

THREE MINUTE THESIS COMPETITION 2026

19 MAY 2026
VR ZONE, LEARNING GARDEN, UNIVERSITY LIBRARY



2:00 PM | Registration

2:15 PM | Opening

- **Opening Remarks**
Mr. Benjamin Meunier, University Librarian, CUHK Library
- **Speech**
Prof. Cecilia Chun, Director, Centre for Learning Enhancement And Research (CLEAR)

2:30 PM | 3-Minute Presentations -- Session 1, Presentations 1 to 8

3:00 PM | Networking Break

3:15 PM | 3-Minute Presentations -- Session 2, Presentations 9 to 16

3:45 PM | Networking Break

4:00PM | 3-Minute Presentations -- Session 3, Presentations 17 to 24

4:30 PM | Networking Break

5:15 PM | Award Ceremony

- **Overall Comments on Presentations**
Prof. Anthony So, Dean, Graduate School
- **Presenting the People's Choice & 3rd Runner-up**
Mr. Benjamin Meunier, University Librarian, CUHK Library
- **Presenting the 2nd Runner-up**
Dr. Yvonne Loong, Acting Co-Director, Independent Learning Centre
- **Presenting the 1st Runner-up**
Prof. Wendy Lee, Associate Dean (Development), Graduate School
- **Presenting the Champion**
Prof. Anthony So, Dean, Graduate School



香港中文大學
CUHK
研究院
Graduate
School



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The Chinese University of Hong Kong Library

LIST OF PARTICIPANTS

19 MAY 2026
VR ZONE, LEARNING GARDEN, UNIVERSITY LIBRARY



- 1 | Miss Yuqi WU, Department of Medicine and Therapeutics, Faculty of Medicine
- 2 | Mr Chang YU, Earth System and GeoInformation Science, Inter-Faculty
- 3 | Mr Jiahao ZHOU, School of Life Sciences, Faculty of Science
- 4 | Mr Meiguang CHEN, Department of Mathematics, Faculty of Science
- 5 | Miss Anum SALEEM, Department of Geography and Resource Management, Faculty of Social Science
- 6 | Miss Yue WANG, Department of Medicine and Therapeutics, Faculty of Medicine
- 7 | Ms Xuechun WANG, Department of Educational Administration and Policy, Faculty of Education
- 8 | Miss Jifei WANG, Department of Geography and Resource Management, Faculty of Social Science
- 9 | Mr Qian WU, Department of Computer Science and Engineering, Faculty of Engineering
- 10 | Ms Jun LIU, Department of Biomedical Engineering, Faculty of Engineering
- 11 | Ms Shuqi WANG, Department of Linguistics and Modern Languages, Faculty of Arts
- 12 | Mr Jingru ZHUANG, Department of Chemistry, Faculty of Science
- 13 | Mr Cheuk Yin HO, Department of Sports Science and Physical Education, Faculty of Education
- 14 | Mr Jianming SHEN, Department of Medicine and Therapeutics, Faculty of Medicine
- 15 | Miss Jun WANG, Department of Social Work, Faculty of Social Science
- 16 | Ms Tsz Ching YEUNG, Department of Obstetrics and Gynaecology, Faculty of Medicine
- 17 | Miss Cheuk Yan CHUNG, Department of Obstetrics and Gynaecology, Faculty of Medicine
- 18 | Mr Ruijie ZENG, Department of Medicine and Therapeutics, Faculty of Medicine
- 19 | Mr Hoi Cheung CHEUNG, The Jockey Club School of Public Health and Primary Care, Faculty of Medicine
- 20 | Ms Yikun NIE, Department of Electronic Engineering, Faculty of Engineering
- 21 | Mr Jonathan Zhen Chong CHAN, Department of Music, Faculty of Arts
- 22 | Ms Yu JIANG, School of Hotel and Tourism Management, Faculty of Business Administration
- 23 | Ms Danyang LEI, School of Architecture, Faculty of Social Science
- 24 | Ms Sze Nga Myrian FAN, The Nethersole School of Nursing, Faculty of Medicine



Miss Yuqi WU
PhD in Medical Sciences
Department of Medicine and Therapeutics
Faculty of Medicine

A Different Gut Recipe: Unlocking Autism's Diet-Microbiome Interactions

While the link between autism spectrum disorder (ASD) and the gut microbiome is well established, it remains unclear how dietary inputs lead to microbial dysregulation. In this study, we analyzed metagenomic data and dietary patterns from 818 children. Our goal was to move beyond simple correlations and identify how diet and the microbiome interact at a functional level.

Our findings reveal a striking heightened microbial responsiveness within the ASD gut. While neurotypical children maintained a relatively stable microbial ecology, the gut microbiome in children with ASD exhibited a disproportionately reactive interaction network in response to nutritional inputs. We found that poor dietary quality was not merely a co-occurrence but a primary driver of core autistic symptoms and gastrointestinal distress.

Most notably, we identified synthetic emulsifiers—specifically polysorbate-80 and carrageenan—as "network disruptors." In children with ASD, these common food additives were linked to a fragmentation of microbial connectivity and a significant downregulation of neuroprotective metabolite synthesis. Intriguingly, this disruptive effect was markedly attenuated in neurotypical peers, suggesting that the ASD gut ecology is uniquely vulnerable to modern processed food constituents.

By integrating multi-omics data with clinical phenotyping, we show how specific dietary factors, especially synthetic additives, may influence neurodevelopment through microbial shifts. These findings suggest that current dietary guidelines for ASD should be re-evaluated. They also provide a basis for developing personalized nutritional strategies that target the gut-brain axis.





