MediCine

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DATA-DRIVEN DECISIONS

NUS-IHME Global Burden of Disease Research Centre Tracks Population Health Concerns across Southeast Asia

06

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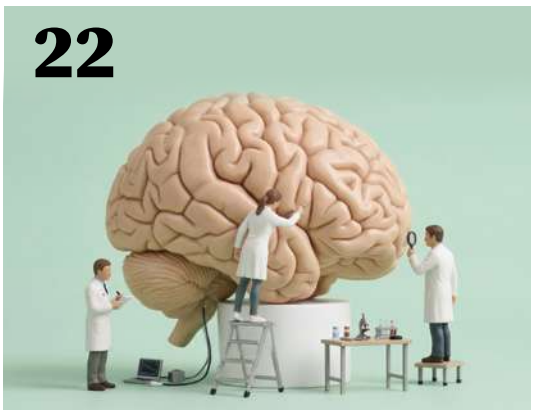

MediCine

MediCine is published quarterly by the communications office of the NUS Yong Loo Lin School of Medicine.

NUS National University of Singapore
Yong Loo Lin School of Medicine

inspire120
120 YEARS OF INSPIRING HEALTH FOR ALL

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Dean's Message

Dear Reader,

If you visit a doctor in Singapore for a consultation, chances are your doctor will be a graduate of the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine). Since the School's establishment in 1905, NUS Medicine has graduated 12,456 men and women. Numbers alone don't mean much: many of our graduates are doing good and great work in the community and even abroad. Let me share three examples of this.

Moved by the struggles that adults with intellectual disabilities (IDs) experience in trying to access healthcare, Dr Chen Shiling (Class of 2005) established the non-profit Happee Hearts Movement and IDHealth in 2014. The latter is a full-service clinic staffed by doctors, nurses, social workers and allied health professionals serving adults with IDs. Many of these patients have mobility and sensory processing difficulties that make it difficult for them to articulate their needs to healthcare workers, even as their families struggle with the demands of caring for them. The clinic is working with healthcare and academic institutions to include palliative and dementia care as well as preventive health, said Dr Chen, who was named The Straits Times Singaporean of the Year 2025 in March this year.

Dr Glen Liau Zi Qiang (Class of 2012) and his team at Alexandra Hospital designed a patented, surgical-grade stainless steel intra-incisional tibial pin guide jig, designed to accurately personalise pin positioning and trajectory for each patient undergoing robotic knee replacement surgery. Where four tracker pins had to be inserted into a patient's thigh and shin bones to enable the robot to accurately map the surgical site, the tool only requires a single incision, through which all four pins are inserted and later removed. This novel device reduces the risk of bones fracturing, bleeding and infection.

Her undergraduate experiences volunteering on short humanitarian missions motivated Dr Deborah Khoo (Class of 2014) to look for opportunities to serve on longer duration assignments overseas. For three months in 2024, she was part of a Medicins Sans Frontieres medical team based in a trauma unit in Kunduz, north Afghanistan. "I'm not the first or only doctor from Singapore to do this—far from it," she said in a recent news interview. "Many of us go because we want to serve. Living and working in Singapore, it's easy to believe the world is orderly, safe and predictable. But it's not. Even those of us who've travelled widely may not grasp how chaotic the world can be."

The efforts of NUS Medicine alumni like Drs Chen, Liau and Khoo are also helping to progressively move the needle towards a lifespan zone marked by longer and healthier lives for Singaporeans. While life expectancy in 2024 rose to 83.5 years, living longer is only one half of the equation. I have shared previously that NUS Medicine is at the forefront of scientific work to increase the healthspan of Singaporeans. In this edition, you can read about the new as well as continuing efforts to help people stay healthy as they age, such as the discovery that natural metabolite calcium alpha-ketoglutarate (CaAKG) may help restore key memory-related brain functions disrupted by Alzheimer's disease, as well as the identification of a key protein that could reverse ageing.

The practice of Medicine centres fundamentally on human health and wellness, and partnering with international institutions is paramount in the School's efforts to drive preventive health. We recently launched the NUS-IHME Global Burden of Disease Research Centre, a new regional hub which aims to provide analysis for the region, generating actionable data and policy insights on population health and disease burden. To uncover how sleep and physical activity influence population health in the long term, our Centre for Sleep and Cognition has also established a joint lab with the Finnish smart ring maker, ŌURA.

At NUS Medicine, competent, compassionate, committed staff and alumni are working ceaselessly to close the gap between longevity and health. Thanks to them, all of us can look expectantly forward to the time when our length of years is marked by vigour and vitality.

Yours sincerely,

Yap Seng

NUS National University of Singapore

Yong Loo Lin School of Medicine

inspire120

120 YEARS OF INSPIRING HEALTH FOR ALL

NUS Medicine is proud to be ranked 13th globally and 1st in Asia in the 2026 Times Higher Education rankings for Medical and Health.

This marks our highest-ever placement and reflects the unwavering support of our esteemed partners and community.

Together, we can shape the future of health by striving for excellence and inspiring better health for all.

Levelling The Playing Field: The Office of Equal Opportunities and Career Development

For almost 25 years, the number of female students at Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), was capped at one-third of the cohort. Although the quota was lifted in 2003, gender equity in certain medical specialisations and leadership roles remains elusive.

"When the quota was lifted, it took just three years for the proportion of female students to become roughly 50%," said Associate Professor Sophia Archuleta, Assistant Dean of Equal Opportunities and Career Development.

But the number of women in academia and healthcare dwindles with seniority, in what is termed the "leaky pipeline" phenomenon. "Many of us reached a point in our careers where we increasingly sat in rooms where men outnumbered women," said Assoc Prof Archuleta, who is also Senior Consultant in the Division of Infectious Diseases at National University Hospital. "There was some sort of attrition going on, and we wanted to figure out why." That led to the formation of Women in Science & Healthcare (WISH), a voluntary group within the National University Health System (NUHS), in 2017.

Removing barriers

What the group found was a mix of social and cultural norms, systemic constraints and unconscious bias. "No one is trying to exclude women," Assoc Prof Archuleta explained. "Men in senior positions often rely on their network (which is predominantly male) when reaching out to potential collaborators or talent, which may unintentionally influence who gets approached for opportunities. The system is also structured such that crucial stages of career progression may coincide with women's very personal decisions about starting or caring for their families, amplifying the effects of taking time away."

While unintentional, such instances can have far-reaching consequences. "Unless we address them deliberately, these biases will remain," Assoc Prof Archuleta said. She and WISH members compiled their findings into a White Paper and presented it to Professor Chong Yap Seng, Dean of NUS Medicine.

"Dean Chong was incredibly supportive," she recalled. As a result of the meeting, NUS Medicine's Office of Equal Opportunities and Career Development (EOCD) was officially established in 2019 to look at policies and best practices to promote equity for women faculty. Different from WISH (a voluntary group), EOCD is an official entity under the Office of Academic Affairs which is resourced accordingly.

It's not just about women

Today, EOCD actively works with WISH to advance awareness of gender equity—holding cognitive bias training workshops and a quarterly Lunch and Learn series to share about diversity and inclusion. Noting the prevalence of "manels" (all-male line-ups at conferences and events), EOCD released diversity and inclusion guidelines for conference planning.

The positive impact of EOCD events and initiatives goes further. "Many of the issues we tackle—such as parental leave or caregiving—don't just affect women," Assoc Prof Archuleta said. "Research has also shown that diversity fosters greater innovation and better quality of care. This means the entire organisation stands to gain when we address these equity gaps."

In 2024, NUS Medicine admitted its largest intake of female students, at

60%

of the cohort

Hearteningly, awareness and male participation at EOCD events are rising—the annual International Women in STEM & Medicine Symposium (previously International Women's Conference) now sees participants from Singapore's three medical schools and all healthcare clusters. She said, "We see more men at our events, and senior leaders have shared instances where they called out and rectified blind spots."

Pushing for sustainable change

Along with NUS Medicine admitting its largest intake of female students in 2024 at 60% of the cohort, women are now also better represented among the faculty and leadership, including the ranks of Vice-Deans and Assistant Deans.

But while gains have been made, EOCD's job is not done yet. "Awareness and representation are still issues," Assoc Prof Archuleta said. "Women remain underrepresented among Heads of Department and full professors—creating a void of female mentors and role models."

> **"We are on the right track now. And if we can get more young blood from various specialties and healthcare professions, I hope we can continue creating a ripple effect of positive change that leaves things better than we found them."**
>
> *Assoc Prof Sophia Archuleta, Assistant Dean of ECOD*

Furthermore, initiatives like EOCD's Leave Support Grant which offers financial support for researchers (both male and female) who have to take an extended leave of absence—has had only one recipient in three years. "This shows that it's well and good to have supportive policies, but we need faculty members to know about them and apply, and leaders who encourage them to do so."

To that end—in addition to EOCD's ongoing initiatives—cross-promotion and collaboration are underway with other divisions such as the Global Centre for Asian Women's Health and the Centre for Healthy Longevity.

Assoc Prof Archuleta is also on the lookout for successors and allies. "Not because I'm ready to call it a day," she said with a smile. "We are on the right track now. And if we can get more young blood from various specialties and healthcare professions, I hope we can continue creating a ripple effect of positive change that leaves things better than we found them."

From Data to Decisions:

NUS-IHME Global Burden of Disease Research Centre Tracks Population Health Concerns across Southeast Asia

A research centre to study the burden of health challenges in ageing populations, changing disease patterns, as well as the impact of public health emergencies in an era of global climate change was launched on 2 February 2026 by the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine) and the Institute for Health Metrics and Evaluation (IHME), University of Washington School of Medicine. The NUS-IHME Global Burden of Disease Research Centre will serve as a key analytical engine for Southeast Asia and the surrounding region, delivering scientific evidence that its leaders can translate into policy.

Southeast Asian countries are home to nearly one in 10 people worldwide and collectively face a perfect storm of health challenges. Yet the region lacks critical data and insights that would help local leaders prioritise diseases, allocate resources, target inequities, and operate proactively rather than reactively. Research at the Centre will help better understand the changing epidemiological landscape in the region and identify drivers of emerging threats. Key research focus areas include understanding diseases and risk factors affecting healthspan, quantifying the health impacts of climate and environmental risks, and expanding the Global Burden of Disease evidence base for women's health as well as metabolic, dietary, and lifestyle risk factors.

Associate Professor Marie Ng, Director of the Centre, who has joint appointments at NUS Medicine and IHME, said, "This Centre is about empowering decision-makers with the data and insights they need to improve population health, both regionally and globally. By embedding global methodologies within local contexts, the Centre seeks to not only generate population health data but also translate insights into meaningful policies."

Based at NUS Medicine, the partnership leverages the strengths of both NUS Medicine and IHME by bringing together IHME's globally recognised expertise in health metrics and NUS Medicine's deep regional networks, research capabilities and academic leadership in the healthcare sector.

"This Centre is about empowering decision-makers with the data and insights they need to improve population health, both regionally and globally."

Assoc Prof Marie Ng, Director of NUS-IHME Global Burden of Disease Research Centre, NUS Medicine

"The launch of the Centre underscores Singapore's role as a regional hub for health intelligence and policy-relevant research. Singapore's strategic location in Southeast Asia, together with its leadership in the academic and healthcare sector, makes it a natural base for this work. The insights generated through the Centre will inform health strategies across the region and contribute to global discussions on population health and sustainable health systems," said Professor Chong Yap Seng, Dean of NUS Medicine.

A globally renowned leader in population health metrics, IHME has a track record in capacity building and supporting national health policy development. Its flagship project—the Global Burden of Disease (GBD) study—has informed health strategies in over 200 countries and territories, including Singapore.

"Better health starts with better evidence, and unifying our expertise will allow us to pinpoint the leading causes of death and disability and provide solutions that are grounded in regional and local context," said Dr Christopher J.L. Murray, IHME Director.

Scan to hear the podcast where, Prof Chong and Dr Murray discuss how the new NUS-IHME Global Burden of Disease Research Centre can help improve population health in Southeast Asia:

Giving a WHIT to Conditions That Affect Women and Their Health

The Global Centre for Asian Women's Health (GloW) at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine) will take over the hosting and enhancement of the Women's Health Impact Tracking (WHIT) platform, a first-of-its-kind, publicly accessible tool which measures progress on closing the women's health gap across a set of conditions and countries.

The WHIT platform—initiated and developed by the World Economic Forum (WEF), in collaboration with the McKinsey Health Institute (MHI)—consolidates and translates complex datasets into clear, comparative insights. It supports decision-making across clinical, public health, research, advocacy and funding sectors. By highlighting conditions that uniquely or disproportionately affect women and their health, it pinpoints gaps in care, data and investment, complementing datasets like the Global Burden of Disease and World Health Organization (WHO) mortality data with a consolidated view of global and national needs.

Research by the WEF and MHI indicates that closing the women's health gap could yield substantial benefits, including improvements in quality of life and productivity.

Earlier analyses estimate that narrowing the gap could add up to US$1 trillion to the global economy annually by 2040[1]. These findings underpin *Blueprint to Close the Women's Health Gap*, which outlines the global actions needed to advance women's health—and which provides the foundation for the creation of WHIT, as a tool to measure progress against this agenda.

Professor Chong Yap Seng, Lien Ying Chow Professor in Medicine and Dean of NUS Medicine, said, "As stewards for the WHIT platform, NUS Medicine will build on its already strong foundations so that the platform can serve as a high quality, long-term resource for policymakers, clinicians, researchers and the public. Advancing women's health requires coordinated, international effort—to ensure that the issues affecting women are measured consistently and understood more clearly."

Moving forward, WHIT will further broaden its condition coverage, improve data quality, strengthen participation from countries—particularly low- and middle-income regions—and deepen use cases for stakeholders across disciplines. The aim is to establish a comprehensive and long-term data/information platform that enhances accountability and support for major women's health issues as well as empowers leaders across sectors to better understand, prioritise and improve women's health worldwide.

"Improving women's health requires sustained attention to the conditions that affect us most, risk factors that lead to the conditions, effective methods that treat the conditions and factors that shape our access to screening, diagnosis and care. WHIT brings these issues into focus by organising information and data in a way that is accessible, understandable, transparent and actionable."

Professor Cuilin Zhang, Director of GloW, NUS Medicine

Professor Cuilin Zhang, Director of GloW, NUS Medicine, said, "Improving women's health requires sustained attention to the conditions that affect us most, risk factors that lead to the conditions, effective methods that treat the conditions and factors that shape our access to screening, diagnosis and care. WHIT brings these issues into focus by organising information and data in a way that is accessible, understandable, transparent and actionable. We aim to extend its reach so that countries and partners can make better-informed decisions to support women's health across diverse landscapes. Maintaining and strengthening the platform would require tremendous joint efforts across multiple disciplines in our ecosystem—involving epidemiologists, clinicians, data scientists, economists and more. We welcome partners and collaborators."

Narrowing women's health gap is projected to add up to

US$1 TRILLION

annually to the global economy by 2040

[1] https://www3.weforum.org/docs/WEF_Closing_the_Women's_Health_Gap_2024.pdf.

ŌURA and National University of Singapore Open Joint Lab to Advance Research in Personalised Preventive Health

ŌURA, maker of the most scientifically validated smart ring, Oura Ring, and the Centre for Sleep and Cognition (CSC) at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), announced the opening of the Oura-NUS Joint Lab, a new research entity dedicated to advancing personalised preventive health in January.

Located at NUS, the Joint Lab will advance scientific research by combining continuous, real-world biometric data from ŌURA within approved research studies with NUS' decades-long expertise in sleep science, physiological data analysis, and cognitive neuroscience to study how sleep and physical activity shape health and drive better health outcomes. The Joint Lab aims to generate insights that help individuals, clinicians and health systems shift from reactive care to proactive, preventive health.

Building on a proven collaboration

ŌURA and NUS have collaborated for more than six years across multiple research projects, including evaluating the accuracy of Oura Ring's sleep tracking[1,2,3,4], characterising multi-country differences in nocturnal sleep variability[5], exploring effects of travel-related sleep disruption[6] and investigating how day-to-day shifts in wearable biometric data can inform about cardiovascular health and disease risk[7].

The new Joint Lab will expand this work by designing and running multi-year studies that use Oura Ring's continuous data to understand how real-world sleep and daily behaviours influence long-term health outcomes, both at the individual and population levels.

"Changing health habits is notoriously difficult, and doing it well requires robust science and accurate, continuous data," said Dr Shyamal Patel, Senior Vice President of Science at ŌURA. "Our long-standing collaboration with NUS has already shown how high-quality wearable data can deepen our understanding of cardiovascular, metabolic and mental health. With this Joint Lab, we're expanding that work to tackle some of the world's most pressing preventive health challenges."

Singapore as a hub for global preventive health

The Joint Lab is the first research entity in Asia Pacific (APAC) for ŌURA, underscoring the company's commitment to

> **"The Joint Lab will accelerate the realisation of our shared goal of reducing the burden of chronic disease. By pairing ŌURA's continuous biometric data with our expertise in sleep science and behaviour change, we can test new ways of giving people timely and relevant feedback that help them make optimal lifestyle choices every day for better health outcomes."**
>
> *Prof Michael Chee, Director, CSC at NUS Medicine*

the region and recognition of Singapore as a strategic hub for international growth, health innovation and public–private collaboration. By anchoring this work in Singapore, the partners aim to contribute to national priorities around preventive health and healthy longevity and build data-driven models that can be scaled across APAC and global populations.

"The Joint Lab will accelerate the realisation of our shared goal of reducing the burden of chronic disease," said Professor Michael Chee, Director, CSC at NUS Medicine.

