Research Center Quarterly Report

Office of Research & Development

2025| August

Contents

1.List of Research Centers

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The Featured Areas Research Center Program (107~116)

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University-Level Research Center Networking Event

【Cross-Disciplinary Collaboration × Talent Recruitment × Casual Conversation】

by Office of R&D

To promote communication and collaboration between KMU's faculties, students, and university-level research centers, and to spark cross-disciplinary research ideas, the Office of Research and Development will regularly host the University-Level Research Center Networking Sessions from April 2025.

Each session will feature keynote presentations by the core teams of different centers.

Through the relaxed and enjoyable tea party format, these events aim to promote cross-department and cross-center collaborations, attract and recruit new blood to participate in related research, and organize research teams to apply for external funding.

Session 1

Precision Sports Medicine and Health Promotion Center & Biomedical Artificial Intelligence Academy

This event was first held on April 28, 2025, by the newly established " Precision Sports Medicine and Health Promotion Center (PSMHPC)" and " Biomedical Artificial Intelligence Academy (BAIA)". The event aimed to create an open and interactive platform to promote exchanges and cooperation between KMU's faculties, students, and university-level research centers.

During the session, the PSMHPC and the BAIA took turns to share their research focuses and development directions, explore potential collaboration opportunities, and widely invite researchers from KMU system to join the centers' teams. Through direct dialogue and networking, participants were encouraged to explore the possibility of developing concrete collaborative projects.

The event also featured hands-on demonstrations of several advanced sports science instruments, including the *AfaScan* (Intelligent Human Motion Assessment System) and an extracorporeal shockwave therapy device of the same level as those used by the National Sports Training Center, allowing attendees to experience the charm of scientific exercise firsthand.

Participants responded enthusiastically, expressing strong anticipation for future collaborations. KMU will continue to integrate AI, biomedical technology, and sports medicine, hoping to lead the trend of health promotion and research innovation through cross-disciplinary collaboration.

Event Highlights https://youtu.be/pla5fvCe68U

Group Photos
(Dr. Ping-Hsun Wu; BAIA-Dean, Henry Horng-Shing Lu; PSMHPC-Director, Shang-Jyh Huang; ORD- Deputy Dean, Chia-Yang Li; PSMHPC-CEO, Nai-Jen Chang; CBDR-Deputy Director, I-Te Yiter Chen)

Lecture by PSMHPC & BAIA

Collaboration & Partnership Networking

Light refreshments

Hands-on Experience with Sports Science Equipment

Session 2

Center for Cancer Research & Drug Development and Value Creation Research Center

This event was held on June 4, 2025, jointly organized by the Center for Cancer Research (CCR) and the Drug Development and Value Creation Research Center (DVCR). In addition to introducing their respective research directions, both centers took turns to share their distinctive research and platform services, followed by discussions to explore potential opportunities for collaborations.

The CCR's presentations showed its oncogene screening platform, clinical trials, and small-molecule targeted drug monitoring platform; the DVCR's presentations featured antibody locks, high-throughput drug screening, and AI-driven automated drug screening, etc. The on-site interaction was lively and successfully promoted cooperation between different research teams. It is hoped that in the future, the cooperation links between basic and clinical practice can be further deepened and extended to the industry.

Event Highlights https://youtu.be/De8op0bDDBg

Lecture by CCR (CEO: Li-Tzong Chen; Deputy CEO: Hsiao-Sheng Liu; Dr. Hui-Ching Wang; Assoc. Prof. William Chih-Wei Chang)

Lecture by DVCR (Deputy CEO: Chih-Hung Chung; Prof. Chia-Hung Yen; Prof. Yeng-Tseng Wang; Assoc. Prof. Wen-Wei Lin)

Collaboration & Partnership Networking

Group Photos
(Left to right, first line: ORD- Deputy Dean, Chia-Yang Li; DVCR-Deputy CEO: Chih-Hung Chung; ORD-Dean, Ya-Ling Hsu; CCR-Deputy CEO: Hsiao-Sheng Liu; CCR-CEO: Li-Tzong Chen)

3.Newly-Established Research Centers

Center for Metabolic Disorder and Obesity (CMDO)

University-Level Academic Research Center

Date of Establishment: May, 2025

Research Focus

The Center for Metabolic Diseases and Obesity aims to establish a "healthy and sustainable society" by addressing the health and economic burdens associated with obesity and metabolic disorders. The primary research focus of the center is metabolic diseases and obesity, given their role as major risk factors for chronic non-communicable diseases, including cardiovascular diseases and diabetes mellitus.

Through public health-oriented surveys and disease surveillance, the center collects and analyzes nationwide health data in Taiwan to systematically identify high-risk populations, elucidate causative factors, and determine predictive indicators for disease occurrence. Additionally, the center evaluates various intervention strategies, such as pharmacological treatments for metabolic conditions and exercise prescriptions in collaboration with the Precision Sports Medicine and Health Promotion Center. The effectiveness of these interventions is verified through rigorous scientific research.

Ultimately, the center aims to effectively reduce disease incidence, delay disease progression, and decrease the risk of early mortality, thereby mitigating the overall impact of obesity and metabolic abnormalities on chronic non-communicable diseases and achieving substantial improvements in public health.

Introduction

Facing the increasing challenges of chronic non-communicable diseases in Taiwan, the Center for Metabolic Diseases and Obesity at Kaohsiung Medical University addresses metabolic dysfunction and obesity by systematically implementing preventive and intervention strategies, aiming to comprehensively reduce disease burden and early mortality.

Comprehensive Disease Surveillance

Nationwide surveillance of metabolic diseases and obesity trends

- Mapping Taiwan's metabolic disease health atlas
- Analysis of nationwide health data
- Estimating healthcare costs of obesity and metabolic diseases
- Providing robust scientific evidence for public health policy

Precise Identification of High-Risk Populations

Clearly defining high-risk groups and associated factors

- Cardiac risk stratification in metabolic-associated fatty liver disease
- Gene-environment interaction: air pollution and chronic respiratory diseases
- Impact of obesity and diabetes on extrahepatic complications in fatty liver disease
- Long-term metabolic health after hepatitis C virus clearance

Precision Intervention and Disease Prevention

Implementing targeted intervention and prevention strategies

- Conducting double-blind clinical trials
- Evaluating metabolic disease medications
- Assessing hepatocellular carcinoma prevention in metabolic fatty liver disease
- Providing evidence-based novel treatments for clinical practice

Effective Health Promotion Strategies

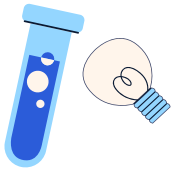
Cross-disciplinary research to promote evidence-based health programs

- Collaboration with Precision Sports Medicine and Health Promotion Center
- Developing efficient, sustainable exercise and lifestyle prescriptions
- Enhancing physical activity among metabolic disease patients
- Promoting widespread adoption of healthy lifestyles

Health Outcomes and Social Contribution: Promoting Health Equity

Transitioning from treatment to prevention

- Advancing Taiwan's metabolic health and obesity prevention through precise research and innovative interventions
- Reducing disease prevalence and healthcare burden
- Promoting health equity and narrowing urban-rural disparities
- Creating a positive cycle among research, policy, industry, and public health



I. Comprehensive Disease Surveillance and Precision Identification of High-risk Populations

The primary objective of the center is to systematically investigate and monitor epidemiological trends in metabolic diseases and obesity in Taiwan. By leveraging big data integration and analysis, the center precisely identifies high-risk populations and associated risk factors, clearly defines key problems, and provides a solid foundation for intervention:

- **Disease Surveillance and Economic Impact Assessment:** Through comprehensive collection and analysis of nationwide health data, the center estimates the economic impacts of obesity and metabolic diseases on healthcare expenditures and productivity losses. This provides robust scientific evidence for government public health policymaking and supports efficient resource allocation.
- **Risk Assessment and Stratification:** The center develops precise and effective predictive factors by integrating clinical and biological markers, assisting healthcare professionals in early identification of high-risk groups to enable timely interventions and reduce the likelihood of future disease progression.

Representative Projects

Mapping the Health Atlas of Metabolic Diseases in Taiwan:

This project aims to clearly define the optimal criteria for metabolic syndrome and identify the most predictive clinical indicators. By comprehensively integrating health, environmental, and socioeconomic factors, the research will create a health atlas of metabolic diseases in Taiwan. This visualization will pinpoint disease hotspots, enabling precise resource allocation and effective health promotion strategies.

Cardiac Risk Stratification in Patients with Metabolic-associated Fatty Liver Disease (MAFLD):

This study investigates underlying mechanisms linking fatty liver disease with atrial fibrillation and heart failure. It systematically identifies novel early-warning indicators, such as Ln(TG/Glucose) and TGH-BMI, facilitating earlier identification of high-risk patients and enabling timely clinical intervention and prevention strategies.

Gene-Environment Interaction of Air Pollution and Chronic Respiratory Diseases:

This research explores the interactions among air pollution, urban green spaces, and genetic factors in metabolic disease patients who develop chronic respiratory diseases such as chronic obstructive pulmonary disease (COPD) and asthma. By combining large-scale databases with genomic techniques, the project will establish precise risk prediction models to inform public health policies, thereby reducing environmental impacts on vulnerable populations.

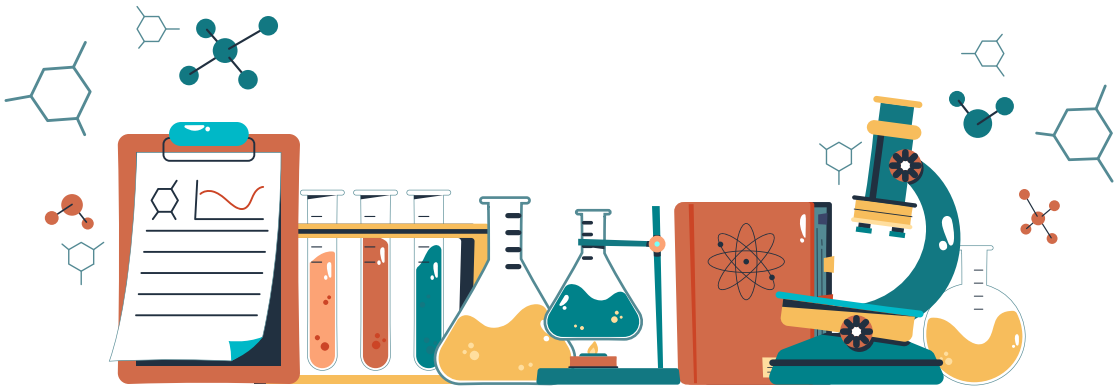
Impact of Obesity and Diabetes on Extrahepatic Complications in Patients with Fatty Liver Disease:

This project investigates how obesity and diabetes mellitus, two prevalent metabolic disorders, serve as comorbid conditions exacerbating extrahepatic complications—including cardiovascular diseases and chronic kidney disease—in patients with fatty liver disease. The study will specifically perform differentiated analyses between obese and non-obese patients with type 2 diabetes and follow their long-term health outcomes.

Long-term Metabolic Health in Patients after Hepatitis C Virus (HCV) Clearance:

Kaohsiung Medical University Hospital has achieved excellent outcomes in hepatitis C treatment and established a large patient cohort. This project evaluates the long-term prognostic impacts of metabolic abnormalities and fatty liver disease in chronic hepatitis C patients who have successfully cleared the virus. Specific focus will be placed on the development and progression of metabolic disorders and fatty liver disease, aiming to improve strategies for long-term clinical care and public health planning.

Through these research initiatives, the center aims not only to comprehensively understand the current disease landscape but also to provide robust evidence to guide policy improvements and implement effective health promotion measures, ultimately reducing the disease burden and improving the overall health status of the population.



II. Precision Intervention and Disease Prevention to Promote Effective Health Strategies

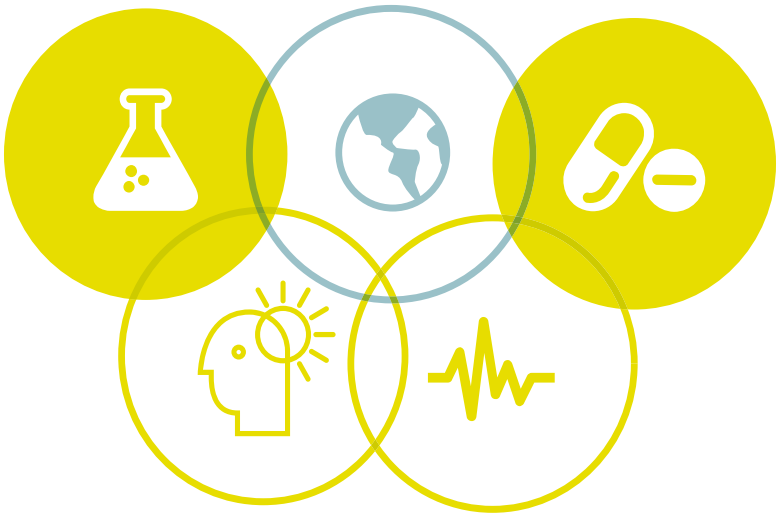
The center actively promotes intervention and preventive strategies. Through interdisciplinary, evidence-based research integration, the center disseminates scientifically validated health improvement programs aimed at slowing disease progression and reducing premature mortality:

Pharmacological and Clinical Intervention Studies

Utilizing rigorous clinical trial methodologies, including double-blind randomized controlled trials, the center evaluates the efficacy of metabolic disease medications (GLP-1 receptor agonists or statins) in preventing hepatocellular carcinoma among patients with metabolic-associated fatty liver disease. These studies aim to establish evidence-based novel therapeutic strategies for clinical practice.

Environmental and Lifestyle Interventions

Through inter-institutional collaboration, particularly with the university-level Precision Sports Medicine and Health Promotion Center, the center develops efficient and sustainable exercise and lifestyle prescriptions. These efforts aim to increase physical activity adherence and widespread adoption of healthy lifestyles among patients with obesity and metabolic diseases, thereby effectively controlling disease progression and associated complications.



III. Health Outcomes and Social Contribution: Promoting Health Equity for All

Through comprehensive research and strategic interventions, the center is committed to achieving significant health outcomes and making multi-level contributions to society:

Reducing Disease Prevalence and Reducing Healthcare Burden

By implementing effective early screening and precision prevention programs, the center aims to substantially reduce the incidence of obesity and metabolic disorders, thereby reducing the burden on the healthcare system and enhancing the quality and efficiency of overall medical care.