Mr Chang YU
PhD in Earth System and GeoInformation Science
Earth System and GeoInformation Science
Inter-Faculty

Drought-Induced Acceleration of Land Subsidence in the Mekong Delta, Vietnam: Insights from Satellite Radar Remote Sensing

The Mekong Delta, one of the world's most productive and densely populated deltas, has been experiencing significant land subsidence for decades, greatly increasing its vulnerability to coastal erosion, flooding, and permanent land loss. This research reveals that severe droughts can dramatically intensify subsidence rates. Using satellite radar remote sensing time series, we observed rapid subsidence on the order of 7 cm within only a few months during the 2020 drought event. In two coastal regions, an uncompensated surface drop of up to 3.5 cm occurred, which we attribute to irreversible deformation. The magnitude and spatial pattern of drought-induced subsidence were strongly correlated with specific surface water management practices and land-use types, particularly rain-fed rice cultivation zones.

Such irreversible subsidence has profound long-term consequences for the delta's elevation and resilience. With climate change projected to increase the frequency and intensity of droughts, these episodic subsidence events will further accelerate relative sea-level rise and exacerbate flood risk and land loss. This highlights the urgent need for integrated mitigation strategies that align with the United Nations' Sustainable Development Goals. Specifically, addressing drought-induced subsidence is critical for SDG 9 (building resilient infrastructure), SDG 11 (making cities and human settlements inclusive, safe, resilient and sustainable), and SDG 13 (taking urgent action to combat climate change and its impacts).

Our findings underscore that drought is an under-recognized but increasingly important driver of subsidence in the Mekong Delta, calling for immediate policy and management interventions to safeguard the region's future.





Mr Jiahao ZHOU
PhD in Cell and Molecular Biology
School of Life Sciences
Faculty of Science

Development of a genetically encoded protein crystal for the oral delivery of therapeutic peptides to treat colorectal cancer

Colorectal cancer (CRC) is the third most commonly diagnosed cancer worldwide and the second leading cause of cancer-related mortality, necessitating innovative therapeutic strategies. The LL-37 peptide has demonstrated promising anti-cancer activity against CRC cells. However, its clinical translation is hindered by rapid proteolytic degradation, particularly during oral administration. To address this challenge, we developed a novel oral delivery system, Cry3Aa(iRGD)-MIIA(D45E)-LL37-RKOpep, using Cry3Aa protein crystals as a protective carrier for LL-37 with enhanced tumor penetration and targeting abilities. Our studies confirmed that Cry3Aa crystals effectively encapsulate and protect LL-37 in acidic environments that mimic gastric conditions, and enable its release under neutral pH, simulating the colonic environment. In vitro assays demonstrated that the fusion crystals significantly inhibited CRC cell proliferation and penetrated 3D tumor spheroids. Preliminary in vivo studies using an orthotopic CRC mouse model revealed efficient targeting, tumor penetration, and suppression by the fusion crystals following oral administration, with no observable toxicity upon repeated dosing. These findings suggest that Cry3Aa-based fusion crystals represent a promising platform for the oral delivery of LL-37 as a therapeutic agent for CRC. Ongoing research will focus on elucidating the mechanisms of action in CRC cells and further assessing the therapeutic efficacy of this delivery system using CRC orthotopic mouse models.





Mr Meiguang CHEN
PhD in Mathematics
Department of Mathematics
Faculty of Science

Implosion for the Compressible Navier-Stokes Equations with Density Dependent Viscosity

The formation of singularities in compressible Navier-Stokes equations remains central in mathematical fluid dynamics. Existing results indicate that finite-time shock formation (jump discontinuities propagating along surfaces) does not occur, owing to viscous smoothing. In contrast, finite-time implosion—where density blows up to infinity at an isolated point—can develop. These are distinct: shocks form codimension-one discontinuity surfaces, whereas implosion is a stronger, localized point singularity with unbounded density concentration.

We find that the form of the viscosity coefficients fundamentally determines whether a compressible fluid can develop singularities—such as implosion with infinite density—in finite time. It was previously known that, in three dimensions, constant viscosity can lead to implosion, whereas viscosity proportional to density (as in the shallow-water equations) prevents singularity formation.

In this work, we investigate viscosity coefficients proportional to ρ^δ . We prove that when δ lies below a critical threshold (which depends on the fluid's adiabatic exponent γ), finite-time implosion occurs in three dimensions even if the initial density is strictly positive. The underlying reason is that the dissipative effect becomes too weak to counteract the compressive convection.

In addition, we obtain two further results. First, we construct imploding solutions whose viscosity coefficients are independent of the adiabatic exponent γ , showing that the implosion mechanism does not rely on this specific thermodynamic parameter. Second, we establish that analogous finite-time implosion can also occur in two dimensions and in other spatial dimensions, thereby extending the phenomenon beyond the three-dimensional case.

These findings highlight the subtle yet decisive role of viscosity structure in multi-dimensional fluid dynamics: whether a flow remains smooth or collapses hinges critically on how strongly the viscosity depends on density.





