KMU
Kaohsiung Medical University

RESEARCH CENTER QUARTERLY REPORT

2026.08

OFFICE OF RESEARCH & DEVELOPMENT

KMU
Kaohsiung Medical University

Contents

UNIVERSITY-LEVEL RESEARCH CENTERS 01

HEADLINE FOCUS 04

UNIVERSITY RESEARCH CENTER COLUMN 08

QUARTERLY IMPORTANT EVENTS 47

UNIVERSITY-LEVEL RESEARCH CENTERS

UNIVERSITY-LEVEL RESEARCH CENTERS

University -Level Academic Research Institute

Biomedical Artificial Intelligence Academy

https://baia.kmu.edu.tw
Dean：Dist. Prof. Henry Horng-Shing Lu
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University-Level Academic Research Center

Research Center for Precision Environmental Medicine

https://envmed.kmu.edu.tw
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CEO：Prof. Chih-Hsing Hung
Deputy CEO：Prof. Pei-Shih Chen, Prof. Chih-Jen Yang, Prof. Tusty-Jiuan Hsieh, Prof. Wei-Ting Liao, Clinical Asst. Prof. Da-Wei Wu
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Regenerative Medicine and Cell Therapy Research Center

https://rcc.kmu.edu.tw
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Deputy CEO：Prof. Cheng-Chang Lu, Assoc. Prof. Bin Huang
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Drug Development and Value Creation Research Center

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Center for Cancer Research

https://ccr.kmu.edu.tw
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Deputy CEO：Prof. Ming-Yii Huang, Prof. Yu-Tse Wu, Prof. Pei-Feng Liu, Assoc. Prof. Hui-Ching Wang
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Center for Metabolic Disorders and Obesity

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Deputy CEO：Prof. Jee-Fu Huang, Prof. Yi-Chun Tsai
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Precision Sports Medicine and Health Promotion Center

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Deputy Director：Prof. Pei-Hsi Chou, Prof. Nai-Jen Chang
CEO：Prof. Lan-Yuen Guo；Deputy CEO：Prof. I-Hua Chu, Assoc. Prof. Wei-Chun Hung
Division Director: Prof. Hwai-Ting Lin, Prof. Chia-Yen Dai, Asst. Prof. Yung-Li Hung
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UNIVERSITY-LEVEL RESEARCH CENTERS

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Neuroscience Research Center
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Deputy Director：
Prof. Tzyh-Chyuan Hour,
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E-mail：nrc@kmu.edu.tw

Center for Tropical Medicine and Infectious Disease Research
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Deputy Director：
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Center for Big Data Research
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Center for Long-Term Care Research
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Center for Medical Education and Humanizing Health Professional Education
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Research Center for Medical Technology and Policy
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Indigenous Health Care and Cultural Sustainability Research Center
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E-mail：ihccsrc@kmu.edu.tw

Center for Disease Multi-Omics Research
Director：Prof. Jaw-Yuan Wang
Deputy Director：Prof. Ya-Ling Hsu,
Prof. Jee-Fu Huang
CEO：Prof. Chia-Yang Li;
Deputy CEO：Prof. Yi-Ching Lin
Division Director: Prof. Yi-Chang Liu,
Asst. Prof. Chao-Ju Chen,
Asst. Prof. Sin-Hua Moi
Division Section Director:
Dr. Peir-In Liang, Prof. Hsin-Chih Yeh,
Asst. Prof. Pei-Kang Liu,
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HEADLINE FOCUS

Kaohsiung Medical University Awarded the Ministry of Sports 2026 Pilot Program Grant for Adapted Physical Activity Transition and Promotion in Southern Taiwan

University-Level Mission-Oriented Research Center —
Precision Sports Medicine and Health Promotion Center (PSMHPC)
R.A. Zhi-Yan Wang / Director Shang-Jyh Huang

Kaohsiung Medical University Receives the Ministry of Sports 2026 Pilot Program Grant to Build an Exercise Support Network for People with Disabilities in Southern Taiwan and the Offshore Islands.

Led by Vice President Chih-Lung Lin, the Kaohsiung Medical University (KMU) team, in collaboration with Prof. Shang-Jyh Huang, Dr. Chia-Ling Lee, and Prof. Kuei-Lan Tsai, has been awarded the 2026 Ministry of Sports Pilot Program for Adapted Physical Activity Transition and Promotion (Southern Taiwan Region). The project will serve seven cities and counties in southern Taiwan, as well as the offshore regions of Taitung and Penghu, with the goal of establishing a comprehensive support network for adapted physical activity for people with disabilities.

The program is designed to facilitate the transition from medical rehabilitation to regular community-based physical activity. Through interdisciplinary medical assessments, adapted physical activity experiences, and coordinated referrals to community exercise resources, participants are supported in developing sustainable exercise habits and improving their long-term health and functional independence after completing rehabilitation.

Participants who have been medically assessed and determined to be in stable condition may enroll in a one-month adapted physical activity program, choosing from adapted table tennis, boccia, or physical fitness training. Upon completion, the multidisciplinary team evaluates each participant's physical function and exercise readiness, and assists with referral to appropriate community-based exercise programs, promoting a smooth transition from healthcare services to lifelong participation in physical activity.

To strengthen regional collaboration, the KMU team has also signed Memoranda of Understanding (MOUs) with social welfare organizations and community partners to establish an adapted physical activity collaboration network across southern Taiwan and its offshore islands. By integrating healthcare institutions, community organizations, and local exercise resources, the project aims to build a sustainable support system that expands access to adapted physical activity, encourages long-term exercise participation, and enhances the health, functional capacity, social inclusion, and quality of life of people with disabilities.

Through this initiative, Kaohsiung Medical University continues to demonstrate its commitment to advancing adapted physical activity, promoting inclusive health, and strengthening collaboration between healthcare and community sectors. The project represents an important milestone in developing an integrated rehabilitation-to-exercise model and expanding equitable access to lifelong physical activity opportunities throughout southern Taiwan and its offshore regions.



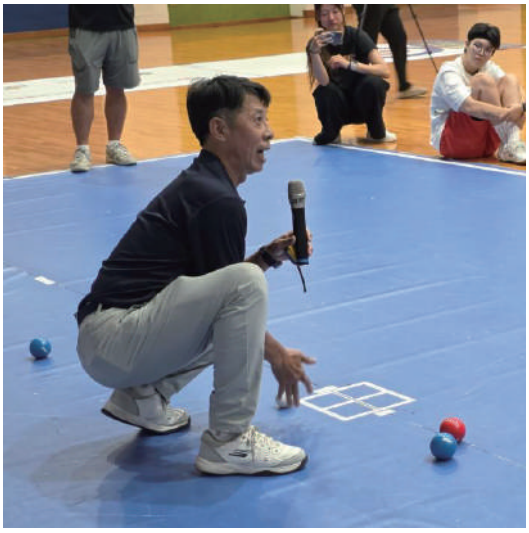
KMU Vice President Chih-Lung Lin signs the Memorandum of Understanding (MOU) on behalf of Kaohsiung Medical University.



Prof. Shang-Jyh Huang, Director of the KMU Precision Sports Medicine and Health Promotion Center, delivers opening remarks.



Dr. Chia-Ling Lee, Department of Physical Medicine and Rehabilitation, Kaohsiung Medical University Hospital, delivers remarks.



Associate Dean Chao-Yen Chen, Deputy Dean of Student Affairs and Director of the Physical Education Center at Kaohsiung Medical University, demonstrates the fundamentals of boccia.



Participants experience and practice the sport of boccia under professional guidance.



Group photo of participants, partner organizations, and the Kaohsiung Medical University team.

Press Released or Other References

ETtoday News Cloud > ETtoday Sports Cloud June 25, 2026, 18:34

The Department of Physical Education pioneered the "Adaptation to Sports Transition Program" to create a unique exercise pathway for people with disabilities.

MSC Glory winter cruises are now offering amazing early bird deals for Christmas and New Year's Eve!



▲The Department of Sports has established a bridge between medical care and sports through adaptive sports transition and promotion pilot programs, helping people with disabilities develop regular exercise habits after rehabilitation, thereby improving their health and quality of life. (Photo/Reporter Tsai Hou-hsuan)

Original Article: https://sports.ettoday.net/news/3189944

Bridging Gaps in Care: Advancing HCV Micro-Elimination in Indigenous Communities

University-Level Mission-Oriented Research Center —
Indigenous Health Care and Cultural Sustainability Research Center (IHCCSRC)
Prof. Chia-Yen Dai / Director

Our center implemented the second phase of a hepatitis C virus (HCV) micro-elimination program in Taoyuan District, Kaohsiung City (Figure 1). The program targeted registered residents who were not long-term inhabitants and lived in the district for fewer than six months per year. A total of 542 participants were enrolled.

All participants underwent testing for alanine aminotransferase (ALT), aspartate aminotransferase (AST), hepatitis B surface antigen (HBsAg), and anti-HCV antibodies. Participants who tested positive for anti-HCV antibodies subsequently received reflex HCV RNA testing.

The results showed that 23.2% of the participants had abnormal ALT levels. The overall anti-HCV positivity rate was 3.1%, and HCV RNA was detected in 23.5% of anti-HCV-positive participants, indicating the presence of ongoing viremia.

These findings suggest that combining abnormal ALT findings with viral hepatitis screening may serve as an effective component of HCV micro-elimination strategies in rural Indigenous communities. This approach may facilitate the identification of individuals with undiagnosed infection and improve the efficiency of medical intervention.

Our center implemented the project entitled “Micro-Elimination of Chronic Hepatitis C Among Indigenous Populations in Southern Taiwan: A Healthcare Delivery Model,” conducting a community-based HCV micro-elimination program in Taoyuan District, Kaohsiung City. During the first phase, micro-elimination activities were completed among 1,092 registered residents who lived in the district for more than six months per year. The second phase targeted registered but non-permanent residents who lived in the district for fewer than six months per year, enrolling a total of 542 participants.

Screening included alanine aminotransferase (ALT), aspartate aminotransferase (AST), hepatitis B surface antigen (HBsAg), and anti-HCV antibody testing. Participants who tested positive for anti-HCV antibodies underwent reflex HCV RNA testing to determine whether active viremia was present. Among the 542 participants, 23.2% had abnormal ALT levels, and the overall anti-HCV positivity rate was 3.1%. Of the 17 participants who tested positive for anti-HCV antibodies, four were positive for HCV RNA, corresponding to 23.5%.

Overall, approximately one-quarter of registered non-permanent residents in Taoyuan District had abnormal ALT levels, and active viremia remained present in a proportion of anti-HCV-positive individuals. These findings highlight the importance of continuing community-based screening, reflex HCV RNA testing, and timely referral for treatment. They also support the integration of abnormal ALT findings with viral hepatitis screening as one component of HCV micro-elimination strategies in rural Indigenous communities.

In addition to Taoyuan District in Kaohsiung City, our center has established outreach hepatitis care clinics and multidisciplinary care teams in Shizi Township, Taiwu Township, and Rinari Village in Majia Township, Pingtung County (Figure 2). Moving forward, our center will continue collaborating with local health centers, medical teams, and community resources to develop a more comprehensive system for screening, treatment, and follow-up, thereby addressing a critical gap in the continuity of healthcare services in Indigenous communities.



HCV Micro-Elimination Outreach Clinic Services



Outreach Clinic Services in Taiwu Township, Pingtung County

UNIVERSITY RESEARCH CENTER COLUMN

SmartSeminar: An Intelligent Seminar Assistant for Automating Seminar Management and Advancing Smart Campus Administration

University -Level Academic Research Institute —
Biomedical Artificial Intelligence Academy (BAIA)
Research Assistant I-Ting Wei / Dean Henry Horng-Shing Lu

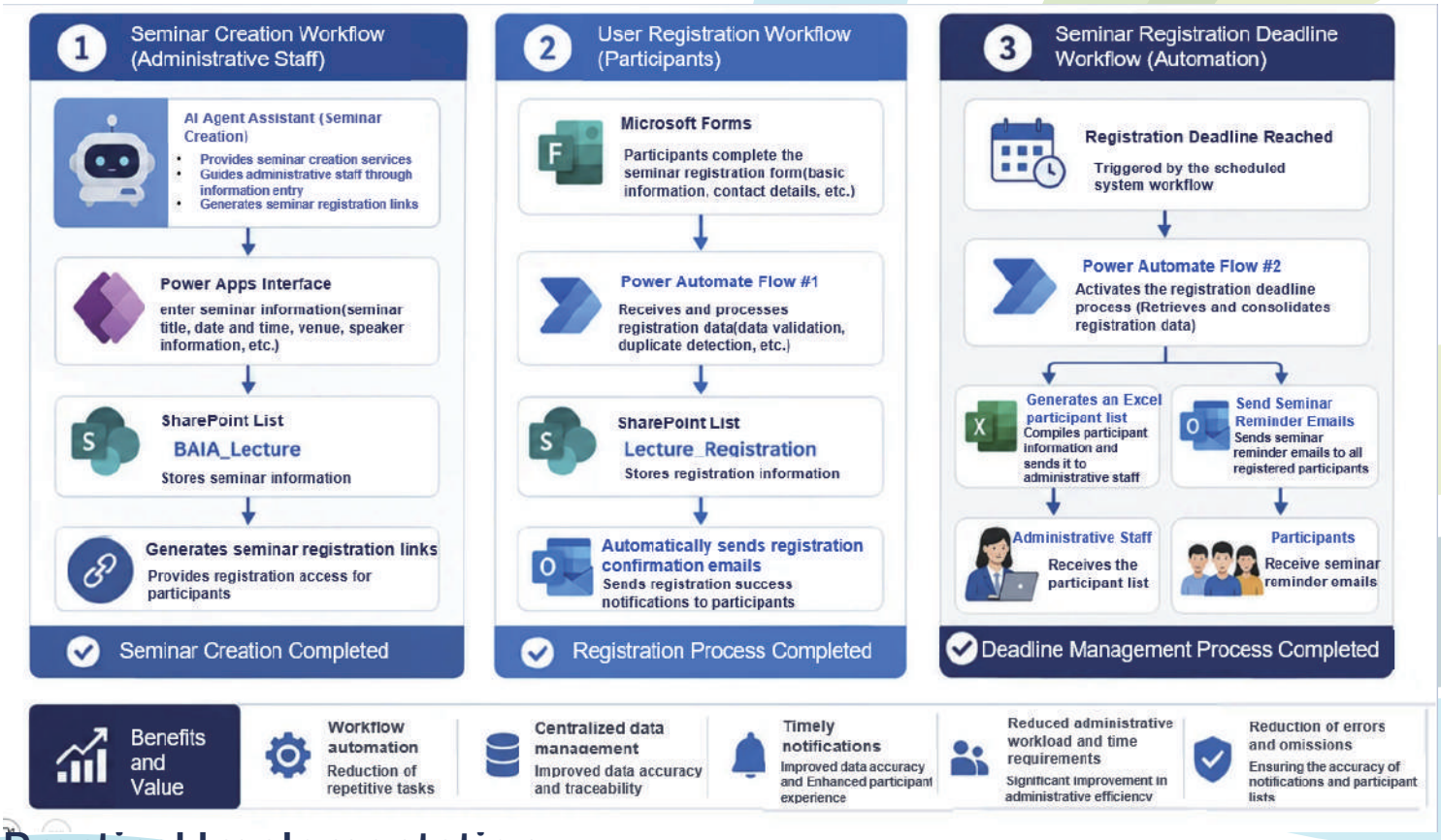
As AI tools continue to gain prominence in task assistance and workflow automation, our Academy has developed SmartSeminar, an intelligent seminar assistant built on the Microsoft 365 ecosystem to streamline seminar administration. By simply entering seminar information, administrative staff can automatically manage participant quotas, send notification emails, generate sign-in sheets, compile satisfaction survey results, and produce post-event reports. Following its implementation, administrative processing time has been reduced from several hours to just a few minutes, while significantly minimizing human error and repetitive manual work. The system also advanced to the finals of the Microsoft AI Agent Hackathon, demonstrating the practical value of AI agents in campus administrative applications. SmartSeminar is expected to serve as a concrete example of promoting digital transformation and intelligent administration in higher education.

Generative artificial intelligence is becoming increasingly integrated into many aspects of daily life and work. Consequently, it is important not only to equip students with the ability to understand and use AI, but also to encourage faculty and administrative staff to explore how AI tools can be effectively incorporated into routine administrative workflows. By leveraging AI as an assistant, repetitive tasks can be reduced, thereby improving the efficiency of event management and the quality of administrative services. In response to the growing demand for smarter and more efficient administrative processes, the Academy developed SmartSeminar, an intelligent seminar assistant built by integrating Microsoft 365 tools, including Power Apps, Power Automate, Microsoft Forms, SharePoint, Outlook, and Excel. The system was designed as an administrative assistant for campus seminar management and serves as a practical example of AI application and workflow automation in higher education.

Focusing on Administrative Challenges: Automating Event Management to Reduce Repetitive Tasks and Human Error

Rather than serving as a conceptual demonstration, SmartSeminar was developed to address genuine administrative needs on campus. The system responds to the practical challenges encountered by the administrative staff of the Academy of Artificial Intelligence in Biomedicine in managing seminar activities, covering the entire administrative workflow from event creation and participant registration to pre-event preparation and post-event data consolidation. Through the Power Apps interface, administrative staff can create seminar events by entering information such as the seminar title, date and time, venue, speaker information, and registration limits. The corresponding data are then stored in backend SharePoint lists. Once the event information has been created, the AI Agent assists with participant quota management, duplicate registration detection, automatic recommendation of online sessions when in-person capacity has been reached, participant list adjustment following registration cancellations, and the distribution of event notification emails and virtual meeting links. These automated functions reduce the repetitive tasks previously required for repeatedly verifying participant lists, checking remaining capacity, and manually sending notifications.

In addition, SmartSeminar provides valuable support during and after seminar activities. Before an event begins, the system automatically compiles participant lists, summarizes meal requests, and generates Excel sign-in sheets. Following the event, attendance records and satisfaction survey responses are also consolidated automatically by the AI Agent. Once the survey response period has ended, administrative staff no longer need to manually compile or calculate the survey results. Instead, they receive a completed event report by email, with the calculated results automatically incorporated into a Word document, substantially reducing the time required for data consolidation and report preparation.



Practical Implementation: Pilot Deployment Demonstrates Potential and Advances to the Microsoft AI Agent Hackathon Finals

SmartSeminar has progressed beyond the conceptual stage and has been piloted by the Academy's administrative staff, demonstrating its potential to improve administrative workflows. Previously, creating a new registration form and configuring its closing time required approximately 10 minutes; with SmartSeminar, this process has been reduced to about 2 minutes. Participant quota management and notification emails are now automatically handled by the AI Agent, requiring administrative staff only to perform a final review. Following each event, satisfaction survey results, which previously required approximately one hour of manual compilation, are now automatically processed, allowing administrative staff to receive a completed event report via email.