Advancing Health Equity and Narrowing the Urban-Rural Gap

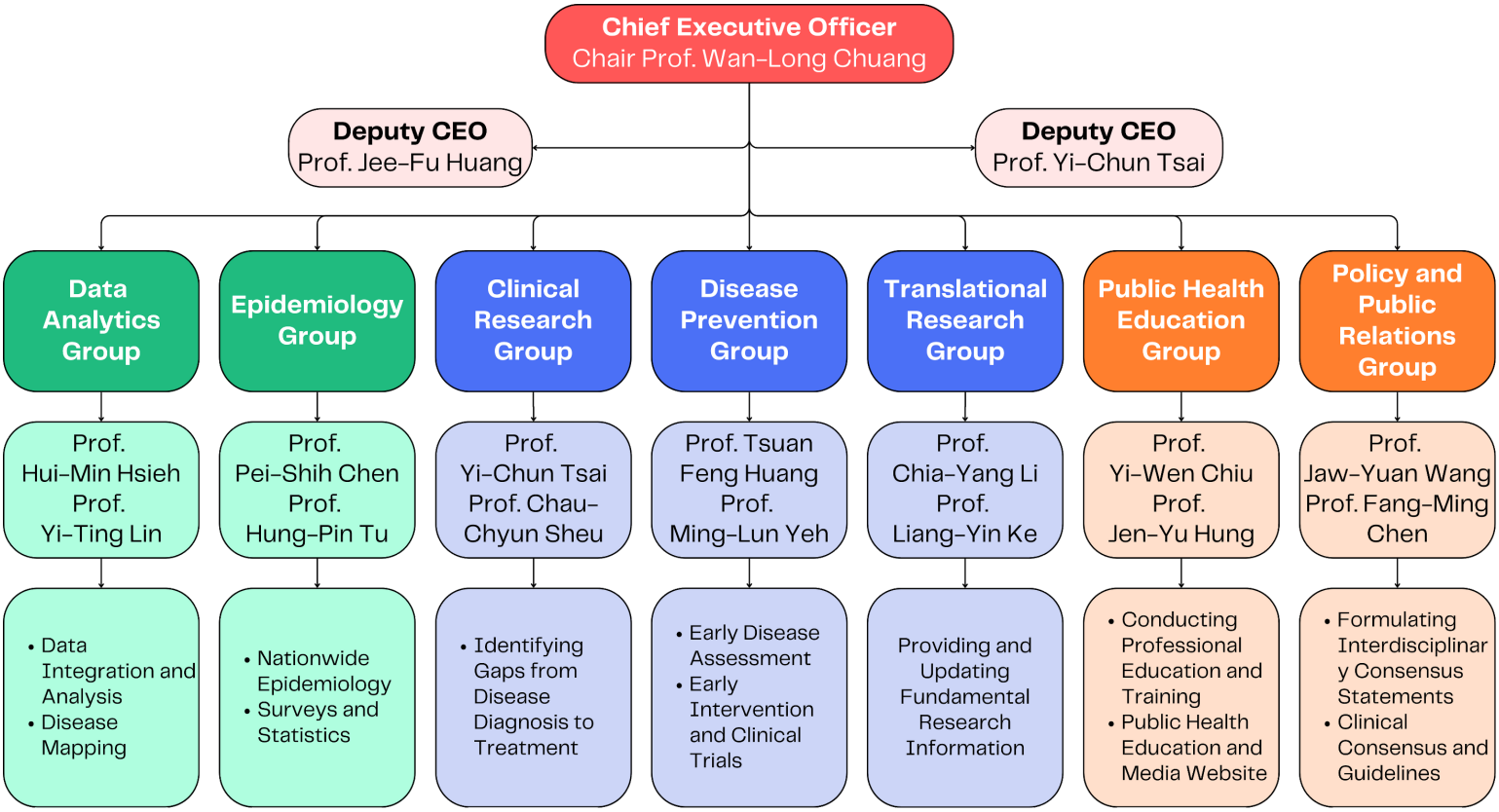
Through clearly mapping health disparities and accurately identifying vulnerable populations, the center strategically allocates resources to high-risk areas. This targeted approach addresses inequalities in health resource distribution, promotes health equity, and reduces regional health disparities.

Creating a Positive Cycle among Research, Policy, Industry, and Public Health

Starting with academic research, the center emphasizes practical application of research findings to inform evidence-based governmental health policies. This approach supports industrial innovation (such as health technology sectors and startup ecosystems), thus fostering a beneficial cycle of “research–policy–industry–public health,” continuously improving the quality of public health and enhancing overall national competitiveness.

Guided by the principle of "transitioning from treatment to prevention," the Center for Metabolic Diseases and Obesity at Kaohsiung Medical University will utilize precision research and innovative interventions to comprehensively enhance metabolic health and obesity prevention in Taiwan, creating a healthier and sustainable future for all citizens.

Organizational structure



4.Research Center Column

Cross-Disciplinary Dialogue to Usher in a New Era of Smart Healthcare — 2nd AI ESG Precision Medicine Forum

University-Level Academic Research Institute /
Biomedical Artificial Intelligence Academy (BAIA)
RA Yi-Xiang Chen / Dean Henry Horng-Shing Lu

Biomedical Artificial Intelligence Academy (BAIA) of KMU is dedicated to integrating AI technologies into medical practice, spanning clinical fields such as nephrology, hepatology, and emergency medicine. Through seminars and large-scale forums, BAIA brings together representatives from industry, government, academia, research, and healthcare to engage in in-depth dialogue. Most recently, the “AI ESG Precision Medicine Forum” was held to explore the intersection of AI, sustainability, and precision medicine, with the aim of advancing smart healthcare development in Taiwan and alleviating burdens on medical professionals.

Since establishment, BAIA has actively promoted research and practical applications of artificial intelligence in clinical settings, integrating advanced technologies such as large language models (LLM) and machine learning into the development of smart healthcare systems. Its applications span nephrology, hepatology, gastroenterology, emergency medicine, anesthesiology, and nursing care, realizing a vision of cross-disciplinary digital transformation and precision medicine.

To foster knowledge exchange in smart healthcare, BAIA also regularly hosts the lecture series “AI seminar: Dialogues on the Future of Smart Medicine,” featuring expert speakers from industry and academia. Conducted in hybrid (online and in-person) formats, the series has attracted 2,138 total attendees to date.

2025/4/10 AI seminar

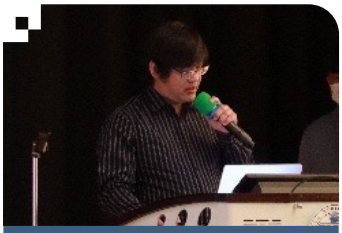
2025/4/30 AI seminar

The poster of 2nd AI ESG Precision Medicine Forum

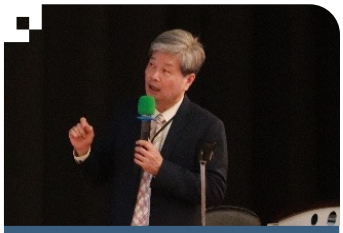
4/12 Group Photo

In addition, from April 12 to 13, 2025, BAIA co-hosted the 2nd AI ESG Precision Medicine Forum with AI THINK MED Co., Ltd. The event gathered cross-sector representatives from industry, government, academia, research, and healthcare—including domestic and international medtech firms, AI technology companies, academic institutions, NGOs, and policymakers—to promote interdisciplinary knowledge integration and practical collaboration.

On the first day (April 12), the forum was held at the KMU International Conference Center. Featured speakers included Dr. Hui-Wen Yin (Taipei Veterans General Hospital), Dr. Ming-Ju Tsai, Dr. Tzu-Ping Kao, and Dr. Hao-Wei Chen (KMU Chung-Ho Memorial Hospital), Mr. Ming-Tai Chang (CEO, Atgenomix), Mr. Szu-Kai Hsiung (CEO, Willy Advanced Power Technology Co., Ltd.), Ms. Yi-Chien Tsou (National Sales Manager, Biotronik), Dr. Lai-Hsun Lai (Taichung Veterans General Hospital), etc. Discussions focused on AI medical applications across clinical validation, academia-industry collaboration, and technology integration.



4/12 Lecture by Dr. Tzu-Ping Kao, KMUH



4/12 Lecture by Dr.Hui-Wen Yin, Taipei Veterans General Hospital

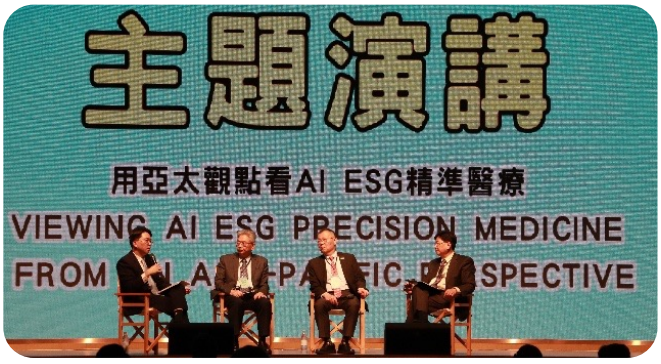
4/12 Opening Remarks by Superintendent Chao-Yuan Wang, KMUH

4/12 Opening Remarks by President Ming-Lung Yu, KMU

On the second day (April 13), the forum continued at the Kaohsiung Marriott Hotel, featuring panelists such as Mr. Wei-Chien Chen (Deputy Director, National Health Research Institutes), Mr. Chung-Ho Tai (Chairman, Zettabyte), Mr. Dun-Chieh Chang (General Manager, Changs Ascending Enterprise Co., Ltd.), Mr. Chia-Cheng Lu (General Manager, Cisco Taiwan Enterprise Business), Mr. Chia-Pin Tu (Director, Primax Electronics), Mr. Fang-Ren Kuo (CEO, PT Emliku Smart Technology), Mr. Hsueh-Shih Lee (General Manager, SinoPac Securities Investment Consulting), Prof. Yu-Chih Chung (KMU), Dr. Hsin-Jung Lin (Superintendent, Hualien Tzu Chi Hospital), and Dr. Wan-Yu Kuo (President, World Federation of Neuroradiological Societies). The forum emphasized the converging potential of AI, ESG, and precision medicine, exploring strategies, ethics, and clinical implementation through interdisciplinary exchange.

4/13 Group Photo

4/13 Keynote Speech Photos



4/13 Keynote Speech Photos

4/13 Forum Participants

Through the diverse expertise assembled at this forum, BAIA hopes to advance Taiwan's smart healthcare technology, align with global standards, and achieve precision and sustainable healthcare goals—continuing to reduce the burden on healthcare professionals and improve medical service quality.

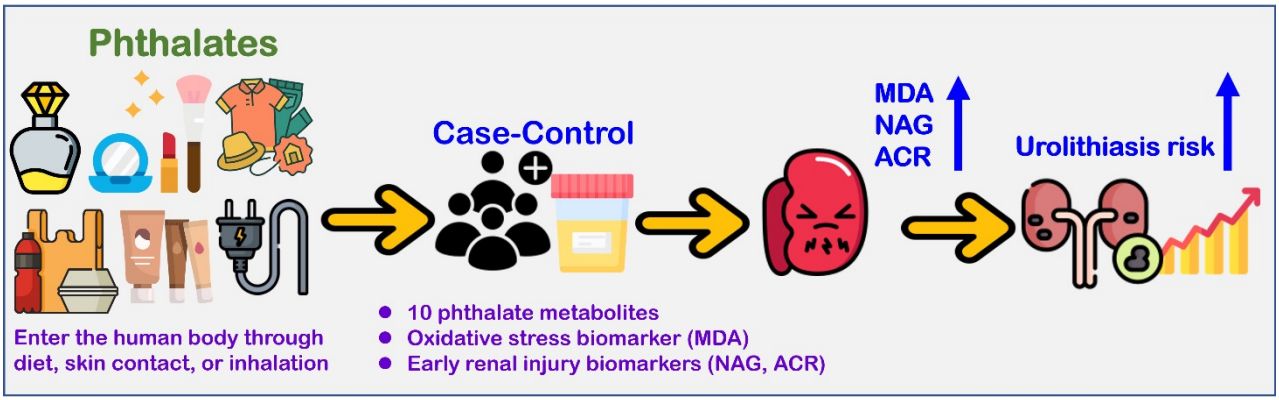
Other Important Highlights

In the first half of 2025, BAIA focused on the cross-disciplinary integration and application of AI in healthcare, with research themes including kidney and brain disease progression, acute patient outcome prediction, imaging analysis for breast and liver cancers, and occupational injury surveillance. By combining clinical data, medical imaging, and multi-omics information, the Institute is driving model development, offering AI training programs, fostering international collaboration, and advancing data governance—thereby strengthening the smart healthcare ecosystem and enhancing its clinical and societal impact.

Reduce the Risk of Urolithiasis by Minimizing Phthalate Exposure

University-Level Academic Research Center /
Research Center for Precision Environmental Medicine (RCPEM)
Ph.D. Candidate Shih-Ting Huang, Postdoc Yu-Ming Hsu, RA Hui-Ru Chen/
Prof. Chia-Chu Liu, Prof. Ming-Tsang Wu, CEO Chih-Hsing Hung

Phthalates, also known as plasticizers, are chemical compounds commonly added to plastic products to enhance their flexibility and durability. With the widespread use of plastics, phthalates have also become ubiquitous in our living environment. There are many types of phthalates, among which phthalate esters—such as DEHP—are the most commonly used. Phthalates are considered a type of environmental hormone, and long-term or high-level exposure may pose potential health risks, particularly by disrupting the endocrine system and affecting reproductive function and developmental processes. A recent case-control study conducted by the research team at the Center for Precision Environmental Medicine examined patients with urolithiasis and healthy individuals. The results showed a significant positive correlation between urinary phthalate metabolite levels, early kidney injury biomarkers, and the risk of urinary tract stone formation. These findings further support the hypothesis that phthalates may increase oxidative stress in the body, thereby contributing to kidney damage and the development of urinary stones. Based on these results, the public is advised to reduce daily exposure to phthalates-starting with simple changes in daily habits—as a means of protecting kidney health.



Schematic illustration of the association between phthalate exposure and the risk of urolithiasis.

The Hidden Ubiquity of Phthalates

Phthalates, also known as plasticizers, are a class of chemical compounds commonly added to plastic products, with phthalate esters—such as DEHP—being the most widely used. Their primary function is to enhance the flexibility and durability of plastic materials. Due to their versatile applications, phthalates are nearly ubiquitous in modern life, found in items ranging from food packaging, beverage bottles, and children's toys to medical devices. However, a growing body of research has indicated that phthalates may disrupt the human endocrine system, adversely affect reproductive health and child development, and are potentially associated with metabolic disorders and kidney damage. While plastic products bring convenience to daily life, it is important to remain aware of the potential health risks posed by these invisible chemical threats.

Urolithiasis and Oxidative Stress: The Hidden Damage

Urolithiasis refers to mineral crystal masses that form within the urinary system, such as in the kidneys or ureters. Approximately 80% of urinary tract stones contain calcium, most commonly in the form of calcium oxalate or calcium phosphate. Their formation is not only related to increased concentrations of minerals in the urine but also involves localized inflammation and cellular injury within the kidneys. Recent studies have shown that oxidative stress, caused by excessive production of reactive oxygen species (ROS), plays a key role in the formation of kidney stones. When the kidneys are exposed to internal diseases or external environmental factors that trigger an overproduction of ROS, oxidative stress can lead to inflammation and damage of kidney cells. This damage causes cells to shed and form debris, which can serve as a nidus for crystal aggregation, further promoting the onset and advancement of urolithiasis.

Phthalates and Renal Injury: New Findings from a Case–Control Study

Phthalate metabolites are primarily filtered and excreted by the kidneys, which has raised concerns about their potential nephrotoxicity. Against this backdrop, we aimed to clarify whether phthalates encountered in daily life could induce oxidative stress, lead to early renal injury, and consequently increase the risk of urolithiasis. To investigate this hypothesis, our team conducted a case–control study measuring the urinary concentrations of ten common phthalate metabolites, along with markers of oxidative stress (malondialdehyde, MDA) and early renal injury indicators [N-acetyl-beta-D-glucosaminidase (NAG) and albumin/creatinine ratio (ACR)].

In this study, phthalate metabolites were categorized into two groups, high-molecular-weight and low-molecular-weight phthalates (the sum of high-molecular-weight phthalate metabolites; the sum of low-molecular-weight phthalate metabolites), to calculate their total concentrations. Additionally, the daily intake of di-2-ethylhexyl phthalate (DEHP) metabolites was estimated to comprehensively assess exposure levels.

The results revealed significant differences between patients with urolithiasis and healthy controls. Urinary MDA concentrations were significantly higher in urolithiasis patients, and both NAG and ACR levels were also markedly elevated compared to the control group, indicating more severe oxidative damage and early renal injury. In addition, the concentrations of most phthalate metabolites were higher in patients with urolithiasis than in controls, reflecting greater cumulative phthalate exposure. Further analysis showed that nearly all phthalate metabolite concentrations were significantly positively correlated with MDA, NAG, and ACR, indicating that higher phthalate levels in the body are associated with increased oxidative stress and early renal injury. Even after adjusting for potential confounding factors such as age, sex, and lifestyle, the sum of high molecular weight phthalate metabolites, the sum of low molecular weight phthalate metabolites, and the daily intake of DEHP remained consistently associated with an increased risk of oxidative stress, early renal injury, and urolithiasis. These findings provide direct human evidence supporting the hypothesis that phthalate exposure may induce early kidney injury and increase the risk of urolithiasis.

Key Message and Recommendations: Reducing Phthalate Exposure to Protect Kidney Health

This study is the first to reveal an association between phthalate exposure and the risk of urolithiasis. Since phthalates are widely present in the environment and everyday products, exposure is difficult to avoid completely. The research team recommends taking practical steps in daily life to reduce exposure by choosing products that are free of phthalates whenever possible and maintaining adequate hydration to help eliminate phthalates from the body and lower the risk of urolithiasis formation. Vulnerable groups—such as pregnant women, children, patients with urolithiasis, and individuals with kidney disease—should be especially vigilant in minimizing their phthalate exposure. Although this study provides important preliminary evidence, larger-scale research is needed to clarify the causal relationship and underlying mechanisms. More robust evidence in the future will help support this link and provide policymakers with a scientific basis for developing relevant public health policies and regulatory measures aimed at reducing phthalate use and exposure, thereby lowering their potential nephrotoxic risks.