Miss Anum SALEEM

PhD in Geography and Resource Management

Department of Geography and Resource Management
Faculty of Social Science

Comparative efficiency of endophytic bacteria varies across different application methods in enhancing growth and yield of maize

Overuse of chemical fertilizers has resulted in soil and environmental degradation, emphasizing the need for ecologically sound biological approaches for yield enhancement of different crops. Endophytic bacteria have a great deal of potential to boost crop productivity, but how the relative efficacy of individual strains and their consortium varies under different application methods is poorly understood. Considering this, the current study investigated the comparative effectiveness of *Burkholderia phytofirmans* PsJN, *Enterobacter* sp. MN-17, and *Bacillus* sp. MN-54 and their consortium on growth and yield, nutrient acquisition, and physiology of maize by using soil, seed, and foliar inoculation methods in a pot experiment. It was observed from the results that all endophytic bacterial strains and their consortium performed better as compared to the control treatment in all application methods. Application of the consortium consistently showed a maximum significant increase in cobs' fresh weight by 224-270 g, cobs' dry weight by 111-141 g, and 1000 grain weight by 241-249 g as compared to the control. Likewise, the consortium substantially strengthened the physiological performance of maize by improving stomatal conductance (221-250 $\text{mmol m}^{-2}\text{s}^{-1}$), chlorophyll content (47-57 SPAD value), and leaf area (436-540 cm^2). The consortium also illustrated a remarkable increase in nutrient uptake in N (3.99-4.26%), P (0.49-0.63%), and K (2.89-3.315%) in plant tissue. Performance of individual strains demonstrated clear variation across application methods. *Burkholderia phytofirmans* PsJN performed best in the foliar application method, *Enterobacter* sp. MN-17 and *Bacillus* sp. MN-54 showed outstanding results in seed treatment and soil application, respectively, while the consortium exhibited superior results to the isolated strains in all application methods. Our findings suggest that endophytic bacteria could be efficiently used to enhance the growth and yield of maize, potentially reducing the need for chemical fertilizers and providing extensible pathways for sustainable agriculture.





Miss Yue WANG
PhD in Medical Sciences
Department of Medicine and Therapeutics
Faculty of Medicine

Finding the Right Blood Sugar Target for People with Diabetes, with or without Liver Disease

Background

For people with type 2 diabetes, keeping blood sugar (measured as HbA1c, reflecting individuals' blood sugar in 3 months) under control is important to prevent heart attacks and strokes. But when patients also have cirrhosis, treatment choices are limited and low blood sugar (hypoglycemia) becomes a real danger. We aimed to find the safest blood sugar target for them.

Methods

We studied 695,549 adults with diabetes in Hong Kong, including about 19,000 with cirrhosis (compensated and decompensated cirrhosis, namely, early-stage and advanced). We tracked who developed major heart or main vascular events, died, and had hypoglycemia episodes.

Key findings

- For all patients – with or without cirrhosis – a HbA1c level below 7% was associated with the lowest risk of heart attacks and strokes.
- All patients with or without cirrhosis with HbA1c level of 6-7% had the lowest risk of mortality.
- The risk of hypoglycemia was high in those with decompensated cirrhosis: over 15.9% of them had a severe hypoglycemia event within 10 years.

Why this matters

- The ideal blood sugar target for protecting the heart is the same for people with cirrhosis as for those without – HbA1c <7%.
- But caution is needed. In patients with advanced cirrhosis, aiming too low can trigger dangerous hypoglycemia. Doctors should still target <7% for heart health, while carefully monitoring and preventing low blood sugar.

Take-home message

For diabetes patients with liver cirrhosis, a moderate blood sugar goal (HbA1c <7%) is safe for the heart, but be cautious for low sugar, especially in more severe liver disease.





Ms Xuechun WANG

PhD in Education

Department of Educational Administration and Policy
Faculty of Education

Validating AICoMeta: a Human-AI Collaborative Platform for Meta-Analysis Through Computational Replication in Educational Research

Meta-analysis is a foundational approach to evidence synthesis in academic and policy, yet systematic reviews remain prohibitively resource-intensive – averaging 67 weeks and \$141,000 per review. While large language models (LLMs) show promise in automating workflows, their validation in academic contexts remains limited, where methodological diversity, disciplinary terminology ambiguity, and varied reporting quality pose critical challenges.

This study presents AICoMeta (AI Collaborative Meta-analysis), a human-AI platform purpose-built for educational systematic reviews, and validates its performance through computational replication of six published meta-analyses (N = 488 studies, Effect size = 1,802, participants over 378,000). Using a replication-based mixed-methods design, we evaluate AICoMeta across four dimensions: accuracy and reliability, efficiency and optimization, context-dependent performance, and decision consistency with policy implications. Validation spans two streams: 1) judging (applying inclusion/exclusion criteria) to screen large amounts of abstract and 2) coding (retrieving study, sample, intervention, and effect size data) included full-text literature with multiple-LLMs. Test-retest reliability assessments embedded across multiple model comparisons was also conducted.

This research is motivated by an origin question: what happens when rigorous evidence synthesis is no longer the exclusive privilege of well-resourced institutions? Tools like AICoMeta hold real chances for researchers and policymakers in under-resourced contexts, where the infrastructure for large review teams rarely exists yet the need for timely, high-quality evidence to inform educational decisions is just as pressing. Beyond expanding access, it also opens a door of retrospective auditing of published meta-analyses. Work that was once too labor-intensive to scrutinize during peer review can now be systematically re-examined, surfacing coding inconsistencies, extraction errors, and methodological blind spots that may have quietly shaped the evidence base for years. In this sense, tools like AICoMeta does not merely accelerate how we conduct future reviews, it invites us to revisit, and potentially correct, the foundations we have already built upon.





Miss Jifei WANG

PhD in Geography and Resource Management

Department of Geography and Resource Management
Faculty of Social Science

Understanding Intercity Youth Migration Based on Geotagged Social Media Data

Where young people move shapes the future of cities. In China, youth migration is a key force behind urban growth, labour redistribution, and regional development. Yet we still know surprisingly little about how these migration patterns changed after the COVID-19 pandemic. Traditional census data are too infrequent to capture rapid mobility changes, while social media data can track movements in real time but are often biased and unrepresentative.