"By pairing ŌURA's continuous biometric data with our expertise in sleep science and behaviour change, we can test new ways of giving people timely and relevant feedback that help them make optimal lifestyle choices every day for better health outcomes."

"ŌURA's decision to set up a joint lab in Singapore builds on the strong foundation of its long-standing collaboration with NUS. This is ŌURA's first presence in Asia and reflects Singapore's strong base of talent, research and innovation capabilities, as well as the growing market opportunities in preventive health," said Ms Goh Wan Yee, Senior Vice President and Head, Healthcare, Singapore Economic Development Board.

"Our long-standing collaboration with NUS has already shown how high-quality wearable data can deepen our understanding of cardiovascular, metabolic and mental health. With this Joint Lab, we're expanding that work to tackle some of the world's most pressing preventive health challenges."

Dr Shyamal Patel, Senior Vice President of Science at ŌURA

↑ Members of the Oura-NUS Joint Lab with colleagues from Finland and the US at ŌURA, at "World Sleep 2025" in Singapore. Front row from right to left: Prof Michael Chee, NUS Medicine, Dr Shyamal Patel, Senior Vice President of Science at ŌURA and Michael Chapp, Chief Operating Officer at ŌURA.

1 https://www.dovepress.com/multi-night-validation-of-a-sleep-tracking-ring-in-adolescents-compare-peer-reviewed-fulltext-article-NSS.
2 https://www.dovepress.com/multi-night-at-home-evaluation-of-improved-sleep-detection-and-classif-peer-reviewed-fulltext-article-NSS.
3 https://www.sciencedirect.com/science/article/pii/S235272182300267X.
4 https://www.sleephealthjournal.org/article/S2352-7218(24)00032-9/fulltext.
5 https://www.sciencedirect.com/science/article/pii/S1389945723003003?via%3Dihub.
6 https://academic.oup.com/sleep/article/48/7/zsaf077/8092480?login=false.
7 https://ouraring.com/blog/reset-oura-cardiovascular-health-partnership/.

Pursuing a Shared Vision

NUS Medicine and CUHK Medicine deepen partnership to advance precision eye health.

The Department of Ophthalmology, Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), and the Department of Ophthalmology and Visual Sciences, Faculty of Medicine, The Chinese University of Hong Kong (CUHK) signed a Memorandum of Understanding (MOU) on 8 February 2026 at the Hong Kong Convention and Exhibition Centre. This Ceremony marks an important milestone in strengthening academic ties and expanding collaboration in research, education and innovation in ophthalmology and visual sciences.

The MOU formalises a framework for collaboration across several key areas, including the exchange of scientific and academic information, joint research and development initiatives, staff visits and academic exchanges, as well as the organisation of joint seminars, conferences and other scholarly activities. The agreement builds on a long-standing relationship between NUS and CUHK, shaped by years of shared work and common ambition to improve eye health outcomes through research-led innovation.

Over the years, the partnership gained fresh momentum through ongoing academic conversations, including a networking dinner at the Association for Research in Vision and Opthalmology (ARVO) 2025 in Salt Lake City. There, Professor Ching-Yu Cheng, Assistant Dean of Research and Director of Centre for Innovation and Precision Eye Health at NUS Medicine and Professor Calvin Pang, Director, Joint Shantou International Eye Center (JSIEC), Shantou University and CUHK, identified new opportunities to strengthen joint efforts in eye research and innovation. The ensuing MOU provides the structure to deepen this collaboration, enabling both institutions to accelerate impactful projects and broaden the exchange of expertise.

Both Hong Kong and Singapore face similar, pressing eye health challenges, including rising rates of myopia and age-related eye diseases. The collaboration is positioned to tackle these issues by pairing CUHK's strengths in ophthalmic genetics and imaging with NUS Medicine's leadership in translational clinical research and epidemiology.

Guests at the MOU signing ceremony.

The partnership also aligns with Singapore's healthcare transformation under HealthierSG, which emphasises preventive and community-based care. As chronic eye conditions become more prevalent, the need for scalable and accessible tools for early detection and long-term disease management is increasingly urgent. One key challenge highlighted is the development of improved glaucoma screening technologies suitable for community settings, underscoring the importance of cross-institutional innovation to translate research into real-world impact.

The MOU strengthens and expands ongoing joint efforts across multiple areas, reflecting both the breadth of current work and the potential for future breakthroughs. These include collaborations in:

- Artificial Intelligence (AI) in glaucoma
- Global RETFound initiative
- Oculomics
- Myopia genetics
- Inherited eye disease research
- Stem cell therapy for age-related macular degeneration (AMD)
- AMD genetics

Together, these initiatives aim to transform population-level eye care through advanced diagnostics, predictive modelling, novel therapeutics, regenerative medicine and personalised treatment strategies.

The Ceremony was attended by senior academic leaders from both institutions. Representing CUHK were Professor Philip Chiu, Dean of the Faculty of Medicine, Professor Clement Tham, Chairman of the Department of Ophthalmology and Visual Sciences, and Professor Calvin Pang, Director of the Joint Shantou International Eye Center (JSIEC), Shantou University and CUHK. NUS Medicine guests included Professor Chong Yap Seng, Dean, Professor Ching-Yu Cheng, Assistant Dean of Research and Director of the Centre for Innovation and Precision Eye Health, and Associate Professor Victor Koh, Head of the Department of Ophthalmology.

Exchange of corporate gifts during the MOU signing ceremony.

"By combining the complementary strengths of our Schools, we are creating a powerful platform for innovation and discovery in ophthalmology and visual sciences. This partnership enables capabilities that neither institution could achieve alone and establishes a model of regional cooperation showing how Asia can lead in the global conversation on precision eye health."

Prof Chong Yap Seng, Dean of NUS Medicine

Speaking at the Ceremony, Prof Chong Yap Seng, Dean of NUS Medicine, underscored the power of combining complementary strengths to advance the field: "By combining the complementary strengths of our Schools, we are creating a powerful platform for innovation and discovery in ophthalmology and visual sciences. This partnership enables capabilities that neither institution could achieve alone and establishes a model of regional cooperation showing how Asia can lead in the global conversation on precision eye health."

With this MOU as a foundation, NUS Medicine and CUHK aim to accelerate joint research, deepen academic exchange, and initiate new high-impact projects to improve eye health outcomes across the region and globally. As eye diseases and visual impairment rise alongside ageing populations and increasing myopia, the partnership signals a shared commitment to shape the future of ophthalmic science, innovation and patient-centred care.

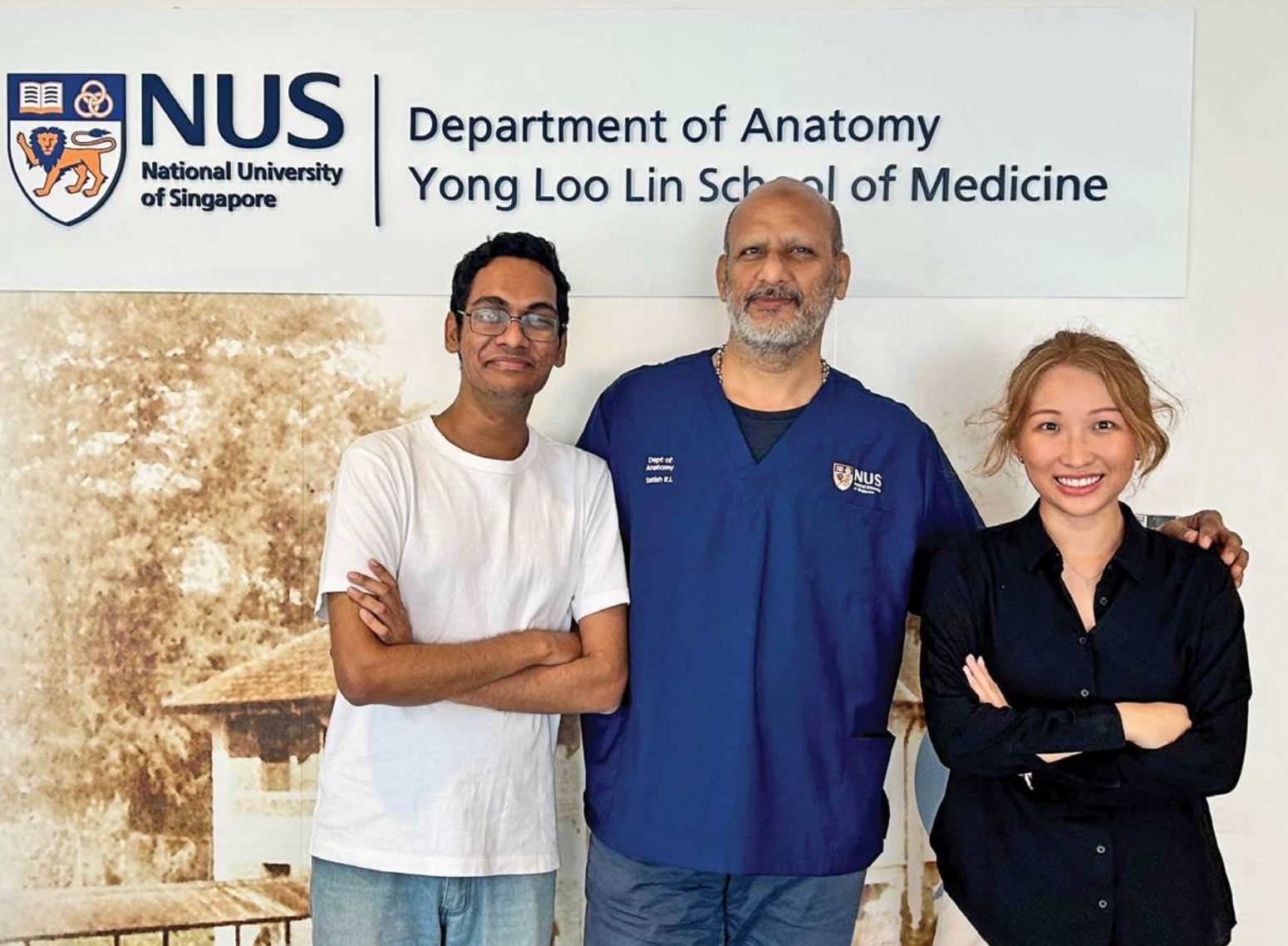
Beyond Mere Teaching

BY DEBRAATH PAHARI AND YONG REI EN, KERA RUTH, SECOND YEAR STUDENTS, NUS YONG LOO LIN SCHOOL OF MEDICINE

"I am not a teacher, but an awakener." – Robert Frost

We first met Dr Satish Ramapatna Lakshminarasappa as wide-eyed Phase I medical students in Anatomy class on a Tuesday morning. From the very first session, his passion for teaching and love for the subject shone through. Classes were never boring monologues, but rather boisterous discussions about theory and its applications in clinical cases. His approach to teaching highlighted students' current knowledge and then built on any gaps that were present. Instead of asking us to memorise lists of signs and symptoms, he patiently walked us through the clinical reasoning behind each case.

His classes left a deep impression on us, not just because of how clearly he explained complex concepts, but also because of the way he modelled what it meant to be a thoughtful, humane clinician. Whenever he spoke about patients, he did so with a mix of curiosity and respect that encouraged us to think of patients as people with stories, instead of cases to be diagnosed.



Dr Satish (middle) together with the student authors Debraath (left) and Kera (right).

A passage from India

Dr Satish did not decide on a career in medicine early on. In his youth, he took life as it came and without a concrete idea of what he wanted to do after high school since his family had given him complete freedom and never pressured him. His father was a strong pillar of support, whose silent dedication and sense of discipline instilled in Dr Satish values he carried up to this day.

Although his brother-in-law discouraged him from applying to medical school, citing his grades as a reason, Dr Satish nevertheless sat for entrance examinations for both Medicine and engineering and earned a place at the Bangalore Medical College.

Upon completing his MBBS, he began as a Junior Resident in Neurosurgery in May 1991 at the All India Institute of Medical Sciences in New Delhi, one of India's premier medical institutions. Six months later, he transferred to Safdarjung Hospital, where he spent a year working in both Rehabilitation Medicine and Haematology as a medical officer. During his posting in Haematology, a chance encounter changed the course of his career—a junior house officer sought his assistance for a minor procedure, and days later, mentioned a job opening in Singapore while they were chatting in the library.

Dr Satish seized the opportunity and came to Singapore in 1996 to pursue his PhD on peritoneal healing post-laparotomy under Professor Steven Chan. Having spent the first 25 years of his life in India, Dr Satish found Singapore to be "heaven on earth"; to the point he did not visit his family for nearly five years!

Finding purpose in teaching

His greatest satisfaction in his career comes from the energy he draws from engaging with students. He feels energised the moment he steps into the classroom, despite however little rest he has had and constantly reminds his students to attend classes regularly. He believes that student attendance and active participation are essential for deeper understanding.

Balance, he emphasises, is crucial: "Medicine is demanding, and even if you study every day, you can never finish everything in the syllabus. Be realistic, do your best, and make time for the passions that nurture your spirit—music, art, whatever you like." He is heartened that the medical curriculum has shifted away from rigid grading towards nurturing comprehension and appreciation for the discipline's beauty.

While topics like Pharmacology, Microbiology and Anatomy were taught in isolation, today's integrated curriculum allows learners to perceive the intricate connections that bring Medicine to life. To him, good doctors are not necessarily those with perfect grades, but those who have cultivated sound clinical judgement and genuine curiosity.

His advice to every aspiring doctor is simple: take each day as it comes, stay grounded, and remain grateful to the family, friends, and teachers who have supported them along the way.

Becoming good doctors

Dr Satish changed how we understood the study of Medicine. He reminded us that our goal should be understanding, not mindless memorisation of content. From him, we learnt that what matters most in being a good doctor is clinical acumen, a desire to learn more and the ability to connect the dots.

Some of our most enduring memories of Dr Satish are not from formal teaching sessions, but the moments in between—chatting after Foundations of Clinical Practice sessions in the hospital wards, at Anatomy Hall in MD10, or during Project I2Eye trips when he would ask how we were coping and offer a listening ear. He demonstrated how it is possible to love Medicine without letting it consume every other aspect of our lives.

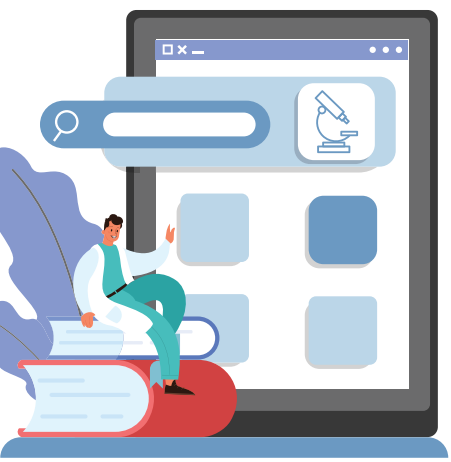
In getting to know him better, we also learnt something about ourselves: in Dr Satish, we see the kind of doctors we aspire to become.

The original version of this edited article was published in Humans of Med YLL (HoMY), a student-led storytelling project that shares personal stories of students, staff and educators from the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine).

NUS Medicine Launches Free Online Learning Resources Portal for Health and Life Sciences Students

Dubbed MediXperience, the new curated, open-access platform from the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine) is designed to support learners and educators across the medical continuum. It aims to offer a broad spectrum of teaching and learning resources—each reviewed by subject-matter experts—and is freely available to students, clinicians as well as faculty worldwide.

The vision behind MediXperience extends beyond simply aggregating materials online, said Vice-Dean of Education, Adjunct Professor Lau Tang Ching, "It is a transformative healthcare education portal to enhance the sharing of education resources, best practices and scholarly work locally and internationally, positioning NUS Medicine as a centre of excellence in Health Professional Education." In encouraging collaboration and elevating standards in teaching and learning, the platform also positions NUS Medicine at the forefront of Health Professions Education, helping to shape the future of healthcare by fostering excellence in education. As learners engage in different ways, the site hosts resources across multiple formats and levels, e.g.:



- E-books as foundational science primers, and potentially for clinical cases and topics
- Podcasts featuring perspectives from professional societies and subject experts
- Videos and lectures for rapid concept review
- Bespoke web resources by specialty

Connecting a global community of learners

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Seeking Prometheus' Fire

What does it take to do scientific research at the highest level? What advice do accomplished researchers give to aspiring young scientists hoping to follow in their footsteps? Organised by the NUSMedSci Alliance in partnership with the NUHS Education and Research Office, the 2025-2026 NUS Medicine Trailblazer Research Series speakers explored these questions while sharing insights into the research that keeps their minds and labs busy.

Designed to inform and connect, the Series are monthly seminars that strengthen the research culture at Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine) by bringing together preclinical and clinical researchers across the School, National University Health System (NUHS) and national as well as community partners.

"Through this series, we aim to bring the community closer by providing a platform for meaningful interactions—and hopefully seed opportunities for even more collaborations, and research excellence at our School," said Professor Roger Foo, Vice-Dean of Research at NUS Medicine.

Each session features leading researchers sharing the journeys behind transformative scientific discoveries, offering insights to inspire young scientists to chart their own paths towards research excellence. Interactive chats further encourage cross-disciplinary exchange and new collaborations across the NUS Medicine community.

Professor Ashok Venkitaraman: Research is a multi-splendoured journey best travelled with company

Widely recognised for his pioneering research on genome stability and cancer susceptibility, Professor Ashok Venkitaraman's discoveries on the BRCA2 gene have transformed understanding of inherited cancer risk and early cancer intervention. At the opening lecture of the Trailblazer Research Series, he shared his journey from clinician to researcher, recounting his experience working alongside Michael Neuberger, Gregory Winter—a Nobel Prize winner, and Frederick Sanger—a double Nobel Prize winner.