References

Shih-Ting Huang, Tusty-Jiuan Hsieh, Yung-Chin Lee, Chia-Fang Wu, Yi-Chun Tsai, Chu-Chih Chen, Sih-Syuan Li, Jiun-Hung Geng, Yu-Ming Hsu, Che-Wei Chang, Yau-Hsuan Tsau, Shu-Pin Huang, Yung-Shun Juan, Wen-Jeng Wu, Ming-Tsang Wu*, Chia-Chu Liu*. Environmental phthalate exposure increases oxidative stress, early renal injury, and the risk of calcium urolithiasis: A case-control study. *Ecotoxicol Environ Saf* 2024; 287:117322

Other Important Highlights

The RCPEM in collaboration with Kaohsiung Municipal Siaogang Hospital, the Department of Geomatics at National Cheng Kung University, and WaCare Telehealth, has jointly established the nation's first "Smart Lung Health Clinic." By integrating the KMU Health System database, the Environmental Protection Administration's air pollution database, and geospatial artificial intelligence technology, this initiative has developed an innovative Smart Lung Health Clinic application to provide real-time disease prevention and treatment services. This "Predictive System for Chronic Obstructive Pulmonary Disease" was also granted ROC Utility Model Patent No. M669643 in April 2025.

Breakthroughs and Innovation: International Experts Gather in Taiwan to Explore New Opportunities in Regenerative Medicine

University-Level Academic Research Center /
Regenerative Medicine and Cell Therapy Research Center (RCC)
RA Chun-Ya Kao/ CEO Yin-Chih Fu

2025 Taiwan Regenerative Medicine Summit – International Academic Conference

Contemporary medical science is undergoing a revolutionary transformation, and regenerative medicine stands out as one of its most promising frontiers. Technologies such as stem cell therapy, gene editing, and the creation of artificial organs not only offer the potential to repair damaged tissues but also hold promise for treating chronic diseases and extending healthy lifespans.

In recent years, Taiwan has actively invested in the development of regenerative medicine, achieving significant progress in policy, technology, and industry. The passage of the Regenerative Medicine Act has laid a legal foundation for the field's growth, accelerating the clinical application of research breakthroughs and promoting further development within the sector. Taiwan is also making continuous advancements in the development and clinical trials of regenerative medicinal products, establishing a solid groundwork for future precision medicine.

Our center (RCC) is also actively connecting with the international community to promote global collaboration in regenerative medicine. We have established partnerships with world-renowned institutions such as the Center for iPS Cell Research and Application (CiRA) at Kyoto University in Japan and the skin research team at Singapore's A*STAR. These collaborations enhance cross-border and interdisciplinary cooperation, enabling the sharing of cutting-edge technologies and knowledge.

On April 10, 2025, the RCC has hosted the 2025 Taiwan Regenerative Medicine Summit at KMU, inviting leading experts from Taiwan and around the world to gather and exchange insights on the latest research findings and clinical applications in regenerative medicine. This landmark event aims to facilitate academic dialogue and raise public awareness about this groundbreaking field poised to reshape the future of healthcare.

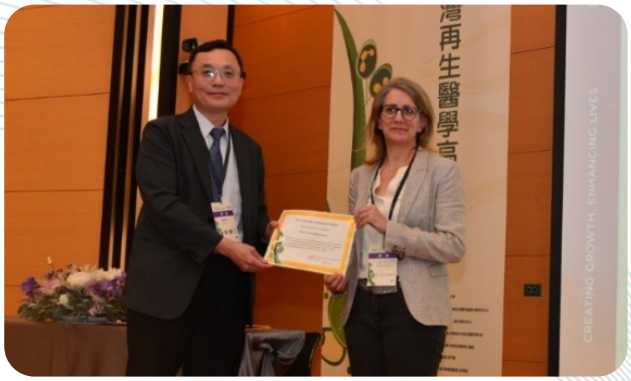
Group photo of invited keynote speakers & distinguished guests

Center for iPS Cell Research and Application (CiRA), Kyoto University, Japan – Associate Prof. Akitsu Hotta, Prof. Kenji Osafune, Prof. Shin Kaneko (from left to right)

Poster Presentation

Lecture by Prof. Kenji Osafune / Deputy Director, CiRA, Kyoto University, Japan

Group photo with attending guests



Certificate of Appreciation presented to Dr. Carine Bonnard (A*STAR Skin Research Labs, Singapore) for her invited lecture. (Session Chair: Prof. Yur-Ren Kuo, KMU)

Certificate of Appreciation presented to Dr. Jiah Shin Chin (A*STAR Skin Research Labs, Singapore) for invited speech (Session Chair: Assoc. Prof. Jia-Jung Lee, KMU

Live Lecture Session, 2025 Taiwan Regenerative Medicine Summit

Other Important Highlights

Special Lecture Invitation held on May 5, 2025

RCC was honored to invite Professor Jonathan Isaacs, Director of Hand Surgery and Professor at Virginia Commonwealth University (VCU), USA, to deliver a Special Lecture: **"Nerve Tape and Innovations in Nerve Repair."**

Professor Isaacs is a world-renowned authority in the fields of hand surgery and peripheral nerve repair. In this lecture, he shared cutting-edge research from his team, offering insights into the latest advancements in nerve repair. Beginning with the fundamentals of nerve healing, Professor Isaacs will introduce his team's groundbreaking innovation—Nerve Tape.

This novel technology significantly enhances the success rate of nerve repair procedures and offers a transformative approach to surgical techniques. It represents a major leap forward in clinical applications, opening new possibilities for treatment and recovery.

Group photo of RCC members with Professor Jonathan Isaacs from Virginia Commonwealth University, USA

Presentation of "Nerve Tape and Innovations in Nerve Repair"

May 21, 2025 – Invited Special Lecture held on May 21, 2025

RCC was honored to invite Academician Savio Lau-Yuen Woo, a distinguished scholar from the United States and Academia Sinica, to deliver a special lecture on May 21, 2025, for KMUs' faculty, researchers, and medical professionals. The lecture's title was "GenAI and the Future of Orthopaedic Biomechanics and Medicine."

Academician Woo is a world-renowned expert in orthopaedic biomechanics. He currently serves as a Distinguished University Professor Emeritus in the Department of Bioengineering at the Swanson School of Engineering, University of Pittsburgh, and is the founding director of its Musculoskeletal Research Center. His expertise spans engineering science, biomechanics, and tissue engineering, and he has made outstanding contributions to the integration of medicine and engineering.

During the lecture, Academician Woo explored the applications and future potential of Generative Artificial Intelligence (GenAI) in orthopaedic medicine and biomechanics. With a visionary outlook and practical depth, the talk will guide participants through emerging opportunities at the intersection of AI and medical science.

Presentation by Academician Savio Lau-Yuen Woo, Academia Sinica

Chulalongkorn University of Thailand visited RCC's lab on June 10, 2025

Prof. Yan-Hsiung Wang introduces the centers' founding background, research focus, and future development directions.

Group photo of Prof. Yen-Hsiung Wang and students from Chulalongkorn University, Thailand

Four students visited KMU to participate in a one-week academic exchange and learning program. During the visit, Prof. Yan-Hsiung Wang warmly received the group and gave a brief introduction to the Center for Regenerative Medicine and Cell Therapy Research Center (RCC), as well as the Orthopedic Research Center, outlining their founding background, key research areas, and future development directions.

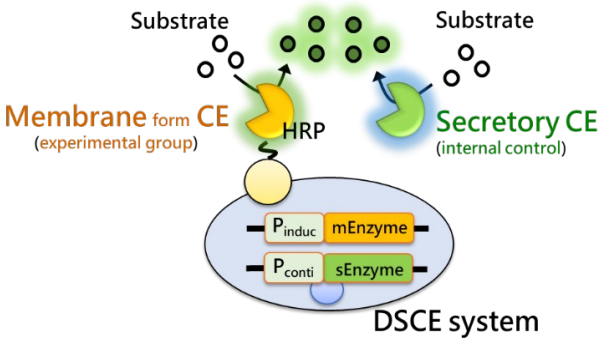
Professor Wang also shared significant research achievements in the field of regenerative medicine and introduced the current major research themes of his team. The visit included theoretical courses such as the fundamentals of stem cells and the mechanisms of stem cell differentiation. In addition, practical sessions were arranged, including hands-on operation of the Alizarin Red S staining experiment, a technique commonly used to detect calcium deposits in tissues and an important step in verifying bone differentiation.

Through this laboratory visit and exchange program, the students not only gained deeper insights into cutting-edge technologies in regenerative medicine but also had the valuable opportunity to engage in hands-on experimental work, enhancing their research competencies and broadening their international perspectives.

Dual-structural chromogenic enzyme reporter gene system: A new option for high-throughput drug screening

University-Level Academic Research Center /
Drug Development and Value Creation Research Center (DVCR)
Assoc. Prof. Wen-Wei Lin /CEO Ya-Ling Hsu

"Dual-luciferase reporter assay" is a well-known reporter gene assay for its high sensitivity, such assay contains luciferases from two species - Photinus pyralis and Renilla reniformis. However, it still remained with some spaces for improvement, such as (1) The substrate, firefly luciferin and coelenterazine, both are high in cost, and could be a concern when conducting a loads of experiments such as high-throughput screening, repeatedly. (2) Luciferase is expressed inside the cells, hence, luciferin must pass through the cell membrane or perform cell lysis first prior to subsequent chemical catalyzation. (3) The half-life of luciferase is short, and the chemical property of its substrate – luciferin /coelenterazine, are not stable in the common experiment operating environment. If drugs or compounds screening are imperative for a long period; the instability of enzymes and substrates will increase over time, thereby raising the odds/variations in experimental operation. (4) The luminometer for signal detection is not an ordinary machine within every laboratory. The above limitations shall make high-throughput screening platforms of reporter gene system hard to either establish or to accomplish. Therefore, we seek to develop a better drugs screen reporter gene system which comprise of several advantages, such as, low in cost, convenient, long half-life and high-efficiency. We utilized chromogenic enzyme which anchored to the cell membrane to form a membrane-tethered chromogenic enzyme (MTCE) and a secretory type of chromogenic enzyme - secreted chromogenic enzyme (SCE) as a reporter. These two became a **dual-structured chromogenic enzyme (DSCE)** contain the following benefits: (1) The substrate is low in price, which reduces the cost. (2) It is inserted into the cell membrane or secreted to the cell supernatant, hence the interaction of the substrate and enzymes will be enhanced. (3) Let MTCE or secretory type as an internal control to maintain batch to batch performance (4) It has a relatively long half-life and high stability. (5) An easy to obtain detection equipment – an ELISA reader. Therefore, this invention is the first that combined membrane-tethered chromogenic enzyme with a drug screening reporter gene system, making it highly sensitive, low-cost, easy to operate, and a prolonged half-life. It surely will benefit the user by saving costs of high-throughput drug screening and improving the efficiency of drug development.



Easy perform enzyme-substrate reaction

Extracellular expressing enzyme direct contact with the substrate, shortening 50% of the operating steps and 60% of the operating time.

Stable signal

The pigmentation signal is more stable (>3.6 times) than the cold light signal, making it easier to observe for a long time.

Low cost

The substrate cost is more than 30 times lower than competing products, making it suitable for high-throughput drug screening.

We established dual-structured chromogenic enzyme (DSCE) platform, horse-radish peroxidase (HRP) was engineered either to be tethered on the cell membrane or secreted into extracellular compartment, We had found that sHRP as an internal control, mHRP for sample signal detection provided the most reasonable output. DSCE system is stable, sensitive, being capable of normalize each experiment value with a cost-friendly substrates. We hope that this technology may serve as an alternative to DLR, and be able to provide a better experiment operating environment in drugs development.

Awards

- 2022 KMU "The 11th Campus Entrepreneurship Competition" Entrepreneurship Group-2nd Place
- 2023 Joint creative entrepreneurship competition of five schools-2nd Place
- 2023 The 2nd Merck Young Scientist Award_Excellence Award
- 2024 NBRP PITCH Day National Biomedical Translational Selection and Matching Event-Finalist Team in the Medical Device Category
- 2024 21st National Innovation Award-Academic Research Innovation Award (Biotech, Pharmaceuticals, and Precision Medicine Category)

Publications

1. Chang MS, Lee CY, Liu ES, Chao H, Wu HY, Chang YY, Liu YL, Chen YT, Su YC, Wang YT, Cheng TL, Yen CH, Lin CW, Huang HK*, **Lin WW***. A low-cost, sensitive reporter system using membrane-tethered horseradish peroxidase for efficient gene expression analysis. ***Anal. Chem.*** 2023 Sep 26;95(38):14341-14349. 2022 SCIE IF: 7.4 (7/86, 8.1% in Chemistry, Analytical)
2. Chang MS#, Lee CY#, Chang YY, Li PJ, Wu HY, Liu ES, Huang HK, **Lin WW***. Genetically engineered secretory horseradish peroxidase is a sensitive, stable, and affordable non-lytic reporter gene system for real-time promoter activity management. ***J Biol Eng***. 2025 Apr 22;19(1):37. 2024 SCIE IF: 6.5 (5/86, 5.8% in Biochemical research methods)
3. Chang MS, Lee CY, Wu HY, Wang YT, Chao H, Chang YY, Liu ES, Huang HK, **Lin WW***. A dual-structured chromogenic enzyme platform for a rapid, sensitive, durable and precise gene expression analysis. ***Anal. Chem***. 2025 Feb 25;97(7):3872-3880. 2024 SCIE IF: 6.7 (10/111, 9.0% in Chemistry, Analytical)

Patent

Patent of R.O.C. (I886846): Cells containing reporter gene system of Dual-Structure chromogenic enzyme and application thereof

Other Important Highlights

1. The members of DVCR are honored as “Distinguished Professors”: Prof. Shyng-Shiou Yuan, Prof. Ya-Ling Hsu, Prof. Chia-Yen Dai, and Prof. Chai-Lin Kao.
2. A total of 23 students from DVCR have passed the "2025 National Science Council College Student Research Project".
3. Precisem Ab Biotech won the Enterprise Group of the 9th "Entrepreneurship Star Talent Show" of Economic Daily News.

Economic Daily News.
https://money.udn.com/money/amp/story/5612/8833543

4. DVCR's entrepreneurial team "I X I" won the "Student Group Champion" of the 9th Entrepreneurship Star Talent Show Team.
   Instructor：Assoc. Prof. Chih-Hung Chuang.
   Member：Shi-Wei Chao, Chia-Tse Li, Hsin-Ming Liu, Hong-Ren Wang, Jo-Han Fan, Chien-Yi Wang, Yu-Jui Sung

Economic Daily News.
https://money.udn.com/money/story/5648/8834064

The Link Between G9a and Autophagy Research: Professor Hsiao-Sheng Liu's Leadership and Inspiration in Cancer Research at KMU

University-Level Academic Research Center /
Center for Cancer Research(CCR)
RA Ting-Yang Hung, Dr. Hui-Ching Wang,
Postdoc Chang-Han Wu, Postdoc Wei-Chung Chen /
CEO Li-Tzong Chen

In honor of the upcoming retirement of Prof. Hsiao-Sheng Liu, this column reviews his contribution in establishing autophagy research platform for the center and how his novel work profoundly influenced the direction of drug development to immunotherapy in various cancer fields.

The work of Prof. Liu's team established basis for the autophagy research in our center focusing on seeking autophagy modifiers to counter cancer drug-resistance and progression. During their research, the team unexpectedly found that agents that inhibit G9a, a chromatin-remodeling enzyme, could also enhance autophagy. Subsequently, big data research assisted the discovery of “niclosamide”, a FDA-approved, clinically available anti-parasitic drug, possessed the same dual effects. Laboratory works confirmed that this drug could effectively suppress the proliferation of various types of cancer cells and reduces drug resistance and stem cell-like properties. This "drug repurposing" discovery highlighted the multiple mechanism of action of niclosamide and also inspired young scholars to devote themselves into exploring its application in overcoming chemotherapy resistance and enhancing immunotherapy sensitivity, and to generating derivatives or identifying natural products for new drug development. The goal is to bring Professor Liu's research into clinical applications and hopefully can benefit the patients.

Professor Hsiao-Sheng Liu established and led one of the center's earliest platform, "Cell Autophagy and Mitochondria Research Platform" since 2020. His works focused on investigating the roles and functions of autophagy in both normal and cancerous cells, and based on these findings, developing novel drugs (including repurposed drugs and their derivatives) for autophagy modulation. The goal was to reduce cancer cell progression, drug resistance, and stemness, while also ameliorating hyperglycemia-related metabolic syndromes by regulating autophagic activity.