My research focuses on young people aged 15 to 34 and uses geotagged Sina Weibo check-in data, carefully adjusted against official statistics, to build a more reliable picture of intercity migration in China from 2021 to 2024. I combine large-scale spatial analysis with text analysis of social media posts to understand not only where young people move, but also why they move and how they adapt after relocation.

The findings show that post-pandemic youth migration is not simply returning to its old pattern. Instead, China's migration network has become more connected and more locally clustered at the same time, revealing a more resilient and reorganised system. Major megacities remain highly attractive, but some second-tier regional hubs are gaining importance. I also find clear gender differences: young women are more strongly drawn to cities with better amenities and lifestyles, while young men are more likely to move toward manufacturing-oriented cities. At the individual level, migrants' emotions and well-being also change in response to the social and urban environments of destination cities.

This research shows how digital trace data can help us better understand youth mobility and provides evidence for more inclusive urban and regional policy in the post-pandemic era.



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Mr Qian WU

PhD in Computer Science and Engineering

Department of Computer Science and Engineering

Faculty of Engineering

HealthCards: Text-to-Image Generation as Visual Aids for Healthcare Knowledge Democratizing and Education

Medical/healthcare knowledge is essential—yet it is often difficult to access and understand. Complex terminology and dense textbooks create a significant gap between medical expertise and real-world understanding. For students, this leads to information overload and fragmented learning; for patients, it limits their ability to understand and act on health information in their daily lives.

Visual explanations—such as diagrams and flashcards—are widely recognized as effective learning tools because they simplify complex ideas and improve memory. However, creating these materials requires substantial time, domain expertise, and careful design, making them difficult to scale. Furthermore, most existing resources are designed as “one-size-fits-all,” failing to adapt to different backgrounds, literacy levels, or learning needs.

In this work, we introduce “HealthCards,” an AI-powered framework that automatically generates medical visual aids. By transforming complex clinical information into concise and structured visual flashcards, this method aims to support more efficient and adaptive content creation for both education and public communication.

HealthCards could support personalized learning in medical education by reinforcing key concepts, improving retention, and helping address individual knowledge gaps. For the general public, it may serve as a visual aid that adapts health information across different literacy levels and languages, making it easier to understand at a glance.

By enabling more scalable and adaptable visual health communication, we envision that this work can help bridge the gap between professional medical knowledge and public understanding. Ultimately, it points toward a future where medical information becomes more accessible, interpretable, and usable for a wider audience.



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Ms Jun LIU
PhD in Biomedical Engineering
Department of Biomedical Engineering
Faculty of Engineering

Microbe-gut-joint axis-on-a-chip to reveal the effect of probiotics on arthritis

Osteoarthritis (OA) is a prevalent joint disease that is characterized by cartilage degradation and currently lacks disease-modifying therapies. Growing evidence implicates gut microbiome–cartilage crosstalk in OA pathogenesis and treatment. However, the microbe-gut-joint axis is experimentally challenging to recapitulate, as *in vivo* animal models have intrinsic genetic and physiological differences from human patients, while conventional *in vitro* systems are inappropriate for simulating human-specific host–microbe interactions in the presence of oxygen gradients and fluid shear stress. Consequently, the replication of gut microbiome–cartilage crosstalk in a controllable microenvironment has not been achieved. We report here the engineering of a first-of-its-kind, microbe-gut-cartilage axis-on-a-chip (MGCAoC) with tissue-specific microenvironments and real-time tissue communication. The chip design and flow conditions were optimized based on computer simulation to establish a stable anoxic–oxic interface for the gut module and to impose physiological shear to intestinal epithelium and cartilage organoids (COs). The platform enabled the perfusion of metabolites from anaerobic and aerobic probiotics seeded on human intestinal epithelium to bone marrow mesenchymal stem cell (BMSC)-derived COs without cross-contamination. Multiomics profiling revealed that probiotic metabolites contribute to cartilage anabolism by modulating the PI3K/MAPK/P38 pathway, upregulating gene expression of collagen type II (COL2A), Sox 9 (SOX9), and aggrecan (ACAN), while suppressing metalloproteinase 13 (MMP13) and a disintegrin and metalloproteinase with thrombospondin motifs 4 (ADAMTS4). To verify the therapeutic effects of the identified components of probiotic metabolites, enriched individual metabolites were used to treat OA patient-derived COs. The results reproduced the chondroprotective effects of probiotics observed in the MGCAoC, supporting the translational relevance of the findings. The first-of-its-kind MGCAoC platform reported herein paves the way for in-depth investigations into the physiological effects and the underlying molecular mechanisms associated with the microbe-gut-joint axis, as well as the preclinical screening of probiotic strains and their metabolites as potential disease-modifying OA therapeutics.





Ms Shuqi WANG

PhD in Linguistics

Department of Linguistics and Modern Languages

Faculty of Arts

Do AI Models Predict Language Like Humans Do?

When we listen to someone speak, our brains don't just passively receive words – we actively predict what's coming next. Before a speaker even finishes a sentence, we've already guessed the ending. This remarkable ability makes human communication fast and efficient. But can AI language models do something similar?

