iHealthtech

A Newsletter of the Institute for Health Innovation & Technology, National University of Singapore (NUS)

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News in Focus

A Year of Distinction: President's Science Award and FREng for Professor Lim Chwee Teck

In 2025, iHealthtech Director Professor Lim Chwee Teck earned landmark recognition at home and abroad. He was honoured with the President's Science Award for revealing how tumour cells withstand harsh mechanical stresses in the bloodstream, enabling metastasis. This work points to strategies that weaken cancer cells' mechano-resilience and curb their spread. The accolade adds to his President's Technology Award (2011), marking rare national honours across both science and technology.

Internationally, Prof Lim was elected an International Fellow of the Royal Academy of Engineering, recognising his impact at the interface of engineering and medicine. With his earlier election as a Fellow of the Royal Society (FRS), he is the first Singaporean scientist to hold both FRS and FREng—an exceptional dual honour reflecting sustained excellence and leadership. Together with the Otto Schmitt Award at the IUPESM World Congress 2025 and recognition among NUS's outstanding alumni, these distinctions underscore his enduring contributions to science, engineering and society.

VK Sukumar, YK Tai, CW Chan et al., *Cancers*, 2024

Cancer I Tipping the Balance: New Way to Boost Breast Cancer Chemotherapy

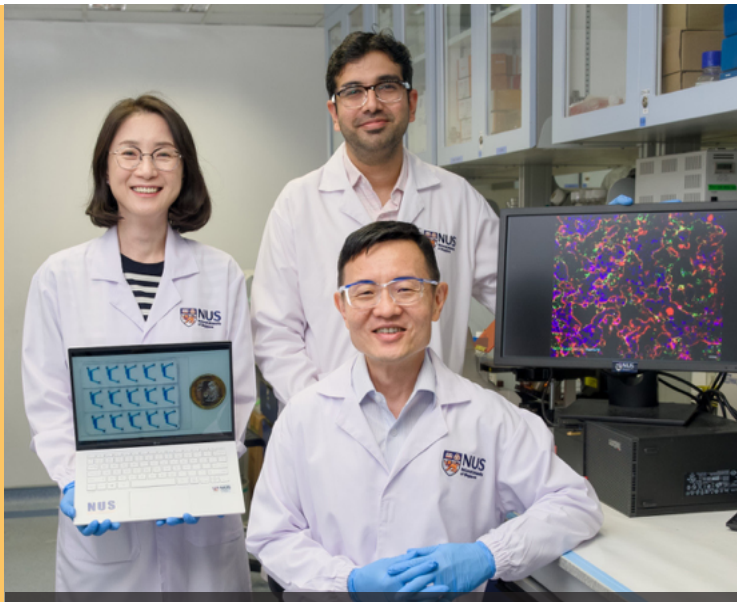
Chemotherapy is a race: can healthy cells endure while cancer cells succumb? A/Prof Alfredo Franco-Obregón and his team have unveiled a promising strategy to tilt that race decisively. By targeting a cellular gateway—the calcium ion channel—they use a proprietary magnetic field therapy to nudge cancer cells into taking up more of the chemotherapy drug. The result: cancer cells absorb and die faster, while healthy cells are spared excessive exposure. If confirmed in further clinical studies, this approach could allow lower drug doses with fewer side effects, making treatment gentler and more effective. It's a smart, precision push that could improve survival and bring renewed hope to women facing breast cancer.

Microbiome I NMRC $25M to Develop Next-Gen Gastric Cancer Solution: iHealthtech Scientist Among Key Investigators