During the drug screening process, Professor Liu's team made an unexpected discovery: the histone methyltransferase EHMT2/G9a inhibitor "BIX-01294" not only significantly inhibited the expression of G9a but also promoted the activity of autophagy. To find a clinically accessible drug, the team used the "Connectivity Map" platform to predict a FDA-approved anti-parasitic drug - niclosamide might have the similar effects. Their laboratory works subsequently confirmed the prediction in 20 cancer cell lines across 10 cancer types to demonstrate that niclosamide and its derivatives could inhibit G9a and promote autophagy that were accompanied with suppressing cancer cell proliferation, drug resistance and cancer cell stemness.

As one of the active members of Center for Cancer Research, Dr. Wei-Chang Chen from Professor I-Chen Wu's team further revealed that inhibiting G9a, promoting autophagy and suppressing cancer cell proliferation, might act through different molecular pathways, including mitochondrial dysfunction, c-Myc, and STAT3, indicating the drug's multi-target potential. Dr. Chen's future works will investigate the immunomodulatory activity of niclosamide to explore it potential efficacy in combination with immune checkpoint inhibitor for esophageal cancer treatment. Dr. Chang-Han Wu from Professor Chao-Yuan Wang's team who was inspired by Prof. Liu's work and plans to investigate β-catenin and STAT3 as potential targets beyond AMPK pathway for autophagy modulation to overcoming chemotherapy resistance in colorectal cancer. Furthermore, Dr. Hui-Ching Wang, in collaboration with Professor Pei-Fen Liu, is building upon the center's autophagy research foundation to focus on the role of MAP3K11 in regulating autophagy and immune escape in head and neck cancer. They are also investigating whether high MAP3K11 expression affects immunotherapy response to evaluate its feasibility as a predictive biomarker and potential therapeutic target.

In addition, Professor Liu's team also collaborates with Dr. Tsz-Hua Tseng from the School of Pharmacy to design, synthesize and screen hundreds of niclosamide derivatives in order to improve the solubility and in vivo activity. They have also partnered with Dr. Chia-Hung Yen from the Graduate Institute of Natural Products to search a database of natural plant extracts for active ingredients that can both inhibit G9a and promote autophagy, with the hope of applying them in the development of anti-cancer and diabetes-related health-promoting products.

We extend our sincerest appreciation to Professor Hsiao-Sheng Liu for his fundamental work, leadership, and outstanding contributions over the past six years for our center's "Cell Autophagy Research Platform" but also, with his insight into "drug repurposing," pioneered a new path in cancer research from G9a to Niclosamide, achieving remarkable results. We firmly believe that this significant research momentum will be carried forward and deepened by the research teams at Kaohsiung Medical University, continuing to inspire more diverse explorations in translational medicine and yielding even more fruitful academic and clinical outcomes in the future.

Prof. Hsiao-Sheng Liu attended CCR's monthly meeting before retirement the last time, and took group photo with colleagues from the CCR on July 16, 2025.

Other Important Highlights

Prof. Hsiao-Sheng Liu's Research Achievements in the Field of Autophagy at KMU

1. Wu SY, Wang YC, Zuchini R, Lan KY, **Liu HS**, Lan SH. Secretory autophagy-promoted cargo exocytosis requires active RAB37. ***Autophagy***. 2024 Apr;20(4):933-934.
2. Wu SY, Chu CA, Lan SH, **Liu HS**. Degradative autophagy regulates the homeostasis of miRnas to control cancer development. ***Autophagy***. 2024 Jun;20(6):1444-1446.
3. **Liu HS**, Wang YP, Lin PW, Chu ML, Lan SH, Wu SY, Lee YR, Chang HY. The role of Atg5 gene in tumorigenesis under autophagy deficiency conditions. ***Kaohsiung J Med Sci***. 2024 Jul;40(7):631-641.
4. Lin PW, Chu ML, Liu YW, Chen YC, Shih YH, Lan SH, Wu SY, Kuo IY, Chang HY, **Liu HS**, Lee YR. Revealing potential Rab proteins participate in regulation of secretory autophagy machinery. ***Kaohsiung J Med Sci***. 2024 Jul;40(7):642-649.
5. Chu ML, Lin PW, Liu YW, Wu SY, Lan SH, Su CL, **Liu HS**. Formosanin C suppresses cancer cell proliferation and migration by impeding autophagy machinery. ***Kaohsiung J Med Sci***. 2023 May;39(5):489-500.
6. Wu SY, Wu HT, Wang YC, Chang CJ, Shan YS, Wu SR, Chiu YC, Hsu CL, Juan HF, Lan KY, Chu CW, Lee YR, Lan SH, **Liu HS**. Secretory autophagy promotes RAB37-mediated insulin secretion under glucose stimulation both in vitro and in vivo. ***Autophagy***. 2023 Apr;19(4):1239-1257.
7. Wu SY, Chen JW, Liu HY, Wang YC, Chu YS, Huang CY, Lan KY, **Liu HS**, Lan SH. Secretory autophagy promotes Rab37-mediated exocytosis of tissue inhibitor of metalloproteinase 1. ***J Biomed Sci***. 2022 Dec 2;29(1):103.
8. Lin PW, Chu ML, **Liu HS**. Autophagy and metabolism. ***Kaohsiung J Med Sci***. 2021 Jan;37(1):12-19.
9. Lee YR, Wu SY, Chen RY, Lin YS, Yeh TM, **Liu HS**. Regulation of autophagy, glucose uptake, and glycolysis under dengue virus infection. ***Kaohsiung J Med Sci***. 2020 Nov;36(11):911-919.
10. Chang HY, Lee CH, Li YS, Huang JT, Lan SH, Wang YF, Lai WW, Wang YC, Lin YJ, **Liu HS**, Cheng HC. MicroRNA-146a suppresses tumor malignancy via targeting vimentin in esophageal squamous cell carcinoma cells with lower fibronectin membrane assembly. ***J Biomed Sci***. 2020 Nov 28;27(1):102

Cross-Disciplinary Collaboration × Talent Development: Precision Sports Medicine Leading a New Trend in Health

University-Level Academic Research Center /
Precision Sports Medicine and Health Promotion Center (PSMHPC)
RA Pei-Chun Liao ; CEO Nai-Jen Chang

The PSMHPC has been actively promoting cross-disciplinary exchange and professional talent development in this season, creating opportunities for collaboration between artificial intelligence and sports medicine. A series of specialized programs were organized, including the Precision Health Exercise Instructor Certification, Anti-Doping Talent Training Program, and the first World Rugby-accredited emergency care course in southern Taiwan, aimed at strengthening both clinical response capabilities and expertise in sports science.

In parallel, the Center launched the Clinical Nutrition Empowerment Lecture Series to help healthcare professionals enhance their knowledge in precision nutrition, thereby building comprehensive core competencies in sports medicine and health promotion.

I.Broaden the Center's Research Scope

Foster Interdepartmental Collaboration

In response to the need for exercise prescriptions for chronic diseases such as metabolic syndrome and fatty liver disease, the PSMHPC convened a cross-departmental meeting with clinical and academic faculty. This initiated the Center's first core research axis: "Exercise Intervention for Type 2 Diabetes and Metabolic Dysfunction-Associated Fatty Liver Disease (MAFLD)", aiming to formulating an integrated research program that reflects local characteristics while delivering significant academic and practical value.

Cross-Departmental Collaboration Meeting

Forums and Lecture Sessions

2025 Elite Performance Summit was co-hosted by the PSMHPC and the National Sports Science Center on June 14~15, 2025. The summit featured a special appearance by the sports science team of Paris Olympic gold medalist Yu-Ting Lin, along with distinguished international scholars from the Australian Catholic University and the UFC Performance Institute Shanghai. Together, they engaged in in-depth discussions on strategies and practical models related to elite athletic performance, aiming to strengthen the integration of sports science theory and practice in Taiwan.

Group photo on 2025 Elite Performance Summit

II. Strengthen Talent Development

Visit to the National Sports Training Center

With the support of the Kaohsiung City Government Youth Bureau's "2025 Daka Youth Career Development and Industry Navigation program", the PSMHPC, together with the Department of Sports Medicine, led students on a visit to the National Sports Training Center on May 6, 2025. The visit included a tour of the athletic protection facilities and an introduction to the training environment and sports science support systems for Taiwan's top athletes, enhancing students' understanding of the sports industry and potential career pathways.

This hands-on experience allowed students to step beyond the classroom and into a professional setting, learning and reflecting on possible future directions in a real-world environment.

Visit to the National Sports Training Center

Certification Course for Precision Health Exercise Instructors (2025)

With the growing awareness of precision health, the demand for personalized exercise guidance and prescriptions among individuals with metabolic syndrome has been steadily increasing. On May 24~25, 2025, **the PSMHPC held the Precision Health Exercise Instructor Certification Course**, targeting sports coaches, athletic trainers, physical therapists, and other related healthcare professionals.

Certified participants were recognized by the Center and added to the Exercise Instruction Talent Pool, with a recommendation for priority consideration within KMU's medical system to provide individualized exercise guidance services. This initiative aims to enhance the quality of professional interventions and promote excellence in patient care.

Certification Course for Precision Health Exercise Instructors

Anti-Doping Training Program

On June 28–29, 2025, the PSMHPC, in collaboration with the Department of Sports Medicine, organized **the Anti-Doping Training Program** to strengthen knowledge in doping detection and prevention. The program aimed to cultivate professionals capable of contributing to both domestic and international sporting events, thereby enhancing KMU's global visibility and addressing the practical needs of the sports industry.

Anti-Doping Training Program

Lecture by Prof. Mei-Chich Hsu

World Rugby Level 1 First Aid in Rugby Course

On May 18–19, 2025, the PSMHPC, in collaboration with the Department of Sports Medicine, organized **the World Rugby First Aid in Rugby (Level 1) Course**. KMU is the first institution in Southern Taiwan to host this program, pioneering by offering two sessions simultaneously while maintaining a 1:6 instructor-to-student ratio. The course significantly enhanced students' practical first aid skills and strengthened their emergency response competencies in sports settings.

World Rugby Level 1 First Aid in Rugby Course

Clinical Nutrition Empowerment Lecture Series for Medical Personnel

From June 4-25, 2025, the PSMHPC, in collaboration with the Department of Sports Medicine and the Physical Education Teaching Center, hosted the Clinical Nutrition Empowerment Lecture Series for Medical Personnel. The program highlighted the differences between general and sports nutrition, offered evidence-based intake strategies for macronutrients before, during, and after exercise, and addressed common misconceptions through interactive discussions. Through this series, clinical personnel were able to further strengthen their professional knowledge in nutrition.

Clinical Nutrition Empowerment Lecture Series for Medical Personnel

40Hz Light and Sound Stimulation- A Rhythm that Awakens the Brain, Bringing New Hope for Dementia

University-Level Mission-Oriented Research Center
- Neuroscience Research Center (NRC)
RA Yi-Pei Lin / Director Yuan-Han Yang

40Hz light and sound stimulation, mimicking gamma oscillations in the brain, can reduce Aβ accumulation and Tau phosphorylation, while enhancing glial cell activity. From in vitro studies to clinical applications, results suggest that such stimulation may stabilize plasma biomarkers and slow Alzheimer's disease progression, offering promising potential as a non-invasive therapeutic approach.

Did you know?

When we focus, remember things, or process sensory information, our brain generates a rhythm called gamma oscillation, a type of brainwave. Among these, the 40Hz frequency is considered essential for healthy brain function. However, for people with dementia, this rhythm often becomes disrupted. Studies have shown that in patients with Alzheimer's disease, 40Hz brainwaves are weakened, potentially contributing to memory loss and cognitive decline.

This led our research team to ask:

- Could external light or sound stimulation at 40Hz help "resynchronize" the brain's natural rhythm?
- Might this affect Alzheimer's pathology and even slow down disease progression?

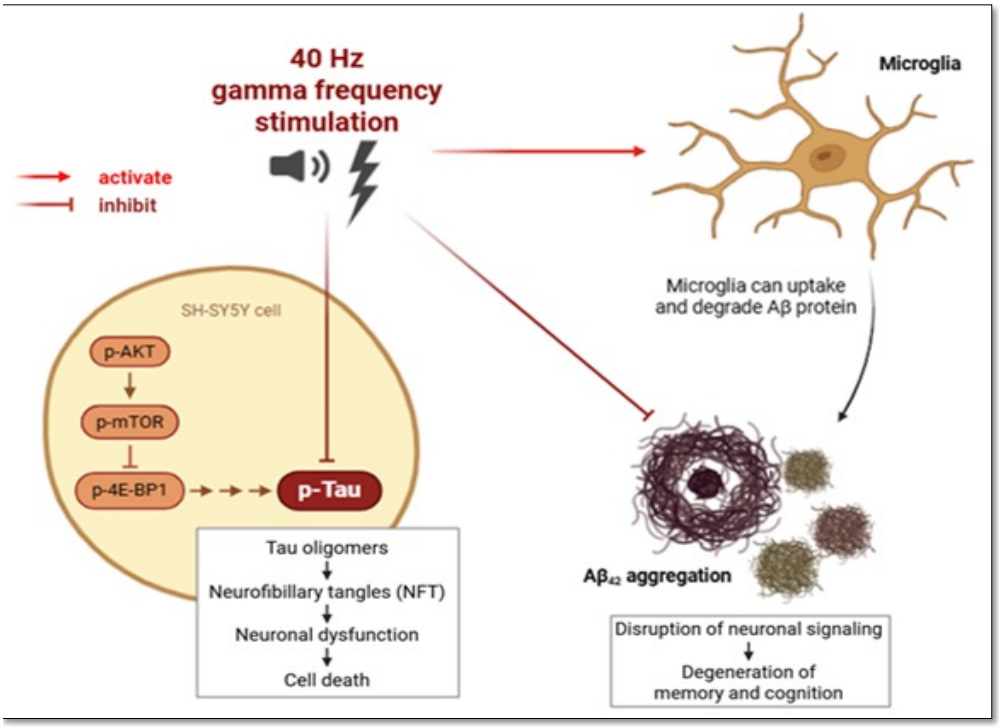
With these questions in mind, Dr. Yuan-Han Yang and his team, in collaboration with the National Health Research Institutes and Delta Electronics, launched an interdisciplinary research initiative—from basic science to clinical application—using 40Hz sound and light stimulation to explore new interventions for dementia.

Mr. Chih-Hsien Wang, Director of Delta's IoT Lighting Division (left), and Dr. Yuan-Han Yang, Director of NRC (right)

From Lab to Life: 40Hz Intervention Offers New Hope for Dementia Treatment

The research began with cell experiments in the lab.
Scientists found that 40Hz light and sound stimulation could influence the core mechanisms of Alzheimer's disease by:

- Reducing beta-amyloid (Aβ) accumulation
- Decreasing Tau protein phosphorylation
- Activating glial cells to clear toxic proteins, reducing brain burden



The team then moved into the clinical stage. Delta developed a special 40Hz light-emitting desk lamp ("M+"). In partnership with NHRI, 40 Alzheimer's patients used the device daily for 3 months at community care centers. Compared to a control group of 48 patients, those using the lamp showed slowed disease progression, emotional stability, and reduced caregiver stress.

In a follow-up study, 7 Alzheimer's patients used the M+ light for 1 hour daily at home over 6 months. Cognitive assessments and blood tests revealed:

1. Plasma biomarkers such as P-tau181 and P-tau217 remained stable in most participants
2. Disease progression may have slowed or stabilized
3. The device was easy to use, non-invasive, and showed no obvious side effects, making it suitable for long-term care

These promising results were published in the *Journal of Neurology* and will be presented at the 2025 AAIC (Alzheimer's Association International Conference), highlighting Taiwan's leadership in cutting-edge dementia research.