"I was surrounded by some of the brightest scientific minds. Yet, these people did not care about Field-Weighted Citation Impact (FWCI), impact factors, which journals to publish in, or even how many," he recalled. "Fred did not publish a single paper in seven years while developing methods for protein sequencing," he recalled. "His impact factor and h-index were lower than mine. He is ranked somewhere around 3,000 in his field—but the man has two Nobel prizes. I am not the better scientist."

He urged the audience to reflect deeply on their work and remain connected to their original purpose. "We should not consider papers and research as achievements, as trophies we put on our walls, or worse, tokens we insert into grant giving machines."

Drawing on his experience driving translational innovation through drug discovery platforms and leading international initiatives and institutions, Prof Venkitaraman spoke about the discipline to pursue deep scientific questions, the courage to bridge laboratory and clinic, and the responsibility to build institutions that enable others to thrive.

He also reflected on what he considers the highlight of his scientific journey—the people he has mentored. "I am very proud that so many alumni from our lab have gone on to do great things. Like anyone at the same stage of my career, I believe our greatest achievements do not lie only in the science we do, but in the science that will be done, and is already being done, by the many talented young people who have come out of our lab."

Prof Venkitaraman concluded with a call to action: "Let's work together more effectively. The competition is not between ourselves, but what we face ahead. Let's embrace measured risk together. Without failing, nothing is achievable. Let's find big problems that deserve our collective effort."

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Prof Ashok Venkitaraman

↑ At the inaugural Trailblazer Research Series lecture. (From left) Prof Roger Foo, Vice-Dean of Research, Prof Yeoh Khay Guan, Chief Executive of NUHS, Prof Venkitaraman, guest speaker, and Assoc Prof Thai Tran, Chair of NUSMedSci Alliance.

Professor Cuilin Zhang: Focusing research to improve population health and future generations

A global leader in advancing women's health through precision nutrition, early diabetes screening and lifelong health after high-risk pregnancies, Professor Cuilin Zhang began her career as a clinical epidemiologist and physician-scientist in the US before establishing the Global Centre for Asian Women's Health (GloW) at NUS Medicine. Today, her work helps to influence global health policy and intergenerational wellness.

In her lecture, Prof Zhang highlighted the importance of designing new studies and platforms to address population health knowledge gaps. She shared the work of GloW and her team's life course approach to breaking the vicious cycle of diabetes and promoting human potential.

Known for pioneering translational innovations that combine sustainable nutrition and lifestyle changes with wearable devices, and omics technologies for high-risk populations, Prof Zhang emphasised that research progress is not always linear and findings are not always predictable. She cautioned, "In research, it is inevitable that you'll come across findings that are surprising and different from your hypothesis. These are the times when it is especially important to explore carefully to understand the cause of the contradiction—because that could redirect research efforts and offer valuable insights."

One example was her team's discovery that iron consumption increased the risk of gestational diabetes mellitus (GDM) in the US population. She explained, "Iron supplements are commonly prescribed for pregnant women in developing countries. However, the same practice in the US can put mothers at risk. This is why it is essential to consider nutritional baselines before supplementation—and why we advocate precision nutrition."

Prof Zhang also stressed the role of genetics and social culture in shaping prevention strategies. She encouraged researchers to go beyond scientific questions to consider technical relevance and implementation. "Ask yourself: What are the important health issues for the local population, policymakers and funding agencies? Doing so not only improves your chances of securing resources, but also ensures your research truly matters and has impact."

On a concluding note, she reminded the audience, "To make a global impact, start by building technical expertise in a domain you are passionate about. Don't forget to practise work ethics while at it, because you are not aiming for short-term gains but long-term wins. Then when you become a leader, share your resources and collaborate to foster mutually beneficial growth."

"To make a global impact, start by building technical expertise in a domain you are passionate about. Don't forget to practise work ethics while at it, because you are not aiming for short-term gains but long-term wins. Then when you become a leader, share your resources and collaborate to foster mutually beneficial growth."

Prof Cuilin Zhang

Prof Zhang (third from left) together with the NUSMedSci Alliance team supporting the Trailblazer series. (From left) Ms Sherline Tay, Manager, Dr Clara Cheong, Deputy Director – Education & Research Office NUHS, Prof Zhang, guest speaker, Assoc Prof Thai Tran, Chair of NUSMedSci Alliance, Ms Amutha Raju, Manager, Mr Woon Tien Cheng, Senior Executive and Mr Emanuel Dobrescu, Manager.

Professor Edison Liu: Seize the day

The Genome Institute of Singapore's founding director, Professor Edison Liu began his talk by describing a future where precision medicine harnesses digital twins to transform healthcare. Addressing the audience in the third session of the Trailblazer Research Series, he said, "We are witnessing the fastest advancement in Medicine in human history—and those who can marshal current resources and leverage science and technology to create new ones will lead in the next millennium."

Drawing a parallel between precision medicine advances and engineering innovations, Prof Liu, whose leadership at the Jackson Laboratory in the US transformed it into a global centre for genomic and translational research excellence, explained how digital twins—patient replicas that integrate genetic, epigenetic and environmental data—could predict health trajectories, drug responses, side effects and comorbidities. "Even with imperfect systems today, we are already making such predictions. But with digital twins, where models can be improved iteratively, imagine the opportunities for disease prevention and therapeutic precision."

He added that developing digital twins of specific diseases could allow researchers to test drugs and study population responses, accelerating drug discovery and improving understanding of disease mechanisms. But to realise this vision, Prof Liu emphasised the need for cutting-edge technologies and the ability to integrate massive datasets across laboratories and nations. "The future belongs to those with the ecosystem to integrate massive data, conduct iterative clinical trials, and bring findings back to basic science labs for analysis. This virtuous cycle of generating hypotheses, testing them and refining models forms the foundation of a health-based large language model—something we don't have yet."

Optimistic about Singapore's potential, he said, "I am very excited about Singapore because we have talent, funds, and most importantly, a government that understands how science can improve not only population health but also the lives of researchers by enabling us to achieve our aspirations."

He rounded up his talk by encouraging the audience, "This is a pivotal moment for researchers in Singapore because you are in a remarkably privileged space. Not many places have what it takes to do great work in an integrated manner. For the first time, instead of playing catch-up, Singapore is in a position to lead the world—and it is your responsibility to step up."

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Prof Edison Liu

Prof Edison Liu, guest speaker (6th from left), together with Prof Chong Yap Seng, Dean of NUS Medicine (5th from left), Prof John Eu-Li Wong, Executive Director of NUS Centre for Population Health and Senior Advisor, NUHS (4th from left), and NUSMedSci Alliance Council members (from left) Assoc Prof Saji Kumar Sreedharan, Assoc Prof Ajay Sriram Mathuru, Prof Roger Foo, Asst Prof Karen Crasta Carmelina, Assoc Prof Shuo-Chien Ling, and Assoc Prof Thai Tran.

Professor Matthew Chang: Unlocking new intervention opportunities with precision biology

Standing at the forefront of synthetic biology, Professor Matthew Chang uncovers fundamental design principles of living systems and engineers programmable biological functions to enable transformative biotechnological applications. The Executive Director of Singapore's National Centre for Engineering Biology and Co-Chair of the World Economic Forum's Synthetic Biology Council, Prof Chang began his talk by sharing how he got started in synthetic biology. "My background is in engineering, my PhD focused on applied microbiology and molecular biology, and my postdoc training was in systems biology and genomics—so I'm always in some kind of identity crisis. But I am very clear about my love for interdisciplinary science and my fascination with design."

Despite his achievements today, his journey was not always smooth. During his PhD, an ambitious project failed to produce the expected results, leaving him with no publications. "With no papers upon graduation, my work prospects were limited. Thankfully, people who worked with me supported me, and I got opportunities to work in some exciting laboratories," he reflected.

His postdoc work eventually brought him to Singapore and NUS, where he established his synthetic biology lab. "One big question my lab is always trying to answer is how to design biology so that it behaves in a predictable and precise manner." Guided by this purpose, his team has pioneered numerous novel projects, producing groundbreaking discoveries that put both him and his lab on the global synthetic biology map.

Over the past decade, his lab has pushed the boundaries of synthetic biology—from ideas to proof of concept, to designing predictability and control, developing therapeutic functions, and now building the broader ecosystem. But Prof Chang is not done. "The future of synthetic biology is filled with exciting possibilities. The integration of synthetic biology with engineering, big data and robotics offers opportunities like never before, and this will only continue to accelerate. My hope is that we can leverage these technologies and work together for the public good."

Reflecting on his own research journey, he concluded by advising scientists to be ambitious while staying humble and open to collaborations. "Focus on the problems that really matter—not only to science, but to society and the people we truly care about. And don't forget to make friends who share your vision and are ready to work with you towards your collective goals."

(From left) Prof Chang with his wife and daughter, a current NUS student, and Assoc Prof Yvonne Tay, who chaired the session.

"Focus on the problems that really matter—notonly to science, but to society and the people we truly care about. And don't forget to make friends who share your vision and are ready to work with you towards your collective goals."

Prof Matthew Chang

Scan here to view the recordings:

NUS Medicine Researchers Identify Key Protein Involved in Ageing Process

Researchers at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine) have found that a key protein can help to regenerate neural stem cells, which may improve ageing-associated decline in neuronal production of an ageing brain.

The study, led by Assistant Professor Ong Sek Tong Derrick and first author Dr Liang Yajing, both from the Department of Physiology and the NUS Centre for Cancer Research (N2CR) at NUS Medicine, sought to identify biological factors that influence the degeneration of neural stem cell function often associated with ageing, and guide the development of therapeutic approaches to mitigate the adverse effects of neurological ageing.

Published in *Science Advances*, the study identified a transcription factor in the brain, cyclin D-binding myb-like transcription factor 1 (DMTF1), as a critical driver of neural stem cell function during the ageing process. Transcription factors are proteins that regulate genes to ensure that they are expressed correctly in the intended cells.

The research team assessed the role of DMTF1 in affecting neural stem cell function during brain ageing, using neural stem cells derived from human and laboratory models that simulate premature ageing through telomere attrition. Telomeres are the ends of chromosomes and gradually erode as cells divide. The progressive erosion of telomeres is an indicator of ageing. Genome binding and transcriptome analyses were employed to elucidate the mechanism of how DMTF1 promotes neural stem cell function.

The study found that DMTF1 levels are repressed in the "aged" neural stem cells, while restoring DMTF1 expression suffices to restore the regeneration capabilities of such neural stem cells. The study results suggest that DMTF1 may serve as a potential therapeutic target to restore neural stem cell function during brain ageing. In contrast to the previously reported role of DMTF1 in regulating the transcription of cancer-related genes, the researchers also uncovered novel gene targets of DMTF1 in neural stem cells. These DMTF1 gene targets include ARID2 and SS18, which help to open up DNA for other transcription factors to activate growth-related genes.

"Impaired neural stem cell regeneration has long been associated with neurological ageing. Inadequate neural stem cell regeneration inhibits the formation of new cells needed to support learning and memory functions,"

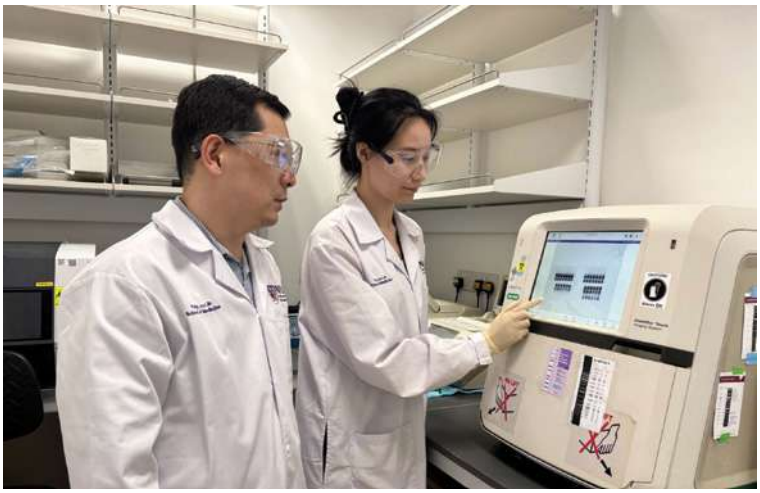
Impaired neural stem cell regeneration has long been associated with neurological ageing. Inadequate neural stem cell regeneration inhibits the formation of new cells needed to support learning and memory functions. While studies have found that defective neural stem cell regeneration can be partially restored, its underlying mechanisms remain poorly understood. Understanding the mechanisms for neural stem cell regeneration provides a stronger foundation for studying age-related cognitive decline."

Asst Prof Ong Sek Tong Derrick, Department of Physiology and the N2CR at NUS Medicine

said Asst Prof Ong. "While studies have found that defective neural stem cell regeneration can be partially restored, its underlying mechanisms remain poorly understood. Understanding the mechanisms for neural stem cell regeneration provides a stronger foundation for studying age-related cognitive decline."

The study findings also suggest approaches that enhance expression or activity of DMTF1 may have therapeutic potential in reversing or delaying ageing-associated decline of neural stem cell function.

While the preliminary findings stemmed mainly from in-vitro experiments, the researchers hope to explore if elevating DMTF1 expression can regenerate neural stem cell numbers as well as improve learning and memory under the conditions of telomere shortening and natural ageing, without increasing the risk of brain tumours. The long-term objective is to discover small molecules that can enhance DMTF1 expression and activity to improve the function of aged neural stem cells.



Asst Prof Ong (left) and Dr Liang (right), both from the Department of Physiology and the N2CR at NUS Medicine, examining protein expression of candidate DMTF1 target genes in the laboratory.

Scan here to read the research paper:

Intranasal Vaccine Booster Confers Stronger, Longer-lasting Protection against Respiratory Viruses

Researchers at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine) and Monash University in Australia, have demonstrated that an intranasal vaccine booster may confer significantly stronger and broader immune responses, and provide robust neutralising antibody and resident T cell responses in the lung and nasal tissues, outperforming conventional mRNA booster vaccination.

Published in *The Journal of Clinical Investigation*, the study led by Professor Sylvie Alonso and first author Dr Nicholas Cheang, both from the Department of Microbiology and Immunology and the Infectious Diseases Translational Research Programme (TRP) at NUS Medicine, examined alternative vaccine booster candidates and administration methods that may improve protective immunity and longevity towards sarbecoviruses.

Leveraging a dendritic cell-targeting platform that consists of fusing a dendritic cell-targeting monoclonal antibody (Clec9A) to a vaccine antigen candidate, the researchers developed Clec9A^{OMNI}, a dendritic cell-targeting booster vaccine that carries the receptor-binding domain (RBD) from SARS-CoV-2 Omicron XBB.1.5 and SARS-CoV-1 viruses. Dendritic cells are innate immune cells that are essential for initiating adaptive immune responses, which include antibody and T-cell responses.

Sarbecoviruses are a category of coronaviruses that can cause respiratory infections, including SARS-CoV-2, the virus responsible for COVID-19, and SARS-CoV-1, responsible for the 2003 SARS outbreak.

Compared to intramuscular vaccination with existing COVID-19 mRNA booster, the study found that nasal boosting with Clec9A^{OMNI} induced significantly stronger neutralising antibody responses, robust T-cell responses in the lungs and nasal tissues, and sustained immunity for at least six months. Stronger protection against SARS-CoV-2 (Omicron) infection was also observed with Clec9A^{OMNI} nasal boosting, with undetectable virus in the lung and nasal tissues.

The findings showed Clec9A^{OMNI} presents potential in addressing the current shortcomings of the existing COVID-19 mRNA vaccines, including waning immunity, inadequate mucosal immunity and limited breadth as they do not provide protective coverage against sarbecoviruses beyond the SARS-CoV-2 family. Given Clec9A^{OMNI}'s ability to confer broad and long-lasting protective immunity against SARS-CoV-2 variants in the study, there is potential to eliminate the need for repeated booster shots and help maintain optimal immunity at a population level.

Specifically formulated for intranasal administration

Prof Alonso said, "While existing vaccines remain highly effective at preventing severe disease, their protection against infection and transmission decreases within months, partly because they generate little immunity at mucosal surfaces such as the nose and lungs. Our findings suggest that the intranasal Clec9A^{OMNI} vaccine candidate addresses these shortcomings. It may also better protect the elderly and other vulnerable groups who are unable to receive conventional intramuscular vaccine administration."

"Our findings suggest that the intranasal Clec9A^{OMNI} vaccine candidate may better protect the elderly and other vulnerable groups who are unable to receive conventional intramuscular vaccine administration."

Prof Alonso, Department of Microbiology and Immunology and the Infectious Diseases TRP at NUS Medicine

Currently, most vaccine formulations are largely not optimised for nasal administration, as the harsh mucosal environment can lead to rapid degradation of the vaccine components before effective immune responses are induced. The Clec9A targeting vaccine platform therefore offers a promising solution by ensuring vaccine efficacy and longevity at the respiratory tract.

"Targeting dendritic cells through the Clec9A platform opens a new avenue for vaccine design. By leveraging the role of dendritic cells in orchestrating immune responses, the study highlights the promise of intranasal booster vaccines in preventing infection at the point of viral entry," noted collaborator Associate Professor Mireille Lahoud, from the Monash Biomedicine Discovery Institute at Monash University.