My research investigates this question by progressively deepening the comparison between humans and AI across three studies in Mandarin Chinese. First, I showed an AI model the same images and sentences that human participants saw in an eye-tracking experiment. The model could predict objects based on verb meaning – resembling human patterns – but struggled when predictions required social knowledge, like using a speaker's gender to anticipate what they might refer to. Next, I asked both humans and three different AI models to continue the same Mandarin sentences. Both showed sensitivity to grammatical structure, but the AI models tended to exaggerate the effect – appearing to over-rely on word order patterns rather than meaning. Finally, I gave a speech-capable AI model actual spoken Mandarin – the same audio that human listeners heard – while both viewed the same images. This is where the most interesting difference emerged: humans began showing sensitivity to sentence structure well over half a second before critical information appeared, suggesting genuine anticipatory prediction, while the model's sensitivity emerged only after encountering explicit cues in the input – more consistent with reactive processing than true anticipation.

Together, these findings point to a surprising paradox: AI models can often predict similar words as humans, but the way they arrive at those predictions appears to be fundamentally different. Understanding this divergence may help both improve AI design and deepen our scientific understanding of how the human brain processes language.





Mr Jingru ZHUANG
PhD in Chemistry
Department of Chemistry
Faculty of Science

Photocharging of Poly(heptazine amide) accompanied with the dealkylation of tertiary amines

Have you ever considered the possibility of capturing sunlight and utilizing it later, in a way that plants do? In this study, I achieve this by using a specialized material known as poly(heptazine imide) (PHI).

In nature, leaves capture the solar energy and store it in a NADPH molecule. Inspired by this, I use PHI as a "chemical sponge". When irradiated with light, PHI absorbs electrons and protons from common chemicals. This process is called "photocharging". Consequently, the chemicals are broken down into more useful products for chemical industry.

What makes this material special? First, while establishing the great performance, this study turns a vague concept into a measurable metric for the measurement of "photocharging". Second, in the context of the significant challenge of storing renewable energy, our work demonstrates that a simple material can capture light energy and release it on demand. This could eventually lead to artificial photosynthesis systems that convert sunlight into storable fuel. Finally, this work points toward energy independence with photochargeable materials. By integrating such materials into urban surfaces, Hong Kong could move closer to a decentralized, solar driven chemical energy storage system, reducing reliance on imported electricity and fossil fuels.

My findings provide a molecular-level understanding of how light-driven charge storage works in poly(heptazine imide). This knowledge opens new pathways for designing artificial photosynthesis systems that capture solar energy and release it on demand, representing a step toward sustainable, light-powered chemical synthesis.





Mr Cheuk Yin HO
PhD in Education
Department of Sports Science and Physical Education
Faculty of Education

Not just clumsiness: Decoding muscle synergy patterns among children with developmental coordination disorder as they walk

Developmental Coordination Disorder (DCD) affects approximately 6 to 9% of children in Hong Kong, presenting as motor deficits that affect activities of daily living and often persist into adulthood. The consequences – including poor academic performance, physical inactivity and low self-efficacy – were frequently overlooked and masked under the colloquial label of “mere clumsiness”. While gait deficits are widely documented, the underlying neuromuscular mechanisms – the “why” behind these challenges – have remained unclear.

This study employed 3D motion capture to record gait patterns among children with DCD and their typically developing peers, both overground and on a treadmill, at different walking speeds. Additionally, lower-limb muscle activity was recorded using electromyography (EMG). By studying muscle synergies – the modular “building blocks” that simplify complex motor control – we sought to explain how differences in synergy patterns affected children with DCD’s adaptation to different walking speeds and environmental constraints and how their motor adaptation strategies differ from their typically developing peers.

Consistent with previous findings, the typically developing children demonstrated four distinct muscle synergies across all speeds, whereas almost half of the DCD group exhibited only three. Delayed synergy activation among participants with DCD may explain their longer stance time, reflecting a prioritization of stability over movement efficiency. The composition of their synergies revealed greater co-contractions, reinforcing the more rigid and simplified motor control strategies observed in the disorder.

Beyond observable “clumsiness”, this research bring us closer to a potential neuromuscular “signature” for DCD. Our findings established a solid foundation for precision interventions that address unique motor control profiles among children with DCD, rather than generic physical activities. Ultimately, this work aims to replace the “clumsiness” label with evidence-based support, empowering children with DCD to move confidently and effectively in sports, play and daily lives.





Mr Jianming SHEN
PhD in Medical Sciences
Department of Medicine and Therapeutics
Faculty of Medicine

Removing the Security Guard: How Inhibiting ADAT2 Lets Immune Cells Attack Cancer

Colorectal cancer (CRC) is a leading cause of cancer death worldwide. While immunotherapy has revolutionized treatment, many patients don't respond because their tumors create an "immune-cold" environment, blocking immune cells from attacking. We need new strategies to heat these tumors up.

Our team discovered a surprising culprit: a protein called ADAT2. Think of ADAT2 as a molecular security guard that tumors hire to keep immune soldiers out. By analyzing patient samples and animal models, we found that high ADAT2 levels correlate with fewer immune cells inside tumors—specifically dendritic cells (DCs), the "generals" that coordinate immune attacks, and CD8+ T cells, the "foot soldiers".

When we genetically removed ADAT2 from cancer cells, something remarkable happened. The tumors shrank dramatically—not because we killed cancer cells directly, but because we unleashed the immune system. DCs suddenly rushed into the tumor, called in T cells, and launched a coordinated assault.

The mechanism is elegant: without ADAT2, cancer cells produce more CX3CL1, a "chemical invitation" that recruits DCs. More DCs mean stronger T cell activation. Even better, combining ADAT2 inhibition with existing anti-PD1 immunotherapy showed powerful synergy in humanized mice.