Press Released：https://www.ctee.com.tw/news/20220926700239-431205

Challenges of Drug-Resistant Candida, Potential Threats of Rickettsial Infections, and the Multifaceted Role of Galectin in Viral Infections: A Comprehensive Research Report

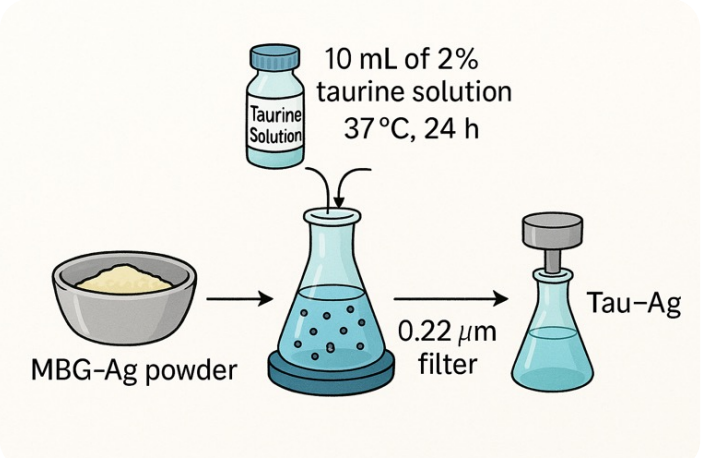
University-Level Mission-Oriented Research Center- **Center for Tropical Medicine and Infectious Diseases Research (TMED)**
RA Jou-An Pan, RA Yung-Mei Chao /Director Chun-Yu Lin

In clinical practice, the selection of antifungal drugs is limited, and the rapid increase of drug-resistant Candida poses a serious threat to treatment. In Taiwan, the canine ectoparasite, the porcupine tick, serves as a vector for Rickettsia, and tick-borne Rickettsial infections have been confirmed as a global threat of newly emerging and re-emerging tick-borne diseases in humans. Therefore, screening for Rickettsia is very important. The regulatory mechanisms of galectins in viral infections play a critical role and may become an important factor in drug development.

Challenges of Drug-Resistant Candida

This research outcome is from one of the TMED's team member, Prof. Sung-Pin Tseng from the Department of Medical Laboratory Science and Biotechnology. Silver ions have antibacterial functions in metal biomedical research, and silver ions are a common keyword in antibacterial products available on the market. Azole drugs are typically the first-line treatment for severe or chronic oral candidiasis and chronic mucocutaneous candidiasis due to their effectiveness and lower toxicity. To obtain purer silver ions, Professor Tseng used 2% taurine as a substrate to induce the release of silver ions, preparing taurine-induced silver ions (Tau-Ag), and evaluated the potential of this combination with itraconazole. The results showed no associated toxicity observed in either *in vitro* or *in vivo* models.

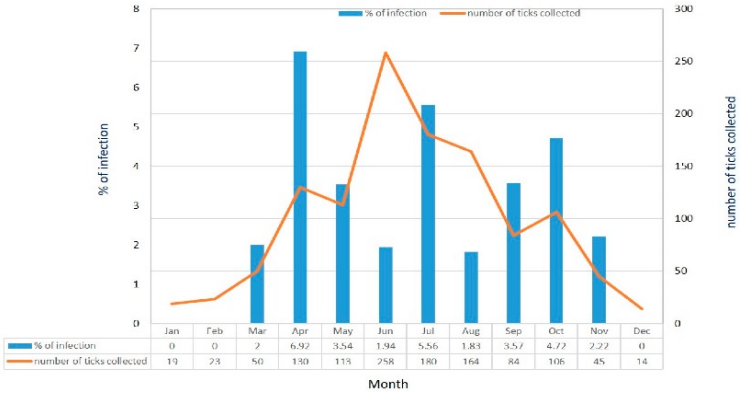
Further mechanistic studies indicated that Tau-Ag effectively increased the expression of reactive oxygen species and could penetrate biofilms, clearing cells that form biofilms. Most importantly, the combination of Tau-Ag with itraconazole demonstrated significant synergistic antifungal effects, restoring the antibacterial activity of itraconazole, indicating its potential as a novel antifungal agent.



Tau-Ag preparation

Molecular Screening of Rickettsial Infections

This research outcome is from one of the TMED's team member, Prof. Chien-Min Shih from the Tropical Medicine Program, focusing on the screening of the citrate synthase gene (gltA) of Rickettsia. A total of 1,186 blood tick samples were tested in Taipei City. The study found that the infection rate of porcupine ticks parasitizing stray dogs was 4.15%, significantly higher than the 1.11% observed in domestic dogs. This research emphasizes the role of dogs as companion animals for humans, highlighting that Rickettsia present in porcupine ticks may pose a potential threat to human health in Taiwan, necessitating enhanced monitoring and research in the future.

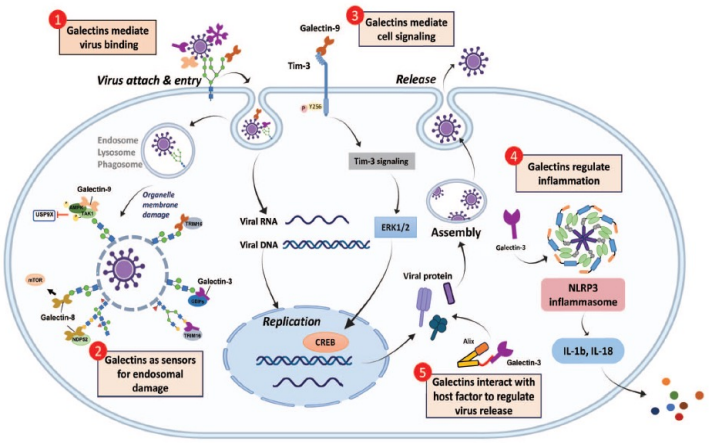


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
% of infection	0	0	2	6.92	3.54	1.94	5.56	1.83	3.57	4.72	2.22	0
number of ticks collected	19	23	50	130	113	258	180	164	84	106	45	14

Multiple Roles of Galectin in Viral Infections

This research outcome is from Professor Sheng-Fan Wang of the Department of Medical Laboratory Science and Biotechnology at our center. Galectins are a group of carbohydrate-binding proteins that are widely expressed in mammalian cells, participating in various biological functions such as cell adhesion, apoptosis, and immune responses. In recent years, the role of galectins in viral infections has received increasing attention. Professor Wang's research indicates that Galectin-1, -3, and -9 play key roles in infections caused by viruses such as HIV, HSV, HBV, and SARS-CoV-2.

This study explores the effects of galectins on viral attachment, entry, replication, and immune evasion, and calls for more precise analyses of the interactions between galectins and viruses in the future, as well as evaluating the feasibility of galectin inhibitors as antiviral strategies.



Other Important Highlights

The TMED hosted the 2025 International Conference on Tropical Medicine and Infectious Diseases. This event brings together international experts from Japan, Thailand, the Philippines, and various sectors of industry and academia to focus on dengue prevention and control. Several experts will discuss the characteristics of Aedes mosquitoes in the Kaohsiung area and explore new trends in infectious disease prevention and control.

Among the highlights are four major international keynote speeches covering important infectious disease topics such as norovirus, monkeypox, and dengue fever.

1. Prof. Ikuo Shoji of Kobe University in Japan shared the results of international collaborations, introduced his research collaboration on norovirus and rotavirus with Airlangga University in Indonesia.
2. Prof. Arunee Thitithanyanont of Mahidol University in Thailand shared global epidemic prevention and control experiences, using monkeypox and H5N1 as examples, to discuss antiviral preparedness
3. Dr. Raul V. Destura of the Philippine National Institute of Health presented new advancements in dengue diagnosis and showd the latest research on the evolution and transmission dynamics of dengue fever.
4. Prof. Wanchai Assavalapsakul of Chulalongkorn University in Thailand showcased dengue virus research and shared findings on its interaction with RNA.

Lecture by Prof. Wanchai, Thailand

Group photo

Present a token of appreciation to Prof. Shoji, Japan

Lecture by Prof. Arunee, Thailand

Lecture by Prof. Destura, Philippines

Group photo of all participants

From Genomics to Lipidomics: Uncovering Molecular Drivers of Disease

University-Level Mission-Oriented Research Center-
Center of Applied Genomics(CAG)
Postdoc Zhao-Feng Chen /Director Chia-Yang Li

Prof. Wei-Chung Cheng from the Ph.D. Program in Cancer Biology and Drug Development, China Medical University, was invited to deliver a special lecture at KMU, titled “From Genomics to Lipidomics: Uncovering Molecular Drivers of Disease.” The event attracted numerous faculty members and students interested in multi-omics research and precision medicine and molecular mechanism research.

On May 23, 2025, the Center of Applied Genomics invited Prof. Wei-Chung Cheng, PhD, from the Ph.D. Program in Cancer Biology and Drug Development at China Medical University, to deliver a lecture sharing his latest research in multi-omics. With his extensive research experience and interdisciplinary perspective, Prof. Cheng guided the audience through various omics layers, including genomics, transcriptomics, proteomics, and lipidomics, illustrating how integrative omics approaches can be harnessed to dissect disease mechanisms and identify novel therapeutic targets.

At the beginning, Prof. Cheng shared his research journey in cancer biology, then moved on to highlight the emerging role of lipidomics in biomedical research. He emphasized that lipids, beyond being structural components of cell membranes, play essential roles in signal transduction, energy metabolism, and disease progression. The application of lipidomics provides a critical layer of insight that complements genomic and proteomic data, enabling a more comprehensive understanding of disease biology.

Prof. Cheng also introduced his BioinfOMICS Lab (Bioinformatics in Omics Data Analysis), which focuses on high-throughput multi-omics analysis. The lab collaborates with clinical and pharmaceutical partners to advance personalized medicine and identify novel druggable targets through integrated computational approaches.

During the Q&A session, the audience actively engaged with questions ranging from data integration strategies and AI applications in omics, to statistical modeling of lipidomic datasets, demonstrating KMU’s strong interest in cutting-edge biomedical research.

This insightful lecture not only broadened attendees' understanding of lipidomics but also paved the way for future interdisciplinary collaborations. The Center of Applied Genomics at KMU looks forward to inviting more distinguished scholars to share their expertise and contribute to the university’s ongoing efforts in advancing multi-omics research and precision medicine.

Lecture by Prof. Wei-Chung Cheng

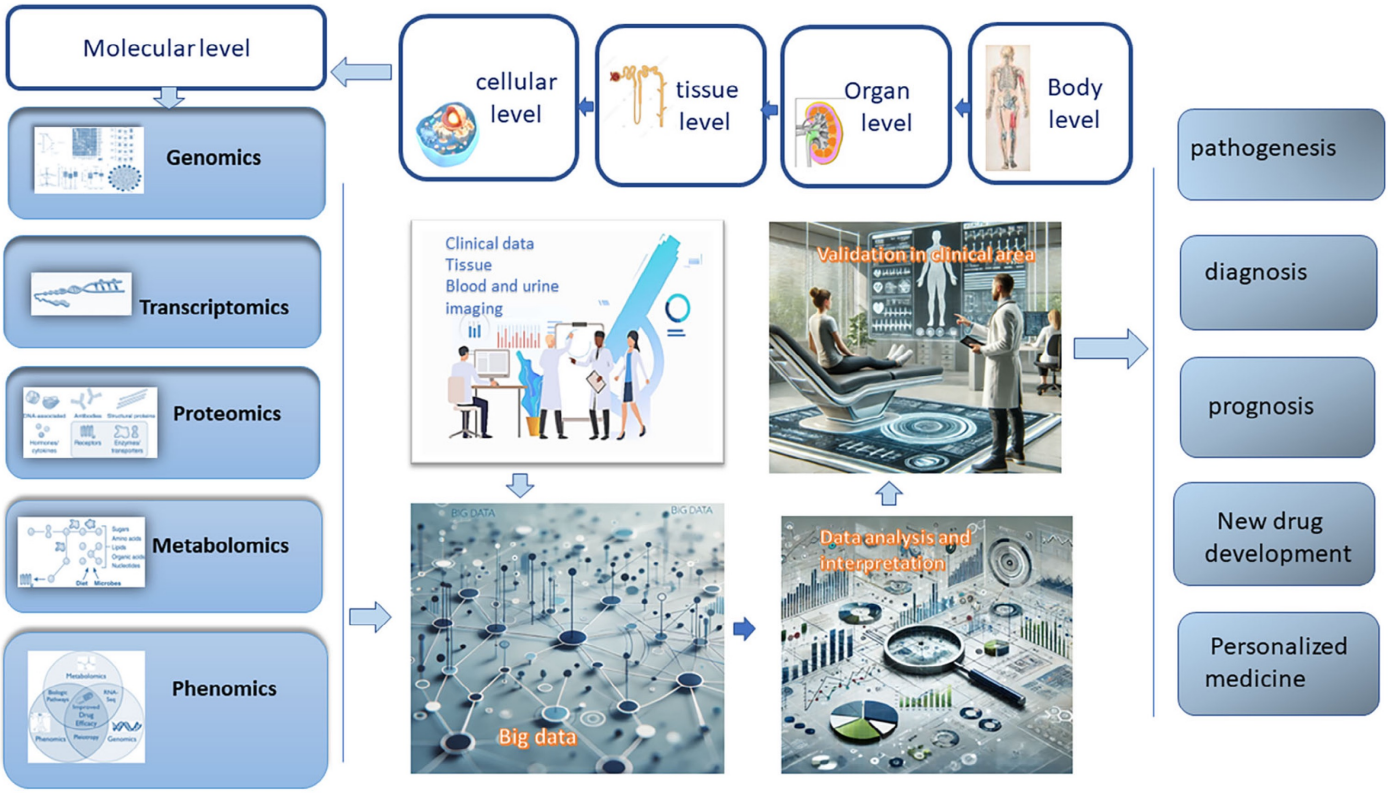
Group photo (Left to right: Prof. Chia-Yang Li /Director, Center of Applied Genomics; Prof. Wei-Chung Cheng / China Medical University; Dr. Shu-Pin Huang / Institute of Clinical Medicine, KMU.

Prospective Cohort Study on The Precision Medicine of Cardiorenal Synfrome

University-Level Mission-Oriented Research Center-
Center for Liquid Biopsy and Cohort Research (CLBCR)
Deputy Director, Yi-Chun Tsai

Chronic kidney disease (CKD) has a higher cardiovascular (CV) risk, and cardiovascular disease (CVD) also has a more rapid deterioration of kidney function. To explore the interaction between the heart and kidney in cardiorenal syndrome is very essential for clinical care. However, traditional clinical examination tools and prognostic values cannot change the treatment condition. This research cohort aims to conduct a new generation of study and develop multi-omics analysis platform for cardiorenal syndrome. Up to date, we have enrolled 2500 participants in this cohort study, and established metabolites, proteomics and microbiome database of 500 CKD patients, and microbiome and metabolites database in 500 diabetes patients. In addition, our team has published 15 papers using cohort data, and applied for eight out-of-hospital research projects (including one NSTC integrated project) and five clinical trials. We expect to apply the new technologies for examination and screening in the cohort. From a clinical perspective view, the depth exploration of patient phenotype, clinical presentation and prognosis assessment also fits the purpose of personalized medicine or precision medicine.

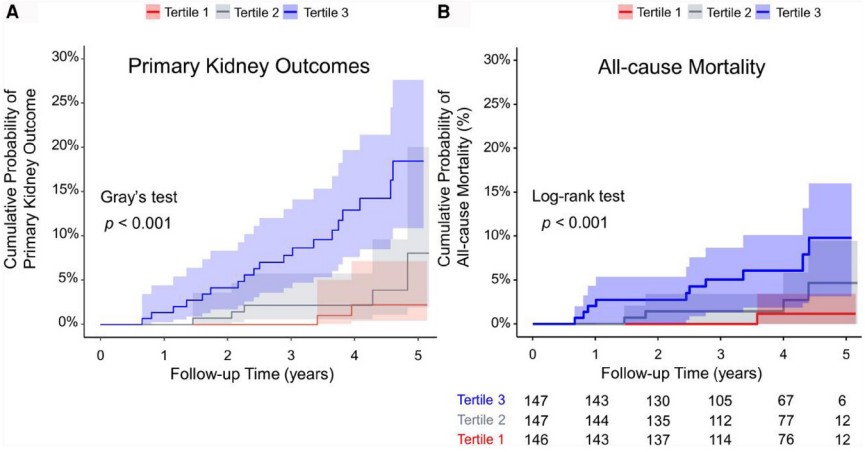
Chronic kidney disease (CKD) is a common chronic disease among the people of Taiwan. The prevalence rate was 12 %. According to the 2022 USRDS annual report, the prevalence in Taiwan ranked first in the world. In the top ten causes of death in Taiwan, nephritis, nephrotic syndrome and renal disease have been ranked ninth for five consecutive years (from 2020 to 2024). The threat of CKD to the health is huge in Taiwan. CKD is associated with significant morbidity and mortality. Cardiovascular disease (CVD) is the main cause of death in patients with CKD. The currently understood complex relationship among cardiorenal syndrome is due to traditional risk factors (e.g., diabetes, hypertension, cardiac hypertrophy, smoking, and dyslipidemia) and nontraditional risk factors (e.g., endothelial dysfunction, medial hyperplasia, vascular calcification, volume overload, abnormal mineral metabolism, anemia, malnutrition, inflammation, oxidative stress, and hyperparathyroidism). According to the development of multi-omics techniques, we expect to have a better understanding of the pathological mechanisms of cardiorenal syndrome in the future, and provide more opportunities for treatment. Thus, we conducted cardiorenal syndrome cohort and multi-omics platform to figure out potential biomarkers and pathophysiologic mechanisms in cardiorenal syndrome (Figure 1).