Scan here to read the research paper:

↑ (First row from left) Assoc Prof Mireille Lahoud, Monash Biomedicine Discovery Institute, Monash University, Prof Sylvie Alonso, Infectious Diseases TRP and Department of Microbiology and Immunology, NUS Medicine, Dr Kirsteen Tullett, Monash Biomedicine Discovery Institute, Monash University, together with Dr Nicholas Cheang (second row, in blue), Infectious Diseases TRP and Department of Microbiology and Immunology, NUS Medicine and members of the research team.

Unforgettable

NUS Medicine and Duke University study shows how motivation shapes our memory.

Researchers from the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine) and Duke University have proposed a neuroscience framework explaining how different types of motivation fundamentally reshape what and how the brain remembers. The study, published in the *Annual Review of Psychology*, reframes motivation not merely as "more effort" but as a set of distinct motivational moods that activate different systems in the brain, shaping memory outcomes in predictable ways.

The study sheds light on two motivational moods—an adaptation-driven "interrogative mood" supported by dopamine, which helps the brain form flexible, relational memories that integrate information, and a goal-driven "imperative mood" supported by noradrenaline, which sharpens a memory's focus on relevant details. These findings offer a scientific basis for tailoring educational environments, enhancing clinical therapies for memory or motivational disorders, and improving public-health communication. While past studies have shown that motivation can enhance learning, the authors explain that not all motivation works the same way. Instead, different motivational states set up distinct neural contexts, which are patterns of coordinated brain activity, that determine what kind of memory is formed.

"Beyond studying whether motivation helps memory, we investigated how it shapes memory," said the study's first author Assistant Professor Poh Jia-Hou, Centre for Sleep and Cognition, NUS Medicine. "Our framework explains that curiosity, stress, deadlines and rewards result in distinct learning outcomes. This is because each factor induces a different motivational 'mood' which in turn modulates how information is processed."

The review integrates findings across neurobiology, cognitive neuroscience, psychiatry, psychology and computational modelling, unifying research into the new "Neural Context" model of motivated memory. It explains the two moods of motivation as associated with the following:

- The interrogative mood, dominated by the motivation to adapt, promotes observation, exploration and uncertainty-driven learning. It is supported by sustained dopamine activity in the ventral tegmental area (VTA), engaging the hippocampus and prefrontal cortex. This helps with relational and integrated memories, schema formation (mental frameworks that the brain builds through experiences), abstraction and generalisation, and flexible learning over longer timescales.
- The imperative mood, dominated by the motivation to act, appears when people perceive urgency such as danger, deadlines or strong goals. It is supported by bursts of noradrenaline

> **"Our long-term goal is to empower people with the ability to tune their own brains for learning. By understanding how motivation shapes memory, people can learn to harness urgency to focus learning and support efficient action, or engage their curiosity to prepare for flexibility in an unknown future."**
>
> *Asst Prof Poh Jia-Hou, Centre for Sleep and Cognition, NUS Medicine*

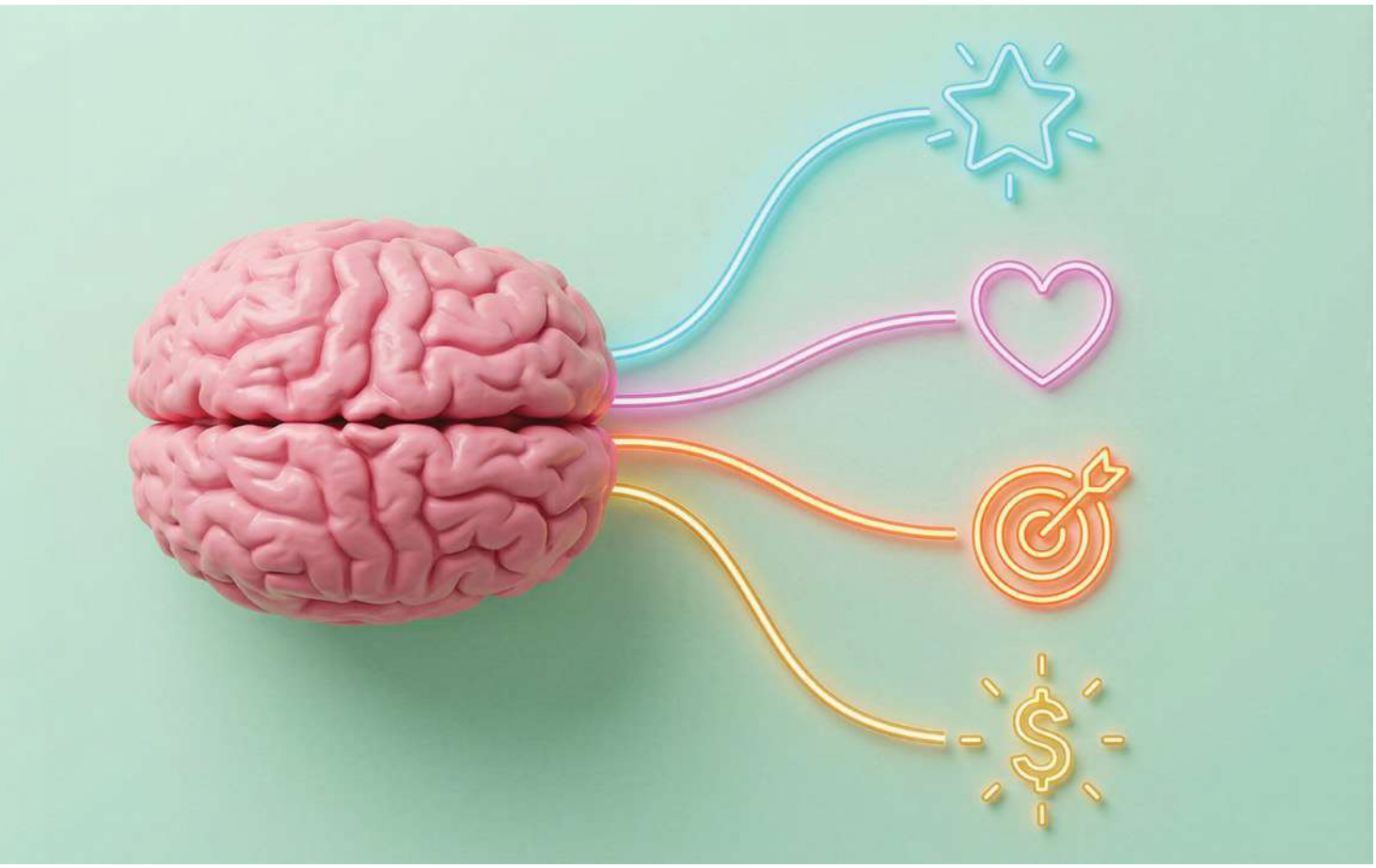
activity from the locus coeruleus (LC), engaging the amygdala and sensory cortices. This helps with high-salience, item-focused memories, rapid sensory processing, and immediate goal-directed behaviour, though often at the cost of broader contextual learning.

Professor R. Alison Adcock, senior author of the study and Director at the Center for Cognitive Neuroscience, Duke University, said, "These neuromodulatory systems, dopamine and noradrenaline, act like switches that tune the entire brain for different kinds of learning. Understanding these switches gives us powerful new levers for designing more effective classrooms and therapies. We hope to help individuals identify these motivational moods and learn to match them to the challenges they face."

The framework shifts the field toward studying how neuromodulatory systems shape patterns of memory, not just whether motivation improves learning. It emphasises the importance of VTA and LC engagement, as well as sustained and phasic modes of activity, in determining how we engage with information and process it to form memories. The model could potentially inform new treatments for disorders involving impaired motivation or memory, such as depression, schizophrenia, attention deficit hyperactivity disorder (ADHD), and dementia and age-related cognitive decline. Additionally, this work offers new insights into how motivational context can influence behavioural and lifestyle changes.

"Our long-term goal is to empower people with the ability to tune their own brains for learning," added Asst Prof Poh. "By understanding how motivation shapes memory, people can learn to harness urgency to focus learning and support efficient action, or engage their curiosity to prepare for flexibility in an unknown future."

Scan here to read the research paper:



Breast Cancer Incidence Rise Offset by Quality Care, Lower Mortality

A Global Burden of Disease (GBD) Study in The Lancet Oncology projects that global breast cancer cases will rise from 2.3 million in 2023 to over 3.5 million in 2050, while annual deaths will increase from 764,000 to nearly 1.4 million in the same period, disproportionately affecting lower-resourced countries.

Singapore presents a distinctly instructive picture: rising breast cancer incidence but falling mortality. Globally, the estimated age-standardised incidence rate (ASIR) rose from 42.4 per 100,000 women in 1990 to 49.3 per 100,000 women in 2023*. This is expected to stabilise through 2050. In Singapore, the incidence rose more sharply, from 41.58 to 62.33 per 100,000 women between 1990 and 2023.

Although Singapore's incidence rate is below the World Bank high-income group average and lower than Japan's, it is higher than Brunei's and South Korea's within the High-Income Asia Pacific group. Singapore mirrors global breast cancer trends: ASIR tends to be higher in high-income countries, where screening coverage and longer life expectancy increase detection. Notably, rises are observed among women aged 65 and above, consistent with Singapore's ageing population.

Demographic and reproductive shifts, such as later pregnancies and fewer births, in advanced economies like Singapore also contribute to rising breast cancer rates. However, the global breast cancer incidence is rising fastest in low-income countries, where ASIR rose by 147% on average since 1990, highlighting widening global inequalities.

Globally, age-standardised mortality rates (ASMR) declined from 17.0 to 16.1 per 100,000 between 1990 and 2023, with mortality in high-income countries decreasing by about 30% but nearly doubling in low-zincome countries. This aligns with Singapore's mortality trajectory, which fell from 14.97 to 12.47 per 100,000, a 16.7% decline. In 2023, Singapore's ASMR was substantially lower than the global average of 16.14 per 100,000.

"However, the shift of breast cancer burden from mortality to morbidity means people are living longer, but not necessarily healthier. Simultaneous preventive action is crucial to mitigate risk factors," added Associate Professor Marie Ng from the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine) and Director, NUS-IHME GBD Research Centre, based at NUS Medicine. Assoc Prof Marie Ng is the co-senior author of the study.

Co-author of the study, Dr Alicia Ong, Adjunct Lecturer from the Division of Family Medicine, Department of Medicine, NUS Medicine, and Family Physician, Associate Consultant at National University Polyclinics, added, "Through Healthier SG efforts, mammography is becoming increasingly accessible in primary care settings across Singapore. Early detection and access to care are key to improved outcomes."

Scan here to read the research paper:

* Based on both resident and non-resident populations.

NUS Medicine Inspire120 Professorial Lecture: Translational Research Changes Lives for the Better

Good research can shape policy, shift mindsets, change behaviours and provide solutions to health challenges. In the second instalment of the NUS Medicine Inspire120 Professorial Lecture, Professor Chong Yap Seng, Lien Ying Chow Professor in Medicine and Dean, Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), shared how he and his team successfully harnessed research insights to impact practice and policy with the Growing Up in Singapore Towards Healthy Outcomes (GUSTO) study.

Starting life with GUSTO

Launched in 2009, GUSTO is a collaborative effort across Singapore following 1,200 mothers and their children to understand how early-life conditions shape health and development. The research team collected DNA, microbiome and blood samples from the mothers, while the babies underwent EEG assessments on their first day, whole-body MRIs at one week, repeated every two years from age four. The study also tracks the children's neurodevelopment, body composition and cardiometabolic health and as they reach their teenage years, the focus expands to social behaviours and connections.

With a total population of just 6.11 million[1], human capital is Singapore's most important resource. Prof Chong, GUSTO's Principal Investigator said, "We are convinced that healthy, successful adults start young, as many critical socio-emotional skills, habits and executive functions develop in the first few years of life. In particular, the period between ages two and four presents a key window between developmental stability and plasticity for shaping outcomes that give children the best possible start in life."

Findings from another study—the Dunedin Multidisciplinary Health and Development Study—support GUSTO's mission. The study, which has been following children in New Zealand since 1972, found that poor executive functions or self-control in childhood is predictive of poor outcomes in adulthood. These individuals earn less over their lifetime, have less savings, and are more likely to be financially dependent on family or public subsidies.

The uniqueness of GUSTO lies not only in its depth and longitudinal scope, but more significantly in how its findings influence clinical practice and healthcare policymaking in Singapore. "Bringing science into practice is not a simple or straightforward process—and usually takes years," Prof Chong explained. "But because GUSTO is already contextualised to the Singapore setting, our government has been very ready to translate findings and insights into pilot interventions as well as full-scale implementation at the population level."

Addressing unmet needs in women's health

One example was the revision of guidelines for gestational diabetes mellitus (GDM) screening. A GUSTO study found that around 20% of mothers had GDM, while another study found that 44% of these women became either pre-diabetic or diabetic within six years of their initial diagnosis. Yet only half were identified through the prevailing high-risk screening approach. This resulted in missed opportunities for timely intervention and lifestyle modifications, which have been proven to reduce the incidence rate by nearly 60%.

Accordingly, the Singapore Ministry of Health (MOH) adjusted its guidelines in 2018 to introduce universal GDM screening between 24 and 28 weeks of gestation and again in 2022, recommending lifelong diabetes screening for women with a history of GDM. "This exemplifies the proactiveness of Singapore's policymakers in turning research into policy and their willingness to revise guidelines as new findings emerge," Prof Chong said.

Maternal blues affect offspring

In another study, the GUSTO team screened women for symptoms of perinatal depression during pregnancy and after delivery and found that about 40% presented with probable clinical or subclinical depression. These high levels of depressive symptoms were associated with microstructural changes in regions of their newborns' brains that process negative emotions. When these children were assessed at four years old for school readiness with the Whole Child Panel, they performed significantly worse than their peers.

"The findings suggest maternal emotional health has an impact on the child's neurodevelopment and subsequent performance," Prof Chong said. "More importantly, it highlights the importance of screening and supporting women for emotional distress before, during and after pregnancy. I am glad to share that this is now routinely practised at National University Hospital (NUH), KK Women's and Children's Hospital (KKH) and Singapore General Hospital (SGH). We are also exploring ways to scale this across private hospitals in Singapore."

"Research cannot be translated into interventions and policies that will benefit communities without researchers going beyond publications, philanthropic support to pilot interventions, and policymakers adopting and scaling up interventions that work—we need to work together and go beyond to give our children the best start to life."

Prof Chong, GUSTO's Principal Investigator and Dean, NUS Medicine

Enabling kids to do well

GUSTO's commitment to give children the best possible start in life led the team to examine school readiness. Building on the understanding that factors such as family demographics, pregnancy, health and preschool executive functions play a key role, the GUSTO team partnered with the Singapore Ministry of Education (MOE) to pilot the Whole Child Panel, engaging four-year-olds in teacher-led self-regulation activities in a few MOE kindergartens. Notable gains in cognitive flexibility were observed in children who spent an average of 44 minutes per week over eight weeks on the executive function playbook—demonstrating that targeted interventions before age five can effectively strengthen early executive function.

"Following the pilot, we are now working closely with the Early Childhood Development Agency (ECDA) and MOE to roll out the Whole Child Panel across preschools in Singapore," Prof Chong said. "We are also testing an application we've developed to help teachers better evaluate children's language skills, social perception and other abilities."

No screen time for infants and toddlers

The team's research has also shaped national guidance beyond the classroom. After uncovering that early screen exposure can adversely affect neurodevelopment, GUSTO researchers recommended that infants and toddlers below 18 months not be given screen time. This recommendation was quickly adopted by the Health Promotion Board (HPB) and rolled out to parents and childcare teachers through various channels. MOH also issued the first ever parental advisory on children's access to and use of devices like mobile phones and tablets in March 2023 and revised it in 2025 with more specific advice—another example of research translating swiftly into national policy.

Their findings on childhood obesity have been similarly well received. In collaboration with HPB and the childcare sector, the Appetite Toolbox developed by Dr Keri McCrickerd was piloted with more than 300 preschoolers. Children aged three to six showed improved ability to recognise feelings of hunger and fullness. Educators expressed support for continuing its use. These encouraging outcomes point to real opportunities to shape healthier eating habits early, building foundations for lifelong well-being.

Generational transformation needs many hands

The GUSTO team does not take these achievements lightly, with Prof Chong attributing the study's success to strong transdisciplinary partnerships among healthcare scientists, social workers, policymakers and the community.

"Research cannot be translated into interventions and policies that will benefit communities without researchers going beyond publications, philanthropic support to pilot interventions, and policymakers adopting and scaling up interventions that work—we need to work together and go beyond to give our children the best start to life," he said.

Looking ahead, he expressed hope for the GUSTO cohort to reach full adulthood, around 30 years of age—in 14 years' time. "Our journey hasn't always been easy, but the study has already delivered clear value and impact to our community. I am optimistic that GUSTO will continue to be a useful resource for Singapore."

Prof Chong's lecture was part of the NUS Medicine Inspire120 Professorial Lecture series, celebrating the school's 120th anniversary and highlighting excellence in medical education, research and healthcare, as well as the impact of academic philanthropy in advancing medical breakthroughs. The lecture also marked the 30th anniversary of the Lien Ying Chow Professorship in Medicine, established in 1995 to provide leadership in medical research and education, and shape Singapore's healthcare landscape.

Scan here to watch Prof Chong's Professorial Lecture:

Scan here to watch the fireside chat:

[1] National Population and Talent Division site. (June 2025). Retrieved 23 February 2026 from https://www.population.gov.sg/our-population/population-trends/overall-population/.