Our findings reveal ADAT2 as a novel immunotherapy target. By inhibiting this single protein, we can transform "cold" tumors into "hot" ones, potentially helping thousands of CRC patients who currently don't benefit from immunotherapy. We're now developing nanoparticle-based delivery systems to bring this approach to the clinic.





Miss Jun WANG
PhD in Social Welfare
Department of Social Work
Faculty of Social Science

Breathless Together: How Couples Communicate Through Chronic Lung Disease

Picture a couple who have shared a bed for forty years. One of them now struggles to breathe through the night. The other lies awake listening. Neither says a word. This is the reality for millions of couples living with Chronic Obstructive Pulmonary Disease, COPD, a progressive lung condition and one of the top three causes of death worldwide. In China alone, nearly 100 million people live with COPD, and for most older adults, their spouse is their closest source of care, comfort, and support. Yet remarkably, little research has ever asked: what happens between them?

Communication about illness is rarely straightforward. Breathlessness itself can make conversation physically exhausting. Chinese cultural expectations often discourage open discussion of health concerns, as many people feel that expressing worry or distress would burden those they love. As a result, couples frequently find themselves navigating one of the most difficult experiences of their lives without fully talking about it. This raises an important question: how do couples communicate about COPD, and does the way they communicate shape their wellbeing?

A survey of 261 couples found that couples who communicated openly and offered mutual support reported better psychological health and greater marital satisfaction. However, when one partner repeatedly sought conversation while the other withdrew, or when both partners avoided the topic entirely, both individuals tended to experience poorer outcomes. Follow-up in-depth interviews with 30 couples revealed the lived reality behind these patterns. Patients often stayed silent to protect their spouses from worry, while spouses gradually withdrew from communication after repeated attempts to engage were unmet.

These findings suggest that supporting couples living with chronic illness requires attention not only to medical care, but to the everyday conversations that hold a relationship together.





Ms Tsz Ching YEUNG
PhD in Obstetrics and Gynaecology
Department of Obstetrics and Gynecology
Faculty of Medicine

Turning Down the Pain by Acu TENS in Women under Miscarriage Care

Background

Miscarriage is common, happening in about one in five pregnancies, and it can be an overwhelming emotional and physical experience. The current common treatment, called manual vacuum aspiration (MVA), is very safe and fast, but many women still feel severe pain even with pain relief medication. A simple technology called acu TENS gently stimulates acupuncture points on the skin using small electrical pulses, no needles involved. It has been shown to reduce pain in other medical procedures. However, no one has tested whether this simple and non-invasive technology can make the MVA procedure less painful. Our study is the first randomized controlled trial of acu TENS for miscarriage undergoing MVA.

Methods

From May 2024 to February 2026, we recruited 66 women undergoing MVA for miscarriage care at Prince of Wales Hospital. They were randomly assigned to receive either real acu TENS or a sham placebo. Pain, stress, and anxiety levels before and during the procedure, and side effects were compared.

Results

Our findings are promising. Women who received acu TENS reported 46% less pain, and their stress and anxiety also dropped more than those of the control group. Importantly, no acu TENS-related adverse effects have been reported so far.

Conclusions

Our current results highlight a promising opportunity: a low-cost, non-invasive, accessible tool that could transform the miscarriage-care experience for women. With more research, acu TENS might become a simple way to turn a painful experience into a more manageable one.





Miss Cheuk Yan CHUNG
PhD in Obstetrics and Gynaecology
Department of Obstetrics and Gynaecology
Faculty of Medicine

Genetics Predicts Early Academic Achievement and Specific Learning Disorders

Early academic abilities in reading and mathematics strongly predict future success and affect long-term quality of life. Studies show that genetics influences academic ability, dyslexia, and dyscalculia. However, which specific genetic variants affect? In the context of bilingual culture in Hong Kong, does genetics affect language abilities in Chinese and English differently? To answer these questions, we recruited >1000 bilingual primary school children in Hong Kong for academic assessments in Chinese, English, and mathematics and collected DNA from their saliva.

Using twin models, we published the first report that genetic overlap between Chinese and English varied across word reading, vocabulary knowledge, and spelling. Looking into common genetic variants, we found that a region near SEMA3F, a gene involved in neuronal development, was a common factor for bilingual vocabulary knowledge but likely a specific factor for English word reading and spelling.

Variation in academic achievement is not only driven by common genetic variants. Rare variants, such as single nucleotide changes and gains/losses of DNA material, may also contribute. We identified several rare variants in, for example, NEGR1 and CSMD3 in twin pairs concordantly affected by specific learning disorders (SLDs). We demonstrated that these variants were too small to be detected by conventional methods and had been neglected.

We further demonstrated that in twin pairs with SLDs, rare, damaging single nucleotide changes clustered in genes involved in neural communication, neuronal maturation, and visual perception. Even in the general population, rare copy number changes were aggregated in genes involved in brain cell connection and communication. These pathways are important for learning and memory.

My thesis reveals that early academic achievement and SLDs are attributed to various types of genetic variants. My data suggest that advanced genetic testing methods help identify children at risk of learning difficulties, enabling earlier support and personalised intervention.





Mr Ruijie ZENG
PhD in Medical Sciences
Department of Medicine and Therapeutics
Faculty of Medicine

Probiotic activates dietary compound to enhance gastric cancer immunotherapy

Background and aims

Gastric cancer has been predominantly linked to harmful bacteria, but good bacteria to protect against gastric cancer remain unknown. Despite therapeutic advances, most patients with gastric cancer do not respond well to immunotherapy such as anti-PD-1 treatment in clinical practice. Thus, we asked what could serve as a probiotic for gastric cancer, and whether it could strengthen anti-cancer immunity to improve immunotherapy outcomes.