Based on the pilot implementation and user feedback, SmartSeminar has effectively reduced the time required for seminar administration while helping to minimize participant list errors, duplicate registrations, manual omissions, and inconsistencies in data consolidation. Administrative tasks that previously relied on manual judgment and repetitive operations have been transformed into standardized workflows that are automated, traceable, and reproducible. These outcomes not only improve administrative efficiency but also demonstrate the practical value of applying AI Agents to campus administrative operations.

The system also participated in the Microsoft AI Agent Hackathon and successfully advanced to the finals, demonstrating that SmartSeminar has practical application potential beyond a single academy or campus. The achievement also highlights the innovative value of integrating AI Agents with Microsoft 365 tools. Moving forward, the Academy will continue to optimize the system's functionality and evaluate its gradual expansion to support seminars and training activities across academic departments, research institutes, and administrative units. The long-term goal is to establish a scalable and reproducible intelligent seminar management model that serves as a practical example of digital transformation and AI-enabled administration in higher education.



Addressing the Rising Incidence of Lung Adenocarcinoma: A Cross-Disciplinary Dialogue on Environmental and Genetic Factors

University-Level Research Centers_ Research Center for Precision Environmental Medicine (RCPEM)
R.A. Hui-Ju Chen / CEO Chih-Hsing Hung

The Precision Environmental Medicine Research Center is dedicated to advancing research on the health effects of environmental pollutant exposure, with a particular focus on environmental health challenges in southern Kaohsiung. As the incidence of lung adenocarcinoma continues to rise, increasing attention has been directed toward the roles of environmental risk factors and the underlying mechanisms of disease development.

To advance interdisciplinary research and strengthen collaboration in this field, the Center, in partnership with Kaohsiung Municipal Siaogang Hospital and the Ph.D. Program in Environmental and Occupational Medicine at Kaohsiung Medical University, hosted the Symposium on “Environmental Factors, Genetics, and Lung Adenocarcinoma” on June 8, 2026.

The symposium brought together ten leading experts from Academia Sinica, National Health Research Institutes, National Taiwan University, National Cheng Kung University, Kaohsiung Medical University, and its affiliated hospitals to present the latest findings on environmental exposures, genetic susceptibility, and lung adenocarcinoma. Through interdisciplinary dialogue and knowledge exchange, the symposium fostered academic consensus, strengthened cross-institutional research collaborations, and laid the foundation for future precision prevention strategies and translational research in lung cancer.



Opening Remark by the Vice President Yeou-Lih Huang



Group Photo of Distinguished Guests



Group Photo of All Participants



Group Photo of All Participants

Strengthening Regenerative Medicine through Global Partnerships: Advancing Translational Cancer Research from iPSC Technology to Exosome Biology

University-Level Academic Research Center —
Regenerative Medicine and Cell Therapy Research Center (RCC)
R.A. Chun-Ya Kao / CEO Chung-Hwan Chen

The Regenerative Medicine and Cell Therapy Research Center continues to promote research excellence through international collaboration and academic exchange, actively partnering with leading research institutions worldwide to strengthen its capabilities in regenerative medicine and cancer translational research.

In recent years, the Center has established collaborative partnerships with Kanazawa Medical University and the Center for iPS Cell Research and Application (CiRA), Kyoto University, Japan. Since last year, researchers have been dispatched to CiRA in successive groups to receive specialized training in ureteric bud (UB) differentiation, further enhancing expertise in induced pluripotent stem (iPS) cell technology and organ regeneration.

The Center also invited Prof. Etsuro Ito from the Advanced Biomedical Sciences Research Center (TWIns), Waseda University, to deliver a distinguished lecture on the molecular mechanisms of exosomes and GRP78 under anticancer drug treatment. His presentation provided valuable insights into the relationships among cancer progression, therapeutic responses, and translational medicine, inspiring faculty members and students to explore emerging research directions in oncology.

Through technology transfer, international exchanges, and academic seminars, the Center continues to strengthen its research foundation in regenerative medicine and cell therapy while deepening understanding of cancer biology, drug responses, and precision medicine. Looking ahead, the Center will further integrate international resources and interdisciplinary expertise to foster innovative research collaborations and generate impactful translational outcomes, demonstrating sustained momentum toward internationalization, scientific excellence, and translational research.





CEO Chung-Hwan Chen and Prof. Yin-Chih Fu with CiRA Prof. Kenji Osafune, Prof. Shin Kaneko, and Junior Asst. Prof. Shin-ichi Mae.



CEO Chung-Hwan Chen and Prof. Yin-Chih Fu with CiRA Prof. Kenji Osafune, Prof. Shin Kaneko, and Junior Asst. Prof. Shin-ichi Mae.



Distinguished Lecture by Prof. Etsuro Ito, Waseda University.



CEO Chung-Huan Chen presenting a Certificate of Appreciation to Prof. Etsuro Ito.

Other Important Highlights

International Student Laboratory Training Strengthens Educational Collaboration in Regenerative Medicine.

On June 2, 2026, Prof. Yan-Hsiung Wang welcomed four fifth-year dental students from Chulalongkorn University for a laboratory internship and academic exchange. The program introduced the Center's research development, ongoing scientific projects, and hands-on training in stem cell osteogenic differentiation. Through practical laboratory experience, participating students gained valuable exposure to regenerative medicine research while enhancing their experimental skills and learning outcomes.



Group photo of Prof. Yan-Hsiung Wang and students from Chulalongkorn University.



Students from Chulalongkorn University participating in hands-on laboratory training.

Distinguished Seminar Promotes Interdisciplinary Academic Exchange

To foster interdisciplinary collaboration, the Center hosted a distinguished seminar on April 17, 2026, featuring Associate Prof. Mon-Juan Lee from the Department of Biomedical Science and Technology, National Sun Yat-sen University, and Assistant Prof. Yi-Chia Wu from Kaohsiung Medical University Chung-Ho Memorial Hospital. The speakers shared their latest research on biosensing technologies, disease biomarker detection, and cancer immunotherapy. The seminar facilitated interdisciplinary collaboration and strengthened research partnerships while continuing to enhance the University's research capacity and talent development in regenerative medicine.

Deciphering the Catalytic Mechanism of a Key Enzyme for Anticancer Natural Product Biosynthesis: A New Biocatalytic Strategy for Sustainable Podophyllotoxin Production

University-Level Academic Research Center —
Drug Development and Value Creation Research Center (DVCR)
Prof. Wei-Yu Lin / CEO Chih-Hung Chuang

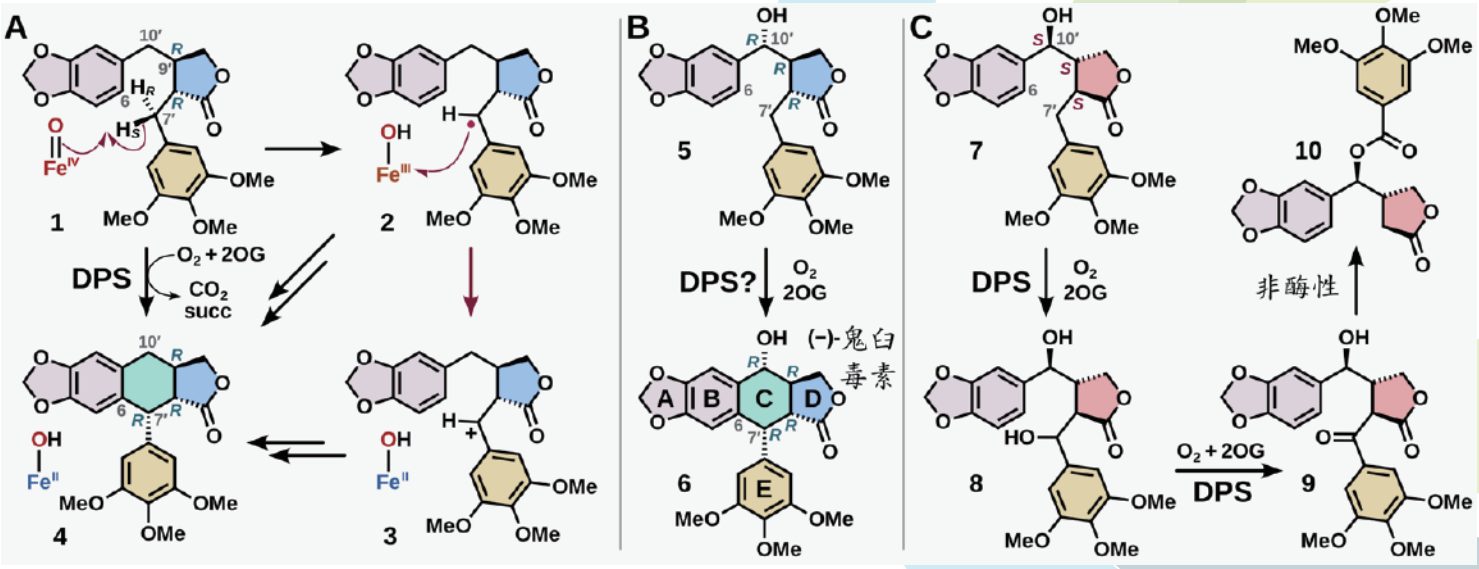
The World Health Organization (WHO) recognizes (−)-podophyllotoxin (6) as an essential medicine because of its broad spectrum of biological activities, including antiviral, anti-inflammatory, anticancer, and antimalarial effects. Owing to the difficulty and inefficiency of its industrial production, considerable attention has been devoted to elucidating its biosynthetic pathway, leading to the discovery of deoxypodophyllotoxin synthase (DPS), a key enzyme involved in podophyllotoxin biosynthesis.[1,2]

DPS is a non-heme iron- and 2-oxoglutarate-dependent (Fe/2OG) oxygenase that catalyzes the oxidative cyclization of (−)-yatein to deoxypodophyllotoxin (1 → 4, Figure A). During catalysis, Fe/2OG enzymes generate a highly reactive iron(IV)-oxo [Fe(IV)=O] intermediate capable of abstracting a hydrogen atom from an unactivated carbon center to produce a substrate radical (e.g., 2). In most Fe/2OG enzymes, this radical subsequently undergoes oxygen rebound with an iron(III)-hydroxo species, leading to substrate hydroxylation. In contrast, DPS and other non-hydroxylating Fe/2OG enzymes suppress this pathway and instead catalyze more complex transformations, including carbon–carbon bond formation, halogenation, desaturation, and cyclization. Understanding how Fe/2OG enzymes precisely control radical intermediates to achieve diverse reaction outcomes has become a central topic in enzymology and biocatalysis. Previous studies attempted to use (+)-hydroxy-yatein (5, Figure B) as a substrate for the direct enzymatic synthesis of (−)-podophyllotoxin; however, these efforts were unsuccessful.[3,4]

Recently, Prof. Wei-Chen Chang's research group at North Carolina State University, in collaboration with researchers in Taiwan, demonstrated that DPS indeed accepts (+)-hydroxy-yatein (5) as a substrate and catalyzes intramolecular C–C bond formation to afford (−)-podophyllotoxin.[5] Through the stereoselective synthesis of (+)-hydroxy-yatein and related analogues, the authors investigated the catalytic mechanism of DPS and found that lowering the substrate concentration effectively alleviated substrate inhibition, thereby enabling efficient cyclization. Using stereoselectively isotopically labeled substrate analogues, they further showed that hydrogen atom abstraction occurs selectively at the C7′ pro-S hydrogen and that the newly formed C–C bond is generated on the opposite face of C7′. Although a radical addition mechanism cannot be completely excluded, the observed stereochemical outcome is consistent with a cation-mediated cyclization mechanism and suggests that the reaction proceeds through a Friedel–Crafts alkylation pathway.

The authors further demonstrated that DPS also accepts the enantiomeric substrate (7, Figure C), although the reaction produces only two C7′-hydroxylated products. A second round of DPS catalysis subsequently oxidizes the C7′ hydroxyl group to a ketone, which undergoes rearrangement under alkaline conditions to yield the corresponding retro-Claisen condensation product (9 → 10). Structural studies using a vanadium(IV)-oxo complex, which serves as a mimic of the catalytically relevant Fe(IV)=O intermediate, together with the crystal structure of DPS bound to substrate 7, identified key active-site residues, including Phe255, that govern reaction selectivity. Furthermore, the Phe255A mutant was found to promote cyclization of substrate 7, highlighting the critical role of steric interactions in controlling the balance between cyclization and hydroxylation.

These findings enabled the development of a practical chemoenzymatic strategy for the synthesis of (−)-podophyllotoxin and its derivatives. Rather than relying on purified enzyme, the method employs freeze-dried whole cells overexpressing DPS as an efficient and scalable biocatalytic platform. The resulting products can serve as valuable synthetic precursors for clinically important anticancer agents such as etoposide. Consequently, DPS represents a promising biocatalyst for natural product synthesis and medicinal chemistry and provides an attractive platform for the discovery and preparation of therapeutically relevant lignan derivatives.



Proposed catalytic pathways of deoxypodophyllotoxin synthase (DPS), illustrating C–C bond formation, hydroxylation, and downstream transformations of different substrates.

This work was recently published in the Journal of the American Chemical Society (Impact Factor: 16.6) .[5] Charalambos Michael, a graduate student in Prof. Wei-Chen Chang' s laboratory, is the first author, while Prof.s Wei-Chen Chang and Wei-Yu Lin serve as the corresponding authors.

Reference

Lau, W.; Sattely, E. S. Six enzymes from mayapple that complete the biosynthetic pathway to the etoposide aglycone. *Science* **2015,** *349*, 1224−1228, 10.1126/science.aac7202.

Tang, H.; Wu, M.-H.; Lin, H.-Y.; Han, M.-R.; Tu, Y.-H.; Yang, Z.-J.; Chien, T.-C.; Chan, N.-L.; Chang, W.-C. Mechanistic analysis of carbon-carbon bond formation by deoxypodophyllotoxin synthase. *Proc. Natl. Acad. Sci. U. S. A.* **2022,** 119, No. e2113770119, 10.1073/pnas.2113770119.

Li, J.; Zhang, X.; Renata, H. Asymmetric chemoenzymatic synthesis of (−)-podophyllotoxin and related aryltetralin lignans. *Angew. Chem., Int. Ed.* **2019,** *58*, 11657−11660, 10.1002/anie.201904102.

Lazzarotto, M.; Hammerer, L.; Hetmann, M.; Borg, A.; Schmermund, L.; Steiner, L.; Hartmann, P.; Belaj, F.; Kroutil, W.; Gruber, K.; Fuchs, M. Chemoenzymatic total synthesis of deoxy-, *epi-,* and podophyllotoxin and a biocatalytic kinetic resolution of dibenzylbutyrolactones. Angew. Chem., *Int. Ed.* **2019,** *58,* 8226−8230, 10.1002/anie.201900926.

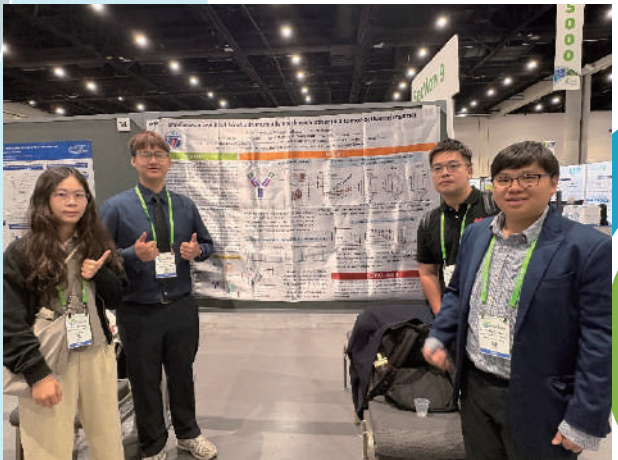
Michael, C.; Zheng, Y.-C.; Ruszczycky, M. W.; Chen, N.-Q.; Lin, C.-H.; **Lin, W.-Y.*;** Chang, W.-c.* Biocatalytic Applications and Mechanistic Insights of Deoxypodophyllotoxin Synthase. *J. Am. Chem. Soc.* **2026,** *148,* 16394-16403.

Other Key Highlights

Leading a Delegation to the AACR Annual Meeting to Drive International Matchmaking

In April 2026, the center's antibody-drug team traveled to the United States to attend the American Association for Cancer Research (AACR) Annual Meeting. During the convention, the team actively promoted its core technologies and engaged with global biotech giants and scientific research institutions, fully exploring opportunities for international co-development and business collaboration.



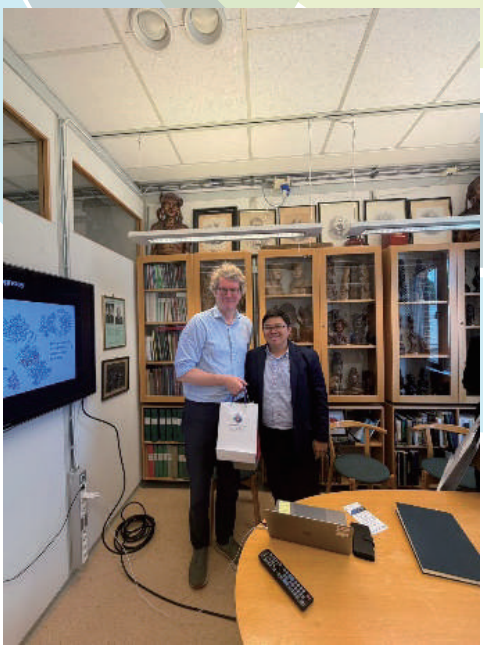


The Center’ s Antibody-Drug Team Visits Sweden for Advanced Biomedical Exchanges and International Industry-Academia Connections

From June 4 to 14, 2026, the center's antibody-drug team—represented by a delegation consisting of Executive Director Chih-Hung Chuang, Associate Prof. Wen-Wei Lin, CEO Yun-Chi Lu of PrecisemAb Biotech, Dr. Bo-Cheng Huang, and three graduate students (Zih-Yu Jhuang, Pin-Jie Li, and Shi-Wei Chao)—conducted an 11-day site visit and academic exchange in Sweden. The team engaged in in-depth discussions with several prominent Swedish scholars and research teams on cutting-edge topics, including cancer immunotherapy, novel drug development, antibody engineering, translational medicine, and natural product/peptide drug design, while touring local key technology platforms and core facilities. Notably, the delegation visited global biopharmaceutical giant AstraZeneca to deliver specialized presentations and technical exchanges, successfully showcasing the center's robust antibody R&D capabilities and laying a solid foundation for future international industry-academia collaborations.