What Does Ethically Sound Nursing Care Look Like?

What happens when a patient refuses life-saving treatment, or family members want to hide a terminal diagnosis from the patient? As Singapore's healthcare landscape grows increasingly complex, these are just some of the ethical posers that healthcare professionals face every day.

Against a backdrop of advancing medical technologies, an ageing society and increasingly informed patients, critical issues such as consent, resource constraints and privacy have moved closer to the bedside—with healthcare professionals often straddling the delicate balance between providing quality, ethical care and the realities of clinical practice.

To advance capabilities in healthcare ethics, Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine) has launched the MOH–NUS Postgraduate Fellowship in Biomedical Ethics. The inaugural recipient of the Fellowship is Kwek Shi Qi, a registered nurse at the National University Hospital (NUH), and an alumna of the Alice Lee Centre for Nursing Studies (NUS Nursing).

Through the Fellowship, Shi Qi is working towards a full-time Master of Science in Biomedical Ethics at NUS Medicine, supported by a scholarship that covers tuition fees and other related university fees, as well as a monthly stipend of S$3,800 for the programme's duration. As part of the programme, she will also take on a six-month study attachment at the Ministry of Health (MOH) or public healthcare institutions

and complete a research thesis under the supervision of faculty from NUS Medicine's Centre for Biomedical Ethics.

Developing a passion for ethics

Caring for cardiovascular patients at the National University Heart Centre, Singapore (NUHCS) since graduating from her undergraduate studies in 2024, Shi Qi, 25, is the youngest student and also the only nurse in the Master of Science in Biomedical Ethics programme. Witnessing patients and their families wrestling with difficult decisions during her time with NUHCS' wards reinforced her conviction that she needed to know more about healthcare ethics in order to provide truly holistic care and advocate for patients.

"As nurses, we are privileged. We spend a lot of time with patients and caregivers in the wards, and over time, they often come to see us as confidants. Nonetheless, this privilege also comes with a heavy responsibility—both as a recipient of confidential knowledge and in our role as patient advocates."

Recalling a particular encounter during a night shift with a patient suffering from triple-vessel coronary artery disease, she said, "It was close to midnight when he began to express his worries—although he had been advised to undergo bypass surgery, financial constraints led him to consider the more affordable option of stenting instead."

She continued, "As a nurse, I hope every patient can recover well and return home safely to their families. But the only thing I could do then was refer him to the medical social workers. I felt morally distressed that there wasn't more I could do." That was also one of the first times when Shi Qi started to question the boundaries of her professional responsibility—was it appropriate for her to intervene further? Where should she stop? At that time, she had no answers.

Returning to the classroom

It was while Shi Qi was mulling over these that a fortuitous email from the NUS Nursing Alumni group sharing about the Fellowship caught her eye. She decided to submit her application. "I wasn't exactly sure of my chances—and I spoke to my head nurse at NUHCS, who was encouraging," she said. The application process further clarified and solidified her interest in the course.

It was a welcome surprise when she was awarded the Fellowship. "I'm very grateful for the opportunity and I hope I can eventually use what I learn to give back to the field." Now a couple of months into her Master's studies, Shi Qi is enjoying delving into the foundational theories of bioethics, as well as the ethics of health data and artificial intelligence.

"It has been an eye-opening experience so far. With classmates from backgrounds such as cognitive science, finance and psychology, they bring different perspectives. Our professors are also very encouraging. These experiences have driven me to approach sensitive ethical issues with a more critical lens, thinking beyond my own viewpoint and emotions."

↑ The MOH–NUS Postgraduate Fellowship in Biomedical Ethics, a new fellowship by the Ministry of Health and NUS Medicine, will strengthen everyday ethics in Singapore's healthcare sector. (From left: Mr Ivan Koh, Director (Regulatory Policy and Legislation), MOH; Adj Prof (Dr) Raymond Chua, Deputy Director-General of Health (Health Regulation), MOH; Ms Kwek Shi Qi, awardee of the fellowship and NUH nurse; Dr Sumytra Menon, Director, NUS Medicine Centre for Biomedical Ethics; A/Prof Michael Dunn and Dr Yeo Shang Long from NUS Medicine Centre for Biomedical Ethics. Photo credit: NUS Medicine / Photographer Tan Eng Keng.

Applying ethical considerations at work

While it's early days yet, Shi Qi has started discussions with her advisor on options for her upcoming study attachment next year. "Right now I'm looking at the Ageing Planning Office in relation to ethical issues that come with an ageing society, as well as the Healthcare Planning Group that addresses the ethics of healthcare resource allocation."

Also on her mind is her research project, titled "Everyday ethics on the ward: Exploring nurse-led ethics support". Shi Qi said, "I am inspired by my own experience to help build a framework which helps nurses better navigate ethics at the bedside and with more clearly defined professional boundaries." Currently, the plan is to work with other nurses and healthcare professionals to obtain their input, in order to create a relevant, applicable and sustainable tool that complements the work of existing ethics committees.

Looking further ahead, Shi Qi is keeping her options open in terms of returning to Nursing work, research or even pursuing further studies after her Fellowship. "The future is something I'm still thinking hard about, having been exposed to so many new horizons and possibilities," she said. But she's certain of her commitment to continue contributing to the field of healthcare ethics, as a nurse.

For aspiring Fellowship applicants, she said, "Every healthcare profession has a unique role to play in addressing current and emerging issues in the field—be it physicians with their expertise in medical treatment or pharmacists' knowledge of drug safety. I believe the Fellowship will be a valuable opportunity to develop personally and professionally, building a solid foundation in healthcare ethics, so that patients can truly receive holistic and quality care."

"Medicine, beyond its technicalities, is a moral practice. By contributing to the ethical discussion from a nurse's perspective, I hope to work with other like-minded healthcare professionals to foster a culture where ethical practice is not an aspiration, but a lived reality—where care is not only medically sound, but deeply human."

Scan here for more information about the MOH–NUS Postgraduate Fellowship in Biomedical Ethics:

Time to Reconsider the Need for Consent to Use "Waste" Biospecimens in Biomedical Research

BY PROFESSOR ROGER FOO, NUS YONG LOO LIN SCHOOL OF MEDICINE CARDIOVASCULAR METABOLIC TRANSLATIONAL RESEARCH PROGRAMME (TRP), NATIONAL UNIVERSITY HEART CENTRE SINGAPORE, SHAUN LOONG, NUS YONG LOO LIN SCHOOL OF MEDICINE CARDIOVASCULAR METABOLIC TRP, KYLIE HENG, NUS YONG LOO LIN SCHOOL OF MEDICINE CARDIOVASCULAR METABOLIC TRP, AND PROFESSOR JERRY MENIKOFF, CBME, NUS YONG LOO LIN SCHOOL OF MEDICINE, NUS FACULTY OF LAW

There are very few readers of this article who haven't, at some point or another, had some of their blood or tissue (a portion of a tumour, perhaps) collected as part of their medical care. What you may not know is that in the great majority of instances, not all of that material was needed for medical purposes. Some of it almost always ends up being thrown away—in more technical terms, disposed of as "biological waste." And yes, this has surely happened to you: some of your biospecimens, perhaps some leftover drops of blood in a test tube, have been thrown away. Junked. Ended up as bio-trash.

But there is an important second sense in which the notion of "waste" comes into play here: when we dispose of these materials, we are losing the opportunity to learn important new medical knowledge from them. This is the more meaningful way in which waste is taking place. Given our technological capabilities in molecular characterisation and techniques such as genome sequencing, metabolite profiling, microbiome characterisation, and more, every bit of blood or tissue can help researchers gain valuable insights into human biology.

To do that, researchers need to combine the information they extract from analysis of biospecimens from many, many people, involving hundreds of thousands or more specimens. Yet each year, it is estimated that millions of biospecimens—ranging from routine blood samples to surgical tissues—are discarded after clinical use, representing an immense untapped resource that could otherwise accelerate scientific discovery and improve healthcare outcomes.

There are numerous examples of breakthroughs from the biomedical analysis of biospecimens:

- Analysis of the BRCA genes led to the discovery that some women are at higher risk of breast cancer, and that they can take important steps to reduce their risk of dying from that disease. BRCA gene testing has revolutionised aspects of medical care for women.
- Research with biospecimens led to the discovery that human papillomavirus (HPV) is a major cause of cervical cancer, which in turn enabled the development of a vaccine. Thousands of girls can now get vaccinated—in Singapore, the vaccination rate is more than 80%—thus dramatically reducing the likelihood that they will ever get cervical cancer.
- Elucidation of the role of the HER2 gene in breast cancer is a monumental discovery which continues to bear fruit, allowing the development of treatments that have dramatically extended survival times for many breast cancer patients. This was only possible with the use of archival human tissues.

We could list many more such breakthroughs. Given the potential benefits from this research, you might well ask: why are we still disposing of—wasting!—most of this excess blood and tissue? Why are we not saving every single drop of blood, every piece of excess tissue, for research purposes?

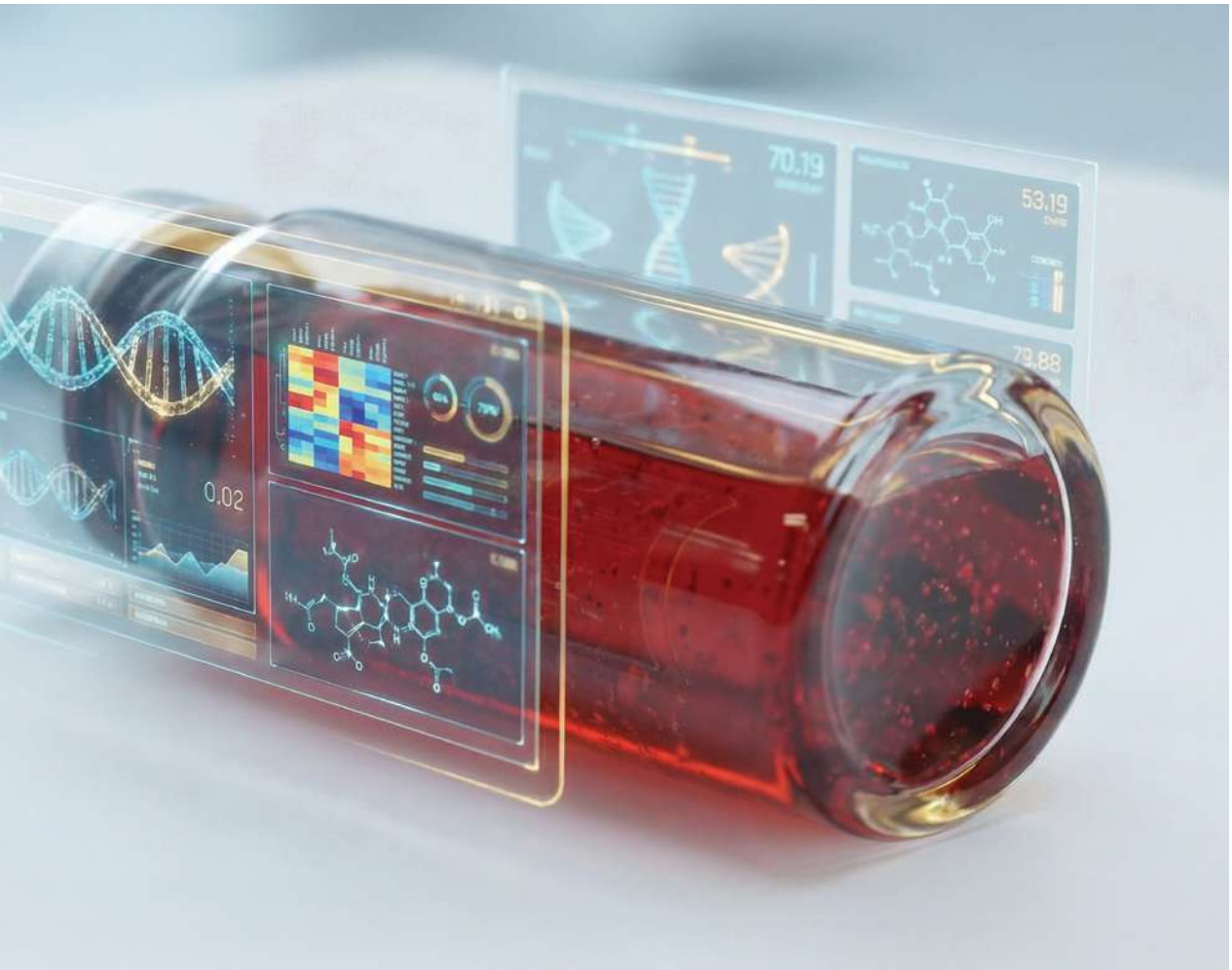
The failure to use or store these biospecimens occurs due to well-intentioned rules that are designed to protect the interests of the people whose biospecimens might otherwise be used in this research. The usage of human bio-specimens in research is a highly regulated practice worldwide. In Singapore, the Human Biomedical Research Act (HBRA), passed in 2015, forms the rulebook for the ethical conduct of human biomedical research. In appropriately protecting privacy and confidentiality, these biospecimens are only given to researchers after they have first been stripped of information that would allow the researchers to know the names of the people whose biospecimens they are getting.

But the major barrier to using more of these biospecimens in research—the barrier that leads to so many of them ending up in the trash—is a HBRA requirement for generally obtaining the consent of each person before their biospecimen can be used, or even before it can be saved and stored for possible future research. Researchers must usually obtain either consent for the specific study in which the biospecimen will be used, or a "broad" consent to the types of future research studies (such as their general purposes) for which it might be saved.

Yet each year, it is estimated that millions of biospecimens—ranging from routine blood samples to surgical tissues—are discarded after clinical use, representing an immense untapped resource that could otherwise accelerate scientific discovery and improve healthcare outcomes.

The need for consent aims to respect your autonomy: after all, it is your biospecimen, it comes from your body, so surely it is a good thing to allow you to control its use.

Maybe not. There are several reasons to question the appropriateness of the current Singapore consent requirements. Indeed, there appears to be a recent trend around the world of public support for the removal of mandatory informed consent procedures as societies become increasingly aware of the harm caused by overly strict consent rules. It is time for Singapore to look at the arguments in favour of relaxing consent requirements and perhaps reach the conclusion that it would be a good thing to join that movement.



The failure to use or store these biospecimens occurs due to well-intentioned rules that are designed to protect the interests of the people whose biospecimens might otherwise be used in this research. The usage of human bio-specimens in research is a highly regulated practice worldwide.

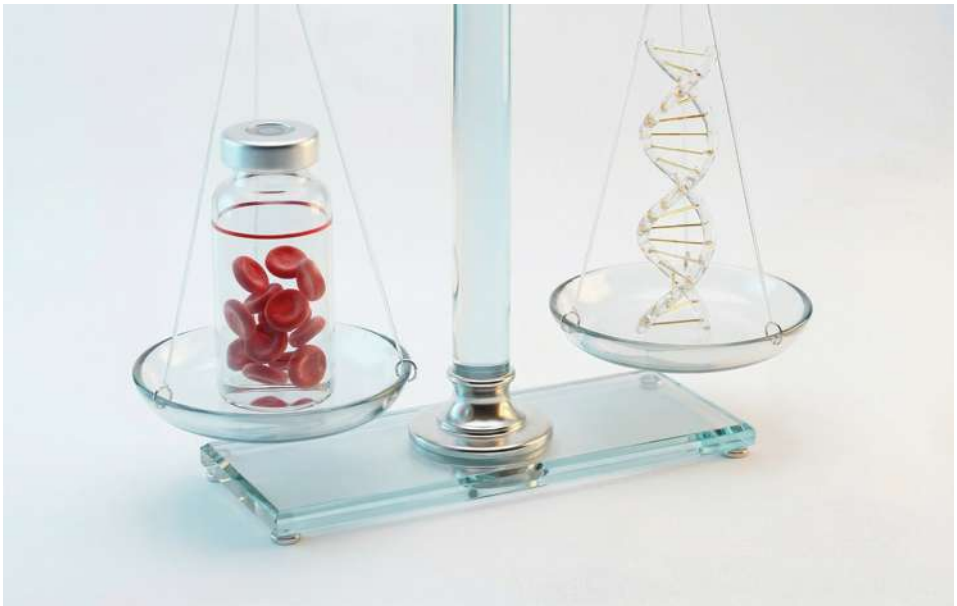
First, in balancing the interests of any person in preventing the use of their biospecimens in research against the benefits to society from allowing that use, the latter interest greatly outweighs the former. Assuming that appropriate protections for privacy and confidentiality are built into the rules for conducting medical research—and stringent protections of that type already are the law in Singapore—the use of a person's biospecimen for research has almost zero impact on a person's life. In contrast, as described above, by combining the biospecimens from many thousands of patients, the amount of new medical knowledge that can be generated is almost limitless.

Secondly, the need for consent taking can actually end up, surprisingly, harming racial minorities and other groups of patients who are less well represented in traditional medical research. Historically, a great deal of research has taken place on Western populations, with the result that there is much less knowledge available about the specific ways that

medical treatments need to be shaped for Southeast Asian populations—including, of course, Singaporeans. To counter that long-standing problem, we need to be doing everything possible to accelerate the growth of biomedical research about Southeast Asians. Putting consent barriers in the way of doing that is going in exactly the other direction.

Thirdly, having a consent-taking procedure does not actually directly minimise the risks of re-identification or other privacy breaches. Paradoxically, it increases the risks to participants. It makes it a requirement for anonymised bio-specimens to be tied to the consent forms for verification purposes, creating an unnecessary linkage between the biospecimen and the donor, thus making re-identification (and thus breaches of confidentiality) easier.