Methods

We first analyzed large human datasets of gastric mucosal microbiomes to identify potential beneficial bacteria and their associations with prognosis. We then tested a candidate bacterium, Bifidobacterium, in several mouse models of gastric cancer. Using metabolomics and flow cytometry, we studied how this microbe interacts with diet and immune system. Integrated analysis of human cohorts was used to evaluate the association between dietary genistein and gastric cancer outcomes.

Results

Decrease in Bifidobacterium is linked to gastric cancer development and poorer survival. Bifidobacterium gavage reduces both the number and size of gastric tumors in mice. Bifidobacterium functions as an activator to convert the inactive dietary compound into its active form named genistein. For the underlying mechanism, genistein reshapes tumor metabolism and enhances anti-tumor immunity by reducing CD8⁺ T cell exhaustion, allowing them to recover their tumor-killing function. In mice, Bifidobacterium and dietary genistein improve anti PD 1 immunotherapy efficacy. In large human data involving 1.3 million participants, genistein-rich diet is associated with lower risk and reduced death of gastric cancer.

Conclusion

Overall, our study identifies Bifidobacterium as a promising probiotic for gastric cancer. We propose a practical “probiotics plus diet” strategy to help prevent gastric cancer and enhance immunotherapy.





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Can a Chatbot Help Change People's Substance Use Habit and Promote Safer Sex? Using Rule-Based AI to Help Men Reduce Drug-Linked Sexual Risk

Imagine struggling with a health problem you cannot talk about – not with your doctor, friends or family. For many gay and bisexual men in Hong Kong, this is the reality of chemsex – using drugs before or during sex. Chemsex does not just increase HIV risk. Overdoses are routinely reported, turning what many dismiss as a lifestyle issue into a life-or-death crisis.

Hong Kong is home to 250,000+ gay and bisexual men. 10% engage in chemsex, and of those, 30% need support – approximately 7,500 men. Yet fewer than ten NGOs offer service them. The maths does not work – and fewer than one in ten ever seek help, blocked by stigma, lack of services, and fear of judgement.

What if help could come to you – privately, on your phone, at any hour?

I am conducting the world's first randomized controlled trial testing whether a rule-based AI chatbot on WhatsApp can reduce chemsex and its harms. One hundred men are assigned to two groups. Everyone receives weekly harm reduction podcasts, but the intervention group also gets a chatbot answering over 250 questions about drugs, sexual health, and mental well-being – plus videos matched to each user's stage of change. Changing a deeply ingrained behavior is not a single decision. People struggle through stages – from not thinking about change, to considering it, to acting. Using the transtheoretical model, our chatbot identifies where each person is and delivers content matched to that stage.

This is more than a research study. It is a 24/7 lifeline reaching thousands where overstretched NGOs cannot. Chemsex is a global epidemic devastating communities from London to Sydney to Bangkok. If this trial succeeds, a low-cost, scalable, stigma-free chatbot could turn a simple chat into the frontline response to the global chemsex epidemic.



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Laser Neurons for Ultrafast Bio-Inspired Computing

Artificial intelligence tools such as ChatGPT, Gemini, and DeepSeek are transforming everyday life. These technologies are powered by artificial neural networks, which were originally inspired by biological neural networks in the human brain. The brain's remarkable computing capability arises from its basic processing units—neurons—which process information, transmit signals, and store memories. This raises a fundamental question: can we create an artificial neuron that reproduces powerful neuronal functions while operating at speeds many times faster than a biological neuron?

In this work, we develop a laser-based artificial neuron inspired by biological graded neurons. By engineering specific schemes to manipulate the laser dynamics, we enable the laser to reproduce essential neuron-like properties, including threshold activation, temporal integration, and graded response. This allows the laser to function as a photonic neuron for neuromorphic information processing. Importantly, while biological neurons typically respond on the millisecond timescale, our photonic neuron operates on the picosecond timescale, making it approximately a billion times faster than its biological counterpart. Furthermore, we demonstrate a tunable memory in the laser neuron, enabling flexible adaptation to diverse computational tasks.

Leveraging its rich nonlinear dynamics and tunable memory, we construct a bio-inspired computing system based on this laser neuron. The system performs strongly across a wide range of applications, including medical diagnosis, pattern recognition, and time-series prediction. In proof-of-concept experiments, it realizes arrhythmia detection at a processing rate of 0.1 billion heartbeats per second, and processes 34.7 million images per second. It also successfully generalizes to real-world forecasting tasks, including electricity load and temperature prediction. Our photonic neuron offers the potential to process massive real-world data at ultrafast speeds, paving the way for next-generation intelligent systems and smart cities.