Targeting the Long Non-coding RNA MALAT1: A Novel Strategy to Overcome Lenalidomide Resistance in Multiple Myeloma

University-Level Academic Research Center — Center for Cancer Research (CCR)
Asst. Prof. Wen-Hsin Chang, Prof. Wei-Ting Liao,
Prof. Hsin-Hua Moi, Assoc. Prof. Shih-Feng Cho/ CEO Li-Tzong Chen

Multiple myeloma (MM) is the second most common hematologic malignancy in the United States and the third most common in Taiwan. It is characterized by the malignant transformation of bone marrow plasma cells. In recent years, the introduction of proteasome inhibitors, immunomodulatory drugs (IMiDs), and monoclonal antibodies has markedly improved patient outcomes. However, disease relapse and drug resistance remain major challenges in clinical treatment. The long non-coding RNA (lncRNA) MALAT1 has been reported to be associated with tumor progression and poor prognosis in various malignancies, and our previous studies also demonstrated that MALAT1 is also overexpressed in MM. However, its role in regulating CD38 expression and mediating drug resistance in MM, particularly resistance to lenalidomide, the most commonly used IMiD in clinical practice, remains unclear.

In this study, lenalidomide-resistant H929 and MM.1S cell lines (H929LenR and MM.1SLenR) were established. Anti-MALAT1 antisense oligonucleotides (ASOs) were used to inhibit MALAT1 expression. Single-cell RNA sequencing (scRNA-seq), bulk RNA sequencing (RNA-seq), chromatin immunoprecipitation (ChIP), mitochondrial function assays, ATP production assays and oxidative phosphorylation (OXPHOS) activity assays, together with cytokine profiling of patient-derived bone marrow mononuclear cells (BMMCs), were performed to systematically investigate the roles of MALAT1 in MM drug resistance, metabolic reprogramming, and the bone marrow microenvironment. The synergistic effects of MALAT1 ASO combined with currently available anti-myeloma agents were also evaluated.

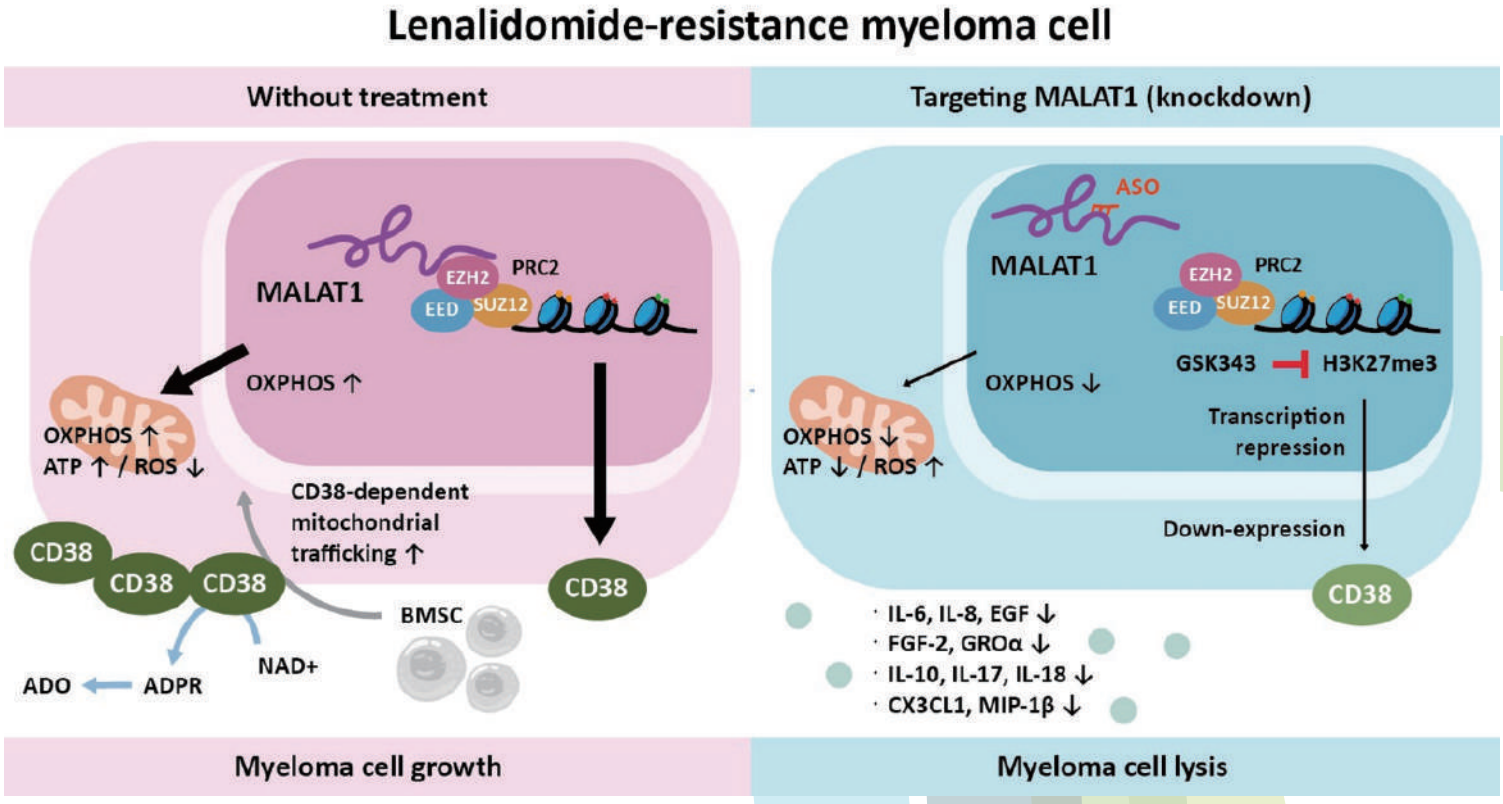
The results showed that MALAT1 expression was significantly higher in lenalidomide-resistant MM cell lines than in drug-sensitive cell lines and was positively correlated with CD38 expression at both the mRNA and protein levels. Analysis of the MMRF CoMMpass database (n = 859) further confirmed a significant positive correlation between MALAT1 and CD38 expression. Single-cell RNA sequencing analysis of plasma cells from newly diagnosed and lenalidomide-refractory MM patients revealed that, in addition to increased CD38 expression, OXPHOS-related genes were also significantly upregulated in refractory plasma cells. KEGG pathway analysis further revealed that OXPHOS was the most significantly enriched metabolic pathway in resistant cells, suggesting that metabolic reprogramming is an important feature of lenalidomide resistance.

Mechanistically, suppression of MALAT1 by anti-MALAT1 ASO significantly reduced CD38 mRNA and protein expression and inhibited MM cell proliferation by approximately 40%, with a more pronounced inhibitory effect in lenalidomide-resistant cell lines. ChIP analysis showed that treatment with anti-MALAT1 ASO increased the enrichment of the repressive histone mark H3K27me3 and slightly decreased the active histone mark H3K4me3 at the CD38 promoter, accompanied by increased recruitment of the PRC2 complex (EZH2 and EED) to the CD38 promoter. Furthermore, treatment with an EZH2 inhibitor or siRNA-mediated EZH2 knockdown partially restored CD38 expression, demonstrating that MALAT1 maintains CD38 transcriptional activity by suppressing PRC2/EZH2-mediated epigenetic repression.

Regarding energy metabolism, bulk RNA-seq analysis showed that treatment with anti-MALAT1 ASO significantly downregulated genes mainly involved in the OXPHOS pathway in H929 and MM.1S cells, accompanied by decreased expression of ATP synthase subunits. In contrast, OXPHOS-related genes were significantly upregulated in resistant cells. Functional analyses further demonstrated that anti-MALAT1 ASO significantly inhibited OXPHOS activity, accompanied by reduced ATP production, mitochondrial dysfunction, and marked ROS accumulation. More than a tenfold increase in ROS was observed in MM.1S and MM.1SLenR cells. Pretreatment with the antioxidant N-acetylcysteine (NAC) partially restored mitochondrial membrane potential and cell viability, indicating that oxidative stress caused by ROS accumulation is an important mechanism underlying cell death induced by MALAT1 inhibition.

In patient-derived BMMCs, anti-MALAT1 ASO treatment reduced the viability of CD138 myeloma cells by approximately 40%, decreased the proportion and fluorescence intensity of CD38-high cells, and increased mitochondrial ROS levels, which were consistent with the findings in MM cell lines. In addition, the secretion of several pro-tumorigenic and immunosuppressive cytokines, including IL-6, IL-8, IL-10, and FGF-2, was significantly reduced, indicating that MALAT1 not only directly regulates tumor cells but also participates in maintaining a bone marrow microenvironment that supports MM growth. Furthermore, combination treatment demonstrated that MALAT1 ASO synergistically enhanced the cytotoxic effects of lenalidomide, pomalidomide, or carfilzomib in resistant MM cells, highlighting the potential of MALAT1-targeted therapy in combination with current anti-myeloma agents.

This study demonstrates that MALAT1 is a key regulator of lenalidomide resistance in MM and plays multiple roles in both tumor-intrinsic and bone marrow microenvironmental regulation. MALAT1 maintains CD38 transcriptional activity by suppressing PRC2/EZH2-mediated epigenetic repression, while simultaneously promoting OXPHOS activity, increasing ATP production, and reducing ROS accumulation to maintain MM cell energy metabolism and survival. In addition, MALAT1 regulates the secretion of pro-tumorigenic and immunosuppressive cytokines, thereby maintaining a bone marrow microenvironment favorable for MM growth. These mechanisms collectively promote MM cell survival and lenalidomide resistance. Notably, although MALAT1 inhibition is accompanied by reduced CD38 expression, its anti-tumor effects are mainly attributed to metabolic reprogramming and remodeling of the bone marrow microenvironment rather than simply to the reduction of CD38 expression. Overall, this study elucidates the molecular mechanisms by which MALAT1 contributes to lenalidomide resistance in MM, supports MALAT1 as a potential therapeutic target for relapsed and refractory MM, and provides a mechanistic rationale for the future development of MALAT1-directed combination therapies.



Proposed mechanism of MALAT1 in lenalidomide-resistant multiple myeloma.

Left panel: MALAT1 promotes MM cell growth and lenalidomide resistance by maintaining CD38 expression, OXPHOS-dependent metabolism, and a pro-tumorigenic bone marrow microenvironment.

Right panel: Anti-MALAT1 antisense oligonucleotides (ASOs) knock down MALAT1, resulting in PRC2/EZH2-mediated repression of CD38 transcription, impaired mitochondrial metabolism (↓OXPHOS, ↓ATP, ↑ROS), and reduced pro-tumorigenic and immunosuppressive cytokine production, leading to decreased MM cell survival and enhanced sensitivity to anti-myeloma therapies. Partial restoration of CD38 expression by the EZH2 inhibitor GSK343 further supports the involvement of PRC2/EZH2-mediated epigenetic regulation.

Reference

Chang WH, Liao WT, Yeh TJ, Moi SH, Liu YC, Hsiao HH, Wang HC, Du JS, Gau YC, Yang CI, Lee CP, Hsu CM, Cho SF*. Targeting lncRNA MALAT1 attenuates lenalidomide resistance via CD38 epigenetic modulation, oxidative stress-mediated cell death, and remodeling of the pro-tumor microenvironment in multiple myeloma. *J Transl Med.* **2025** Oct 30;23(1):1199

Precision Sports Medicine and Health Promotion Center Conducts the 2026 Exercise Training Program Design and Practical Application Course

University-Level Academic Research Center —
Precision Sports Medicine and Health Promotion Center (PSMHPC)
R.A. Zhi-Yan Wang / Director Shang-Jyh Huang

In response to Taiwan's Healthy Taiwan initiative and the growing prevalence of metabolic diseases, developing sound exercise knowledge and the ability to design appropriate training programs has become essential for improving public health.

The course is centered on health promotion and sports medicine, featuring a comprehensive and progressive curriculum designed to equip healthcare professionals and practitioners in health promotion and fitness with evidence-based knowledge of health promotion and exercise intervention for healthy individuals, sub-healthy populations, and people with metabolic diseases. It provides a solid foundation for regular physical activity, health management, disease prevention, and healthcare practice.

Beginning with the fundamental principles of health promotion, the curriculum integrates theoretical instruction with hands-on practical training. Topics include exercise principles for healthy and sub-healthy populations, pre-exercise safety screening, exercise risk assessment, and the fundamentals of exercise program design. Through a structured learning approach, participants develop the knowledge and practical skills required to prescribe and implement safe, effective, and scientifically sound exercise programs.

The course also introduces the basic pathophysiology, common complications, exercise intervention strategies, health benefits, and safety considerations for metabolic diseases, including obesity, metabolic syndrome, prediabetes, and type 2 diabetes. Participants will gain an understanding of the exercise needs and precautions for different populations while developing fundamental competencies in health management and exercise instruction.

Whether seeking to enhance personal health management, strengthen professional expertise, or pursue a career in exercise and health promotion, participants will establish a comprehensive foundation in health promotion and exercise prescription, providing an essential starting point for future professional practice and career development.



Group photo at the opening ceremony of the training program.



KMU Vice President Chih-Lung Lin leads participants in a warm-up exercise session.



Prof.Shang-Jyh Huang, Director of the Precision Sports Medicine and Health Promotion Center, lectures on cardiovascular responses to exercise.



Prof.Shang-Jyh Huang interacts with participants during the course.



Prof. Nai-Jen Chang, Department of Sports Medicine, delivers a lecture on safe exercise practices.



Prof. Nai-Jen Chang reminds participants of the importance of assessing their physical condition before exercising.



Dr. Mei-Yueh Lee, Kaohsiung Medical University Hospital, demonstrates the correct technique for measuring blood pressure.



Dr. Mei-Yueh Lee explains important warning signs and symptoms that should not be ignored during exercise.



Asst. Prof. Wen-Hsin Chang, Department of Sports Medicine, presents the fundamentals of sports nutrition.



Asst. Prof. Wen-Hsin Chang explains key nutritional considerations before exercise.





Coach Hsuan Su demonstrates and instructs participants in resistance band training.



Participants practice resistance band training during the hands-on session.



Director Shang-Jyh Huang participates in the resistance band training session.

Redefining Metabolic Health in the Era of Integrated Care: From MASLD to the CKLM Framework

University-Level Academic Research Center —
Center for Metabolic Disorders and Obesity (CMDO)
Postdoc. Edward His / Deputy CEO Jee-Fu Huang

Metabolic dysfunction–associated steatotic liver disease (MASLD) has emerged as one of the most important chronic liver diseases worldwide. According to a recent JAMA Network Open perspective, MASLD represents "the new epidemic of chronic liver disease," with its impact extending far beyond the liver to encompass type 2 diabetes, cardiovascular disease, chronic kidney disease, and other metabolic disorders that frequently coexist and progress together.

As scientific evidence continues to accumulate, our understanding of chronic disease is undergoing a fundamental transformation. In 2026, The Lancet published a three-part Series introducing the concept of cardiometabolic multiple long-term conditions (cardiometabolic MLTC), emphasizing that chronic disease management should evolve from traditional organ-specific care toward an integrated, multidisciplinary model that addresses shared biological mechanisms, common risk factors, and lifelong health trajectories.

This paradigm shift reflects a growing recognition that chronic diseases rarely develop in isolation. Instead, they represent interconnected manifestations of metabolic dysfunction that influence one another throughout disease progression. Consequently, early identification of shared risk factors, risk stratification, and coordinated multidisciplinary care have become central strategies for improving long-term health outcomes.

From Organ-Based Medicine to Integrated Metabolic Health

Modern healthcare systems have traditionally been organized around individual organs and medical specialties, each with well-established diagnostic and therapeutic pathways. In clinical practice, however, patients with metabolic disorders commonly present with multiple coexisting conditions, including obesity, type 2 diabetes, hypertension, MASLD, chronic kidney disease, and cardiovascular disease. These disorders share numerous pathological mechanisms—including insulin resistance, chronic low-grade inflammation, dyslipidemia, and ectopic fat accumulation—making it increasingly difficult to manage them as isolated diseases.

Recognizing this challenge, the Kaohsiung Medical University Center for Metabolic Disease and Obesity Research has adopted metabolic health as the foundation of its research strategy since its establishment. Building upon the American Heart Association's Cardiovascular–Kidney–Metabolic (CKM) framework and the emerging concept of cardiometabolic multiple long-term conditions (cardiometabolic MLTC), the Center has adopted the Cardiovascular–Kidney–Liver–Metabolic (CKLM) framework as an operational model to integrate liver disease into the broader continuum of metabolic health.

Rather than representing a new disease entity, CKLM serves as an operational framework that integrates research, clinical care, and population health. By focusing on shared risk factors, common pathophysiological pathways, and multidisciplinary collaboration, the framework aims to support the entire continuum of metabolic health—from disease prevention and early risk identification to risk stratification and long-term management.

Building an Integrated Research Platform from Population Health to Individual Care

Developing an integrated model of chronic disease management begins with understanding where diseases occur, who is most affected, and how risk evolves across populations.

To address these questions, the Center has established a comprehensive research platform centered on disease burden analysis. Large-scale population databases have been used to construct the first nationwide MASLD prevalence map in Taiwan, while nationwide maps of metabolic syndrome and obesity are currently under development. By integrating geographic information system (GIS) analyses, these projects aim to identify regional variations and high-risk areas, providing valuable evidence for public health planning, healthcare resource allocation, and precision prevention strategies.

Complementing these population-based initiatives, the Center has also established a prospective MASLD cohort to support translational and clinical research. During the first year of this four-year study, approximately 200 participants were enrolled. Comprehensive clinical information—including laboratory data, imaging findings, biological specimens, and longitudinal follow-up—has been systematically collected to facilitate investigations into disease mechanisms, risk prediction, and precision medicine.

Together, these efforts bridge population health and individual clinical care through a continuously evolving research platform. By integrating epidemiological surveillance with longitudinal clinical data, the Center seeks to better characterize disease development, monitor disease progression, and evaluate the impact of early intervention across the continuum of metabolic health.

Translating Research into Clinical Practice Through Smart Screening

Establishing a comprehensive research platform is only the first step. Equally important is translating research findings into practical tools that support clinical decision-making and improve patient care.

To achieve this goal, the Center has been developing a smart MASLD screening platform that integrates non-invasive tests (NITs), a clinical decision support system (CDSS), and evidence-based risk stratification algorithms. The platform is designed to assist frontline healthcare professionals in identifying individuals at increased risk of advanced liver disease while providing standardized recommendations for further evaluation and long-term follow-up.

A prototype of the platform has been implemented at Kaohsiung Medical University Hospital and is currently undergoing clinical evaluation in the Departments of Hepatobiliary Medicine, Endocrinology and Metabolism, and Family Medicine. Physicians, nurses, and information technology specialists work closely together to refine the platform based on real-world clinical workflows and user feedback. This iterative development process aims to ensure that the system is practical, clinically relevant, and readily adaptable to different healthcare settings.

The platform also aligns with the recommendations of the Taiwanese joint clinical consensus for patients with diabetes and MASLD, which advocates a stepwise screening strategy using non-invasive fibrosis assessment. Initial risk stratification with the Fibrosis-4 Index (FIB-4), followed by liver stiffness measurement (LSM) in individuals at increased risk, provides a practical and evidence-based pathway for the early identification of advanced fibrosis.