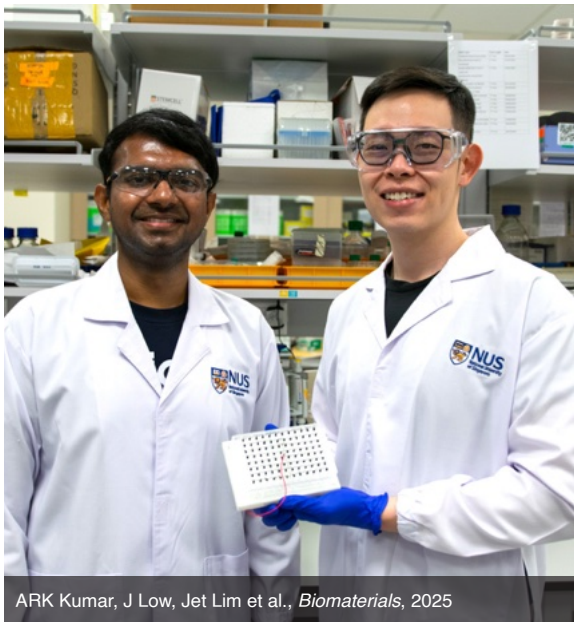
iHealthtech Principal Investigator Dr Jonathan Lee, together with a team of clinicians from National University Hospital (NUH), Duke-NUS, Singapore General Hospital (SGH), National University Cancer Institute, Singapore (NCIS), and the National Cancer Centre Singapore (NCCS), has secured $25 million in funding from the National Medical Research Council (NMRC) for a five-year research programme. The team aims to develop AI-driven tools for the prevention, early detection, and treatment of gastric cancer. Their research leverages the gut microbiome and genomic technologies to develop predictive diagnostics, innovative treatments for gastric cancer peritoneal metastases, and advanced immunotherapies that could transform gastrointestinal cancer detection and care.

Microbiome I Advancing Gut Research: NUS iHealthtech's GMoC Mimics Real Tissue Environment

iHealthtech Director and Principal Investigator Prof Lim Chwee Teck, together with team members Dr Lee Jee Yeon and Dr Nishanth Venugopal Menon, has developed a Gut Microbiome on a Chip (GMoC). This innovative micro-gut model allows researchers to study complex interactions between the gut microbiome and human health in a controlled environment by mimicking key architectural and functional features of the gut epithelium. The GMoC system enables scientists and clinicians to probe inter microbial dynamics and gut microbial community interactions, including microbe-induced disease pathogenesis, and to design therapeutic interventions that improve gut microbiome health.



J Lee, N Menon & CT Lim, *Advanced Science*, 2024



ARK Kumar, J Low, Jet Lim et al., *Biomaterials*, 2025

Cancer I Advancing CAR T in Singapore: NexT Technology to Reduce Costs and Expand Access

Cancer is a leading cause of death globally. Tackling it requires a range of strategies, many of which have had limited success in advancing the war on cancer. Recently, CAR T-cell immunotherapy—engineering a patient's immune cells to target cancer—has emerged as one of the most advanced treatment approaches. However, a key challenge is efficiently delivering genetic material to the targeted immune cells. In Singapore, a CAR T-cell infusion can be heartbreakingly expensive; a single treatment can cost around SGD 670,000. Dr Andy Tay and his team aim to lower treatment costs through a platform called Nanostraw Electro actuated Transfection (NexT), which uses tiny hollow nanostructures and electrical pulses to insert a wide variety of biomolecules, such as proteins, mRNA, and gene editing tools, into immune cells with high efficiency and minimal disruption. Their method has demonstrated efficacy and versatility, delivering genetic material to immune cells in a single run, including cell types that are traditionally challenging such as gamma delta T cells, regulatory T cells, dendritic cells, macrophages, natural killer cells, and neutrophils.

Diabetes I Exploratory SGH study: Non-invasive Magnetic Muscle Therapy Shows Promise in Type 2 Diabetes Treatment