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Not Dead Yet: Cultural Identity, Social Resilience & Doing-It-Together With The Hong Kong Indie Music Scene

This thesis explores the ways that members of the Hong Kong indie music scene have built social resilience during the turbulent times of the pandemic and beyond through negotiations in cultural identity, commoning, alternative economies and building inter-Asia networks. I propose the concept of doing-it-together (DIT) to analyse how the scene's socialities and interpersonal connections are essential to the ability of the scene to remain socially resilient despite the precarious and changing conditions of post-2019 Hong Kong. I demonstrate that precarious and risky circumstances surrounding gig organization and attendance during the pandemic constituted negotiations and constructions of cultural identity, and collective forms of mutual protection strengthened this identity by commoning the livehouse site. Through ethnography of a music festival held at CUHK, I show how the affective relations developed by individuals towards the scene and its members form the basis of a political economy that enacts a form of consumerism oriented not at capitalistic forms of consumption but collective cultural sustainability. Analysing the interpersonal and inter-group connections between those in Hong Kong and across Asia, I also show how these often personal relationships are forming the basis of a growing network of flows allowing musicians in the scene to bring their music abroad to other Asian cities and scenes, enacting an inter-Asia form of connection to other cities and landmarking Hong Kong as a growing member of an Asia-wide indie network. In a case study of one specific band and their fans, I show how alternative forms of socialities between musicians and fans formed relations that crystallise the way that the scene negotiates its ethos regarding notions of autonomy and alternativity to the mainstream. Each chapter demonstrates the importance of intimate socialities in a community and culture's ability to remain resilient through the act of doing it together.





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From Oracle to Partner: How Collaborative AI is Revolutionizing Travel

Imagine planning your dream vacation. You ask an AI travel agent for help, and within seconds, it spits out a rigid, minute-by-minute itinerary. You have no idea how it chose those restaurants or why it skipped your favorite museum. Do you trust it? For 40% of travelers, the answer is a resounding no. Despite the rapid integration of AI in platforms like Expedia and Kayak, consumer frustration remains high due to hallucinations, generic recommendations, and a fundamental lack of user control.

My research tackles this trust deficit by shifting the focus from what AI delivers to how it interacts with us. Current AI systems typically operate in a "Parallel Mode," acting as independent oracles that simply hand down decisions. I propose a shift to a "Collaborative Mode," where the AI acts as an intelligent partner. In this mode, the AI engages in multi-round dialogue, explains its reasoning, and makes decisions with you, rather than for you.

To test this, I conducted an experimental study with 160 participants, comparing these two modes of interaction. The results were striking. When users planned their trips collaboratively with the AI, their acceptance of the technology—measured by trust, satisfaction, and intention to use—skyrocketed. Why? Because of a psychological mechanism called "Perceived Control." Collaborative AI doesn't diminish human agency; it amplifies it. By providing transparent reasoning and active choices, users feel they master the planning process and truly own the final outcome. In fact, perceived control accounted for nearly a third of the increase in AI acceptance.

Ultimately, my research demonstrates that to unlock the true potential of AI in the travel industry, we must stop building black-box tools and start designing empowering partners. The future of travel planning isn't just artificial intelligence; it's collaborative intelligence.





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Rethinking Age-Friendly Neighbourhood Design: How Older Adults' Everyday Leisure Reconfigures Shared Space

When we talk about population ageing and age-friendly environments, we often portray older adults as vulnerable. We emphasise that their physical abilities are declining, and they need protection within the home environment. Yet we often overlook one thing: older adults also seek enjoyment, social connection, and everyday leisure. In a high-rise, high-density city like Hong Kong, such leisure does not usually take place in private gardens or dedicated facilities. Instead, it unfolds in shared community spaces. In this sense, their everyday leisure is a public matter: how do they share space with others and negotiate its use? And do public spaces really respond to their everyday recreational needs?

In this study, I first identified designated leisure spaces and observed how they were actually used on site. I also conducted interviews with older adults to understand their stories. I found that older adults often use spaces in ways they were not originally designed for. For example, a roadside planter may not be designed for seating, yet it can become the most popular resting spot because it offers a wider view for people-watching. Likewise, the entrance to a community centre is not meant for staying but often attracts clusters of older adults chatting after joining activity programmes. The actual function of the space is continuously reshaped through negotiation with other people's activities and community management. In this process, older adults' leisure is not just about individual activity, but about being with and observing others. This phenomenon is often driven by a strong motivation: older adults' desire to stay connected to society, to feel less isolated, and to maintain a sense of belonging. We need to rethink age-friendly design: It is not about adding more age-specific facilities, but about creating spaces that older adults can adapt, share, and enjoy every day.





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Beyond Clinical Walls: Sailing Toward Resilience

Autistic children are often defined by what they struggle with, including difficulties in social interaction, emotional regulation, or fitting into classroom expectations. Over time, these challenges can quietly shape their confidence, well-being, and future opportunities. Yet while many interventions focus on reducing problems, far fewer focus on building resilience, the ability to adapt, recover, and thrive.

My research asks a simple but powerful question:

Can sailing build resilience in autistic children?

This journey began not on the water, but in the literature. Two systematic reviews revealed that nature-based interventions show promise for children's development. Sailing emerged as particularly promising, yet high-quality trials in autistic populations were limited.

I then turned to the community. Through qualitative research, stakeholders described how inclusive outdoor spaces foster belonging, confidence, and growth, and perhaps resilience. Their voices shaped our intervention design.

Building on this foundation, I developed a nurse-led, community-based sailing programme delivered through interdisciplinary collaboration at Sailability Hong Kong. Importantly, it was economically sustainable, supported by community donations rather than hospital resources, demonstrating that innovative mental health support can extend beyond clinical settings.

In a full-scale randomized controlled trial involving 184 school-aged autistic children in inclusive education, we observed a moderate-to-large effect enhancing resilience, alongside gains in quality of life and reductions in depressive symptoms.

This research shows how nurses can lead transformative partnerships beyond hospital walls by turning wind, water, and teamwork into a structured mental health intervention.

Ultimately, this work reframes autism support by focusing not on deficits but on empowering children to discover their strengths and realise they can navigate far more than a boat.

For me, this research is not only professional. It is personal. As both a nurse and a mother of an autistic child, I believe every child deserves the chance to sail toward their own horizon.



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