Beyond facilitating early detection, the Center views smart screening as an opportunity to bridge research and clinical care. By integrating clinical evidence, digital technologies, and standardized assessment pathways, the platform seeks to support timely intervention while generating high-quality real-world data for future research.

Integrating Expertise Across Specialties

An integrated care model requires more than collaboration among different clinical departments. It also demands a shared understanding that metabolic diseases represent interconnected processes rather than isolated organ-specific conditions.

Over the past several years, the Center has generated evidence that supports this multidisciplinary perspective.

One of our previous studies demonstrated that the Fibrosis-4 Index (FIB-4), originally developed as a non-invasive marker of liver fibrosis, is also significantly associated with coronary artery calcification (CAC), even among asymptomatic individuals. These findings suggest that liver fibrosis markers may provide clinically meaningful information beyond liver disease alone and could contribute to a broader assessment of cardiometabolic risk.

In parallel, the Center has participated in the international Global MASLD (G-MASLD) collaboration, contributing to the validation of the Agile-3+ and Agile-4 algorithms in Asian populations. These studies confirmed the excellent diagnostic performance of both models for identifying advanced fibrosis and cirrhosis, while providing important evidence supporting their application in routine clinical practice.

Although these studies were conducted independently, they converge on a common message: risk assessment for liver disease should not remain confined to hepatology but should become an integral component of comprehensive metabolic health evaluation.

Guided by this concept, the Center formally launched a multidisciplinary recruitment strategy during the second half of last year. Building upon the prospective MASLD cohort established by the Department of Hepatobiliary Medicine, collaborative recruitment has expanded to include the Departments of Endocrinology and Metabolism, Family Medicine, and Cardiology. This multidisciplinary framework enables longitudinal follow-up across specialties while establishing a shared research platform for integrated metabolic health.

To facilitate collaboration, the Center convenes monthly project progress meetings and basic science research seminars, providing opportunities for clinicians and researchers from different disciplines to review ongoing studies, discuss implementation of the smart screening platform, exchange scientific findings, and continuously refine collaborative research strategies. Through these regular interactions, multidisciplinary collaboration has become an essential component of both the Center's research activities and its long-term vision for integrated metabolic care.

From Research to Population Health

The ultimate goal of biomedical research is not only to generate new knowledge but also to improve clinical practice and population health. For this reason, the Center has continuously sought to integrate epidemiological research, clinical investigation, digital health technologies, and multidisciplinary collaboration into a coherent framework that supports both scientific discovery and healthcare delivery.

Our work has progressed from nationwide disease burden analyses and geographic mapping of MASLD, obesity, and metabolic syndrome, to the establishment of a prospective clinical cohort and the development of a smart screening platform for early risk identification. More recently, multidisciplinary clinical collaboration has further strengthened the connection between research findings and routine patient care, enabling evidence generated through research to be translated into practical clinical applications.

These initiatives are consistent with the global movement toward integrated management of chronic metabolic diseases. Rather than addressing individual diseases in isolation, future healthcare systems will increasingly emphasize coordinated risk assessment, early intervention, longitudinal follow-up, and multidisciplinary collaboration across specialties.

Within this context, the CKLM framework provides an operational model that connects population health, clinical research, precision medicine, and healthcare implementation. By integrating these complementary components, the Center aims to facilitate earlier identification of individuals at risk, improve coordination across specialties, and ultimately contribute to more effective prevention and management of metabolic diseases.

Looking Ahead

During the past year, the Center has continued to expand its research infrastructure while strengthening collaboration across clinical specialties. These efforts have established a solid foundation for future investigations into disease mechanisms, risk prediction, implementation science, and precision prevention.

Looking forward, the Center will continue to refine the CKLM framework through multidisciplinary collaboration, real-world clinical evidence, and digital health innovation. Future research will further integrate population-based studies, prospective cohorts, artificial intelligence–assisted risk assessment, and implementation strategies to improve the prevention and management of metabolic diseases across the continuum of care.

As evidence supporting integrated metabolic health continues to grow, we hope that the CKLM framework will serve not only as a platform for collaborative research, but also as a practical model for translating scientific evidence into clinical practice and public health. Through sustained collaboration among researchers, clinicians, and healthcare professionals, we aim to contribute to the development of more coordinated, patient-centered, and evidence-based approaches to metabolic disease prevention and care.

References

Ginès, P., Serra-Burriel, M., & Kamath, P. S. (2025). Metabolic Dysfunction-Associated Steatotic Liver Disease-The New Epidemic of Chronic Liver Disease. *JAMA network open, 8*(6), e2516381.

Khunti, K., Zaccardi, F., Mehta, R., Gregg, E. W., & Misra, S. (2026). Epidemiology of cardiometabolic multiple long-term conditions. *Lancet (London, England), 407*(10548), 2641–2654.

Lim, L. L., Jenkins, A., Prabhakaran, D., Sookoian, S., Bannuru, R. R., & Khunti, K. (2026). Biological and mechanistic pathways of cardiometabolic multiple long-term conditions. *Lancet (London, England), 407*(10548), 2655–2667.

Valabhji, J., Hope, D., Sayed, N. E., Godia, P. M., Lawson, C., Seidu, S., & Khunti, K. (2026). Interventions for the prevention and management of cardiometabolic multiple long-term conditions. *Lancet (London, England), 407*(10548), 2668–2684.

Huang, J. F., Chang, T. J., Yeh, M. L., Shen, F. C., Tai, C. M., Chen, J. F., Huang, Y. H., Hsu, C. Y., Cheng, P. N., Lin, C. L., Hung, C. H., Chen, C. C., Lee, M. H., Lee, C. C., Lin, C. W., Liu, S. C., Yang, H. I., Chien, R. N., Kuo, C. S., Peng, C. Y., … Yu, M. L. (2024). Clinical care guidance in patients with diabetes and metabolic dysfunction-associated steatotic liver disease: A joint consensus. *Hepatology communications, 8*(11), e0571.

The Century-Long Battle Between Mosquitoes and Humans: 2026 International Conference on Tropical Medicine Unveils How Global Scientists Decode Dengue’ s Invisible Shield

University-Level Mission-Oriented Research Center —
Center for Tropical Medicine and Infectious Disease Research (TMED)
R.A. Jou-An Pan, R.A. Yung-Mei Chao / Director Chun-Yu Lin

Imagine tiny mosquitoes carrying the "Dengue virus," capable of causing hundreds of millions of people worldwide to suffer from high fevers and bone-shattering pain. On May 22, 2026, Kaohsiung Medical University hosted the "2026 International Conference on Tropical Medicine and Infectious Diseases," bringing together top scientists from Switzerland, Japan, the Philippines, Singapore, Thailand, and Taiwan. This group of "virus hunters" and "mosquito control masters" gathered to share insights ranging from how viruses camouflage like chameleons to evade the immune system, to how simple "rapid test kit" principles can detect viruses in underdeveloped regions. They even discussed utilizing genetic engineering to build an "invisible shield" against dengue, delivering a fascinating feast of scientific thinking.

As summer approaches, the buzzing of mosquitoes around standing water after afternoon thundershowers represents one of the greatest enemies to global public health. Tropical medicine and infectious diseases are not just terms in textbooks; they are real crises threatening the health of millions in Southern Taiwan and Southeast Asia every year. To combat this century-long challenge, the Center for Tropical Medicine and Infectious Disease at KMU grandly held the "2026 International Conference on Tropical Medicine and Infectious Diseases" on May 22, 2026, at the Audiovisual Center in the Li-Hsueh Building. Here is an exclusive look at the highlights shared by international speakers:

Global Challenges and Invisible Killers: 21st Century Health Transitions and HTLV-1

The conference kicked off with Dr. Quazi Monirul Islam (from Switzerland), who led the audience through a macro-perspective of the health challenges and opportunities facing the world in the 21st century. Subsequently, Prof. Jun-ichirou Yasunaga from Kumamoto University, Japan, shifted the focus to the microscopic world, exploring the pathogenic mechanisms of Human T-cell Leukemia Virus Type 1 (HTLV-1). If the human immune system is an army, the HTLV-1 virus acts like an "invisible spy" hidden within the immune core, quietly causing destruction. This research sheds light on how to unmask this stealthy killer.



Switzerland Speaker Dr. Islam and moderator Dr. Tyan



Japanese Speaker Dr. Yasunaga and moderator Dr. Lin

The Chameleon Camouflage of Viruses and Scientists' "Invisible Shield"

Why is the dengue virus so formidable? Prof. Jen-Ren Wang from National Cheng Kung University pointed out that the dengue virus has evolved a sophisticated talent for "immune evasion," changing its appearance like a chameleon so that our immune system fails to recognize it. However, scientists are equally resourceful! Prof. Yi-Ling Lin from Academia Sinica introduced an exciting defensive weapon—AAV-mediated delivery of a broadly neutralizing antibody. This technology functions like implanting an "automatic shield generator" in the human body. By using the harmless adeno-associated virus (AAV) as a delivery vector, genes for a super-antibody that simultaneously fights dengue and Zika viruses are sent directly into the body. This allows the body to automatically and sustainably secrete antibodies, promising to eliminate these two troublesome mosquito-borne viruses at once!



Speaker Dr. Wang and moderator Dr. Liu



Speaker Dr. Lin and moderator Dr. Wang

Returning to Simplicity: A Diagnostic Savior for Low-Resource Environments

In remote, underdeveloped areas lacking basic infrastructure, PCR testing machines costing tens of thousands of dollars are a luxury. Dr. Raul V. Destura from the National Institutes of Health, Philippines, presented stunning results. Adhering to the philosophy of "precision in simplicity," his team developed diagnostic assays for neglected tropical diseases (NTDs) suitable for low-resource environments. This technology is like a scientific "precision cutting technique"—it operates as simply as a rapid test kit but can accurately detect viruses, bringing hope to areas with scarce medical resources.



Filipino Speaker Dr. Rauland moderator Dr. Kao

Big Data Codes from Southeast Asia and the Next Steps in Clinical Treatment

Dr. Tippawan Liabsuetrakul from Prince of Songkla University, Thailand, used big data analysis to uncover peculiar age and sex differences in dengue incidences across Southeast Asia. Dr. Jenny Low Guek Hong from Duke-NUS, Singapore, directly addressed clinical pain points, guiding the audience through the current status and future breakthroughs in dengue therapeutic trials. Following this, Dr. Waradon Sungnak from Mahidol University, Thailand, utilized cutting-edge "single-cell resolution" technology to observe the unique immune responses of fortunate individuals who infected with dengue but remained "completely asymptomatic." This is akin to peek at a master's defense secrets, enabling scientists to replicate these asymptomatic immune strategies to save critically ill patients in the future.



Thai Speaker Dr. Tippawan and moderator Dr. Lee



Thai Speaker Dr. Waradon and moderator Dr. Chang



Singaporean speaker Dr. Jenny Low participating online

Know Your Enemy! Mosquito Control Masters and Vascular Repair

To solve the dengue problem, controlling the mosquitoes is just as vital as treating the disease. Prof. Chun-Hong Chen from the National Health Research Institutes shared fascinating research showing that Mucin-Lectin, circadian rhythms, and genetic regulation within mosquitoes actually affect their ability to transmit the dengue virus. By understanding the mosquitoes' "schedule" and transmission mechanisms, scientists might interfere with their biological clocks in the future, turning them into "vegetarian mosquitoes incapable of transmitting viruses." Finally, homegrown expert Dr. Chun-Yu Lin from KMU presented a highly anticipated pre-clinical study. The most feared outcome of severe dengue is hemorrhagic shock. Dr. Lin' s team successfully treated dengue-virus-infected mice with medication, significantly attenuating vascular leakage manifestations! This is like timely sealing a leaking pipe with superglue to save the mice's lives, revealing immense medical potential for human severe dengue treatment.



Speaker Dr. Chen and moderator Dr. Lee



Dr. Chun-Yu Lin present his reserch

Conclusion: Global Wisdom at the Roundtable

In the evening, following the exciting poster awards and an engaging roundtable discussion, this highly rewarding international conference came to a successful close. Through this cross-border academic exchange, KMU not only demonstrated its leadership in tropical medicine research but also contributed crucial Taiwanese wisdom to the global fight against mosquito-borne infectious diseases.



Group photo of speakers and guests



Roundtable Discussion

Other Important Highlights

- Dr. Ya-Fang Wang from the National Mosquito-Borne Diseases Control Research Center, National Health Research Institutes (NHRI), is invited to share her journey and achievements in researching the epidemiology of Japanese encephalitis and dengue fever over the years.
- Prof. Chih-Peng Chang from the Graduate Institute of Microbiology and Immunology, National Cheng Kung University (NCKU), is invited to share his journey and achievements in researching strategies against dengue fever over the years.
- Assoc. Prof. Ling-Shan Yu from the Institute of BioPharmaceutical Sciences, National Sun Yat-sen University (NSYSU), is invited to share the application and practice of cross-disciplinary innovation in tropical medicine.



Dr. Ya-Fang Wang presented her research



Prof. Chih-Peng Chang presented his research



Assoc. Prof. Ling-Shan Yu presented her research

From Social Determinants to Innovative Treatments: The Neuroscience Research Center Convenes Asian Experts to Unlock the Protective Codes of Alzheimer's Disease

University-Level Mission-Oriented Research Center — Neuroscience Research Center (NRC)
Prof. Yuan-Han Yang / Director

Dementia has become a major challenge for aging societies worldwide. On June 27, 2026, the Center hosted the "2026 Asian Dementia Forum," bringing together leading neuroscience experts from various countries, including Japan, South Korea, the Philippines, Thailand, Indonesia, Malaysia, and Germany. Through this forum, insights were gained into the "social determinants of health," such as lifestyles across different Asian nations. Additionally, German scholars shared clinical applications of cutting-edge Transcranial Pulse Stimulation (TPS) for the brain and the latest targeted therapies for Alzheimer's disease.

- Building an International Frontier Against Dementia:
  With the global increase in average life expectancy, "how to age healthily and stave off dementia" has become one of the most pressing health concerns of our time. As a pivotal driver in safeguarding brain health, our university's Neuroscience Research Center has long been dedicated to the deep cultivation and innovation of neurological medicine. Following last year's collaboration with the National Health Research Institutes (NHRI) to publish the White Paper on Dementia Risk Factor Management in Taiwan, the Center has taken the lead this year by hosting the "2026 Asian Dementia Forum: From Social Determinants to Innovative Treatment." This forum brought together renowned experts and scholars from home and abroad, delivering a highly rewarding medical feast for both the campus and society.

- Learning from Asia: Unlocking the Environmental Codes of Brain Health:
  Brain health is determined by far more than just genetics; where we live, what we eat, and whether we have adequate social support—collectively known as social determinants of health—profoundly impact the incidence of dementia.
  The forum kicked off with an opening address by Dr. Yuan-Han Yang, Director of the Neuroscience Research Center, who invited neuroscience experts from multiple Asian countries to present relevant data on social support within their respective nations. Conducted in a hybrid format (combining online and offline sessions), the forum successfully broke down geographical barriers, connecting top universities and medical centers across Japan, South Korea, the Philippines, Thailand, Indonesia, and Malaysia.

- Technology and Innovation: Non-Invasive Diagnostics and Targeted Therapies:
  Beyond proactive prevention, the second half of the forum focused squarely on "innovative treatments" driven by medical technology. Highlighting advancements in non-invasive brain stimulation techniques, the forum featured Prof. Ulrich Sprick, a renowned Prof. from Germany, alongside Director Chung-Yao Hsu from Kaohsiung Medical University Hospital. Together, they explored the latest clinical applications of Transcranial Pulse Stimulation (TPS) in treating Alzheimer's disease. This technology utilizes precisely targeted, low-energy shock waves to safely stimulate and activate specific brain regions without disrupting daily life, offering a promising new beacon of hope as an auxiliary treatment alongside traditional pharmacology.
  Furthermore, addressing the targeted therapies for Alzheimer's disease that have captured global medical attention in recent years—such as Donanemab and Lecanemab—the forum invited frontline clinicians from National Cheng Kung University Hospital and Fengshan Hospital. They engaged in practical dialogues focusing on critical clinical questions, such as "when to initiate or discontinue medication" and "real-world treatment efficacy." By bridging academic research with frontline clinical experience, these discussions directly addressed the real-world medical decisions that healthcare professionals and patients' families care about most.



Prof. Ulrich Sprick posing for a photo with the Director of the Center.



Neurologists experiencing Transcranial Pulse Stimulation (TPS) firsthand.



Scholars from various Asian countries participating online to s hare data on the social determinants of health within their respective nations.



Exhibitors demonstrating the operation of the Transcranial Pulse Stimulation (TPS) system.



Prof. Ulrich Sprick sharing past research and clinical experience regarding shock wave therapy.

Other Important Highlights

- Collaboration with National Institutions (Dementia Prevention and Care Policy Guidelines and Action Plan 3.0): In collaboration with several members of our Center, the National Health Research Institutes (NHRI) successfully developed the "Dementia Cloud Passport" and has actively promoted its implementation across various dementia co-care centers and community care points. The team has completed the dementia caregiver support system, which is currently deployed in 22 co-care centers and 43 community care points. Moving forward, the Center will continue to expand its coverage throughout Taiwan.
- National Leadership and Key Publications: The Director of the Center serves as the Convener of the Dementia Research, Prevention, and Treatment Group at the National Center for Geriatrics and Welfare Research, NHRI. Under his leadership, the group has officially published and released the White Paper on Dementia Risk Factor Management in Taiwan.

Three Portals, One Multi-Omics Path from Disease to Cancer

University-Level Mission-Oriented Research Center —
Center for Disease Multi-Omics Research (ATOMICS)
Assistant Research Fellow Chao-Feng Chen / CEO Chia-Yang Li

Over the past year, the Computing Division of the Center for Disease Multi-Omics Research has built three publicly accessible interactive databases, progressing from transcriptomic analysis of metabolic dysfunction-associated steatotic liver disease (MASLD) to integrated genomic exploration of liver and bladder cancer. Each database addresses a different question, but all share the same design logic: transforming raw data scattered across public repositories into interactive tools that researchers can query, compare, and download from directly.