There actually exists a much better model for dealing with consent issues relating to biospecimen research in Singapore than the one that is currently mandated by the HBRA. And that model comes from Singapore's own laws: namely, the Human Organ Transplant Act (HOTA), which created an "opt-out" system for organ donation. In Singapore, you have the right to specifically put yourself on a list saying that you do not want your organs to be used for transplantation purposes after your death. But if you fail to take that action, the default is that your organs then will indeed be available for transplantation.



A similar rule could be used in the case of research with biospecimens. It would allow anyone who objects, for whatever reason, to the research use of their biospecimens to put their name on a list of people whose biospecimens could not be used for such research. But for the great majority of us, who would tend not to object to the use of our own tissues in research, our biospecimens will otherwise automatically become available to be anonymised, stored and used for research. Far fewer biospecimens will be inappropriately trashed. And a great deal of the time, effort and money spent in obtaining consent will be saved, freeing it up to pay for the actual conduct of research. There will be minimal impact on the rights of Singaporeans to prevent biospecimen research with their tissues if they object to that. But it would be a huge win for the people of Singapore in terms of dramatically increasing the number of specimens that would be available for medical research on the unique aspects of the Singaporean population. This would go far in fostering a much more conducive environment for our biomedical research landscape, without offending key bioethical pillars that define medical practice here in Singapore.

A version of this article was first published on CNA and is reproduced with edits.

The authors thank other members of the team who co-authored a prior publication on which this shorter piece was based. These members are Gini W. W. Wong, Athena Ham, Aaron D'Sa and Mayank Dalakoti. That prior publication, "Your Tumour Can Save Lives" was in the *Asian Bioethics Review*.

Scan here to read the published paper:

Improving Cardio-metabolic Health Requires Endeavours over Life Course and across Generations

BY DR ZHILA SEMNANI-AZAD AND PROFESSOR CUILIN ZHANG, GLOBAL CENTRE FOR ASIAN WOMEN'S HEALTH AND DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY, NUS YONG LOO LIN SCHOOL OF MEDICINE

The nine months of pregnancy have long been emphasised as a critical period for fetal development. Researchers at the Global Centre for Asian Women's Health (GloW), Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), together with their collaborators, now confirm that the choices mothers make before and during pregnancy—from what they eat and how much weight they gain to even their body composition in childhood—ripple across the life course and generations, influencing cardiometabolic disease risk not only for the women themselves but also for decades to come.

The developmental origins of health and disease suggest that chronic conditions do not simply emerge in middle age. Instead, their roots reach back to the earliest stages of life—even before conception. Understanding these primordial risk factors—the conditions present at the very start of the developmental journey—can offer novel insights into the mechanism of disease and present opportunities to prevent disease onset.

A life-course perspective: From childhood to motherhood

Findings from the GloW team have illuminated how human health trajectory is shaped across the lifespan. Research examining childhood body size and composition and its relationship to adult type 2 diabetes revealed that children who were overweight or obese faced significantly elevated risk of developing diabetes later in life. Women who were overweight in childhood and continued to gain excessive weight into adulthood faced compounded risks—including an increased likelihood of developing type 2 diabetes compared to women who maintained healthy weights throughout life. This finding, among others, underscores a critical insight: the genesis of cardiometabolic disease is not a single moment but a journey that begins in our earliest years. Overall adiposity and body composition in childhood become part of the foundation upon which health is built, suggesting that primordial prevention must begin far earlier than previously thought.

The GloW team outside the centre office located at MD11 level 6.

The pre-pregnancy diet and lifestyle

What women eat before becoming pregnant can have an important impact on maternal and offspring health. In a comprehensive study of over 100,000 women in the Nurses' Health Study II, researchers found that pre-pregnancy diet, physical activity and sedentary behaviours significantly influenced the risk of gestational diabetes mellitus (GDM) onset—a condition affecting one in seven pregnancies worldwide and almost one in five in Singapore. Women who were less physically active and consumed higher amounts of animal fats, refined carbohydrates, red meat and sugar sweetened beverage before pregnancy faced substantially higher risk compared to those with the lowest intake.

On the other hand, the Mediterranean diet, along with the DASH (Dietary Approaches to Stop Hypertension) and HEI (Healthy Eating Index) dietary patterns, offer significant benefits in long-term health. Women who adhered most closely to these dietary patterns before pregnancy showed a lower risk of developing GDM by 24% to 46%. These diets, rich in fruits, vegetables, whole grains, nuts, fish and olive oil, have been shown to be important building blocks of metabolic health. Jointly, a healthier diet, regular exercise, not smoking cigarettes, and maintaining healthier weight are related to more than 60% lower risk of GDM, and almost half of GDM events can be prevented by adopting these optimal lifestyles.

No one-size-fits-all approach to weight management

Perhaps no aspect of pregnancy receives more attention—or generates more confusion—than weight gain. Using longitudinal data of women spanning more than 50 years, Professor Cuilin Zhang, Director of GloW, and colleagues have revealed that gestational weight gain is not simply about the nine months of pregnancy. It has profound implications for maternal health across the entire lifespan.

Data from the Collaborative Perinatal Project (CPP), an observational study of almost 50,000 pregnant people from 12 clinical centres across the US, showed a U-shaped association between gestational weight change and long-term mortality risk. Both inadequate weight gain and excessive weight gain during pregnancy were associated with increased mortality risk in later life.

These findings challenge the one-size-fits-all approach to pregnancy weight management. For women beginning pregnancy at a healthy weight, moderate weight gain within the 2009 US National Academy of Medicine recommended ranges was associated with best long-term health outcomes. However, for women with obesity, gestational weight change showed imprecise mortality associations. Beyond the health impacts on the mother, gestational weight gain has been shown to increase the risk of preterm birth, low birth weight infants and small-for-gestational-age offspring, all of which have been associated with cardiometabolic risk later in life. Furthermore, excessive gain is linked to gestational diabetes, hypertensive disorders, cesarean delivery and macrosomic infants who later face elevated obesity and diabetes risk.

Health risks extend well beyond pregnancy

Common pregnancy complications such as preeclampsia, gestational hypertension, GDM, and preterm delivery together account for almost 30% of pregnancies. Research from the GloW team has demonstrated the long-term consequences of these conditions. Findings from multiple projects led by Prof Zhang showed that individuals with a history of GDM experienced substantially higher risks of developing type 2 diabetes, hypertension, stroke, myocardial infarction and premature mortality. Despite the elevated risk, there is cause for optimism: adopting healthy dietary patterns and lifestyle behaviours can substantially mitigate the risk of developing these chronic conditions, regardless of genetic predisposition.

Women adhering to diets rich in fruits, vegetables, whole grains, nuts, fish and olive oil enjoy

24% TO 46%

lower risk of GDM

A healthier diet, regular exercise, not smoking cigarettes, and maintaining healthier weight are related to more than

60%

lower risk of GDM

The intergenerational impact

Findings to date emphasise the transmission of cardiometabolic risk across generations. Women who develop GDM face up to a seven-fold increased risk of type 2 diabetes within a decade of delivery. Their children, exposed to hyperglycemia *in utero*, face doubled risks of childhood obesity and metabolic syndrome. This intergenerational pattern, however, can be intercepted. Studies have shown that women with a history of GDM who adopt healthy lifestyle patterns and behaviours can substantially reduce their risk of type 2 diabetes and cardiovascular disease.

Asian populations: A special vulnerability

While existing research has shown striking findings, the GloW research team has brought particular attention to Asian women, who face disproportionately high rates of GDM despite having lower body weights than their Western counterparts. Asian women may carry less lean muscle mass—a concept known as "thin-fat"—and possess genes that are less metabolically flexible to glucose challenges of pregnancy. Thus, understanding population-specific vulnerabilities is critical for tailoring prevention strategies.

The GloW team is now pioneering cultural adaptations of proven dietary interventions through the A+Meal Trial (Asian-Mediterranean Diet and Women's Health)—creating approaches that maintain the metabolic benefits of the Mediterranean-style diet while incorporating flavours, ingredients and cooking traditions familiar to Asian populations, providing sustainable dietary changes that are beneficial to long-term health.

Prevention begins before conception

The message emerging from this body of research is both sobering and hopeful: many chronic diseases that manifest in middle age have their origins before conception, creating multiple windows of opportunity for prevention. For women planning pregnancy, achieving a healthy weight, adopting healthy dietary patterns, emphasising whole foods and plant proteins over animal fats, maintaining physical activity and appropriate gestational weight gain can profoundly influence both maternal and child health outcomes.

This primordial prevention approach—stopping disease risk factors from developing in the first place—suggests that optimising nutrition, physical activity and body weight from childhood through reproductive years could prevent millions of cases of type 2 diabetes and cardiovascular disease worldwide. Research from GloW demonstrates that by understanding the developmental origins of cardiometabolic disease, we can intervene earlier and more effectively than ever before, shaping health not just for nine months, but across the lifespan and over generations to come.

The message emerging from this body of research is both sobering and hopeful: many chronic diseases that manifest in middle age have their origins before conception, creating multiple windows of opportunity for prevention.

A Molecule Our Bodies Produce may Help Defend against Alzheimer's Disease

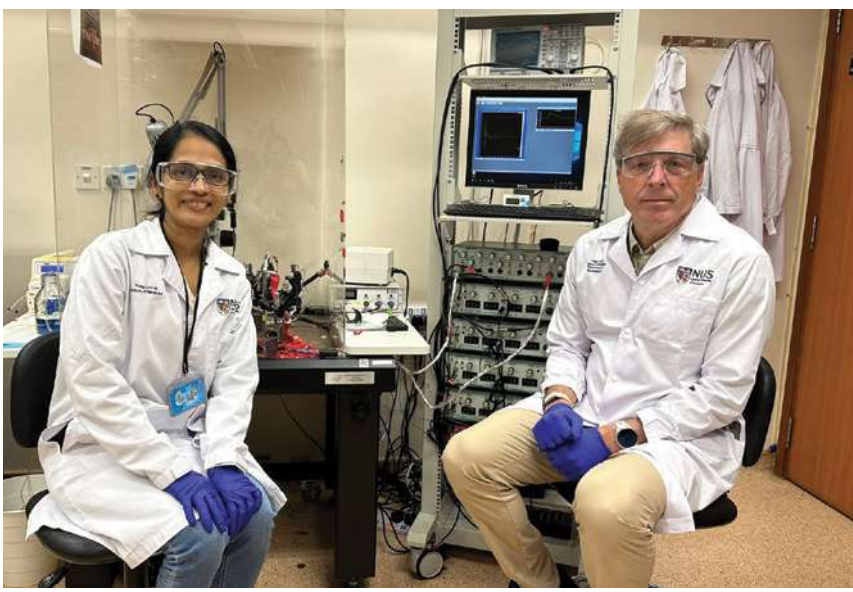
Published in Aging Cell, a new study led by Professor Brian K Kennedy, Department of Biochemistry, Chair of the Healthy Longevity Translational Research Programme (TRP) at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), has discovered that calcium alpha-ketoglutarate (CaAKG), a safe, naturally occurring metabolite commonly studied for healthy ageing, can restore key memory-related brain functions that have been disrupted in Alzheimer's disease.

LIFE, FULL OF YEARS

This is a new column spotlighting the latest research in Healthy Longevity, showcasing cutting-edge studies from NUS Medicine researchers working at the forefront of ageing science, preventive medicine, and population health. By bridging discovery and application, this column underscores how breakthroughs in today's laboratories will influence how societies age tomorrow.

The main aim of the study was to evaluate whether CaAKG could also enhance synaptic plasticity in the Alzheimer's brain, restore memory-related signalling, protect neurons from early degenerative changes, and contribute to healthier cognitive ageing. For healthcare and medicine, this shift opens the door to geroprotective strategies—treatments that target ageing biology itself rather than individual disease symptoms. It is a timely discovery—Singapore has one of the highest life expeactancies in the world, yet many individuals spend almost a decade in poor health toward the end of life.

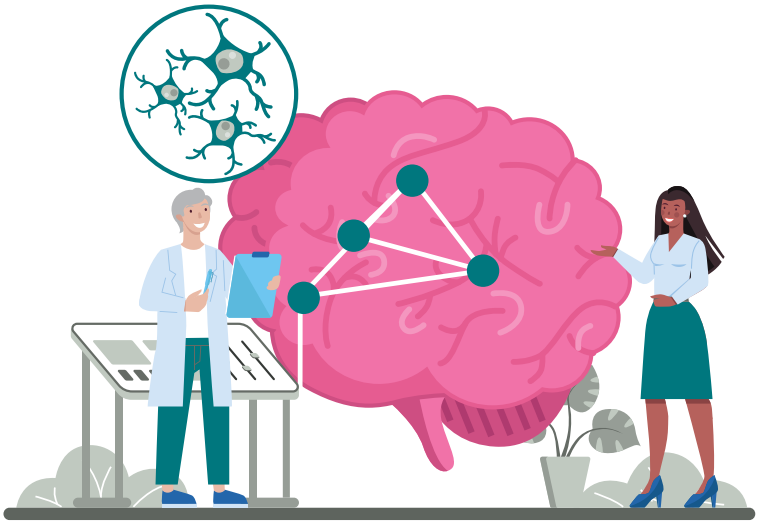
"Our findings reveal the exciting potential of longevity compounds in addressing Alzheimer's disease," said Prof Kennedy. "The research suggests that safe, natural compounds like CaAKG may one day complement existing approaches to protect the brain and slow memory loss. Because AKG is already present in our bodies, targeting these pathways may offer fewer risks and broader accessibility. Thanks to that, we may have a powerful new strategy to delay cognitive decline and support healthy brain ageing."



CaAKG'S rejuvenating power in the brain

The study shows that CaAKG helps brain cells communicate better in Alzheimer's disease models. It not only repairs the weakened signals between neurons, but also restores associative memory, one of the early abilities lost in Alzheimer's. Because AKG levels naturally fall as we age, replenishing this molecule could be a promising way to support healthier brain ageing and lower the risk of neurodegenerative diseases.

To understand how CaAKG helps the brain, the researchers measured long-term potentiation (LTP), which is the process that allows neurons to strengthen their connections. LTP is essential for learning and forming lasting memories, but in Alzheimer's disease it becomes severely impaired. The team found that CaAKG brought this signal-strengthening process back to normal. CaAKG also boosted autophagy, the brain's built-in "clean-up" system that removes damaged proteins and keeps neurons healthy. The molecule worked through a newly identified pathway, helping neurons become more flexible by activating L-type calcium channels and calcium-permeable AMPA receptors, while avoiding NMDA receptors, which are often disrupted by amyloid buildup. Importantly, CaAKG restored synaptic tagging and capture, a key mechanism that allows the brain to link events and form associative memories. This suggests CaAKG may support not just basic memory function, but also more complex learning abilities that decline early in Alzheimer's disease.



"Our findings reveal the exciting potential of longevity compounds in addressing Alzheimer's disease. The research suggests that safe, natural compounds like CaAKG may one day complement existing approaches to protect the brain and slow memory loss. Because AKG is already present in our bodies, targeting these pathways may offer fewer risks and broader accessibility."

Prof Brian K Kennedy, Department of Biochemistry, Chair of the Healthy Longevity TRP, NUS Medicine

"Our goal was to determine whether a compound originally explored for extending healthy lifespan could be helpful for Alzheimer's disease," said Dr Sheeja Navakkode, first author of the study, and research scientist at Healthy Longevity TRP, NUS Medicine. "Understanding the cellular mechanisms of how CaAKG improves synaptic plasticity sheds light on new ways to protect memory and slow brain ageing."

← Dr Sheeja Navakkode and Prof Brian Kennedy, in the Healthy Longevity Translational Research Programme laboratory.

Scan here to read the research paper:

Adding Life to Years

BY CHRISTIAN RON NIEMBRA SOTELO, RESEARCH ASSISTANT AND OPERATION LEAD FOR HELO, NUS ACADEMY FOR HEALTHY LONGEVITY, NUS YONG LOO LING SCHOOL OF MEDICINE, JORDI MORWANI MANGNANI, RESEARCH FELLOW, NUS ACADEMY FOR HEALTHY LONGEVITY, NUS YONG LOO LING SCHOOL OF MEDICINE, AND ANDRIK PETER FURTADO FERNANDES, HELO INTERN, NUS ACADEMY FOR HEALTHY LONGEVITY, NUS YONG LOO LING SCHOOL OF MEDICINE.

Life, full of years is a new column profiling the work of NUS Medicine researchers in longevity health. One such effort is the HELO Initiative at the NUS Academy for Healthy Longevity.

In Singapore, life expectancy is approximately 84 years. However, the average healthspan is around 74 years, meaning that many individuals spend nearly a decade in sub-optimal health, struggling with chronic conditions such as diabetes, cardiovascular disease or cancer. For many people around the world—and increasingly in Singapore—this scenario is becoming the norm rather than the exception.

Healthy longevity seeks to change this narrative by extending not only how long people live, but how long they live in good health. Rather than focusing solely on lifespan—the total number of years lived—the concept of healthspan emphasises the number of years lived free from major chronic disease or disability[1].

This shift in focus towards helping people live full, healthy, long lives reflects a growing international priority. The World Health Organization (WHO) has declared 2021 to 2030 the "Decade of Healthy Ageing", a global initiative aimed at improving the lives of older people, their families, and communities through healthier ageing policies and systems[2,3].

To address this challenge, the NUS Academy for Healthy Longevity at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), launched the Healthy Longevity (HELO) initiative. The initiative aims to understand how the public perceives healthy longevity and translate these perspectives into actionable insights for healthcare systems, policy development and clinical practice.