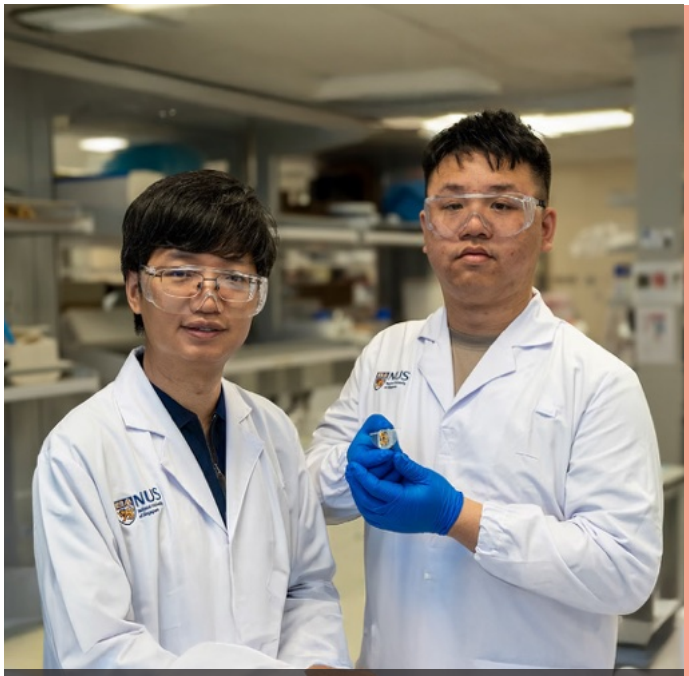
FS Tseng, GH Lim, YM Bee et al., *Journal of Clinical Medicine*, 2025

A/Prof Alfredo Franco-Obregón and his co-founded startup, QuantumTX, have initiated an exploratory study with Singapore General Hospital to utilise a promising, non-invasive treatment pathway for Type 2 diabetes. After 12 weeks of treatment, the results are promising: the HbA1c level dropped from 7.5% to 7.1%, moving toward a well-controlled diabetes range (6.5%–7.0%). This is a significant finding for a patient group in which traditional management through diet and exercise can be challenging. The technology works by stimulating the body's mitochondria, effectively mimicking the metabolic benefits of exercise at a cellular level. This preliminary success paves the way for the next phase: the team is now recruiting for larger, longer-term studies.

Diabetes I Targeting Inflammation to Heal: A Microneedle Patch for Diabetic Wounds

Z Le, Y Shou, RR Li et al., *Advanced Functional Materials*, 2025

Diabetes can cause a range of diverse adverse symptoms to our health, notably leading to chronic and non-healing wounds due to persistent inflammation, with serious consequences such as amputation, causing severe mental distress and financial strain for patients and their families worldwide. Dr Andy Tay and his team have developed a microneedle patch to treat these non-healing diabetic wounds. The sponge-like patch combats inflammation in two ways: 1. Removing harmful factors from the wound that worsen inflammation using heparin-coated porous microneedles. 2. Delivering interleukin-4, an immunomodulatory protein that promotes tissue regeneration. Preclinical studies show this dual-action approach significantly accelerates healing, offering a promising solution for diabetic wound care.



X Li, X Xiao, Z Liu et al., *Science Advances*, 2025

AI & Robotics I Rethinking Miniature Robotics: Flexible Battery, Magnetically Actuated Soft Bots

As battery-powered devices shrink, their power capacity and runtime diminish—and rigidity often increases, especially in conventional batteries. These constraints make miniaturized systems difficult to deploy in critical, harsh environments. To overcome this, iHealthtech Principal Investigator Dr Wu Changsheng and his team have developed a tiny, flexible, battery-powered autonomous soft robot with embodied intelligence and magnetic actuation for aquatic operations. Its flexible battery overcomes rigidity limitations, while the robot's own magnetic field can be harnessed to enhance performance. Together, these advances enable soft robots that can think and act autonomously in complex or inaccessible spaces such as inspecting narrow channels, monitoring marine habitats, or supporting medical interventions in the operating theatre.

Startup I Regulatory milestone: QuantumTX's BIXEPS approved for clinical use by FDA and HSA

QuantumTX, a startup offering innovative magnetic muscle therapy co-founded by A/Prof Alfredo Franco-Obregón, has achieved regulatory approvals from the FDA and HSA for the clinical use of its BIXEPS device. This milestone paves the way for broader deployment to support the well-being and healthy ageing of older adults, providing an accessible, safe, effective, and non-invasive, low-burden option to help maintain muscle strength.