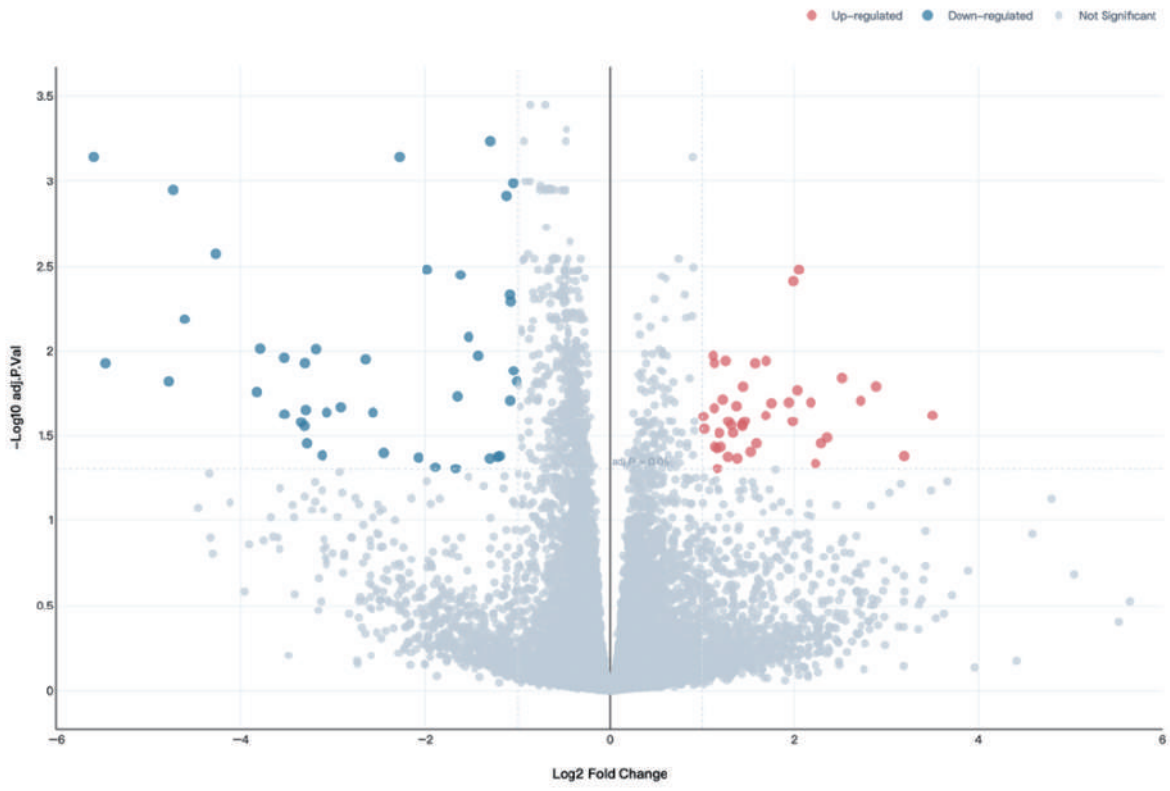
This is more than building a website. Behind each portal is a complete pipeline from raw data download, quality control, and standardization to statistical analysis. When a researcher selects a gene or a cohort on the front end, the response draws on tens of thousands of pre-computed results.

MASLD Multi-Omics Database

Scale: 21 independent cohorts (13 RNA-Seq, 8 microarray) • Interactive DE + GSEA

The center's first database integrates 21 independent MASLD transcriptomic cohorts (13 RNA-Seq, 8 microarray) from GEO and ArrayExpress. Researchers can perform interactive differential expression and Gene Set Enrichment Analysis (GSEA) online, cross-comparing results across cohorts.

Its core value lies in cross-cohort consistency testing: does a gene show the same direction in different laboratories and platforms? This is especially important for MASLD, a disease that lacks a single large-scale cohort. Each cohort entry includes full provenance, sample size, and links to the original publication.



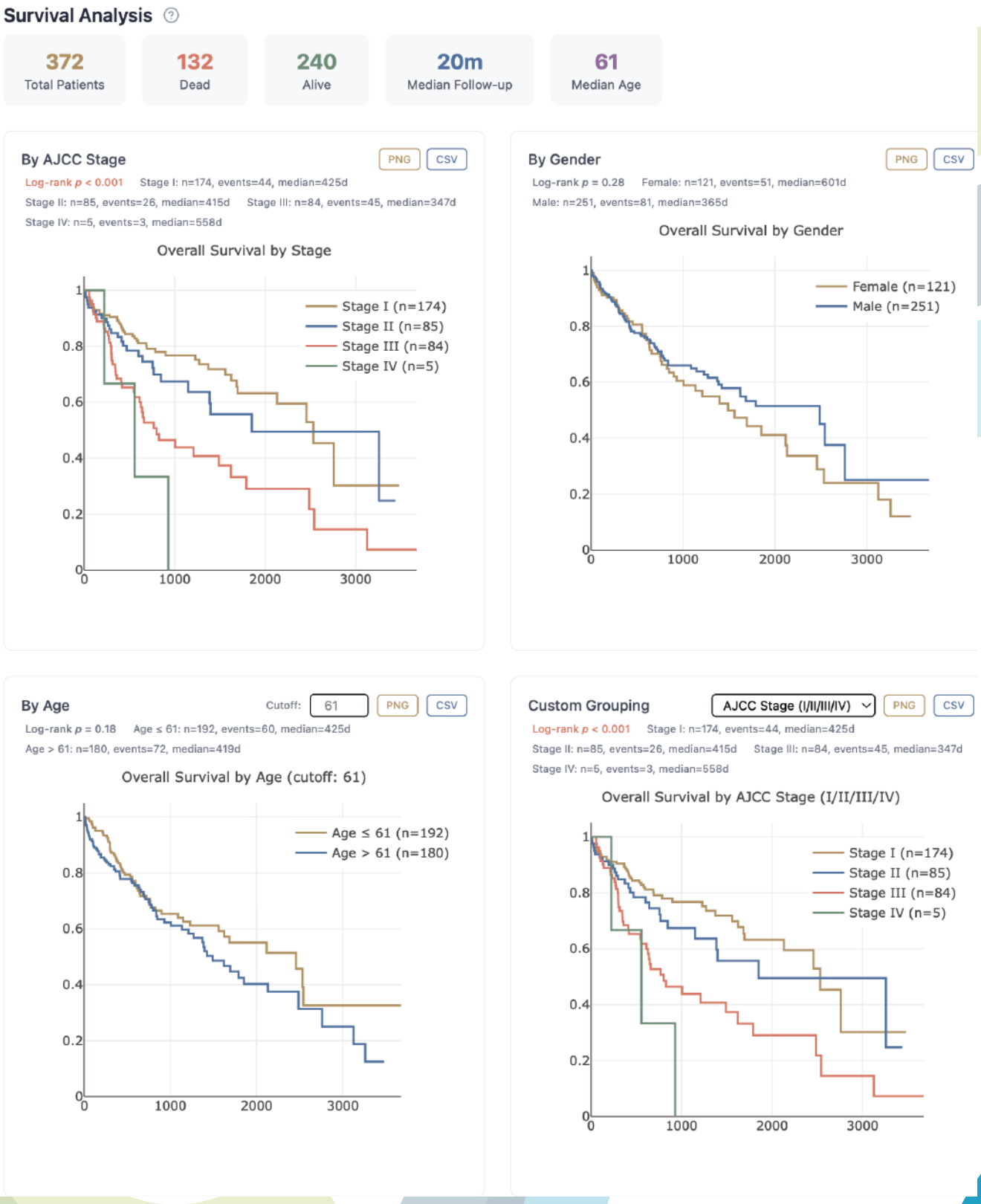
MASLD Multi-Omics Database: Volcano plot generated upon cohort selection, with up- and down-regulated genes highlighted in red and blue

TCGA-LIHC Genomics Explorer

Scale: 377 patients • WES 364 • RNA-Seq 371 • Methylation 450K 371 • RPPA 184

The second database moves into cancer genomics, built on the TCGA Liver Hepatocellular Carcinoma project. It integrates four molecular assay platforms: whole-exome sequencing (WES), RNA sequencing, DNA methylation (Illumina 450K), and reverse-phase protein array (RPPA). All data are sourced from the Genomic Data Commons (GDC) and aligned to the GRCh38 reference genome.

The platform supports single-gene cross-omics queries (Gene Query): enter a gene name to simultaneously view its mutation frequency, copy-number alterations, DNA methylation-expression correlation, protein expression, and stage-stratified survival analysis. This "one gene, four layers" integrated view is difficult to achieve with traditional single-omics approaches.



TCGA-LIHC Genomics Explorer: Kaplan-Meier survival analysis for 372 hepatocellular carcinoma patients, with interactive stratification by AJCC stage, gender, age, and custom grouping

TCGA-BLCA Genomics Explorer

Scale: 412 patients • WES 414 • RNA-Seq 412 • Methylation 450K 418 • RPPA 348

The third database is an integrated exploration platform for the TCGA Bladder Urothelial Carcinoma project, sharing the same generalized front-end architecture and analysis pipeline as the LIHC Portal, with identical four-assay and Gene Query capabilities. This is the first instance of the center's Pan-Cancer expansion strategy: one architecture, different cancer parameters.

The BLCA Portal has a larger cohort (412 patients) and higher RPPA coverage (348, compared to LIHC's 184), giving protein-level analyses greater statistical power. Data are sourced from GDC with processing pipelines identical to LIHC, ensuring a consistent methodological basis for cross-cancer comparison.



TCGA-BLCA Genomics Explorer: Mutation landscape showing high-frequency mutated genes and tumor mutation burden distribution

Portal	Disease	Data Types	N	Status
MASLD Database	MASLD	RNA-Seq, Microarray	21 cohorts	Live
TCGA-LIHC Explorer	Hepatocellular Carcinoma	WES, RNA-Seq, Methylation, RPPA	377	Live
TCGA-BLCA Explorer	Bladder Urothelial Carcinoma	WES, RNA-Seq, Methylation, RPPA	412	Live

Next: TCGA Pan-Cancer Expansion

The launch of the BLCA Portal validated the generalized architecture: by substituting cancer-specific parameters, the same front end and pipeline produce a new portal. The center has completed the architectural design and delivery plan for Pan-Cancer expansion, aiming to incorporate additional TCGA cancer types over the coming months.

The next priority cancers include prostate (PRAD) and colorectal (COADREAD), aligned with the needs of in-house clinical research teams. Subsequent expansion will follow incidence and clinical importance until all TCGA cancer types are covered. Each portal provides full data-source documentation and methodology references for citation and methodological review.

Comparison of SGLT2 and DPP4 inhibitors on clinical outcomes in COPD patients with diabetes: A nationwide cohort study

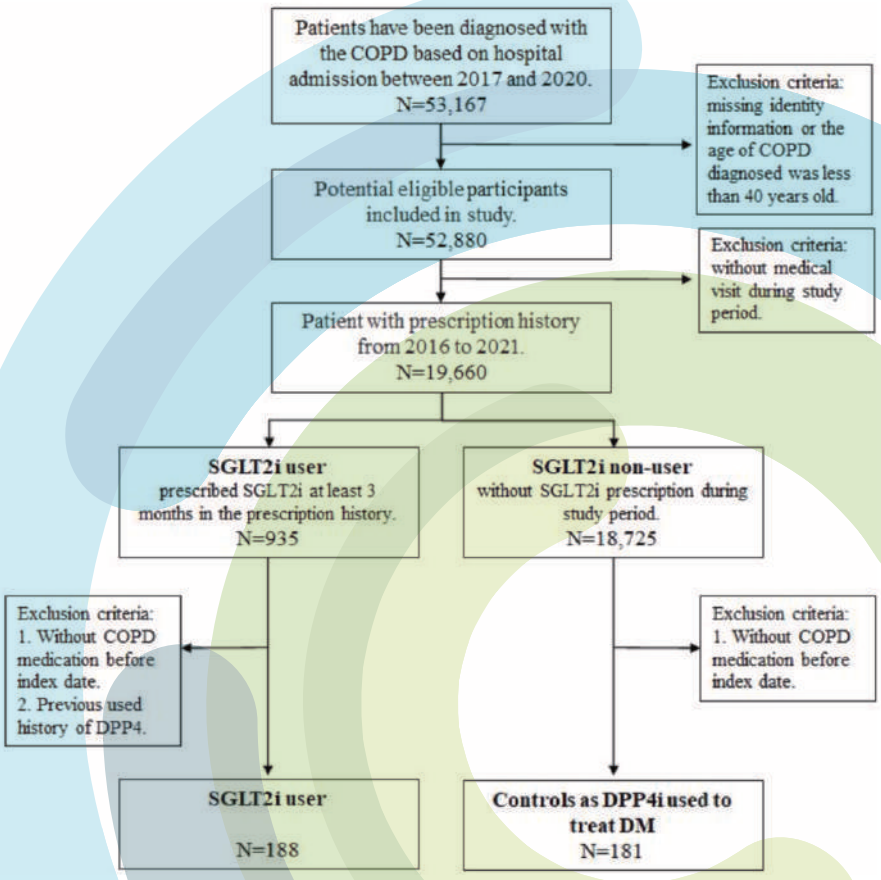
University-Level Mission-Oriented Research Center — Center for Big Data Research (CBDR)
Prof. Fu-Wen Liang / Director Hung-Pin Tu

For patients living with both diabetes and chronic obstructive pulmonary disease (COPD), acute respiratory exacerbations pose a major threat to health. A recent study using Taiwan's National Health Insurance Research Database found that, compared with the traditionally used glucose-lowering medication DPP4 inhibitors, patients using the newer class of glucose-lowering drugs, SGLT2 inhibitors, had an approximately 31% lower risk of COPD exacerbation, while the likelihood of severe acute exacerbations requiring hospitalization or emergency department visits was reduced even more, by 65%. Although no significant difference was observed between the two groups in all-cause mortality within one year, overall, this study suggests that this newer class of glucose-lowering medications may provide additional pulmonary protection for patients with these comorbidities, offering a new clinical reference for medication choice.

Chronic obstructive pulmonary disease (COPD) is a long-term inflammatory airway disease. In affected patients, the airways are like rusted and jammed pipes, making every breath heavy and laborious. This disease has already imposed a substantial medical and economic burden on millions of people worldwide. For patients, the most dangerous event is an "acute exacerbation," which is like a sudden storm striking the lungs. It can lead to permanent loss of lung function, severely impair quality of life, and even increase the risk of death. Therefore, the medical community widely recognizes that "preventing exacerbations" is the key to COPD management. Even preventing just one exacerbation is critically important for patients.

In addition to conventional measures such as inhalers, vaccination, and smoking cessation, recent real-world big-data studies from the United Kingdom and Hong Kong have preliminarily observed that "SGLT2 inhibitors" (commonly known as glucose-excreting drugs), originally used for diabetes treatment, may reduce the frequency of pulmonary exacerbations. To further verify this finding, our research team specifically focused on patients with both diabetes and COPD and used Taiwan's National Health Insurance Research Database to investigate whether SGLT2 inhibitors truly offer greater pulmonary protection than traditional glucose-lowering drugs (DPP4 inhibitors), while also reducing the risk of death.

The research team identified patients aged 40 years and older who were diagnosed with COPD between 2017 and 2021 from the National Health Insurance database. Using an active-comparator new-user design, the study compared 188 patients treated with SGLT2 inhibitors and 181 patients treated with DPP4 inhibitors in order to reduce selection bias and confounding bias.



Flow chart of study participants, SGLT2i used compared to DPP4 used in COPD patient.

This study found that, compared with the DPP4 inhibitor group, patients using SGLT2 inhibitors had a significantly lower overall rate of acute exacerbations (82.3% vs. 68.1%), with a significant 31% reduction in risk (adjusted hazard ratio, 0.69; 95% confidence interval, 0.52–0.92). In addition, the time to the first exacerbation was significantly delayed (median time extended from 0.63 months to 1.35 months). Regarding the outcome of severe acute exacerbations requiring emergency department visits or hospitalization, SGLT2 inhibitors demonstrated even stronger protective effects, reducing the risk by 65% (adjusted hazard ratio, 0.35; 95% confidence interval, 0.20–0.61). Although there was no statistically significant difference in one-year all-cause mortality between the two groups (hazard ratio, 1.51; 95% confidence interval, 0.53–4.25), this medication effectively reduced the frequency of emergency visits or hospitalizations due to breathing difficulty, thereby providing substantial benefits in improving patients' quality of life (Table 1, Figure 2).

The relative risk of exacerbation and mortality among COPD patients receiving SGLT2i compared to DPP4i users.

Outcome	COPD patient, N (%)		SGLT2i vs. DPP4 user	
	DPP4i User N = 181	SGLT2i User N = 188	Crude HR (95 % CI)	Adjusted HR** (95 % CI)
Overall acute exacerbation	149 (82.32)	128 (68.09)	0.66* (0.52–0.84)	0.69* (0.52–0.92)
Severe	63 (34.81)	24 (12.77)	0.36* (0.23–0.58)	0.35* (0.20–0.61)
Moderate	136 (75.14)	124 (65.96)	0.76* (0.52–0.96)	0.76 (0.57–1.03)
Time to event (months), median (Q1-Q3)	0.63 (0.20–1.93)	1.35 (0.58–2.25)		
1-year mortality	12 (6.63)	12 (6.38)	1.13 (0.51–2.51)	1.51 (0.53–4.25)
Time to event (months), median (Q1-Q3)	6.95 (5.17–9.03)	5.05 (3.97–6.65)		

*P-value < 0.05; **Adjusted HR: the covariate, including age, sex, comorbidities, DCSI score, history of moderate or severe exacerbation, COPD drug used, and OCS, was adjusted in the cox regression model.

Table 1. Relative risk of exacerbation and mortality among COPD patient receiving SGLT2i compared with DPP4i user

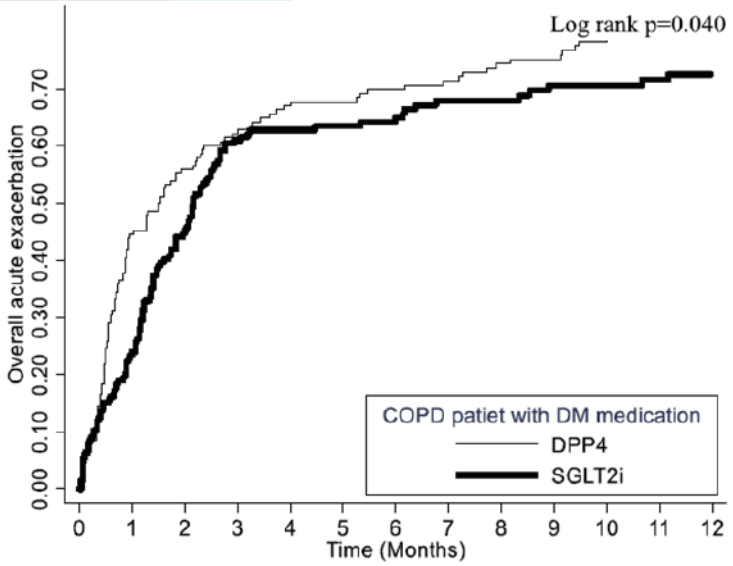


Figure 2. Cumulative incidence of acute exacerbations in COPD patients using SGLT2 inhibitors versus DPP4 inhibitors

According to the subgroup analysis, the protective effect of SGLT2 inhibitors was not limited to a specific population. In terms of the risk of severe exacerbations, benefits were observed in patients younger than 70 years (hazard ratio, 0.30; 95% CI, 0.11–0.87), those aged 70 to 79 years (hazard ratio, 0.38; 95% CI, 0.17–0.86), men (hazard ratio, 0.35; 95% CI, 0.20–0.61), patients without heart failure (hazard ratio, 0.27; 95% CI, 0.14–0.51), and those without coronary artery disease (hazard ratio, 0.18; 95% CI, 0.08–0.42). Particularly noteworthy is that among patients who did not require long-term oral corticosteroids in routine care, the protective effect of this drug was most pronounced, with the risk of severe exacerbation reduced by more than 80%. Even among patients with more severe diabetes requiring insulin therapy, a consistent trend of pulmonary protection was still observed after switching to SGLT2 inhibitors. This indicates that, for most patients with both diabetes and COPD, this medication acts like a line of defense that crosses disease categories—achieving precise glucose control while also protecting every smooth breath (Table 2).