Understanding public perspectives on healthy longevity

A key component of the HELO initiative is the survey. The first was conducted among 3,034 adults aged 18 years and above in Singapore between June and August 2024. Participants were recruited through 2,003 door-to-door interviews and 1,031 online responses, allowing perspectives from a broad cross-section of the population to be captured[4].

The study sample had a median age of 46 years, with 54% female participants, 71% identifying as Chinese, 83% Singapore citizens or permanent residents, and 22% reporting at least one chronic disease.

The research was guided by the HELO conceptual framework[5], which organises public views on healthy longevity into two evidence-based domains:

1. Awareness and knowledge of lifespan, healthspan and healthy longevity medicine (HLM)
2. Motivational drivers—such as personality, behaviours, values/beliefs, health perceptions which influence individuals' willingness to pursue strategies aimed at extending both lifespan and healthspan

To operationalise these domains, the survey incorporated validated international measurement instruments, including the Big Five Inventory, WHO Ageism Scale, Aspiration Index[5]. These tools enabled researchers to study not only knowledge levels but also psychological and behavioural factors that shape attitudes toward healthy ageing.

Key findings from the Singapore HELO survey

While 82.3% of respondents were able to correctly define the term "lifespan," just 41.3% could correctly define "healthspan". This difference highlights a substantial opportunity for improving public awareness of healthy longevity concepts. The survey also revealed strong public interest once the concept of healthspan was explained. After learning about the idea of extending years lived in good health, 55.5% of respondents reported interest in visiting healthy longevity medicine clinics[6].

These findings suggest that increasing awareness of healthspan may play a key role in encouraging individuals to engage with preventive healthcare strategies aimed at maintaining long-term health and functional independence.

From Singapore to the world: The global HELO consortium

Building on the insights from the Singapore survey, the NUS Academy for Healthy Longevity established the Global HELO Consortium in 2024, a collaborative international research network designed to examine public perspectives on healthy longevity medicine across countries and cultures.

By the first quarter of 2026, 15 countries have adopted the HELO survey, enabling researchers to explore how different populations understand and engage with healthy longevity practices.

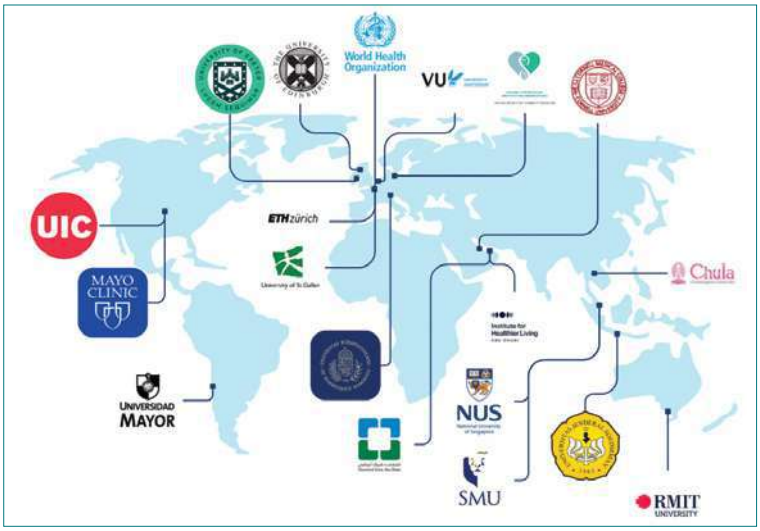
The consortium includes partners from Australia, Chile, Hungary, Indonesia, the Netherlands, Poland, Qatar, Switzerland, Thailand, Nigeria, UAE, the UK and the US. Through this network, we aim to generate comparable international data that can inform healthy ageing strategies across different healthcare systems and cultural contexts.

In addition to surveying members of the public, the initiative is expanding to include healthcare professionals, academic leadership and policy stakeholders. This broader approach enables comparisons between the perspectives of the public, healthcare providers and decision-makers involved in shaping healthcare systems.

↑ HELO Consortium presentation, Geromedicine Conference Public Open Day, March 28, 2026.

83.2% of respondents were able to correctly define the term "lifespan", but just **41.3%** could correctly define "healthspan"

55.5% of respondents reported interest in visiting healthy longevity medicine clinics



↑ Global HELO Consortium Map.

From public perspectives to policy implementation to desired outcomes

The goal of the HELO initiative is to translate research insights into practical changes in healthcare systems and policy.

Findings from the Singapore survey highlight both a challenge and an opportunity. On one hand, public awareness of healthspan and healthy longevity medicine remains relatively limited. On the other hand, there is strong interest, particularly among younger and middle-aged adults, in taking a more proactive approach to maintaining health across the lifespan.

Bridging this awareness gap will require coordinated efforts in public education, healthcare innovation and policy development. Providing accessible information about healthy longevity, expanding preventive healthcare services, and developing healthy longevity clinics may help individuals take earlier and more active steps to maintain their health.

Bridging this awareness gap will require coordinated efforts in public education, healthcare innovation and policy development. Providing accessible information about healthy longevity, expanding preventive healthcare services, and developing healthy longevity clinics may help individuals take earlier and more active steps to maintain their health.

Through the Global HELO Consortium, the NUS Academy for Healthy Longevity aims to contribute evidence that supports governments, healthcare systems and institutions in developing strategies to extend both lifespan and healthspan.

As populations continue to age worldwide, initiatives such as HELO demonstrate how understanding public perspectives can help guide the planning and delivery of healthcare services, shifting the focus from treating disease to sustaining health throughout the human lifespan.

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4 Amalaraj, J.J.P., et al., Towards Precision Geromedicine in Singapore. Geroscience, 2025. 47(5): p. 6399–6409.
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6 Amalaraj, J.J.P., et al., Knowledge of lifespan and healthspan and interest in Healthy Longevity Medicine among the general population in Singapore: the Singapore HEalthy LOngevity (HELO) survey. GeroScience, 2026.

Being Present to Suffering

BY DR NOREEN CHAN, SENIOR CONSULTANT, DIVISION OF PALLIATIVE MEDICINE, NATIONAL UNIVERSITY CANCER INSTITUTE, SINGAPORE

"Dr Chan, can you come now, he wants to see you." My heart sank. I was in the middle of reviewing patients, work was piling up … but I heard the hesitation in the voice at the other end of the line and knew that this call would only have been made after everything else had been tried.

It was not a surprise given the situation. The request had come from the father of a patient who had spent the last month or so in the Paediatric ICU (Intensive Care Unit). G was an infant girl who, at three months of age, was struck with a devastating bacterial infection which had left her with injuries to multiple organs, including severe brain damage. She could not breathe on her own and was dependent on a ventilator. Medications were needed to maintain her blood pressure. In short, multiple means were being used to support vital functions but eventually they would stop working. She was dying.

The PICU team had sought my help to support the family, as we worked out what to do going forward. Gradually, over the days, a decision was made to withdraw life support and allow the child to pass away naturally and without suffering. Working with the nurses and medical social worker, mementoes like photographs and hand and foot prints were made for a keepsake box; extended family members came to provide support and to say goodbye, everything seemed to be going according to the agreed plan.

Then on the morning when the breathing tube was to be removed, G's father asked to see me. He had been distant when we first met, but always asked many questions, including about test results, what was the blood pressure, etc. Like any parent, he wanted what was best for his baby girl and he had seemed certain—or as certain as any parent can be—about the decision. Was he going to change his mind?

As we sat facing each other in the PICU conference room, I had so many questions, but only asked one. "What's on your mind?"

"Am I doing the right thing," he asked, with a stricken expression. I didn't answer. He had asked this question before, several times, and we had gone over it again and again. He was not asking me—that I was sure of.

Then he started to talk. Head bowed, hands clasped, he told me about his childhood, when his father used to abuse him verbally and physically, punished him by tying him up and deprived him of food. He spoke about broken relationships, work struggles, challenge after challenge. And finally, when things were working out, this happened.

Like any parent, he wanted what was best for his baby girl and he had seemed certain—or as certain as any parent can be—about the decision. Was he going to change his mind?"

A few times I opened my mouth to say something, then realised he just wanted me to listen. So I sat there while he lamented and raged at the world and life and fate. I thought about how my mobile phone, which I had left outside at the nurses' station, was probably buzzing with messages. I wondered if his wife knew even half of what he was pouring out. But mostly I thought about how I was going to deal with this wave of long-buried pain that was coming at me.

After what seemed like an eternity, he calmed down. He looked me in the eye and said, "I sometimes wonder what I will do after she's gone." I returned his gaze. "You're not going to do something drastic, are you?" A long pause. "Nah... she wouldn't want that." We both relaxed. I realised that he was already contemplating how to go on after his daughter's death.

He stood up and shook my hand. "Thanks Doc. Let's do this." We walked to his daughter's room, along the way I gave a nod to the hovering PICU staff and visibly relieved, they followed Dad into the room. I had meant to return to catch up with both parents, but my day ended late, and by the time I had time to go back to the PICU, the room was empty.

I've often thought about that encounter: most of the time, we are dealing with patients' distress, and I had forgotten how much their families may be suffering. It was also a reminder about how, in Palliative care, our role may be less about doing, and more about *being*. Healthcare professionals tend to be task-focused; we like to diagnose situations, identify problems and then fix them. But there are many circumstances which are not "fixable"; Atul Gawande in "Being Mortal" had listed ageing and death as two examples. I would add to that past traumas which come bubbling to the surface.

An article by Mateus Eduardo Romão and colleagues, published in the journal *Palliative Medicine* in early 2026, explored what it means for palliative care professionals to "be with dying". Called "One must know things, but above all, one must know how to be", it was based on interviews with staff working in community-based palliative care services.

"Being" was not simply a passive state nor was it "being kind". Rather, staff described it as an active accompaniment of patients and families, comprising three intertwined dimensions:

- Presence – staying with patients and families in their distress, without the need to fix anything;
- Ethical engagement – upholding dignity and respect, continuing to journey with patients and families;
- Emotional attunement – recognising emotions (others' and one's own) without becoming overwhelmed or detached.

Most were not taught this formally, but developed it gradually over many interactions with patients and families. As one participant said, "Professionalism in palliative care is not only about prescribing the right medication, but about knowing how to connect with people, how to listen, understand and be available."

Too often, patients' distress is seen as a problem to be analysed and solved, rather than a human experience that deserves time and presence."

Ironically, this kind of compassionate presence is described as a "soft skill" when in reality, it can be incredibly hard. Part of the difficulty is that we ourselves have to be part of the therapeutic relationship—if you are disengaged, the patient and family will know it—and it is accurately described as emotional labour. It is also tough to sit with all that suffering, when we cannot make the pain go away, or to continue engaging with individuals whom we think are "unreasonable" or "unrealistic".

It is not something you can learn out of a book, but it can be taught and its practice supported within teams. Pain and symptom control are still core competencies for any palliative care professional, but we should not be too quick to switch into "fix it" mode. Too often, patients' distress is seen as a problem to be analysed and solved, rather than a human experience that deserves time and presence.

We would do well to remember the words of Rachel Naomi Remen (2002):

Helping, fixing and serving represent three different ways of seeing life. When you help, you see life as weak. When you fix, you see life as broken. When you serve, you see life as whole. Fixing and helping may be the work of the ego, and service the work of the soul.

When You Hate Yourself for Revisiting Old Wounds

By Nikita Gill

You revisit old wounds for the same reason
birds will come back to the places
their nests have been destroyed
The mind walks into the same room because it wants to know how to fix
those floorboards, paint the walls, turn this into a more habitable place
if it tries something different from the last time.
This is survival.
This is learning how to live through pain once the skeletons have decided to walk out
of the closet and refuse to go back in again.
Call it the worst story you ever owned,
a car crash within your bones that you cannot stop staring at.
But the only way to understand pain
is to look at it and feel it
without turning away.
There is no shame in this.
Eventually, it will scab over and heal.

Dawn of The Cyber Nurse

Nurses who can code, muster and wield digital information tools with ease. These are the new healthcare professionals that will graduate from the Yong Loo Lin School of Medicine's novel integrated nursing-informatics degree programme at the National University of Singapore. Launched on 27 February, this Concurrent Degree Programme (CDP) combines the Bachelor of Science (Nursing) (Honours) with the Master of Science (Biomedical Informatics).

Offered by the Alice Lee Centre for Nursing Studies (NUS Nursing) at NUS Medicine, this 4.5-year full-time programme is designed to prepare nurses for expanded professional and leadership roles in a healthcare landscape increasingly shaped by electronic health records, data analytics, Artificial Intelligence (AI) and digital health technologies. The inaugural cohort of approximately 20 students will begin their studies in August 2026.

The programme was launched at the opening ceremony of the East Asian Forum of Nursing Scholars (EAFONS) 2026, an international conference held in Singapore and organised by NUS Nursing. With the theme, "Innovate, Integrate, Inspire: Advancing Nursing Excellence in the Digital Age", the Conference gathered over 1,800 nursing scholars, educators and healthcare leaders from over 34 countries to examine how informatics, data and technology are reshaping nursing practice and healthcare delivery.

EAFONS gathered over 1,800 nursing scholars and educators from over 34 countries to share research on how technology can reshape nursing practice.

Embracing the growing importance of nursing informatics

Rapid advancements in healthcare information technology, such as Singapore's National Electronic Health Record (NEHR), which integrates data across public and private healthcare institutions, have made digital health systems central to clinical care across hospitals and community settings. As healthcare becomes increasingly data-driven, nursing informatics has gained significant prominence, with nurses now playing an expanded and crucial role in designing, implementing and optimising digital tools that directly support clinical decision-making, enhance patient safety and improve care coordination.

Concurrently, the growing use of AI in nursing practice is reshaping care delivery. AI-enabled tools are increasingly supporting areas such as clinical decision, risk prediction, documentation and workflow optimisation. Therefore, preparing nurses to understand, evaluate and ethically apply these technologies is essential to advancing safe, effective and person-centred care in the digital era. In response to these evolving needs, the new CDP equips nurses with strong capabilities in both clinical practice and informatics. Graduates will confidently use complex digital systems, collect and interpret clinical data in real time, and apply these insights in practice. This ensures that technology seamlessly supports clinical workflows and delivers high-quality patient care.

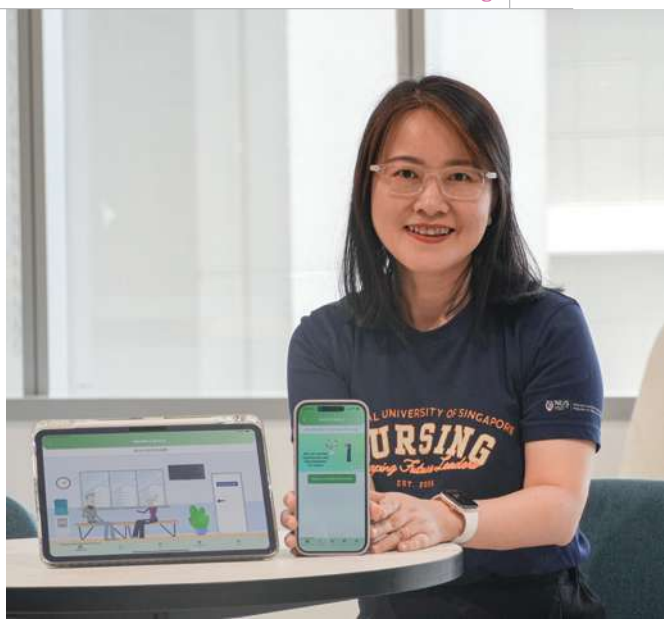
An integrated and accelerated pathway

The integrated curriculum blends professional nursing education with biomedical informatics, covering areas such as data analytics and clinical decision support, health information system design and management, leadership, informatics strategy and change management, as well as ethics, privacy and cybersecurity in digital healthcare.

Unlike traditional pathways where bachelor's and master's degrees are pursued separately, the NUS Nursing CDP allows students to complete both qualifications in 4.5 years. This approach saves time and cost, enabling graduates to enter the workforce equipped with the requisite expertise. Students may choose from two specialisations—Analytics or Hospital Management—and will learn alongside peers from other fields including Medicine, Allied Health, Computing and Engineering, reflecting the interdisciplinary nature of modern healthcare teams.

Beyond traditional career pathways in clinical practice, education, research and management, nursing informatics significantly expands the range of professional roles available to nurses. Graduates will gain dual expertise in care and technology, enabling them to practise as nurses while also taking on emerging roles such as clinical informatics specialists, digital health project managers, Electronic Health Records implementation consultants and healthcare data analysts.

Associate Professor Lydia Lau, Deputy Head (Undergraduate Education) at NUS Nursing, said, "As healthcare becomes increasingly digital, nurses must be equipped to not only use technology, but also shape how it is designed, implemented and governed. Nursing education therefore needs to shift its approach from simply training nurses to use digital tools, to preparing them to understand, evaluate and lead digital systems in real-world clinical practice. With the launch of this new Concurrent Degree Programme, we are preparing graduates who can apply technology meaningfully to patient care, contribute to system design, and respond confidently to the evolving demands of healthcare practice."



↑ The Care4Senior app, showcased at the EAFONS, is a first-of-its-kind mobile platform that uses gamification to fight frailty and cognitive decline in older adults, led by Assistant Professor Vivien Wu, NUS Nursing.

"With the launch of this new Concurrent Degree Programme, we are preparing graduates who can apply technology meaningfully to patient care, contribute to system design, and respond confidently to the evolving demands of healthcare practice."