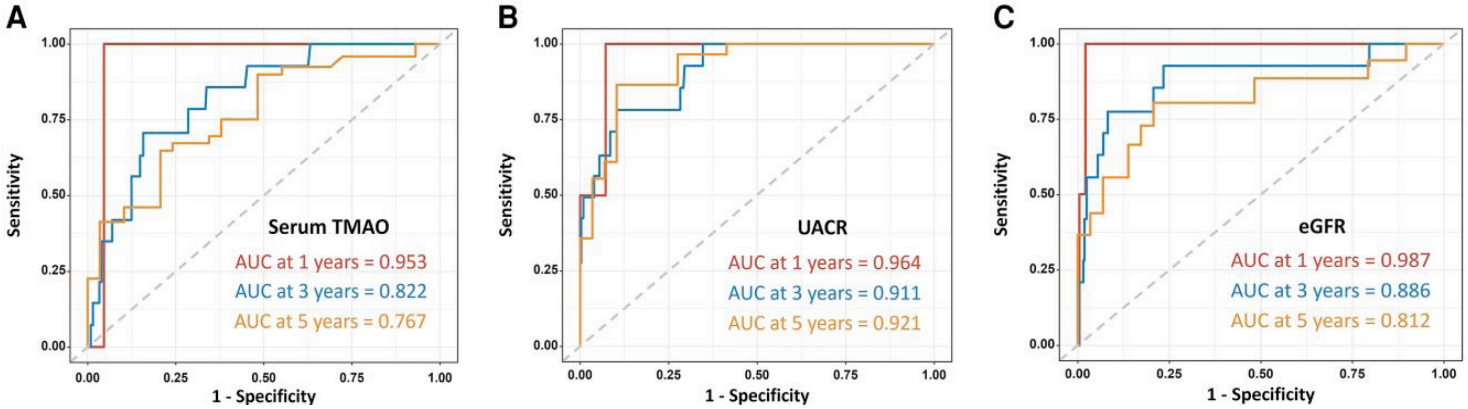
Multi-omics platform. (**Proteomics**, 2024; 0:e202400151)

We have enrolled 2,500 participants in this cohort study, and established metabolites, proteomics and microbiome database of 500 CKD patients, and microbiome and metabolites database in 500 diabetes patients. In addition, our team has published 15 papers using cohort data, and applied for eight out-of-hospital research projects (including one NSTC integrated project) and five clinical trials.

Among our metabolites database, several uremic toxins had an important impact on adverse kidney outcomes or all-cause mortality. Trimethylamine N-oxide (TMAO), a gut microbiota-dependent metabolite, was significantly correlated with adverse kidney outcomes or all-cause mortality in type 2 diabetic (T2D) patients. Cumulative probability analysis showed a significantly elevated risk of primary kidney outcomes in the highest tertile compared with the middle and lowest tertiles (Figure 2, published in *The Journal of Clinical Endocrinology & Metabolism* 2024;109: 2097–2105). Time-dependent ROC analysis revealed that the area under the curve (AUC) for TMAO (0.953) was comparable to UACR (0.964) and eGFR (0.987) at 1 year, suggesting that serum TMAO had similar activity to predict kidney outcomes in T2D as UACR and eGFR at 1 year. At 3 and 5 years, the AUCs of serum TMAO and eGFR were similarly decreased over time (Figure. 3A–C). These findings indicated that TMAO's classification strength was not inferior with eGFR over time.



Cumulative probabilities of primary kidney outcome and all-cause mortality by TMAO tertile (J Clin Endocrinol Metab 2024;109: 2097–2105).



Time-dependent ROC curves and calibration plots for TMAO, UACR, and eGFR in predicting primary kidney outcome (doubling of serum creatinine or dialysis) in T2D (*J Clin Endocrinol Metab* 2024;109: 2097–2105).

In addition, short-chain fatty acids (SCFAs) play key functional roles in the pathophysiology of T2D through regulating energy intake and substrate metabolism. Body composition, including fat tissue, muscle tissue and the pattern of their distribution in the body, can represent health status and be the cause or consequence of T2D complications. Our results found that T2D patients with a higher circulating methylbutyrate level and serum valerate/isovalerate ratio had lower fat tissue index (published in *International Journal of Medical Sciences* 2025; 22: 2289-2297), meaning that SCFAs components have a close relationship with body composition in T2D patients. Our metabolites analysis provides potential biomarkers to identify early phenomenon or predict adverse consequent outcomes in clinical patients.

In recent years, CKD treatment has witnessed remarkable progress, driven by a deeper understanding of disease mechanisms and the development of novel therapeutic strategies. Beyond traditional approaches such as renin-angiotensin system (RAS) inhibitors, new drug classes have emerged, including sodium-glucose cotransporter-2 (SGLT2) inhibitors, nonsteroidal mineralocorticoid receptor antagonists (nsMRAs), and endothelin receptor antagonists. These agents not only slow kidney function decline but also provide cardiovascular protection, addressing the complex cardiorenal interplay in CKD patients. Because our cohort has been well-constructed, at least five projects invited our cohort to participate in these exciting clinical trials. In summary, we believe that our cohort of cardiorenal syndrome will not only provide the depth exploration of patient phenotype, clinical presentation and prognosis assessment but also fit the purpose of personalized medicine or precision medicine.

Other Important Highlights

The CLBCR organizes 3-4 knowledge seminars and application workshops each year, inviting experts and scholars in various fields of biotechnology to deliver lectures. Through sharing and discussion, the center aims to provide research teams with novel biotechnological and analytical platforms, thereby enhancing the research capacity of each group. For example:

- The Liquid Biopsy and Third-Generation Sequencing Applications Workshop shared how third-generation sequencing technology can be used for real-time analysis of DNA and RNA sequences, with wide-ranging applications in infectious disease research, cancer research, human genetics, environmental science, and plant science. Thanks to its unique advantages, it is becoming increasingly popular in genomic studies.
- The Organoid Toolbox New Knowledge Applications Seminar, held by ACRO-Biosystems, introduced the Organoid Toolbox. Compared to traditional cell culture models, organoid technology offers more accurate and reliable human organ models. Its physiological and pathological features are closer to humans, thus providing an important platform for disease research, drug development, and safety assessment.
- The Extracellular Vesicles Precision Purification & Multi-Level Analysis Applications Workshop introduced the potential of extracellular vehicles (EVs) in fields such as cancer diagnosis, biomarker discovery, regenerative medicine, and immune regulation, as well as their rapid rise in biomedical research. The workshop presents EV detection solutions, assisting researchers in biomarker exploration, functional evaluation, and mechanism validation, thereby accelerating the clinical translation of research results.

The CLBCR promotes interdisciplinary research by integrating biomedical information, clinical data, and multi-omics analyses to enhance disease diagnosis and personalized medicine. By fostering collaboration and encouraging young scholars, the center aims to bridge basic and clinical research, accelerating the translation of findings into practical applications and strengthening KMU's position in biomedical research.

Strengthening Clinical Data Collaboration and Global Research Integration: KMU Big Data Research Center Advances Inter-Hospital and International Platform Applications

University-Level Mission-Oriented Research Center-
Center for Big Data Research (CBDR)
Analyst Chen-Yang Hsiao / Director Hui-Min Hsieh

The CBDR is dedicated to advancing the application of clinical data and fostering international integration. Since 2022, the Center has deepened its collaboration with both domestic and international institutions. Notable milestones include the inter-hospital partnership with Changhua Christian Hospital (CCH) and the introduction of the global clinical research platform TriNetX—key developments in clinical data governance, AI application, and international cooperation.

1.Inter-Hospital Collaboration: KMU × CCH Join Forces to Promote Clinical Applications

The collaboration between KMU and CCH spans five major clinical topics: chronic respiratory diseases, cardiovascular conditions, potentially inappropriate medication (PIM), thoracic trauma, and in-hospital cardiac arrest. A bilateral mechanism for data governance and model co-development has been established to foster deep collaboration between clinical and data science teams. Annual meetings are held to exchange outcomes and jointly develop models. Four practical applications were launched in parallel:(1) using AI to predict prognosis in chronic respiratory diseases; (2) identifying risk factors for PIM in older adults with cardiovascular disease; (3) predicting thoracic trauma risk among COPD patients; and (4) building a prediction model for in-hospital cardiac arrest to enhance early warning during hospitalization.

The collaboration has also led to concrete academic outputs, including two international journal publications: “Development of a Predictive Model for Potentially Inappropriate Medications in Older Patients with Cardiovascular Disease,” published in *Drugs & Aging* ; “Prediction model of in-hospital cardiac arrest using machine learning in the early phase of hospitalization,” published in *Kaohsiung Journal of Medical Sciences*. These publications highlight the university’s substantial contributions and academic strength in clinical AI research.

高醫大與彰基深化合作 共同推展醫療大數據研究新方向

發稿時間：2024/11/27 09:37:24

(中央社訊息服務20241127 09:37:24)肺阻塞(Chronic Obstructive Pulmonary Disease, COPD)位居全球十大死因第3名，每年死亡人數近300萬人，目前台灣肺阻塞病人面臨著高死亡率、高住院率、高惡化率及高共病率的「四高問題」。高雄醫學大學與彰化基督教醫院攜手開發能預測肺阻塞病人急性惡化的AI模型，對預防急性惡化及降低死亡率具有重大意義。

高雄醫學大學與彰化基督教醫院於2024年11月26日共同舉辦了一場合作成果研討會，展示雙方在醫療人工智慧（AI）、機器學習和臨床數據應用領域的最新研究進展。這場研討會突顯了雙邊在慢性疾病、心血管疾病及急性病預後管理中的合作成就，為醫療研究和臨床應用帶來了新的思維。

其中，高醫胸腔內科許超群教授團隊與彰基林慶雄副院長團隊共同開發能預測肺阻塞病人急性惡化的AI模型。藉由此類AI預測模型，醫療團隊能夠更精確地預測肺阻塞疾病進展及預後情況，幫助醫師為患者提供個人化的治療方案，並在病情惡化前提前介入。這項技術對於肺阻塞病患者達成預防急性惡化及降低死亡的目標具有重要意義。此外，高醫家醫科李純馨主任與彰基家醫科劉晏孜主任團隊合作研究老年心血管疾病患者的用藥風險，藉由大數據分析揭示了潛在的不適當用藥風險，並提出用藥監控與調整建議，將有助於減少藥物不良反應的發生，提升病患用藥安全。另一方面，高醫胸腔外科張博智醫師與彰基胸腔外科黃章倫主任團隊研究發現，臨床上胸部鈍傷後的康復過程較為複雜，且面臨較高的併發症風險，如呼吸衰竭等，藉由到院時所量測的生命徵象和患者的年紀、與相關共病等大數據可以預測病患的預後，所屬醫療團隊可以針對此類患者提供更適宜的治療，以減少併發症及提升生活品質。最後，高雄醫學大學附設中和紀念醫院林宗憲副院長與彰化基督教醫院大數據中心許秋婷組長團隊合作，運用AI技術建構住院患者心臟驟停的早期預測模型，能即時辨識高危險群患者。該系統將顯著提升醫護人員的應對效率，為病患爭取更多寶貴的搶救時間。

這場研討會展現了彰化基督教醫院與高雄醫學大學在醫療AI、大數據分析及臨床應用領域的卓越合作成果。雙方強調，未來將繼續攜手，深耕醫療數據研究，推動醫療精準化及個人化發展，為台灣醫療帶來更多創新突破。

2.Global Integration: Implementing the TriNetX Platform to Enhance International Research Practice

KMU has officially signed a collaboration agreement with the international clinical research platform TriNetX, marking the full implementation of a simulated clinical trial platform. In parallel, KMU has developed training modules and platform usage guidelines to ensure the practical application of these tools in both research and teaching contexts. On April 14, 2025, the “Simulated Clinical Trials and TriNetX Workshop” was held, featuring Professor Jia-Jhen Lai from National Cheng Kung University as the keynote speaker. The workshop attracted over 50 faculty members and students. The course covered key topics, including the fundamentals of comparative epidemiology, platform operation techniques, cohort definition procedures, and the practical applications of simulated analyses, all aimed at enhancing researchers’ capabilities in international study design and execution.

The CBDR has continued to host educational seminars and training sessions on platform applications, with over 100 participants to date. Through this initiative, interdisciplinary collaboration among professionals in public health, statistics, and clinical medicine has been successfully fostered, further expanding the visibility and influence of KMU's CBDR in the field of international research.

From Medical System to Community Care: Research and Development Strategies to Promote Health Among Older Adults

University-Level Mission-Oriented Research Center-
Center for Long-term Care Research (CLTCR)
RA Shih-Cian Chang / Director Yi-Chun Tsai

The CLTCR and the KMUH jointly organized the "Health Care in Aging Forum." They invited the President of the British Geriatrics Society, Prof. Adam Gordon, Assoc. Prof. Fang-wen Hu, and Asst. Prof. Tzu-Yu Lin from KMU to share their insights. The forum focused on innovative care models, the application of multiple intelligences, and physical resilience among older adults. Topics discussed included the ACHA cross-domain integrated care model, the Multiple Intelligence Scale among older adults, the empirical intervention of orienteering, and the Physical Resilience Scale for Older Adults and SMILE. The forum highlighted research findings and practical applications in geriatric care.

On June 10, 2025, CLTCR and the Department of Geriatrics of KMUH jointly held the " Health Care in Aging" Forum, inviting Prof. Adam Gordon, the president of British Geriatrics Society, Assoc. prof. Fang-Wen Hu of the College of Nursing, and Asst. prof. Tzu-Yu Lin of the Master Program of Long-term Care in Aging of KMU to give speeches and exchange views.

Prof. Adam Gordon shared his experience in working with the healthcare system, community care agencies and policymakers. Through interdisciplinary collaboration, he promoted evidence-based research and applied the results to improve the quality of life and geriatric care. During his presentation, he introduced an innovative new model known as the "Academic Centre for Healthy Ageing" (ACHA), which was established in northeast London, UK. With the "Living Lab" as the core, it has established experimental sites such as the Care Home RCT Platform and the Fractured Neck of Femur Delirium Platform. Through local participation, cross-disciplinary cooperation, and real-time research applications, it promotes the integration and innovation of geriatric care. Its focus includes translation of empirical research, cultivation of care workforce, application of data and technology (such as AI and big data analysis), and in-depth interaction with the community. This model emphasizes community co-creation and knowledge sharing, shortens the gap between research and clinical practice, aims to improve the quality of life and the effectiveness geriatric care, and creates a more sustainable and inclusive elderly health research platform. Finally, ACHA is based on principles of "inclusion, consensus, and sharing", encourages community participation and advocates for the "Community Advisory Network". The center aims to expand its influence in international education and research cooperation in the future.

Asst. Prof. Tzu-Yu Lin presented on the "Application of Multiple Intelligences in Community Older People: Measurement and Intervention". She highlighted that traditional intelligence assessment methods, such as the Wechsler Adult Intelligence Scale Fourth Edition (WAIS-IV), Mini-Mental Stata Examination (MMSE), and Montreal Cognitive Assessment (MoCA), often rely heavily on language and logical reasoning. This reliance may underestimate the overall cognitive potential and development of intelligence among older adults.