Clinical Implications and Mechanisms

Previous studies have suggested that SGLT2 inhibitors may improve outcomes in patients with COPD through multiple mechanisms, including reducing the carbon dioxide burden generated by glucose metabolism, lowering systemic inflammatory responses, and decreasing the risk of infection-related complications such as pneumonia. Although this study was a retrospective cohort study and cannot directly establish causality, the results indicate that SGLT2 inhibitors may have potentially important clinical benefits in preventing severe acute exacerbations in patients with both diabetes and COPD.

SGLT2i vs. DPP4i users (reference)	Adjusted HR**(95% CI)		
	Moderate	Severe	OAE
Age group, years			
<70	0.65 (0.37–1.17)	0.30* (0.11–0.87)	0.64 (0.36–1.13)
70–79	0.87 (0.55–1.39)	0.38* (0.17–0.86)	0.74 (0.48–1.16)
≥80	0.59 (0.29–1.21)	0.02 (0.00–1.97)	0.60 (0.30–1.19)
Sex, male	0.76 (0.56–1.02)	0.35* (0.20–0.61)	0.68* (0.51–0.91)
CHF			
No	0.80 (0.58–1.09)	0.27* (0.14–0.51)	0.71* (0.52–0.96)
Yes	0.03* (0.01–0.24)	NA	0.03* (0.01–0.25)
CAD			
No	0.63* (0.43–0.92)	0.18* (0.08–0.42)	0.55* (0.38–0.79)
Yes	0.93 (0.52–1.67)	0.57 (0.19–1.69)	0.97 (0.55–1.72)
DCSI score			
0	0.56 (0.28–1.13)	0.07* (0.01–0.53)	0.54 (0.28–1.03)
1–2	0.56* (0.35–0.90)	0.22* (0.08–0.59)	0.53* (0.33–0.84)
≥3	0.70 (0.37–1.35)	1.08 (0.29–4.06)	0.59 (0.31–1.11)
Risk of exacerbation			
Low	0.92 (0.27–3.15)	0.01 (0.00–1.00)	0.55 (0.19–1.59)
High[a]	0.76 (0.55–1.04)	0.32* (0.17–0.61)	0.70* (0.52–0.96)
OCS			
No	0.45* (0.26–0.77)	0.14* (0.05–0.44)	0.38* (0.23–0.64)
Yes	0.87 (0.57–1.33)	0.50 (0.25–1.01)	0.79 (0.52–1.20)

[a]High risk of exacerbation high was defined as the history of ≥ 2 moderate or ≥ 1 severe exacerbation during the previous one year.
*P < 0.05; **Adjusted HR: the covariate, including age, sex, comorbidities, DCSI score, history of moderate or severe exacerbation, COPD drug used, and OCS, was adjusted in the cox regression model.
OAE: Overall acute exacerbation
NA: not available for analysis.

Table 2. Comparison of the relative risks of acute exacerbation and death between patients using SGLT2 inhibitors and those using DPP4 inhibitors across subgroups

Decoding Osteosarcopenia in Older Adults: Translational Medicine from Neuromuscular Control Mechanisms to Precision Exercise Prescriptions

University-Level Mission-Oriented Research Center —
Center for Long-Term Care Research (CLTCR)
Asst. Xiang-Wen Hou / Director Yi-Chun Tsai

On June 25, 2026, the Center hosted the symposium "Decoding Osteosarcopenia in Older Adults: Translational Medicine from Neuromuscular Control Mechanisms to Precision Exercise Prescriptions," bringing together experts for cross-disciplinary exchanges. The forum focused on the comorbidity mechanisms of chronic kidney disease and sarcopenia, community practices utilizing sports psychology to stimulate intrinsic motivation in older adults, and the latest diagnostic and intervention strategies for the triple threat of osteoporosis, sarcopenia, and obesity, showcasing empirical research and practical application outcomes in older adult healthcare.

On June 25, 2026, the Center for Long-Term Care Research grandly hosted the symposium "Decoding Osteosarcopenia in Older Adults: Translational Medicine from Neuromuscular Control Mechanisms to Precision Exercise Prescriptions" at the university's Audio-Visual Teaching Center. This symposium specially invited Assistant Prof. Shih-Fen Hsiao from the Department of Physical Therapy, Prof. Chin-Hsing Hsu from National Pingtung University of Science and Technology, and Director Chung-Hwan Chen from the Orthopaedic Research Center of the College of Medicine. From the perspective of translational medicine, they comprehensively analyzed the multiple roles that chronic diseases, sports psychology, and the musculoskeletal system play in sarcopenia.

The Role of Sarcopenia in Chronic Kidney Disease (Speaker: Asst. Prof. Shih-Fen Hsiao)

Chronic Kidney Disease (CKD) is a global public health challenge, and in Taiwan, over 80% of new end-stage renal disease cases are older adults aged 65 and above. Assistant Prof. Shih-Fen Hsiao pointed out that patients are highly susceptible to accelerated muscle loss due to uremic symptoms, inflammation, and dietary restrictions, causing kidney disease, dementia, and frailty to form a complex comorbid triangle that threatens the independent living capabilities of older adults and increases mortality risks.

Based on the AWGS guidelines, Prof. Hsiao’ s team conducted empirical research on patients at Kaohsiung Medical University Hospital. Among 191 older outpatients with pre-dialysis CKD, a staggering 74.87% were classified as a high-risk group for "possible sarcopenia," with their muscle strength and physical performance significantly worse than those in the non-risk group. Meanwhile, an assessment of 42 hemodialysis patients revealed that 47.62% were diagnosed with sarcopenia, and 35.71% faced a high risk of falls. Interestingly, while hemodialysis patients relatively maintained their handgrip strength, ultrasound examinations confirmed that their thigh and arm muscle thickness and strength had dropped significantly.

In terms of clinical care, Prof. Hsiao advocated for the routine screening of muscle mass and strength. The AWGS 2025 consensus has lowered the screening age to 50-64 years old to facilitate early prevention. Even without precise instruments like DXA or BIA, frontline personnel can utilize the SARC-F questionnaire paired with calf circumference measurements, or employ dynamometers and the 5-time chair stand test for initial screening. For high-risk patients, resistance and balance training should be implemented early under professional guidance to delay muscle atrophy, prevent falls, and fundamentally improve the quality of life in later years.



Keynote presentation by Asst. Prof. Shih-Fen Hsiao

Sarcopenia vs. Sports Psychology: From Laboratory Evidence to Community Practice Promotion (Speaker: Prof. Chin-Hsing Hsu)

Even with comprehensive diagnoses and precision exercise prescriptions, preventative interventions are difficult to implement if older adults lack the willingness to participate. Prof. Chin-Hsing Hsu explored how to trigger the "intrinsic drive" of older adults from the perspective of sports psychology. Traditional community programs often rely too heavily on "extrinsic rewards" such as distributing promotional gifts; while this may attract crowds in the short term, psychologist Edward Deci's experiment has long proven that overemphasizing external rewards actually undermines intrinsic motivation, and once the rewards stop, the exercise behavior subsequently ceases.

Prof. Hsu cited Albert Bandura's "Self-Efficacy" theory, emphasizing the need to build older adults' confidence and sense of competence that "I can do it too". Through "vicarious experiences"—observing peers successfully complete exercises—psychological barriers can be effectively broken down to stimulate potential. Integrating the "Self-Determination Theory," intervention programs should provide older adults with a sense of autonomy and competence, while strengthening social relatedness through group exercises.

In community practice, Prof. Hsu shared the "Land, Sea, and Air Dream-Fulfilling Project" in Pingtung County, which designed challenging and life-meaningful goals for older adults. The "100-Kilometer Cycling Dream Project" allowed 25 older adults to successfully ride bicycles 100 kilometers to Fangliao after three months of training, and the profound sense of self-actualization they felt upon being welcomed by their families at the finish line became a powerful driving force supporting their continuous exercise. Facing the boredom of routine daily cycling, the team creatively integrated the strong social support of "religious faith" into the exercise prescription by pioneering the "Iron Horse Pilgrimage Group". They led 37 older adults (with the oldest being 85) to ride 27.4 kilometers round-trip to the Jade Emperor Temple in Pingtung City to offer incense, perfectly combining a physical feat with spiritual and social needs. These practical experiences confirm that exercise prescriptions must be integrated with the life experiences and psychological needs of older adults to transform them from passive to active participants, serving as the most effective sustainable solution for preventing osteosarcopenia in later life.

Bone-Muscle Crosstalk: The New Role of Osteoporosis in Sarcopenia (Speaker: Director Chung-Hwan Chen)

Health crises in older adults are often "geriatric syndromes" interwoven with multiple comorbidities, and the coexistence of osteoporosis, sarcopenia, and obesity constitutes the severe triple threat of "Osteosarcopenic Obesity (OSO)". Director Chung-Hwan Chen pointed out that when bone microarchitecture is damaged, the risk of fractures increases drastically. In Taiwan, the incidence of vertebral compression fractures among women aged 65 and above is 19.8%, and 12.5% for men; overall, the prevalence of osteoporosis in women reaches up to 45%. The lifetime probability of an older adult experiencing a fracture is one-third for women and one-fifth for men. After a first fracture, the risk of subsequent fractures multiplies exponentially, and the mortality rate following a hip fracture rises significantly, posing a massive threat to life safety.

Regarding diagnosis and screening, in addition to using DXA as the gold standard, clinical settings can also rely on simple physical examinations for initial screening, such as a height loss of more than 4 cm, a wall-occiput distance greater than 3 cm, and a rib-pelvis distance of less than 2 cm. Concurrently, combining the OSTAi and MOSTAi self-assessment tools with the FRAX fracture risk assessment tool serves as highly valuable screening instruments in long-term care practice. Director Chen specifically analyzed the latest AWGS 2025 consensus: the revised guidelines simplified the criteria, requiring only the simultaneous presence of "low muscle strength" and "low muscle mass" for a confirmed diagnosis of sarcopenia, whereas gait speed and the 5-time chair stand test have shifted to serve as outcome indicators for monitoring intervention effectiveness.

Addressing OSO pathology, aging increases ectopic fat in bone marrow and muscle, which secretes pro-inflammatory substances and causes insulin resistance, further weakening osteoblast activity and muscle regenerative capacity. At the cellular level, the activation of myostatin hinders muscle generation, and currently, relevant drugs have not achieved significant success, highlighting the irreplaceable nature of non-pharmacological treatments. In intervention strategies, older adults must avoid blind weight loss to prevent the loss of muscle and bone mass, which conversely increases fall risks. The correct approach is to supplement adequate protein (1-1.5g/kg), vitamin D3, and specific amino acids, paired with regular weight-bearing and resistance training, to truly break the vicious cycle of bone and muscle loss.



Keynote presentation by Prof. Chin-Hsing Hsu



Keynote presentation by Director Chung-Hwan Chen

Conclusion

In the face of the challenges posed by a super-aged society, the prevention and management of osteosarcopenia in older adults urgently require the establishment of an interdisciplinary and integrated care network. The analyses provided by Assistant Prof. Shih-Fen Hsiao and Director Chung-Hwan Chen collectively highlight the indispensability of early screening and non-pharmacological treatments in addressing both muscle loss in chronic kidney disease and the comorbid mechanisms of osteosarcopenic obesity. Furthermore, Prof. Chin-Hsing Hsu's practical experience points out that even the most precise medical prescriptions must be integrated with the life experiences of older adults to stimulate their intrinsic motivation, ensuring these interventions become enduring healthy habits. In conclusion, only by employing a two-pronged approach that combines scientific evidence with psychological support can we comprehensively safeguard the mobility and dignity of older adults.



Group photo of participants



Q&A session

Simulation-Based Interprofessional Education and Workplace Stress Among Nurses: Research Outcomes in Humanizing Health Professional Education

University-Level Mission-Oriented Research Center —
Center for Medical Education and Humanizing Health Professional Education (MEHHPE)
Asst. Yi-Sheng Li, Postdoc. Nina Tsai / Director Ming-Ju Tsai

This issue of the quarterly report highlights selected recent research outputs by Center members in two areas: simulation-based interprofessional education and emotional blackmail and depression among Taiwanese nurses. The first study applied an oncology oral care scenario involving a patient with breast cancer to evaluate changes in IPE core competencies among dental and dental hygiene students. The second examined how workplace emotional blackmail, coping strategies, and social support were associated with depressive symptoms in nurses. These studies respectively address educational practice and healthcare workplace issues, with attention to interprofessional collaboration skills and nurses' mental health.

In the first study, Prof. Ju-Hui Wu, Prof. Peih-Ying Lu, and their research team published an article in the European Journal of Dental Education examining the effects of simulation-based interprofessional education on oncology oral care competencies among dental and dental hygiene students. Using an oncology oral care scenario involving a patient with breast cancer, fifth-year dental students and third-year dental hygiene students worked in mixed teams to provide oral care and develop a care plan. The course followed a structured five-phase instructional sequence, including preparation, briefing, simulation activity, debriefing, and evaluation and reflection. The results showed significant improvements across all four IPE core competency domains, particularly in roles and responsibilities and teams and teamwork.

In the second study, Prof. Wen-Li Hou and her research team published an article in the Journal of Psychiatric and Mental Health Nursing focusing on emotional blackmail and depression among Taiwanese nurses. Based on data from 297 nurses from a regional hospital in southern Taiwan, the study used the Stress Process Model to examine the relationships among workplace emotional blackmail, coping strategies, social support, and depressive symptoms. The findings indicated that negative emotional blackmail was indirectly associated with depressive symptoms through negative coping, while social support was associated with lower depressive symptoms.

These findings present research observations on humanizing health professional education from the perspectives of student learning and healthcare workplace experience. The first study provides empirical reference for interprofessional education, simulation-based learning, and patient care curriculum design, while the second highlights the importance of attending to interpersonal stressors and nurses' mental health in the healthcare workplace. The two studies broaden the discussion of humanizing health professional education by connecting educational practice with healthcare workplace experience.

Other Important Highlights

● On June 3, 2026 the MEHHPE and the college of Medicine co-organized the “2026 International Conference on Medical Education” inviting international scholars to share insight on competency-based medical education and AI in medical education.

● On April 20, 2026, the Center, in collaboration with the College of Medicine, hosted a keynote lecture by Prof. Wei-Ju Lin, Associate Dean for Global Health Institute at Rutgers University, USA, on " How to Develop Global Leaders in Academic Medicine," exploring leadership development in academic medicine.

● On June 4, 2026, the Center invited Prof. Thomas J. Smith of Northern Illinois University, USA, to deliver a keynote lecture entitled " Designing technology-supported inquiry learning：From K-12 to higher education" The lecture fostered discussions on AI integration in education, student agency, and future interdisciplinary collaboration.







Policy Recommendations for optimizing Low-Dose Computed Tomography (LDCT) lung cancer screening

University-Level Mission-Oriented Research Center —
Research Center for Medical Technology and Policy(RCMTP)
Prof. Chi-Kung Ho, Dr. Ching-Wei Chiu, Dr. Pei-Jing Yang / Director Chi-Kung Ho

A successful lung cancer screening policy relies not only on the advancement of LDCT technology itself, but even more so on robust institutional design, evidence-based decision-making, data governance, risk management, and continuous policy monitoring and evaluation mechanisms. Looking forward, Taiwan's lung cancer screening policy should evolve toward an overall framework of "risk-based, data-driven, transparent governance, and dynamic refinement."

By establishing integrated information systems, precise risk stratification, AI-driven decision support, and open and transparent governance mechanisms, the policy can enhance early diagnosis and reduce mortality rates. Concurrently, it must balance cost-benefit performance, medical quality, health equity, and the sustainable allocation of medical resources, thereby progressively constructing a sustainable national lung cancer prevention strategy that commands scientific evidence, policy efficiency, and public trust.

Establishing a Comprehensive Monitoring Framework and Outcome Measures

An effective national-level Low-Dose Computed Tomography (LDCT) lung cancer screening policy must move beyond mere "one-time checkups" and transition toward "integrated health management." This requires establishing rigorous organized evaluations and institutionalized monitoring and feedback mechanisms. The key lies in data integration and dynamic quality monitoring to maximize screening benefits, minimize the risk of overdiagnosis, ensure the precise investment of state resources, and optimize the efficiency of national resource allocation.

Constructing a Nationwide Integrated Cancer Information System

A national lung cancer screening cloud-based data platform spanning medical institutions and public health systems should be constructed. This platform will integrate the National Cancer Registry Database, the National LDCT Lung Cancer Screening Database, and National Health Insurance (NHI) medical database. It will link real-time screening, diagnostics, treatment, long-term follow-up data, and risk factors such as lifestyle, occupation, and environmental exposure into a complete and continuously updated national-level database.Screening monitoring indicators must cover the entire follow-up data chain, including: Screening coverage rate, Participation rate, Screening positivity rate, Referral rate of positive cases, Long-term follow-up rate, False-positive rate, Treatment completion rate, Recurrence rate, Cancer mortality rate. This comprehensive data chain will support policy outcome evaluation, quality management, and resource allocation.

Setting Screening Indicators and Early Warning Mechanisms

Quality metrics must be monitored regularly to continuously evaluate the effectiveness, safety, equity, and cost-benefit performance of the policy. Key risk indicators and early warning thresholds must be established for parameters such as: False-positive rate, Invasive procedure rate, Overdiagnosis rate, Cancer incidence rate, Screening-related complication rate. These indicators will serve as vital benchmarks for the continuous policy refinement of screening processes, clinical management, and policy adjustments, thereby maintaining a balance between screening safety, clinical efficacy, and long-term cost-effectiveness.

Implementing Health Equity and Local Accessibility of Care

High-risk populations—including those in rural, indigenous, and offshore island areas, as well as specific occupational groups—must be integrated into policy design and planning. This ensures that accessibility and affordability are guaranteed across all stages of screening, diagnosis, treatment, and follow-up, thereby preventing the exacerbation of health inequities.Policy frameworks should combine mobile screening services, transportation and financial subsidies, regional medical cooperative networks, and telehealth measures. These initiatives aim to bridge the health gap caused by geographical and socioeconomic factors, prevent the concentration of screening resources in specific regions or demographics, ensure the equitable distribution of screening resources, and reduce health disparities.

