RESET, we will use **HaptGlove and the Holotechnology to carry out health discussions with participants** so that they will be able to sense and feel their own liver tissue stiffness, organ sizes and heart rate pulse. We hypothesise that using this technology will offer a realistic, immersive and informative approach to induce behavioural lifestyle changes to improve health. Such an approach will be tested among Project RESET participants. **2. CardioSight** CardioSight is a digital dashboard devised to visualise heart attack risk factors "at one glance" starting with the population in the west of Singapore, in real time. This will help to chart plans to carry out targeted interventions to save "groups of hearts", strengthening the fight against heart disease in the community, and targeting higher risk groups with greater efficacy.
National Heart Centre Singapore (NHCS)	The National Heart Centre Singapore (NHCS) extends its support to the Project RESET by providing cutting edge cardiovascular imaging expertise and state-of-the-art imaging techniques to discover more about the impact of heart metabolism and the associated functional and structural changes. With the advanced imaging technologies and capabilities housed in one facility, NHCS is able to image cardiac vasculature, myocardial changes and metabolic flux which provide critical information to the Project. As the nation's key cardiac care service provider, and part of the SingHealth Duke-NUS Academic Medicine Centre, NHCS can leverage on its existing and large cohorts of research volunteers to identify and invite suitable patients to participate in the Project. With strong research capabilities in cardiometabolic disease models, NHRIS and NHCS will support the studies of human cell models – an integral component of the Project RESET, to investigate the interplay between fatty liver disease and heart dysfunction. The studies aim to discover and develop new therapeutic strategies for both fatty liver and heart disease.

Nanyang Technological University, Singapore (NTU Singapore)	Blood is a highly complex biofluid that comprises a range of components, including extracellular vesicles (EVs), which are key mediators for cell-to-cell communication and are implicated in many biological processes and diseases. However, clinical utilities of EVs-based biomarkers remain limited due to difficulties in isolating nanoscale EVs from whole blood reliably. A team led by NTU's Associate Professor Hou Han Wei will develop microfluidic technologies to isolate EVs from patient blood, with the goal of identifying novel EV-based biomarkers that correlate with cardiovascular disease severity and progression in Project RESET's participants.
Agency for Science, Technology and Research (A*STAR)	Leveraging A*STAR's expertise in data science and robust infrastructure, Project RESET integrates extensive datasets encompassing clinical records such as cardiovascular data, tissue samples as well as genomics and smartwatch data, offering a multi-dimensional perspective on health among Project RESET study participants. Collaborating closely with technology partners, the research team is constructing a data platform capable of harnessing AI for predictive health outcomes. The project team will focus on understanding metabolic flexibility's impact on heart health and its connection to insulin resistance, seeking potential disease reversal avenues. These efforts align with national goals to combat obesity and diabetes.