The theory of multiple intelligences (MI) offers a multidimensional approach to understanding cognition, encompassing musical, natural, intrapersonal, interpersonal, and bodily-kinesthetic intelligences. This framework reflects diverse performance across different cultures and life contexts. The discussion aimed to explore how multiple intelligences can be applied in health promotion for older adults with two main aims. The first project developed and validated the "Multiple Intelligence Scale (MIS)" among older adults. A survey conducted on 428 older community dwellers in Taiwan, and revealed that they rated relatively high in spiritual and natural intelligence but low in language and logical intelligence. This suggests that traditional intelligence assessments may not effectively reflect the cognitive potential of older adults. Further exploratory structural equation modeling (ESEM) analysis indicated a close relationship between spiritual intelligence and intrapersonal intelligence, as well as a significant positive correlation between spiritual intelligence and the MoCA cognitive test. This supports the inclusion of spiritual intelligence in cognitive assessments for older adults. The second project designed and implemented an orienteering exercise (OE) intervention program based on the concept of MI. The OE integrated navigation ability using maps and compasses, encouraging older participants to engage in both physical and cognitive challenges and decision-making training in a natural environment. The OE program recruited 80 older community participants, holding sessions twice a week for 12 weeks, a total of 24 sessions, with a follow-up period of 3 months. Preliminary results showed that OE had significantly interventional effects on improving participants' attention, cognitive function (MoCA), agility, cardiopulmonary endurance, and walking ability, demonstrating its feasibility and potential as a health promotion strategy for older adults.

Assoc. Prof. Fang-wen Hu addressed the theme "Subjective Physical Resilience Matters in Recovery of Hospitalized Older Adults", emphasizing that approximately 30–60% of hospitalized older patients experience functional decline during hospitalization. This decline significantly impacts their independence, self-esteem, and quality of life, and may even result in institutionalization or death. Traditional medical approaches often prioritize disease treatment while overlooking the importance of fostering patients' resilience. Focusing on older adults' subjective experiences, Professor Hu conducted a qualitative study to explore the adaptive processes of frail elderly patients during hospitalization and after discharge. The study identified key recovery strategies, including "belief and hopeful mindset," "positive thinking," and "coping with and adjusting one's lifestyle." To operationalize the concept of physical resilience, the research team developed the Physical Resilience Instrument for Older Adults (PRIFOR) and rigorously tested its reliability and validity through empirical methods. Findings suggest that this instrument effectively predicts post-discharge functional outcomes (e.g., ADL), and demonstrates strong associations with cognitive function, emotional well-being, and self-care ability. Building on these findings, the team proposed a structural model centered on physiological reserve, intrinsic capacity, and physical resilience, offering a more accurate framework for assessing recovery potential in older patients.

Furthermore, based on the empirical insights, an innovative multi-component intervention—**SMILE**—was developed. This framework integrates Spirituality/Social support, Mentation, Independence of locomotion, and Emotion, aiming to enhance genuine recovery and facilitate healthy discharge through holistic support. This study not only addresses the limitations of traditional medically oriented interventions but also highlights the critical role of patients' subjective experiences and positive beliefs in the recovery trajectory.

Lecture by Prof. Adam Gordon, England

Lecture by Asst. Prof. Tzu-Yu Lin

Lecture by Assoc. Prof. Fang-Wen Hu

Group Photo

Group Photo

From Clinical Training to Global Advocacy: Advancing Humanizing Health Professional Education

University-Level Mission-Oriented Research Center-**Center for Medical Education and Humanizing Health Professional Education (MEHHPE)**
PhD. Chuan-Hui Chuang / Director Ming-Ju Tsai

The MEHHPE is dedicated to promoting medical and humanizing education by integrating humanistic core competencies across all educational stages—from classrooms to clinical training, and from teaching practice to research publication. This quarter highlights two major initiatives: an educational board game enhancing preclinical patient safety training, and international efforts advocating for global equity in health professions education publishing.

1.Gamification for Patient Safety Education

To meet the growing needs in patient safety education, Professor Ju-Hui Wu from the Department of Oral Hygiene developed a board game named “DentSafe”. The game simulates a full dental clinical procedure, incorporating the Ministry of Health and Welfare’s eight patient safety goals. It serves as a training tool for preclinical dental and dental hygiene students.

Published in *BMC Medical Education*, the study titled “Educational board game for training dental and dental hygiene students in patient safety issues” involved 75 students and demonstrated significant improvement in knowledge recall, understanding, and application—especially among those mentored by dental hygienists. Student feedback praised the game’s motivational, participatory, and practical aspects, while also suggesting improvements to the rules and scenario cards.

Students engaging in patient safety training using the **DentSafe** board game during a preclinical course.

2.Promoting Publishing Justice and Global Knowledge Equity

Power imbalances persist in global health professions education (HPE) publishing, often disadvantaging scholars from the Global South. Structural barriers include language, research framing, and biased peer-review systems. Prof. Peih-Ying Lu from our center joined the "Global South Counterspace Authors Collective" to co-author a paper in Medical Teacher titled "Twelve Tips for Strengthening Global Equity in Health Professions Education Publication". The paper offers actionable reforms addressing language support, collaborative equity, inclusive epistemologies, and cultural sensitivity in peer review. These efforts embody the center's commitment to advancing social responsibility and diversity in global academic discourse.

Other Important Highlights

- On June 13, 2025, the MEHHPE and the college of Medicine co-organized the "2025 International Conference on Resilience in Medical Education," inviting international scholars to share insights on team-based resilience, AI, and CBME strategies.

- Prof. Peih-Ying Lu will co-lead Pre-Conference Workshop PCW 23 at the 2025 AMEE Conference in Barcelona (August 23–27), alongside Diane Nguyen, Tessy Thomas, and Robert Cooney.

Health Risks and Policy Recommendations Regarding the Use of High-Dose Vitamin A Supplements

University-Level Mission-Oriented Research Center
- Research Center for Medical Technology and Policy (RCMTP)
Postdoc Ching-Wei Chiu /Director, Chi-Kung Ho

Vitamin A is an essential nutrient that helps maintain good vision, healthy skin, and a robust immune system, but “Eating Too Much is Harmful to Your Health”! Recent research has shown that long-term use of high-dose vitamin A supplements may cause liver damage, osteoporosis, and even increase the risk of fractures. In Taiwan, some hospitals still prescribe high-dose vitamin A complex supplements as a calcium source without adequately assessing patients’ individual nutritional status or liver function risk. This inappropriate use may lead to failure of calcium supplementation and may increase liver burden and bone loss. Therefore, the results of this study reveal that the government and the medical profession should face up to its potential hazards. It is recommended that the National Health Insurance Administration establish a "high-dose vitamin A prescription monitoring index" and conduct medication tracking and medication feedback for patients who are prescribed long-term medication in hospitals so as to establish more rigorous prescription monitoring and medication guidelines. Promote the public's correct understanding of the Dietary Reference Intakes (DRIs) for people, promote health knowledge education on nutritional supplements, and ensure that nutrient supplements are based on individual actual needs and scientifically recommended intakes, and strengthen the public relevant knowledge education.

This study analyzes the literature on the potential risks of taking high-dose vitamin A supplements from a clinical and public health perspective. It highlights that many compound supplements, if prescribed without considering individual deficiencies, may lead to vitamin A intake exceeding the recommended daily upper limit, thus increasing the risk of liver damage, bone loss, and fractures. Evidence shows that excessive vitamin A intake promotes bone resorption and inhibits osteoblast activity, meaning that even with sufficient calcium intake, it may be insufficient to offset bone loss—posing significant risks to older adults and those at high risk of osteoporosis. Therefore, this study recommends that the government incorporate prescription monitoring mechanisms, strengthen physician guidelines and warning labels, and promote public education on recommended nutrient intake and proper supplement use, helping people recognize the potential health hazards of “over-supplementation.”

Other Important Highlights

Vitamin A Policy Advocacy

- Important Research Findings: By compiling the domestic and international studies, the research indicates that long-term high-dose vitamin A intake may cause liver damage, osteoporosis, and fracture risks, and proposes feasible policy recommendations and directions for revising medical guidelines.
- Policy Advocacy: For the prescription and regulation of such supplements, the report proposes three major policy directions: “prescription monitoring mechanisms,” “risk notification standards,” and “public health literacy education,” calling on the government and the medical profession to work together to protect public health.
- Manuscript Submission: This article has been published in the【Newsletter of The Taiwanese Osteoporosis Association】, 14th Volume, Issue 7, July 2025, on page 43 under "Reader Contributions."

5.Research Platform Services

Applied Genomics Analysis Platform

Center of Applied Genomics

Introduction

The Analysis platform integrates multiple genomic data processing technologies, including next-generation sequencing (NGS), microbiome analysis, epigenomics, mRNA expression profiling, and qPCR, to provide high-quality and reproducible data analysis services. Equipped with high-performance computing resources and comprehensive analysis pipelines, the platform is dedicated to supporting both intra- and inter-institutional research as well as academia–industry collaboration, fostering the application of genomics in precision medicine and the health industry.

Services and Charges

The platform provides seven categories of genomics-related services

Service Items		Internal	External
NGS Cancer Screening Data Analysis	Basic Service:Data preprocessing, variant detection, annotation, and draft report	NT$5,000 /case	NT$6,000 /case
	Customized Analysis: Advanced data interpretation and analysis (including multiple samples)	NT$1,250 /hr	NT$1,500 /hr
TPMI Data Analysis	Basic Service:Data integration and variant frequency analysis	NT$5,000 /case	NT$6,000 /case
	Customized Analysis:Advanced genetic association and risk analysis	NT$1,250 /hr	NT$1,500 /hr
Metagenomics Data Analysis	Basic Service: Quality control (QC), diversity analysis	NT$1,000 /sample	NT$1,000 /sample
	Customized Analysis: Advanced microbiome analysis	NT$1,250 /hr	NT$1,500 /hr
RNA-related Services	RNA Extraction Basic Service： RNA extraction (Frozen tissue)	NT$300 /sample	NT$360 /sample
	RNA Quality Control (QC) Basic Service： RNA quality assessment (RIN value)	NT$200 /sample	NT$240 /sample
Clariom S Array Analysis	Basic Service：Sample processing, array detection, and basic analysis	NT$300 /sample	NT$360 /sample
	Customized Analysis: Advanced gene expression analysis	NT$200 /sample	NT$240 /sample
qPCR Gene Expression Analysis	Basic Service:Gene expression quantification (including reverse transcription and normalization). Charged per sample or per plate (whichever applies)	NT$600 /sample or NT$4,800 /plate (max)	NT$720 /sample or NT$5,760 /plate (max)
	Customized Analysis:Special normalization or advanced analysis	NT$1,250 /hr	NT$1,500 /hr

Notes

- **NGS:** Each case of basic service applies to a single-patient screening and only includes data analysis (sequencing costs are excluded). For more than one sample, customized analysis fees will apply (e.g., ~100–120 hours for 50 samples, ~200–240 hours for 100 samples).
- **TPMI:** Each case of basic service applies to variant frequency analysis and statistical comparison based on the integrated dataset provided by the TPMI Data Center (no sample size limitation).
- **Metagenomics and qPCR:** Basic services are designed for large-scale sample processing.
- **Clariom S Array Analysis:** Basic service includes chip materials, labeling and hybridization, scanning, and basic analysis. If users provide their own arrays, a price reduction will be applied according to the actual material costs.
- **qPCR:** Basic service includes RNA reverse transcription, SYBR/PCR mix usage, primer setup, and reference control handling:

  ▶ The per-sample pricing (NT$600 for internal / NT$720 for external users) represents the platform's basic package, which covers detection of 1 target gene and 1 reference gene, both performed in triplicate (total 6 wells). This rate is intended for small sample sizes with simple experimental designs and serves as a baseline cost reference.

  ▶ If more than one target gene per sample is required, or if the design includes multiple condition comparisons or additional replicates, pricing will be adjusted according to the actual number of wells and experimental setup.

  ▶ For larger sample sizes, if the experimental design allows consolidation into a single 96-well plate, the "per-plate maximum" pricing will apply (NT$4,800 for internal / NT$5,760 for external users) as the batch rate. The actual feasibility of consolidating into one plate depends on the number of wells required per sample, standard curves, and control needs, and will be evaluated by platform technicians.

  ▶ Example: For 10 samples, each requiring detection of 7 target genes and 1 reference gene, all in triplicates, each sample would use 24 wells, totaling ~240 wells. This would require 3 × 96-well plates, resulting in a total fee of NT$14,400 (internal) or NT$17,280 (external). The platform will provide tailored setup and pricing recommendations based on actual experimental requirements.

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6. Important Events

2025 Academic Year MOE's Higher Education Sprout Project C-3【Special Topics on Stem Cell Biology and Regeneration Medicine】Training Program

Sep. 24, 2025 (Wed.) ~ Nov. 26, 2025 (Wed.)

Since the 2020 academic year, our university has implemented regenerative medicine courses in line with the MOE's Higher Education Sprout Project. These courses cover topics such as stem cells, ethics and regulations, and academic-industrial applications. In 2021, the curriculum was expanded in both content and hours and designated as an elective for graduate programs. In 2023, a course on cell therapy was introduced, and in 2025, the program incorporated the “KMU Cell Therapy Development Special Topics,” continuing to cultivate talents in medical research, innovation, and industry.

Venue

4th Conference Room,
4F, Li-Hsueh Building, KMU

Organizer:
Regenerative Medicine and Cell Therapy Research Center

7th International Symposium on Biological Application of Dendrimers

Sep. 4 (Thu.) ~ Sep. 6 (Sat.), 2025

The International Symposium on Biological Application of Dendrimers provides an academic platform for scholars and students worldwide in the field of dendrimer chemistry to present and discuss their latest research findings. It enables participants to stay updated on global advancements and fosters in-depth academic exchange and collaboration. In addition to lectures, poster sessions offer further opportunities for interaction and the building of meaningful connections. Each symposium attracts approximately 100–150 leading experts and students in dendrimer chemistry.

This year, for the first time, the symposium will be held outside of Europe, with Taiwan selected as the host country. This offers a valuable opportunity to showcase Taiwan's soft power in the field, enhance its visibility in the global chemistry community, and strengthen academic exchange and friendship with other countries. It also helps maintain Taiwan's international influence in chemical research and expands opportunities for collaboration.

Venue

Howard Plaza Hotel, Kaohsiung

Organizer: Department of Medicinal and Applied Chemistry
Co-Organizer:
National Science and Technology Council; Economic Development Bureau, Kaohsiung City Government; Prof. Inoue Foundation for Biochemical Science and Education; College of Life Science, KMU; DVCR, KMU

KMU AI seminar

April 10, 2025 (Thur.) 12:10~13:20

Speech Title **The Past, Present, and Future of Generative AI**

The development of generative AI has evolved from early rule-based systems to today's complex neural network models. In recent years, breakthroughs in deep learning have enabled tools like ChatGPT, DALL·E, Midjourney, and Suno to generate astonishing text, images, and music content. Today, large language models are capable of complex reasoning, coding, and multilingual translation. Meanwhile, multimodal models can simultaneously process text and image inputs, generating outputs more aligned with human expectations. AI video generation is also becoming increasingly sophisticated, and these technologies are now integrated into various industries—from content creation to medical diagnostics—bringing transformative changes to workflows.

Looking forward, generative AI will continue to evolve toward greater accuracy, creativity, and ethical alignment. Models will become more personalized, better understanding user needs and preferences. At the same time, emphasis will grow on transparency and explainability, ensuring fair and safe applications that contribute meaningful value to human society.

Venue CS201 Classroom, Chi-Shih Building, KMU



Speaker

Dr. Po-Chao Hsu (Director, Division of Cardiology, KMUH)

Organizer:
Biomedical Artificial Intelligence Academy
Co-Organizer: Project Management Office for Intelligence Healthcare, KMUH

2nd AI ESG Precision Medicine Forum

April 12, 2025 (Sat.) ~ April 13, 2025 (Sun.)

Taiwan is transitioning from the global capital of AI hardware to a global R&D hub for precision and smart healthcare. With the rapid establishment of frontier R&D centers in Taiwan, exchanges in technology and ideas are accelerating the fusion of medicine and AI, forming the heart of cross-disciplinary innovation. This development not only expedites AI applications in healthcare but also supports the global movement toward health equity.