Optimizing Cost-effectiveness and Resource Allocation

The cost-benefit evaluation of national cancer screening programs should not be confined to the calculation of a single indicator. Instead, it must be evaluated systematically from multiple dimensions—including the overall disease burden, healthcare resource allocation, and long-term health benefits—to enhance the investment returns and sustainability of the policy.

Implementing Pilot Programs Combined with Decision Modeling

Prior to the full-scale implementation of publicly funded cancer screening, LDCT screening pilot programs should be prioritized among high-risk populations or within specific regions. These programs will gather localized empirical data, including screening participation rates, administrative costs, referral workflows, medical capacity, and public acceptance. Combining this data with decision modeling will allow for the simulation of the health and economic benefits of different screening strategies, thereby establishing an optimal policy model tailored to national conditions, reducing policy implementation risks, and optimizing resource allocation efficiency.

Integrating Overall Disease Burden and Collateral Benefits into Comprehensive Evaluations

The cost-benefit assessment must look beyond reductions in lung cancer mortality rates. It should also incorporate indicators such as decreased late-stage treatment costs due to early diagnosis, reduced hospital length of stay, medical resource utilization, improvements in quality of life, and gains in healthy life expectancy. Furthermore, it should account for the reduction in disease-related complications and long-term medical expenditures achieved through early therapeutic intervention, thereby fully demonstrating the comprehensive value and benefits of the lung cancer screening policy.

Strengthening Radiation Exposure Risk Control and Medical Resource Management

Risk management principles and monitoring systems for screening must be strictly implemented. This includes establishing a cumulative radiation exposure monitoring system for LDCT screening to prevent unnecessary repeated examinations. Concurrently, assessments must be conducted on medical image interpretation quality, manpower allocation, equipment capacity, and subsequent clinical workloads. This ensures that medical quality and diagnostic consistency are maintained even as the screening scale expands, promoting the rational allocation and sustainable development of medical resources.

International Evidence and Technological Innovation for Optimizing Lung Cancer Screening Policy

Strengthening the Integration Strategy of Early Screening and Smoking Cessation Interventions

The lung cancer screening policy should be integrated with Smoking Cessation Interventions, viewing screening as a pivotal point for public health and health promotion interventions rather than merely an imaging examination. Even if the initial LDCT screening result is negative, it does not imply that the risk of developing lung cancer in the future has disappeared. For individuals who continue to smoke or are exposed to secondhand smoke, their risk of developing lung cancer may still accumulate over time. Therefore, smoking cessation counseling, referrals for cessation treatment, and health education should be provided concurrently during the screening process. Furthermore, subsequent regular screening and follow-up should be arranged based on individual risk profiles, establishing an integrated public health intervention model of "screening–smoking cessation–health promotion–follow-up" to effectively reduce lung cancer incidence and mortality rates.

Strategic Shift: From Early Detection to Risk-Based Prevention

Drawing from international experiences in screening policies, lung cancer screening should gradually transition from universal early detection to a precision prevention strategy centered on risk stratification. This approach comprehensively considers risk factors such as smoking history, family history, occupational and environmental exposures, and lifestyle habits to precisely target high-risk populations (such as individuals with genetic mutations), thereby enhancing screening efficiency and reducing overdiagnosis.

Establishing an AI-Driven Dynamic Risk Assessment Model

Cancer registry data, publicly funded screening records, NHI medical database, and medical imaging data should be integrated using artificial intelligence (AI) and big data analytics to construct a localized lung cancer risk prediction model. By leveraging information such as smoking history, family history, occupational and environmental exposure, as well as imaging characteristics of pulmonary nodules, this system will develop a dynamic risk assessment mechanism. This mechanism will serve as a vital basis for determining screening eligibility, screening frequencies, and follow-up strategies, ultimately improving the efficiency of precision screening.

Strengthening Scientific Decision-Making and Transparent Governance for Screening Policies

The formulation and promotion of lung cancer screening policies must be built upon open and transparent decision-making procedures, as well as a foundation of verifiable data governance. This ensures that the policy possesses scientific validity, impartiality, and public trust, while effectively addressing public concerns regarding "overdiagnosis and overtreatment."

Establishing Standardized Policy Formulation Workflows and Scientific Evidence

The lung cancer screening policy should follow international evidence-based guidelines, systematically considering disease burden, scientific evidence, and localized empirical data. It must publicly disclose policy formulation processes, criteria for screening eligibility criteria, the accuracy and evaluation metrics of screening tools, risk stratification standards, false-positive tolerance thresholds, and cost-benefit benchmarks. This transparency ensures that policy-making is traceable and scientifically consistent, thereby establishing an accountable verifiable, open, and transparent policy deliberation system.

Periodically Disclosing Screening Performance and Quality Monitoring Information

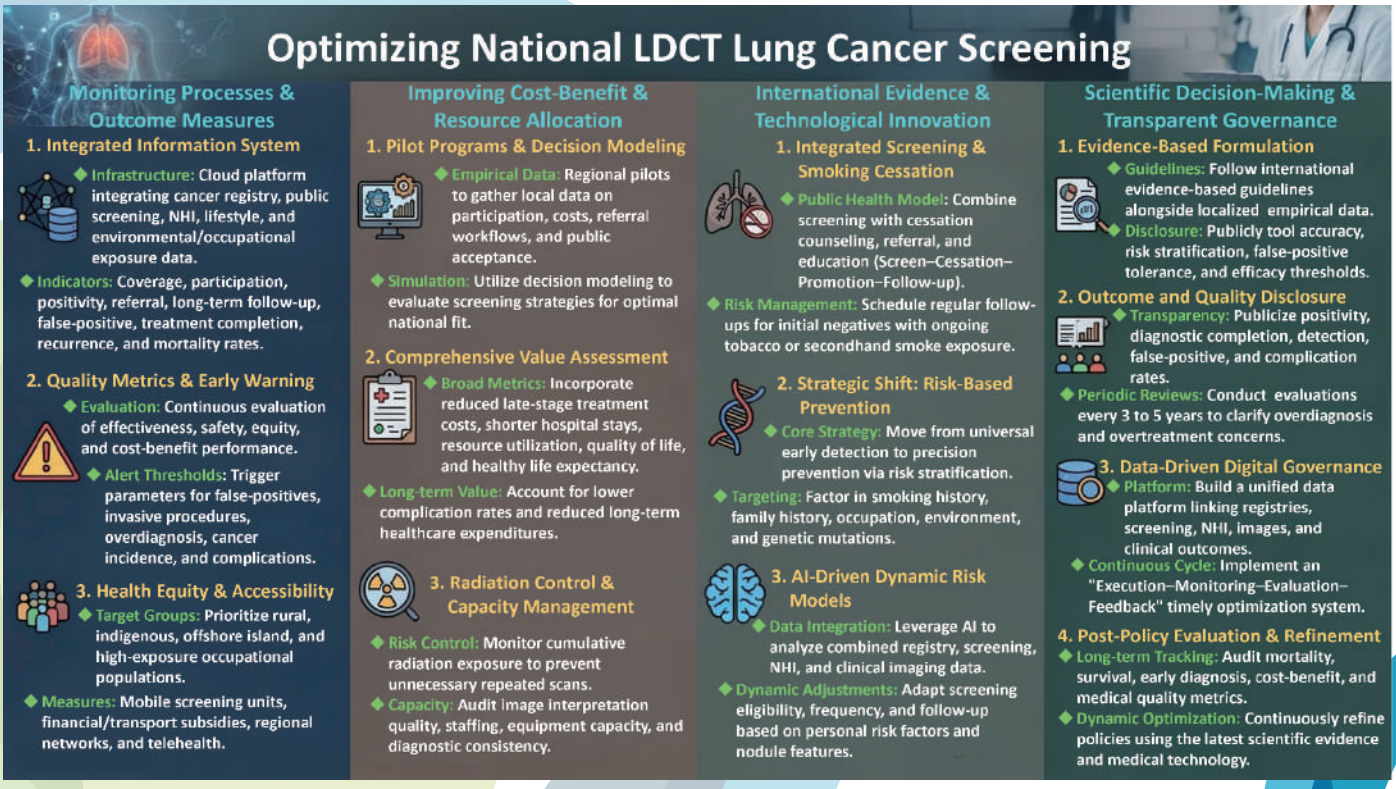
The competent authorities should regularly publish key monitoring indicators of the screening policy. These statistics should include the screening positivity rate, the completed diagnosis rate among positive cases, the lung cancer detection rate, the distribution of lung cancer stages, the false-positive rate, the invasive procedure rate, medical quality metrics, and adverse events. Furthermore, a comprehensive review of the screening policy should be conducted every three to five years, leveraging data transparency to enhance policy credibility and objectively clarify controversies surrounding "overdiagnosis and overtreatment."

Constructing Data-Driven, Digitally Transparent Governance

A national-level screening data governance platform should be constructed by integrating the National Cancer Registry Database, the National LDCT Lung Cancer Screening Database, NHI medical database, medical imaging, and clinical treatment outcomes. Leveraging AI and big data analytics, this platform will support policy benefit evaluations, risk predictions, clinical decision support, and feedback mechanisms. This integration creates a governance model of "screening execution – indicator monitoring – benefit evaluation – corrective feedback," ultimately enabling timely policy optimization.

Implementing Post-Implementation Evaluation and Continuous Refinement Mechanisms

The lung cancer screening policy must establish an institutionalized, open, and transparent evaluation alongside a continuous policy refinement. It should regularly review indicators such as lung cancer mortality rates, survival rates, early diagnosis rates, cost-effectiveness, medical quality, and potential risks. By continuously optimizing policy content based on the latest scientific evidence, clinical research, and advancements in medical technology, the nation can progressively construct a sustainable national lung cancer screening system that commands scientific evidence, effective governance, health equity, and public trust.



Building a Healthcare Model for Indigenous Communities to Advance HCV Micro-Elimination in Southern Taiwan

University-Level Mission-Oriented Research Center —
Indigenous Health Care and Cultural Sustainability Research Center (IHCCSRC)
Prof. Chia-Yen Dai / Director

Our center was awarded and is implementing the 2026 National Health Research Institutes Indigenous Health Research Project, entitled “Micro-Elimination of Chronic Hepatitis C Among Indigenous Populations in Southern Taiwan: A Healthcare Delivery Model.” The project focuses on the prevention and control of chronic hepatitis C and the promotion of health equity among Indigenous populations in southern Taiwan.

The primary implementation sites include Shizi Township, Taiwu Township, and Rinari Village in Pingtung County, as well as Taoyuan District in Kaohsiung City. Through outreach clinics, hepatitis C screening and treatment, telemedicine, integrated chronic disease care, and Indigenous-language health education materials, the project aims to establish an accessible, culturally sensitive, and sustainable healthcare model for Indigenous communities.

Interim achievements include the completion of Institutional Review Board (IRB) and Community Review Board (CRB) reviews, the provision of multiple outreach and telemedicine clinic services, and blood screening for 542 registered non-permanent residents in Taoyuan District. These accomplishments provide an important foundation for advancing Indigenous healthcare and HCV micro-elimination strategies in southern Taiwan.

Our center is implementing the project entitled “Micro-Elimination of Chronic Hepatitis C Among Indigenous Populations in Southern Taiwan: A Healthcare Delivery Model.” The project aims to bring medical services directly into Indigenous communities and reduce interruptions in care caused by long travel distances, limited access to healthcare, and gaps in health information. Recently, our center was awarded and began implementing the 2026 National Health Research Institutes Indigenous Health Research Project under the same title. By integrating research with practical healthcare delivery, the project seeks to address the important need for chronic liver disease prevention and control in Indigenous communities.

If chronic hepatitis C is not detected and treated at an early stage, it may increase the risk of serious liver diseases, including cirrhosis and liver cancer. Establishing a more convenient, continuous, and accessible healthcare model in rural and Indigenous areas is therefore essential to effective disease prevention and control.

Focusing on Indigenous populations in southern Taiwan, the project extends services into mountainous Indigenous communities in Pingtung and Kaohsiung. Through outreach clinics, telemedicine, and collaboration with local health centers, the project assists community members in completing screening, referral, treatment, and follow-up care. It also brings medical students and international students from our university into rural communities, allowing them to gain a deeper understanding of local healthcare conditions and the cultural contexts of Indigenous peoples while developing cultural sensitivity and a broader perspective on rural healthcare.

In addition, health education seminars, Indigenous-language educational materials, and school-based outreach activities are used to ensure that health knowledge extends beyond clinical settings and becomes integrated into everyday life within families, schools, and communities. By proactively entering communities and delivering services in settings familiar to local residents, the project seeks to reduce barriers related to travel distance, information gaps, and discontinuity of care. Health education materials and care pathways are also designed in accordance with local cultural contexts and population characteristics to improve cultural sensitivity, acceptability, and engagement.

In the future, our center aims to translate the research findings into a sustainable service model that can serve as a reference for local governments, healthcare institutions, and Indigenous communities in health policy development and service planning. Ultimately, the project seeks to advance health equity among Indigenous peoples, reduce the burden of disease, and safeguard the health of Indigenous communities.



Outreach Clinic Services in Rinari, Pingtung County



Medical Students Participating in
Rural Outreach Clinics to Learn About Local Healthcare Conditions and I ndigenous Cultural Contexts

Other Important Highlights

● On March 3 and 4, 2026, a Mountain Safety Education Workshop was held at Namasia Junior High School, covering trauma management and awareness of acute mountain sickness.
● On March 18, 2026, a community-based training session on the prevention of chewing and swallowing difficulties and dietary modification was held at the Fuxing Cultural Health Station in Taoyuan District. The session was led by health educator Ya-Wen Sung and speech-language pathologist Yi-Ting Hsueh.



Hands-on Mountain Safety Training Exercise



Guiding Older Adults Through Oral-Motor and Swallowing Exercises

● A variety of new health education materials on hepatitis C, oral hygiene, and mental health were developed to strengthen health literacy promotion.



Trifold Brochure on Hepatitis C Treatment and Prevention



Illustrated Book on Oral Hygiene



Illustrated Book on Mental Health

● On June 30, 2026, the principal investigator of our center attended the “2026 Regional Hospital Leadership Forum,” organized by the Health Promotion Administration, Ministry of Health and Welfare, at Le Phare Weiwuying Hall in Kaohsiung, and was invited to share experiences in implementing Indigenous health promotion and preventive healthcare policies.





Sharing Experiences in Implementing Indigenous Health Promotion and
Preventive Healthcare Policies

QUARTERLY IMPORTANT EVENTS

QUARTERLY IMPORTANT EVENTS

KMU AI seminar

Exhibition of research materials in protein medicine and clinical medicine

Organizer: Biomedical Artificial Intelligence Academy, Kaohsiung Medical University
Co-Organizer:
Department of Artificial Intelligence in Medicine, Post Baccalaureate Medicine, Kaohsiung Medical University
Medical AI Innovation and Application Center, Kaohsiung Medical University Chung-Ho Memorial Hospital
Speaker:
Ping-Hsun Wu (Associate Prof., Division of Nephrology, Kaohsiung Medical University Chung-Ho Memorial Hospital)

2026/04/07 12:00-13:30

IR630 Conference Room, 6F,
International Academic Research Building, KMU

Proteomics is an important and emerging research field that can reflect biological or physiological conditions and disease states in the human body in real time, leaving marks similar to biological fingerprints. In addition to mass spectrometry–based detection of proteomics, many high-throughput proteomics platforms have been developed. These platforms have been widely applied to many clinical databases, among which the most well-known is the UK Biobank. Many proteomic biomarkers have been discovered that can be used to predict disease occurrence and evaluate prognosis. Many proteins have also been found to have not only biomarker value but also pathophysiological significance. Through large-scale clinical studies analyzing proteomics, many new pathogenic mechanisms can be explored.

In addition, many studies are currently investigating research topics related to circadian rhythms and protein organ clocks. Of course, many of these large-scale analyses apply machine learning models (such as LASSO regression analysis, Elastic Net regression analysis, random forest, and deep learning). By combining machine learning models and even artificial intelligence analysis strategies with genetic data and Mendelian randomization analysis, potential targets for drug development in diseases can be identified, and these topics will also be discussed in this lecture.

Integrating the analysis of multi-omics biological data will inevitably become an important research trend in the future. This will enable a deeper understanding of human health and disease conditions. Proteomics is regarded as an important component of multi-omics research. Through this lecture, we can further understand the new developments of proteomics in clinical medical research.









QUARTERLY IMPORTANT EVENTS

KMU AI seminar

From Medical Dialogue Generation to Factual Reasoning in Large Language Models

Organizer: Biomedical Artificial Intelligence Academy, Kaohsiung Medical University
Co-Organizer:
Department of Artificial Intelligence in Medicine, Post Baccalaureate Medicine, Kaohsiung Medical University
Medical AI Innovation and Application Center, Kaohsiung Medical University Chung-Ho Memorial Hospital
Speaker:
From Medical Dialogue Generation to Factual Reasoning in Large Language Models

2026/04/15 12:00-13:30

IR630 Conference Room, 6F,
International Academic Research Building, KMU

This talk explored the advances and challenges of generative AI and Natural Language Processing (NLP) in clinical dialogue, logical reasoning, and personalized generation. Using a hospital-collaborative educational project as an example, it demonstrated how an “AI Intern” system can be developed through fine-tuning and prompting techniques. The system is designed to simulate physician–patient interactions and train healthcare professionals to respond to diverse clinical scenarios.

The presentation also highlighted the issue of hallucinations in domain-specific knowledge within large language models and proposed the IDEAL-RAG framework to reconcile parametric memory with external retrieval, thereby improving response reliability. For emotional support, the EED (Explicit Empathy Decomposition) prompting method was introduced, enabling chatbots to generate highly empathetic responses and helping reduce emotional fatigue among healthcare staff. In addition, the talk examined personalized dialogue generation by leveraging Graph Neural Networks (GNNs) to model discourse relations in conversations, addressing the limitations of conventional systems that often produce uniform and incoherent responses.

Finally, the lecture discussed whether large language models possess reasoning capabilities and introduced decoding strategies. It concluded that factual reasoning ability is latent within pre-trained models and can be elicited and strengthened through iterative fine-tuning, aggregation, and retrieval.









QUARTERLY IMPORTANT EVENTS

KMU AI seminar

Smart Tigerair — Leading the LCC Industry into an AI-Driven Automated Future

Organizer: Biomedical Artificial Intelligence Academy, Kaohsiung Medical University
Co-Organizer:
Department of Artificial Intelligence in Medicine, Post Baccalaureate Medicine, Kaohsiung Medical University
Medical AI Innovation and Application Center, Kaohsiung Medical University Chung-Ho Memorial Hospital
Speaker:
Chih-Yu Ho (Senior Manager, Taiwan Tigerair Co., Ltd.)