Startup I Tacniq selected for NUS BLOCK71–Microsoft programme accelerating generative AI startups

Tacniq, a startup pioneering physical AI—enabling machines to sense, learn, and act with real-world intuition through touch and vision—co-founded by Prof Benjamin Tee, has been selected for the Generative AI Accelerate Cohort 2025, a 10-week programme supported by NUS BLOCK71 and Microsoft. The programme targets promising pre-seed to Series A startups using generative AI, helping them accelerate growth and reach their next business milestones.

Community I Together We Advance: Caring for iHealthtech Community's Wellbeing

As a health institution, we must remember to care for our community even as we strive to create meaningful and lasting impact in healthcare. iHealthtech benefits from being part of a larger support ecosystem at NUS, with strong university-wide attention to staff wellbeing and professional development.

In 2025, our core team actively organised activities that forged new bonds, strengthened existing ties, and shared laughter and cheer, such as a friendly badminton session, a Botanic Gardens excursion, and our grand year-end celebration. Looking ahead, our New Year resolutions, alongside supporting our staff and students to achieve excellence in research and technology translation, are to foster a more inclusive community and build a stronger, more connected network that helps us support one another even better.

Awards and Honours

Gloryn Chia	EMBO Global Investigator
Lim Chwee Teck	President's Science Award 2025, Elected International Fellow of the Royal Academy of Engineering, NUS Distinguished Alumni Award, The International Federation for Medical and Biological Engineering (IFMBE) Otto Schmitt Award 2025
Roger Ho	Highly Cited Researchers 2025 by Clarivate
Benjamin Tee & Team	The Institution of Engineers, Singapore (IES) Sustainability Award 2025
Ali Asgar Bhagat, Alfredo Franco-Obregón, John Ho, Roger Ho, Brian Lim, Lim Chwee Teck, Andy Tay, Benjamin Tee & Wu Changsheng	World's Top 2% Scientists 2025
Andy Tay	Young Scientist Award 2025, 2025 Susan Lim Young Investigator Award, Stem Cell Society Singapore, Asia-Pacific Research Networking Fellowship – IUPESM World Congress on Medical Physics and Biomedical Engineering 2025, Asia Pacific Biomedical Engineering Consortium (APBEC) Young Scholar Award, The International Alliance of Research Universities (IARU) Early Career Collaboration Award, Young Scientist Award by BioEM Society
Liu Xiaogang	University Research Recognition Award
Benjamin Tee	Tatler Gen.T Leaders of Tomorrow 2025, NUS CDE Dean's Chair
Shao Huilin	NUS CDE Design and Technology Innovation Award 2025

New Principal Investigator

Professor Liu Xiaogang
Department of Chemistry

Energy transfer in nanocrystals, optical nanotechnologies, X-ray scintillators for diagnostics, and wearable electronics.

Staff Promotions

Professor
Benjamin Tee

Associate Professor with Tenure
Cheow Lih Feng

Selected Publications

J Yang, BCK Tee, et al. Non-hazardous and fully recyclable ionic thermoelectrics for sustainable human–machine interfaces, ***Nature Communications*** (2025)

Z Le, A Tay, et al. Microneedle-based biofertilizer delivery improves plant growth through microbiome engineering, ***Advanced Functional Materials*** (2025)

C Li, C Wu, et al. Wireless, wearable elastography via mechano-acoustic wave sensing for ambulatory monitoring of tissue stiffness, ***Science Advances*** (2025)

M Liu, & BCK Tee, et al. Recyclable self-secreting autonomous healing dielectrics for millisecond water quality sensing, ***Nature Communications*** (2025)

J Wang, CT Lim, B Sheng, et al. An adaptive AI-based virtual reality sports system for adolescents with excess body weight: a randomized controlled trial, ***Nature Medicine*** (2025)

S Chen, CT Lim, et al. Transforming healthcare: intelligent wearable sensors empowered by smart materials and artificial intelligence, ***Advanced Materials*** (2025)

R Lin, JS Ho, et al. Soft electronics based on particle engulfment printing, ***Nature Electronics*** (2025)

J Qi, CT Lim, et al. Bridging the digital–physical divide using haptic and wearable, ***Nature Electronics*** (2024)