Assoc Prof Lydia Lau, Deputy Head (Undergraduate Education), NUS Nursing

A Portrait of the Artist as a Young Student

Final year medical student at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine) Chen Yiming is Singapore's youngest gallery-represented illustrator in 2022 and founder of the country's only healthcare-focused design startup, Made for Good.

While his studies leave little room for outside pursuits, Yiming has managed to find time to pursue his passion for art.

Art has been a significant part of his life since childhood. "It does feel like I'm living two lives sometimes," he said. "And honestly, I think it's great. I have the very rare opportunity to be able to experience these two vastly different worlds."

His path to medical studies began when the then Secondary Four student from Hwa Chong Institution was allowed to shadow a doctor in a hospital. Job shadowing is a programme that lets interested students in junior colleges and secondary schools spend a few days accompanying hospital doctors to observe and understand the work of healthcare professionals. Those few days following Dr Phua Ghee Chee on his rounds at the Singapore General Hospital (SGH) left a lasting impression on the teen, culminating in his decision to become a doctor. "That was the first time in my life that I'd ever been to a ward," Yiming, 23, recalled.

Not art for art's sake

Embarking on a demanding course of study and making time for his artistic pursuits mirrored the multi-splendoured whirl of activities that many of his peers engaged in, from music and dance to the martial arts, cooking and community service. What made Yiming's journey different was how he bridged healthcare and art by creating a unique niche that serves both the medical community and patients.

Serendipity didn't come in a flash: his artistic journey has evolved over the years, initially focusing on detailed ink landscapes themed around sustainability, climate change and inequality. He then found success as a professional illustrator, holding exhibitions and cultivating a social media presence.

But he found himself questioning the impact and reach of his work. "A big part of me felt like my work wasn't really reaching the average Singaporean." This realisation came during his early hospital rotations, where he observed that patients struggled to understand complex medical information.

He decided to take a six-month break from creative work entirely. "This was not great for my mental health," he recalled thinking as the pressures of gallery showings, curating work and social media content creation mounted. This timeout was transformative and led to the genesis of Made for Good.

The art of Medicine

In January 2024, he founded Made for Good, channelling his creative talents toward making healthcare information more accessible and engaging for patients and the public. Through his startup, Yiming helped to address a critical gap in healthcare communication.

↑

Left: Phase V medical student Chen Yiming with his design startup's first major project, "It's Great To Be @Home" campaign, for the NUHS@Home programme that was launched during COVID-19.

Right: The "It's Great To Be @Home" collaterals designed by Yiming engaged patients through creative visuals around NUH.

His work reflects a basic tenet of healthcare communication, which recognises that groundbreaking medical advances require effective communication to reach the people who need them most.

"Healthcare is moving incredibly quickly nowadays, especially with the onset of Artificial Intelligence (AI) and a lot of these new technologies," he explained. "The gap is becoming wider."

His team's first major project was the "It's Great To Be @Home" campaign for the NUHS@Home programme from National University Health System (NUHS), launched during COVID-19, perfectly demonstrating his approach. The campaign uses engaging, warm visuals to explain hospital-level care at home, making the concept less intimidating for patients.

"A lot of patients want to go home early. But the main concern is that they think, 'Oh, it's unsafe,'" Yiming noted. His designs help alleviate these concerns through thoughtful visual storytelling.

Beyond campaign design, Yiming pioneered the use of graphic recording in healthcare settings, translating complex medical research and information into digestible visual formats. This innovative approach has been embraced by institutions including Changi General Hospital, the Ministry of Health Office of Healthcare Transformation and NUHS.

His work reflects a basic tenet of healthcare communication, which recognises that groundbreaking medical advances require effective communication to reach the people who need them most.
As a fillip, Yiming led a team to win the NUS Medical Grand Challenge 2023 with TOMY, a remote monitoring software for stoma care that is currently undergoing clinical trials at the National University Hospital's (NUH) Department of Colorectal Surgery.

The medical student–artist, named a Philip Yeo Innovation Fellow, is quick to acknowledge the unseen hands behind his success in using art and design in healthcare communication—the network of mentors who have guided his journey. Dr Nicholas Chew from the Department of Cardiology at NUH helped him navigate medical research, while Dr Stephanie Ko, also from NUH, gave him his first major design project despite his limited portfolio. "Dr Stephanie has now become a great mentor of mine," Yiming acknowledged. These relationships have been crucial in bridging his worlds of Medicine and design.

Equally important is being protective of what matters: "You should hold on very dearly to the one or few things that you do as a passion, because, as school gets busier, as life gets busier, everything around you could yank that away from you."

Scan to read other inspiring stories in the "Inspiring Heroes" series:

Innovating the Way To Better Health

Assistant Professor Jocelyn Chew stands out as a pioneer who's transforming healthcare through technology and behavioural science. The youngest nurse in Singapore to obtain a PhD, Asst Prof Chew's innovative approach to obesity management is helping to redefine how one of Singapore's most pressing health challenges can be addressed.

Asst Prof Chew's journey into research began with curiosity and personal experience. "I had a lot of burning questions," she recalled. "I was very intrigued by behaviour."

Her quest for answers led her to Hong Kong to pursue her PhD. When asked what she gained from her time there, she highlighted—"resilience and rigour." The high standards and expectations cultivated during her time in Hong Kong continue to influence her meticulous approach to research and innovation today.

As the first nurse to receive training in the Stanford Biodesign* methodology, Asst Prof Chew represents a new generation of healthcare innovators who combine clinical expertise with technological innovation—a combination that is increasingly vital in modern healthcare.

Tackling obesity as a chronic disease

Central to Asst Prof Chew's research is her conviction that obesity should be treated as a chronic disease rather than merely a lifestyle choice. "Mindsets need to change," she explained.

This perspective shift was partly inspired by personal experience. "When I first started doing research, it was on heart failure because my grandmother had this condition," she shared. As her grandmother's condition deteriorated into multi-organ failure, Asst Prof Chew realised that interventions at advanced disease stages often came too late.

"I realised that it's very difficult to change behaviours when you're already at that terminal stage. I decided I needed to look upstream at cardiometabolic diseases, particularly diabetes. But then I thought, why not go even further upstream to obesity? It became clear to me that this was really the root cause of so many health issues we were treating too late."

Her approach emphasises prevention over cure, addressing health behaviours years before symptoms manifest. "Prevention is indeed better than cure," she noted, though the challenge remains convincing people to make lifestyle changes a decade or more before symptoms appear.

The power of AI in personalised healthcare

Enter the eTRIP (Eating Trigger-Response Inhibition Program) app, an eating impulse trigger prediction and prevention system. Unlike conventional applications, the app uses machine learning to understand each user's unique dietary triggers and provides personalised interventions at critical moments, what some may term as just-in-time adaptive interventions (JITAIs).

"We use a machine learning model to detect personalised triggers," she explained. What makes the app distinctive is its adaptability to different communication styles. "Some people really need to be coddled," she noted. "But some people respond better to 'tough love.'" The app adjusts its messaging approach based on user preferences for optimal outcomes.

In the first trial phase involving 230 participants recruited through social media and a specialist weight management clinic at a Singapore tertiary hospital from January to October 2022, Asst Prof Chew's research revealed that technology alone isn't enough. "For the first few versions of the app, I tried to use it as a standalone intervention, but a large majority of participants said they still need a human," she said. This insight led to combining the app with health coaching—technology provides the nudges, while human connection creates accountability. Her team has seen encouraging results with participants losing an average of five kilograms over three months.

This blend of human touch and technological innovation represents the future of behavioural change interventions, where personalised support meets scalable solutions. Asst Prof Chew is currently collaborating with the National University Health System (NUHS) to roll out a population-wide obesity programme that incorporates this app.

Nurturing innovation in nursing

Beyond her research, Asst Prof Chew is also enthusiastic about elevating the role of nurses in healthcare innovation. As founder of the Singapore Nursing Innovation Group (SNIG), she works to create opportunities for nurses to develop innovative solutions to healthcare challenges.

"I think nurses today are very well-versed with technology. They can do much more as long as they are supported," she said. Her efforts aim to change perceptions of nursing innovation, moving beyond small-scale improvements to transformative healthcare solutions.

Referring to the SNIG, she added, "We hope to create an ecosystem to support this kind of innovation." This includes organising events like health hackathons, where each team must include at least one nurse, ensuring nursing perspectives are central to healthcare innovation.

Research with global impact

This pioneering approach hasn't gone unnoticed globally. Her work has earned significant international recognition, with her inclusion among the world's top 2% most-cited researchers in 2024, acknowledging both her scholarly impact and nurses' growing influence in research leadership.

By redefining obesity management, leveraging AI for behavioural change, and empowering nurses as innovators, Asst Prof Chew is helping to create a healthcare system that truly addresses the root causes of chronic disease—one patient, one factor, and one nudge at a time.

Scan to read other inspiring stories in the "Inspiring Heroes" series:

* The Stanford Biodesign methodology describes a structured, team-based, iterative approach that seeks to thoroughly understand unmet clinical needs via direct observation. This is then followed by the systematic development and introduction of solutions, along with the creation of strategic implementation plans.

IQ + EQ = Good Doctors, Says Associate Professor Marion Aw

Vice-Dean (Office for Students) of the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine) and paediatric gastroenterologist Associate Professor Marion Aw champions an evolution in medical education that goes beyond textbooks and test scores to nurture doctors who can navigate the complexities of modern healthcare competently and compassionately.

Drawing from her extensive experience with both postgraduate and undergraduate education, the veteran educator and paediatric gastroenterologist identifies crucial aspects of medical training that extend beyond clinical expertise. "We are very good at teaching them content. Our medical students are probably up there in the world when it comes to medical knowledge," she notes. "But in these five years of the MBBS degree programme, it is important that we also help them prepare for the other components of working, which are actually more important."

These essential components often determine a doctor's effectiveness more than academic achievements. "It's not the person who gets four 'A's, or a distinction grade student who does well as a doctor," she explains. "It's really the students with empathy, good EQ, and who can interact well with people from all walks of life, who can multitask." This insight has shaped significant changes in NUS Medicine's approach to student development.

The School has strengthened its mentorship programmes and integrated workshops on self-awareness, professional communication and interpersonal skills—competencies that she sees as fundamental to effective healthcare delivery.

She sees evidence of this holistic approach making a difference. "I'm always very encouraged when I see students spend time talking to patients because they care for the patient," she says, "rather than because they have to tick all the boxes... and finish all their assignments on time." Such moments reinforce her belief that medical education must nurture both clinical competence and human connection.

Her own journey has been shaped by mentors who understood the importance of opportunity. "I was actually very touched because, you know, a lot of times we have to prove ourselves first.

I was really inspired by the way the doctors could actually come to a diagnosis through sheer observation and critical analysis. Like detective work," says Assoc Prof Aw as she recalled her early attraction to paediatrics. "That really made me say, 'Wow, this is really what Medicine is all about'—to actually figure things out from first principles without having to do many tests or investigations." It also influenced her own approach to teaching.

As medical education evolves to incorporate more technology and virtual learning, emphasising the importance of these core, critical diagnostic skills and establishing sound doctor-patient communication becomes even more crucial. "Medicine, to be honest, is a social interaction. It is a human thing," she asserts. Her approach advocates using technology thoughtfully, enhancing rather than replacing the personal elements that make Medicine unique.

Seeking Asian-centric solutions

Her belief in the primacy of effective communication has undergirded her work in paediatric healthcare, which spans multiple groundbreaking initiatives. In 2013, she established the Interdisciplinary Feeding and Nutrition Clinic at the Khoo Teck Puat – National University Children's Medical Institute at National University Hospital (NUH), pioneering a comprehensive approach to children's nutritional health. Her vision extends beyond Singapore through her leadership of the Asian Paediatric Inflammatory Bowel Disease Research Network.

This initiative emerged from her observation of shifting disease patterns in Asia. "When I was a medical student, we probably just turned the page and didn't bother to study it," she says of inflammatory bowel disease, reflecting on how what was once considered a Western condition has become increasingly prevalent in Asia. Her collaborative effort brings together expertise across Southeast Asia to build collective knowledge and improve patient care.

Through regular masterclasses and educational initiatives, the network raises the standard of care across the region. "How do we teach paediatric gastroenterologists in Southeast Asia to manage this condition that we all thought was a Western disease?" she asks, highlighting the importance of developing approaches specifically tailored to Asian populations.

Building tomorrow's legacy

Where certain conditions once meant almost certain mortality, today's treatments offer hope and healing. "Medicine has advanced a lot so there's a great potential."

"I can't predict what would happen but I think if we continue doing good work, we'll make a big difference."

Scan to read other inspiring stories in the "Inspiring Heroes" series:

"It's not the person who gets four 'A's, or a distinction grade student who does well as a doctor. It's really the students with empathy, good EQ, and who can interact well with people from all walks of life, who can multitask."

Redefining Healthcare through Design Thinking and AI Leadership

In today's rapidly evolving healthcare landscape, the ability to harness the power of data is a necessity. An education in Artificial Intelligence (AI) is fast becoming a prerequisite for healthcare, and essential for medical professionals to build on their knowledge and reinforce their capabilities.

In light of this, the Department of Biomedical Informatics (DBMI) from Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine) offers high-impact Executive Courses designed to equip and empower the next generation of healthcare leaders with the skills to thrive in this data-driven era. Structured with Singapore's healthcare ecosystem in mind, these courses provide participants with opportunities to build their competencies and deliver better care.

THE BANYAN TREE

This column is dedicated to the pursuit of continuous learning and development and takes its name from the banyan tree. It has roots that grow deep, anchoring it firmly in the soil. The tree spreads its shade wide and far and provides space for reflection and discussion. We invite you to come and take a seat under its shade.

Introduction to Design Thinking & AI in Healthcare Innovations

In collaboration with Singapore Biodesign and DBMI, the workshop highlights key concepts in AI, Large Language Model (LLM) and Machine Learning (ML) through speaker sharing and National University Health System (NUHS) case discussions.

Through group work, participants will also gain hands-on experience with the design thinking process in identifying unmet healthcare needs, defining problems and crafting innovative solutions, moving beyond invention and towards impactful implementation in the workplace.

Key workshop outcomes

- Understand the concepts and applications of AI, ML and LLMs in the healthcare context.
- Understand and apply design thinking in the development of AI healthcare applications.
- Understand the development process of AI applications i.e., business models, reimbursement, regulations and intellectual property aspects.

Who should attend

- Healthcare professionals
- Health informatics professionals and researchers
- Healthcare administrators
- Industry professionals

Course details

- S$1,900 before GST and SSG funding
- Run 1: 14 and 15 May 2026
- Run 2: 16 and 17 July 2026

Find out more:

* Please note: SkillsFuture funding and subsidies are available for eligible Singaporeans and PRs.

Health.AI Leadership Executive (HALE) Masterclass

As AI moves from experimental pilots to core hospital infrastructure, healthcare leaders face a new mandate: to manage, deploy and scale AI ethically, safely and profitably within their institutions.

HALE is a three-day executive masterclass that connects cutting-edge AI and digital health innovation with practical leadership frameworks, so senior decision-makers can confidently lead AI transformation across their organisations and health systems.

Delivered by NUS Medicine, HALE builds on over a century of leadership in medical education and health innovation.

Key workshop outcomes

- Gain executive-level insights from leading AI strategists and healthcare innovators to design and champion high-impact AI initiatives in your organisation.
- Translate generative AI (GenAI), predictive health diagnostics and AI-driven operations into actionable strategies you can implement immediately in clinical and administrative settings.
- Understand how to evaluate and govern LLMs, automation tools and AI-driven risk assessment systems for real-world digital health use cases.
- Learn how AI can enhance care delivery, support smarter, data-driven decisions and drive measurable improvements in quality, safety and efficiency.
- Build cross-sector connections with fellow executives, investors and policymakers to accelerate AI adoption across the health ecosystem.

Who should attend

- C-suite and senior leaders in healthcare organisations, MedTech and HealthTech companies
- Health officials, regulators and policymakers shaping digital health and AI policy
- Board members and strategic advisors overseeing healthcare organisations and health systems

Course details

- S$5,400 before GST
- Date: 17-19 August 2026
- Early bird, staff and group discounts available.
- Clinicians and nurse practitioners may earn up to 12 CME/CPE points.

Find out more:

Secure Your Place, Be Part of the Future of Medicine

Be part of a community dedicated to shaping the future of Medicine through DBMI's executive courses.

Capacity for courses is capped to ensure a more personalised learning experience—interested parties are encouraged to register early to secure their spots.

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NUS Medicine's Custom Executive Programme (CEP)

Tailored Solutions for Excellence and Innovation in Healthcare Leadership and Management

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Our Strategy

Custom Executive Programme (CEP) offered by NUS Medicine's Continuing Education and Training (CET) is designed to empower organisations to create bespoke healthcare programmes and training solutions tailored to their strategic vision. By leveraging the expertise of our renowned faculty and adaptable learning formats, CEP ensures that organisations achieve impactful outcomes.

Our Four-Fold Approach to Customised Programmes

Academic and Practical Integration

We blend advanced research with real-world experience, providing executives with actionable insights to tackle healthcare challenges effectively

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We design flexible, collaborative learning experiences, helping executives turn knowledge into action, yielding immediate, impacts in the organisation

Individual and Organisational Growth

We align personal leadership development with organisational goals, enhancing overall competencies to drive success

Expert Faculty

Our programmes are designed and delivered by experienced and renowned faculty members who are leaders in their healthcare domains

Ready to Empower Your Talent?

Scan the QR code to learn how we can create a customised learning experience tailored to your organisation's unique goals.

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