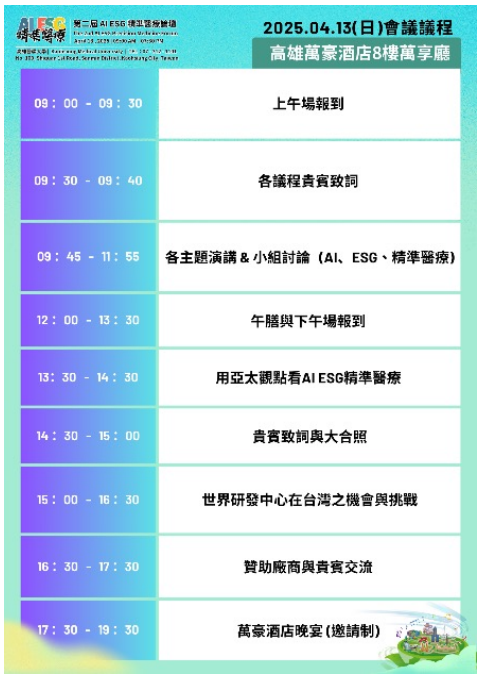
Taiwan's "Sacred Mountain" of semiconductors has laid a strong hardware foundation for AI technology. Now, "MED AI"—a precision medicine platform driven by AI—is emerging from this fertile ground. We must envision its future through a ten-year lens. The past two decades have accomplished medical digitalization; the next decade will revolutionize healthcare technologies.

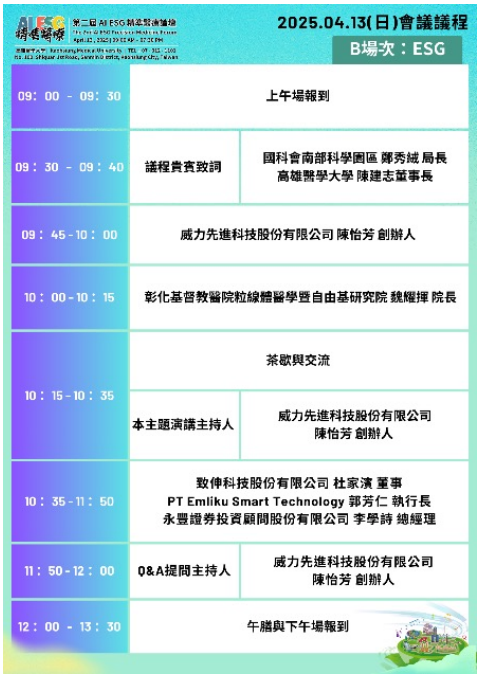
Just as Moore's Law once accelerated semiconductor advancement—doubling transistor counts every two years—a new trend is emerging in the AI era: Huang's Law. According to Huang's Law, computing power increases by a factor of one million every ten years. With this exponential growth in computing and intelligent algorithms, AI will reach new heights in the coming decade, catalyzing medical innovation and the realization of precision healthcare.

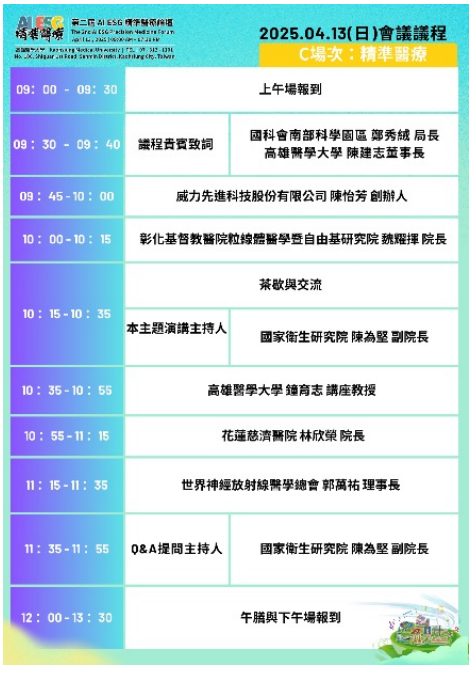
Taiwan's biomedical and tech sectors must join forces to build a medical utopia and achieve health equity. As AI technology matures, the vision of universal access to high-quality healthcare will move closer to reality. AI represents not only technological progress but also a new philosophy of medicine—emphasizing personalized treatment through data and computing, and addressing inequalities in resource allocation.

By advancing MED AI with a "5x per year" strategy, its achievements in ten years could surpass those of today's semiconductor industry by a factor of ten. Mathematically, 5 to the 10th power equals 9,765,625—an exponential leap that would establish MED AI as Taiwan's key force in the global smart healthcare arena. With the continued evolution of AI, Taiwan is poised to transform from the capital of AI hardware into the world's R&D center for smart healthcare.

Venue KMU International Conference Center (Apr.,12);
Kaohsiung Marriott Hotel (Apr., 13)







Organizer:
KMU, Development Center for Biotechnology, Taiwan Digital Health Industry Development Association
Co-Organizer:
NTU, NYCU, NSYU, NSTC, NTU Center for AI and Advanced Robotics, Kaohsiung City Medical Association, Taiwan Precision Health Alliance, AI Industry Innovation Alliance, HSC, TAITA—East Coast, VtR Inc, Hualien Tzu Chi Hospital, Willy Advanced Power Technology Co., Ltd., Kaohsiung Municipal Kaohsiung Girls' Senior High School, Metal Industries Research & Development Center
Execution Unit: AI THINK MED, BAIA

KMU AI seminar

April 10, 2025 (Thur.) 12:10~13:20

Speech Title **How KMUH Builds Its Own GPT**

Through an overarching strategic framework, this session explores how to gradually build a GPT tailored to the KMU healthcare system, sharing real-world application cases—including administrative process optimization and clinical decision support—demonstrating the tangible impact of generative AI across diverse clinical settings.

Venue 1st Conference Room, 6F, Frank C. Chen Memorial Building, KMUH

Speaker Deng-Chiung Shih, Li-Li Wang, Wen-Feng Cai
(Engineer, Project Management Office for Intelligence Healthcare, KMUH)

Organizer:
Biomedical Artificial Intelligence Academy
Co-Organizer: Project Management Office for Intelligence Healthcare, KMUH

KMU AI seminar

April 24, 2025 (Thur.) 12:10~13:20

Speech Title **Smart Healthcare: Taiwan's Next "Silicon Shield"?**

AI applications in healthcare have emerged rapidly, rivaling expert-level accuracy and expanding into increasingly diverse domains. But how can Taiwan identify its unique niche and compete on a global scale?

By introducing seven models of smart healthcare application, we will explore the long-term development trends of intelligent medicine, predict the interdisciplinary challenges that healthcare professionals and hospitals may face, and explain why smart healthcare may be the best path forward for Taiwan's technological and societal development in the foreseeable future.

Venue 1st Conference Room, 6F, Frank C. Chen Memorial Building, KMUH

Speaker **Dist. Prof. Chen-Wen Yen**
(Department of Mechanical and Electromechanical Engineering, NSYSU)

Organizer:
Biomedical Artificial Intelligence Academy
Co-Organizer: Project Management Office for Intelligence Healthcare, KMUH

KMU AI seminar

April 30, 2025 (Wed.) 12:10~13:20

Speech Title **The AI Trend That I Foresee in 2025(~2027)**

This talk analyzes global AI trends in the coming years and the potential paradigm shifts they may bring, offering recommendations for Taiwan and attendees to respond proactively.

Venue 1st Conference Room, 6F, Frank C. Chen Memorial Building, KMUH

Speaker **Ming-Lun Li**
(Director, AI Performance Lab, Foxconn)

Organizer:
Biomedical Artificial Intelligence Academy
Co-Organizer: Project Management Office for Intelligence Healthcare, KMUH

2025 International Conference on Tropical Medicine and Infectious Disease

May 2, 2025 (Fri.) 8:30~17:00

The TMED in collaboration with the Master's Program in Tropical Medicine, co-hosted an international symposium. The event invited global experts of tropical medicine and infectious diseases to deliver presentations, providing participants with the latest research insights and creating opportunities for exchange between faculty members and international scholars.

Venue Audiovisual Center, Li-Hsueh Building, KMU

Organizer: Center for Tropical Medicine and Infectious Disease; M. Sc. Program in Tropical Medicine of College of Medicine
Co-Organizer: Division of Infectious Diseases, KMUH

KMU AI seminar

May 15, 2025 (Thur.) 12:10~13:20

Speech Title **Development of Wearable Brain-Computer Interfaces for Smart Healthcare Applications**

As artificial intelligence and digital technologies evolve rapidly, smart healthcare has become a key direction in global medical development. Since the World Health Organization (WHO) proposed the concept of eHealth in 2005—and expanded it to Digital Health in 2018—emerging technologies such as AI, big data, and mobile health have been recognized as essential tools for improving public health, achieving Universal Health Coverage (UHC), and advancing the Sustainable Development Goals (SDGs). Within this context, intelligent health care has emerged, with smart healthcare as one of its core application areas.

This presentation begins with the topic of wearable brain-computer interfaces (BCIs), offering an overview of current global developments in BCI research applied to smart healthcare. Using our team's own wearable BCI as an example, we have developed multiple AI algorithms aimed at enhancing stroke rehabilitation outcomes, supporting ADHD diagnosis, and predicting migraines. These systems have been introduced into clinical trials and smart health care environments, demonstrating the potential and clinical value of smart healthcare in delivering precise and personalized medical care.

Venue Lecture Hall A1, 1.5F, Li-Hsueh Building, KMU

Speaker **Prof. Li-Wei Ko**
(Department of Electronics and Electrical Engineering, NYCU)

Organizer:Biomedical Artificial Intelligence Academy
Co-Organizer: Project Management Office for Intelligence Healthcare, KMUH

KMU AI seminar

May 21, 2025 (Wed.) 12:10~13:20

Speech Title **Medical Cybersecurity**

This seminar focuses on healthcare information security, covering topics such as ChatGPT and AI-related risks, cybersecurity regulations (including Taiwan's Cyber Security Management Act and the GDPR), OWASP Top 10 vulnerabilities, and the cybersecurity challenges posed by cloud-based electronic medical records and IoT medical devices. It will also delve into 5P medicine, major global healthcare cybersecurity incidents, and the impact of international cybersecurity laws on the medical industry—highlighting the critical role of cybersecurity in the age of AI and smart healthcare.

Venue 1st Conference Room, 6F, Frank C. Chen Memorial Building, KMUH

Speaker **Chair I-Te Chen**
(Department of Health care Administration and Medical Informatics, KMU)

Organizer:
Biomedical Artificial Intelligence Academy
Co-Organizer: Project Management Office for Intelligence Healthcare, KMUH

KMU Happy Hour Seminar

May 21, 2025 (Wed.) 16:30~18:00

Speech Title **Inspire Your Health with Sports Science Experience**

This event mainly to explore the fascinating world of sports science, get hands-on experience with the cutting-edge sports equipment, and spark new ideas for a healthier lifestyle! This is a sports product experience × body data exploration event open to everyone. Professional equipment will be on-site—measure it, see the results instantly!

- MyotonPro: Muscle tone and stiffness analysis
- Digital Micro FET3: Accurate muscle strength measurement
- Goniometer: Joint range of motion assessment

These real-time assessments sparked interest in healthy living and brought sports science closer to the public.

Venue Louisa Coffee, KMU

Speaker **Prof. Nai-Jen Chang**
(Chair of the Department of Sports Medicine)

Organizer:
Precision Sports Medicine and Health Promotion Center, Office of R&D

KMU AI seminar

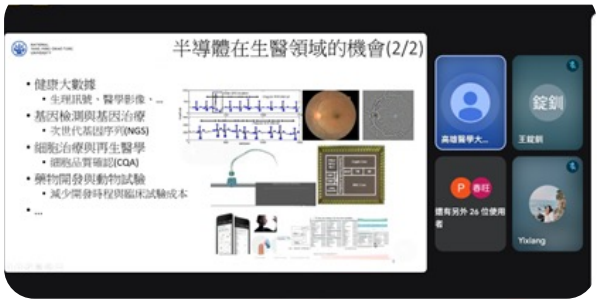
June 4, 2025 (Wed.) 12:10~13:20

Speech Title **Challenges and Opportunities of Programmable Semiconductor Biomedical Chips**

The session leverages Taiwan's strengths in semiconductor manufacturing and chip design to explore emerging opportunities in the medical diagnostics market. Topics include mobile nucleic acid amplification testing and single-cell manipulation solutions for cell therapy. The speaker will explain how the integration of diagnostic data with AI models can drive innovation in Taiwan's medical device industry and enhance the quality of healthcare services.

Venue 1st Conference Room, 6F, Frank C. Chen Memorial Building, KMUH

Speaker **Dist. Prof., Chen-Yi Lee**
(Institute of Electronics, NYCU)



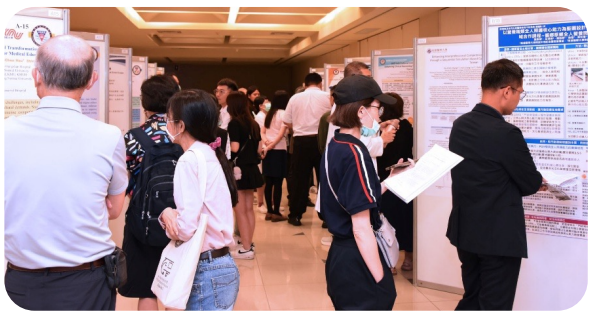
Organizer:
Biomedical Artificial Intelligence Academy
Co-Organizer: Project Management Office for Intelligence Healthcare, KMUH

2025 International Conference on Medical Education: Resilience in Medical Education: Challenge, Change and Chance

June 13, 2025 (Fri.) 8:30~16:30

This symposium focused on resilience in medical education, discussing the integration of AI, CBME, and cross-cultural/professional collaboration in strengthening both individual and team resilience.

Venue Hall B, International Convention Center, B2F. International Academic Research Building, KMU



Organizer: College of Medicine, MEHHPE, KMUH

English Special Lecture

June 17, 2025 (Tue.) 14:00~17:00

Speech Title **Unveiling Return Dynamics: Energy, Crypto, and Equity Factor Insights**

The seminar will feature the following topics:

- Energy Prices and Stock Market Correlation: Analyzing how fluctuations in oil and gas prices affect stock returns in EU countries, using advanced models to explore sector-specific differences.
- A Systematic Review of Crypto Returns: Reviewing existing research and recent data, including the approval of Bitcoin and Ethereum ETFs, to reflect on the performance trajectory and future trends of cryptocurrency returns.
- Frequency Decomposition of Equity Factors: Introducing the Empirical Mode Decomposition (EMD) method, showing how it enhances the predictive power of anomaly factors and captures underlying fundamental signals.

The session will adopt a cross-asset perspective, combining economic models with empirical findings to explore the applications and challenges of “return structure and forecasting” in financial markets. It is ideal for participants interested in financial data analytics, investment research, or quantitative strategies.

Venue Audiovisual Center, Li-Hsueh Building, KMU

Speaker

Daniel Traian Pele (Professor, Bucharest University of Economic Studies, Bucharest)
David Siang-Li Jheng (Doctor of Philosophy, Doctoral School of Economic Cybernetics and Statistics, Bucharest University of Economic Studies)
Owen Chaffard (PhD student, MSCA Digital)
Wolfgang Karl Härdle (Professor, Statistics, Humboldt-Universität zu Berlin)

Organizer: Biomedical Artificial Intelligence Academy

KMU AI seminar

June 18, 2025 (Wed.) 12:10~13:20

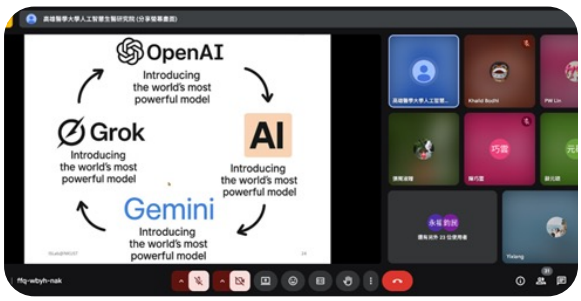
Speech Title **From the Turing Test to Trustworthy Medical AI: The Evolution and Implementation of Validation Methods**

This presentation will begin by examining the recent claim that “large language models have passed the Turing test,” using it as a starting point to explore the representativeness and limitations of the Turing test and other human-centered, subjective evaluation methods in assessing AI’s real-world performance. It will then introduce how traditional task-oriented validation approaches can serve as a complement, along with an overview of current developments in the field.

Drawing from real-world case studies in clinical settings, the talk will illustrate how to design and implement validation processes that align closely with practical healthcare needs. Finally, it will outline the current challenges and limitations of AI models in clinical validation and propose potential directions for future optimization—serving as both a conclusion and a forward-looking perspective.

Venue CS201 Classroom, Chi-Shih Building, KMU

Speaker **Prof. Hong-Jie Dai** (Department of Electrical Engineering, NKUST)



Organizer:
Biomedical Artificial Intelligence Academy
Co-Organizer: Project Management Office for Intelligence Healthcare, KMUH

Kaohsiung Medical University

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