2026/04/23 12:00-13:30

IR630 Conference Room, 6F,
International Academic Research Building, KMU

The lecture will explore:

- The Singularity Has Arrived: The Aviation Industry Is Entering an AI-Driven Inflection Point
- Tigerair's Insight into Trends: Five Core Drivers of Digital Transformation
- Data Silos: The Real Challenges of AI Implementation
- Digital Foundation: Strategic Deployment of an Enterprise-Grade Data Platform
- Dual-Engine Drive: The Data Platform as the Best Fuel for AI
- Practical Flight Paths: Comprehensive Analysis of AI Use Cases from Operations to Revenue
- Tigerair's Leap Forward: Building on the Data Platform, Navigating with AI









QUARTERLY IMPORTANT EVENTS

KMU AI seminar

Harness AI Agents in Clinical Medicine

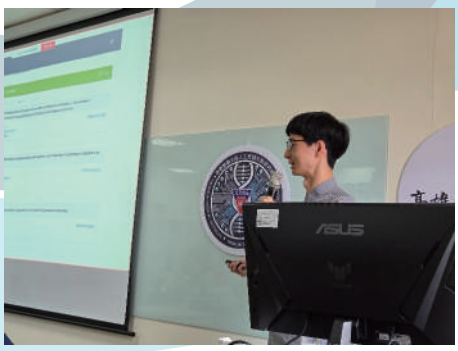
Organizer:Biomedical Artificial Intelligence Academy, Kaohsiung Medical University
Co-Organizer:
Department of Artificial Intelligence in Medicine, Post Baccalaureate Medicine, Kaohsiung Medical University
Medical AI Innovation and Application Center, Kaohsiung Medical University Chung-Ho Memorial Hospital
Speaker:
Hsieh-Ting Lin (Fellowship of Department of Hematology and Oncology, Koo Foundation Sun Yat-Sen Cancer Center)

2026/04/29 12:00-13:30

IR630 Conference Room, 6F,
International Academic Research Building, KMU

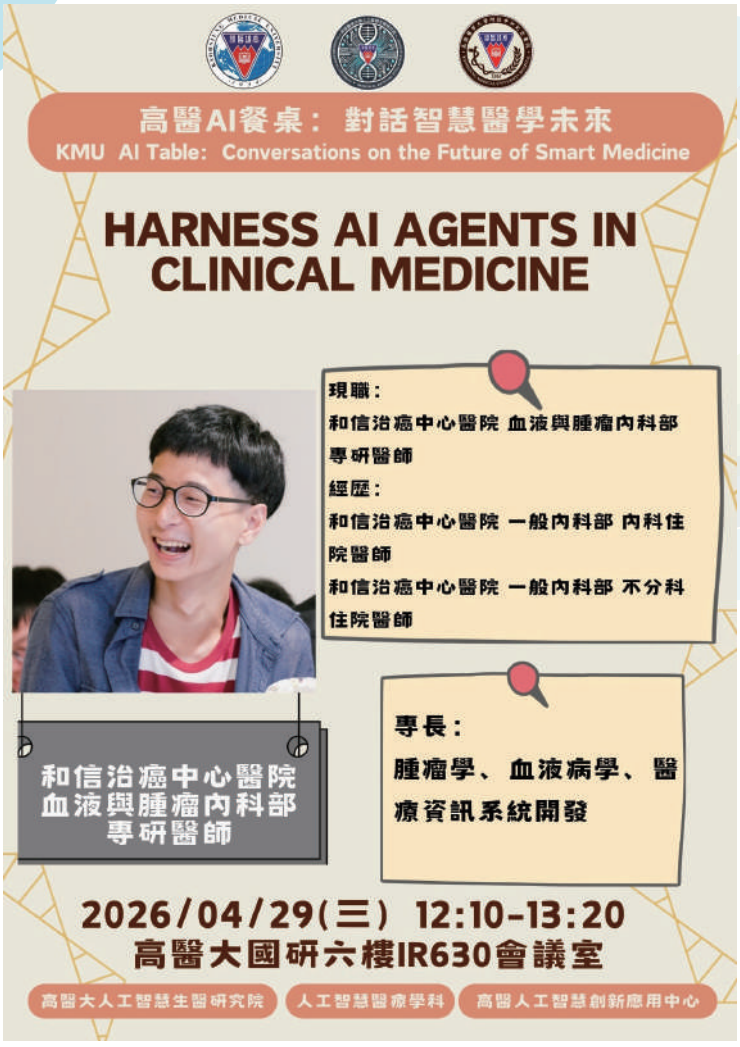
Medicine has always been inherently agentic in nature: physicians observe, reason, act, and continuously iterate. Today, for the first time in history, artificial intelligence is beginning to exhibit the same capabilities. By 2026, we have already moved beyond the era of chatbots that simply answer questions, entering the age of autonomous AI agents. These systems can draft clinical notes, organize literature reviews, screen laboratory results, and even perform diagnostic reasoning without requiring step-by-step human prompts. However, “autonomy” does not mean the absence of oversight. The true breakthrough is not in replacing clinicians, but in designing systems where AI agents and physicians collaborate within tightly coupled feedback loops, each catching what the other may miss.

This lecture will explore the current state of this paradigm, its real-world applications, and the future directions of AI-assisted clinical practice.









QUARTERLY IMPORTANT EVENTS

KMU AI seminar

Health Data Governance in the Era of Agentic AI

Organizer: Biomedical Artificial Intelligence Academy, Kaohsiung Medical University
Co-Organizer:
Department of Artificial Intelligence in Medicine, Post Baccalaureate Medicine, Kaohsiung Medical University
Medical AI Innovation and Application Center, Kaohsiung Medical University Chung-Ho Memorial Hospital
Speaker:
Min-Huei Hsu (Chief Data Officer, Office of Data Science, Taipei Medical University)

2026/04/07 12:00-13:30

IR630 Conference Room, 6F,
International Academic Research Building, KMU

In the rapidly evolving era of Agentic AI, health data governance faces unprecedented opportunities and challenges. Agentic AI is no longer merely a passive tool that executes instructions; rather, it consists of intelligent agents capable of autonomous decision-making, continuous learning, and cross-system collaboration. These agents can actively participate in clinical decision support, health management, and the optimization of healthcare processes. As a result, the demand for high-quality, multi-source, and real-time updated health data has significantly increased, elevating the importance of robust data governance.

This presentation explores the fundamental transformation of health data governance in the context of Agentic AI. It examines the shift from traditional governance models—primarily focused on data storage and regulatory compliance—toward dynamic governance frameworks centered on data usability, interpretability, and trustworthiness. Key topics include data standardization and interoperability, data quality management, privacy protection and security mechanisms, as well as transparency and accountability in AI-driven decision-making processes. Looking ahead, health data governance will require not only the integration of technology and regulation, but also cross-disciplinary collaboration and a rethinking of governance paradigms.









QUARTERLY IMPORTANT EVENTS

KMU AI seminar

Measuring the inconspicuous changes in vital signs during clinical anesthesia

Organizer: Biomedical Artificial Intelligence Academy, Kaohsiung Medical University
Co-Organizer:
Department of Artificial Intelligence in Medicine, Post Baccalaureate Medicine, Kaohsiung Medical University
Medical AI Innovation and Application Center, Kaohsiung Medical University Chung-Ho Memorial Hospital
Speaker:
Yu-Ting Lin (Visiting Staff, Department of Anesthesiology, Taipei Veterans General Hospital)

2026/05/20 12:00-13:30

IR630 Conference Room, 6F,
International Academic Research Building, KMU

Vital signs present a simple assessment of the body's basic condition; as long as the values are normal, they go inconspicuous, and even inconspicuous are their dynamic changes, which seem unpredictable. However, they are not purposeless, as they reflect the body's internal activities. From an AI perspective, a suitable encoder helps interpret and analyze these signs, and the input data could even become an autoencoder. From a clinical practice perspective, these changes should be merged into existing knowledge and experience. Therefore, we use spectral decomposition to develop practical scientific tools.









A Decision Tree Approach to Explainable AI Models

Organizer:Biomedical Artificial Intelligence Academy, Kaohsiung Medical University
Topic:
Special Lecture: Wei-Yin Loh, Prof., Department of Statistics, University of Wisconsin–Madison:
A Decision Tree Approach to Explainable AI Models
Speaker:
Wei-Yin Loh (Prof., Department of Statistics, University of Wisconsin–Madison)

2026/05/28 12:00-13:30

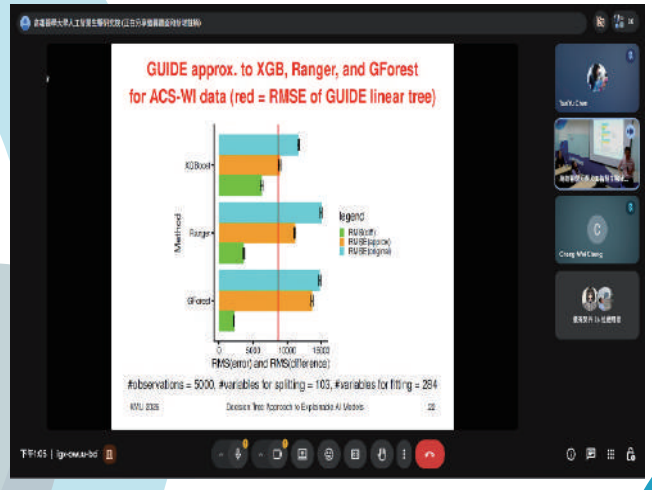
IR630 Conference Room, 6F,
International Academic Research Building, KMU

Vital signs present a simple assessment of the body's basic condition; as long as the values are normal, they go inconspicuous, and even inconspicuous are their dynamic changes, which seem unpredictable. However, they are not purposeless, as they reflect the body's internal activities. From an AI perspective, a suitable encoder helps interpret and analyze these signs, and the input data could even become an autoencoder. From a clinical practice perspective, these changes should be merged into existing knowledge and experience. Therefore, we use spectral decomposition to develop practical scientific tools.









QUARTERLY IMPORTANT EVENTS

AI+AI for better health?
(A workshop for Alcohol Intolerance & Artificial Intelligence)

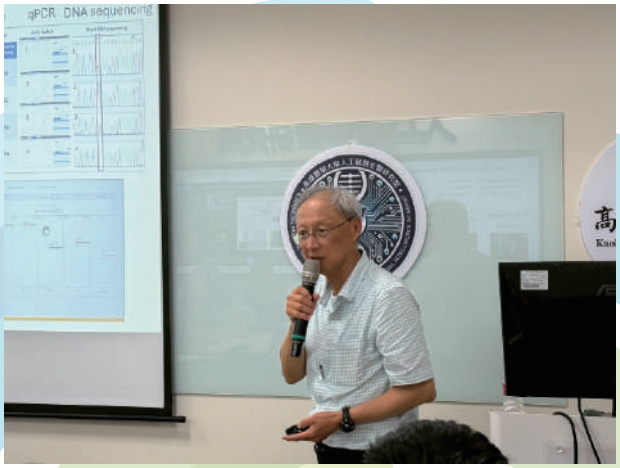
Organizer:Biomedical Artificial Intelligence Academy, Kaohsiung Medical University
Topic:
Special Lecture: Che-Hong Chen, Senior Research Scientist, Dept. Chemical & Systems Biology, Stanford University School of Medicine: AI+AI for better health? (A workshop for Alcohol Intolerance & Artificial Intelligence)
Speaker:
Che-Hong Chen (Senior Research Scientist, Dept. Chemical & Systems Biology, Stanford University School of Medicine)

2026/06/01 12:00-13:30

IR630 Conference Room, 6F,
International Academic Research Building, KMU

"Asian alcohol flushing or alcohol intolerance" isn't just a funny side effect. For over 540 million East Asians including 49% of the Taiwanese, it's a sign of a genetic mutation in the ALDH2 gene that makes alcohol far more dangerous — multiplying the risk of digestive tract cancers and alcohol-related diseases. Alcohol intolerance has a wide range of implications from basic research, drug development to epidemiology, bioinformatics, disease prevention and social, public health education. This workshop will focus on the discussion of applying tools of Artificial Intelligences to Alcohol Intolerance for basic research and improvement of human health.









QUARTERLY IMPORTANT EVENTS

KMU AI seminar

From Dialogue to Action: Medical Agents Reshaping the New Paradigm of Smart Healthcare

Organizer:
Biomedical Artificial Intelligence Academy, Kaohsiung Medical University
Co-Organizer:
Department of Artificial Intelligence in Medicine, Post Baccalaureate Medicine, Kaohsiung Medical University
Medical AI Innovation and Application Center, Kaohsiung Medical University Chung-Ho Memorial Hospital
Speaker:
Hsin-Hsi Chen (Director, AINTU)

2026/06/11 12:00-13:30

IR630 Conference Room, 6F,
International Academic Research Building, KMU

In recent years, with the rapid advancement of artificial intelligence, we are at a pivotal transition from large language models (LLMs) to multimodal large language models (MLLMs), where AI can deeply understand text, images, audio, and environmental information. However, in healthcare settings, what is required goes beyond question answering—it involves decision-making and execution. This lecture explores how medical AI is evolving from response-based systems into medical agents with capabilities in planning, reasoning, and autonomous action, and even toward embodied AI that can interact with the physical world.The talk will systematically examine the three generations of medical AI development:

- First generation (Discriminative AI): classification models focused on image recognition and disease prediction.
- Second generation (Generative AI): conversational assistants for doctor–patient interaction and clinical documentation.
- Third generation (Agentic AI): intelligent agents capable of autonomous tool use and complex clinical pathway planning.

Using virtual multidisciplinary consultation as an example, we will demonstrate how medical multi-agent systems (MAS) overcome the limitations of single models by simulating collaborative workflows of professional healthcare teams. Finally, the lecture will address key challenges in deploying agent-based architectures in digital medicine, including reasoning reliability, semantic alignment across multimodal data, and accountability in medical decision-making, while outlining a new paradigm of healthcare driven by agentic AI.









QUARTERLY IMPORTANT EVENTS

AI, BI & SI—Artificial, Biological and Statistical Intelligences

Organizer:
Biomedical Artificial Intelligence Academy, Kaohsiung Medical University
Topic:
Special Lecture: Dennis K.J. Lin, Distinguished Prof., Department of Statistics, Purdue University: AI, BI & SI—Artificial, Biological and Statistical Intelligences
Speaker:
Dennis K.J. Lin (Distinguished Prof., Department of Statistics, Purdue University)

2026/06/22 12:00-13:30

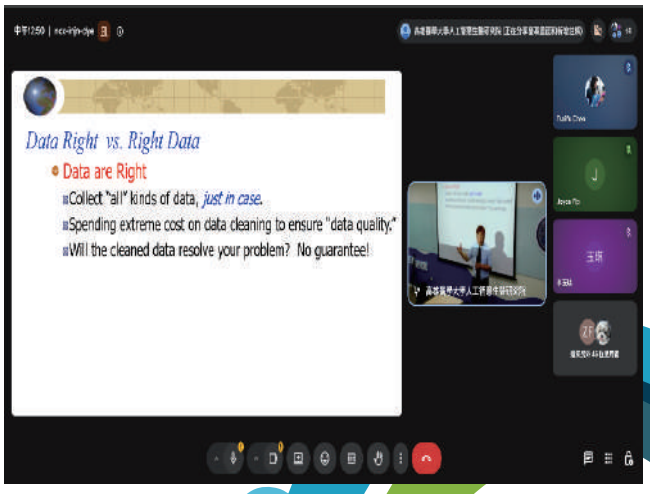
IR630 Conference Room, 6F,
International Academic Research Building, KMU

This lecture explores the fundamental differences and connections between Artificial Intelligence (AI), Biological Intelligence (BI), and Statistical Intelligence (SI). It highlights the critical role of data quality in shaping AI performance, addressing key issues such as input bias, data validity, and the distinction between samples and populations.The speaker will further introduce SI as a bridge between AI and BI, emphasizing how statistically grounded inference and meaningful data can enhance decision-making and real-world applications, particularly in healthcare. The talk aims to provide insights into how integrating AI, BI, and SI can lead to more effective and reliable outcomes.









QUARTERLY IMPORTANT EVENTS

KMU AI seminar

Leveraging Information and Communication Technology and Artificial Intelligence to Support Healthcare in Rural and Unders

Organizer:
Biomedical Artificial Intelligence Academy, Kaohsiung Medical University
Co-Organizer:
Department of Artificial Intelligence in Medicine, Post Baccalaureate Medicine, Kaohsiung Medical University
Medical AI Innovation and Application Center, Kaohsiung Medical University Chung-Ho Memorial Hospital
Speaker:
Ren-Jun Hsu (Director, Cancer Center, Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation)

2026/06/30 12:00~13:30

IR630 Conference Room, 6F,
International Academic Research Building, KMU

Facing the geographic challenges of the Hualien–Taitung region, which stretches over 300 kilometers from north to south and has a rural population rate as high as 78%, as well as structural difficulties including population outflow, an aging population (15.78%), and economic disadvantage (low-income households accounting for 35.93% of the National Health Insurance Sixth Division), the two counties have long suffered from severe healthcare inequalities. Limited transportation accessibility and insufficient health literacy have resulted in low willingness among residents to actively participate in screening programs. Consequently, cancer screening rates, treatment retention rates, cure rates, and five-year survival rates in Hualien and Taitung are generally lower than those in other counties and cities across Taiwan.

To overcome the temporal and geographical barriers of rural healthcare, the Cancer Center of Hualien Tzu Chi Hospital has integrated technology with medical humanities to drive the transformation toward smart healthcare. We launched the “Cancer Center Assistant” communication ecosystem to replace traditional mail and text messaging services. The platform incorporates Large Language Models (LLMs) for intelligent patient navigation, helping individuals schedule appointments based on symptoms and answer questions related to cancer screening. For post-diagnosis care, the center developed the “Case Management Healthcare Mobile System,” which establishes a communication bridge among case managers, patients, and family members through interactive two-way communication functions. The system also integrates appointment reminders, pre-visit examination notifications, and medication collection information. Furthermore, it horizontally connects community hospitals and vertically integrates the hospital’s multidisciplinary team (MDT) care services, creating a seamless and coordinated care model.

The application of technology has brought meaningful and compassionate changes. Through precise message delivery, the Cancer Center Assistant has significantly increased follow-up examination rates and fecal sample kit return rates among individuals with abnormal cancer screening results, effectively preventing the progression of colorectal cancer. The mobile care system has achieved exceptionally high satisfaction rates (>90%) and reduced the outpatient no-show rate among cancer patients from 24% to 7.9%, substantially improving treatment adherence.

At the same time, the center has independently developed a variety of AI-powered tools to empower physicians, treatment teams, cancer registry personnel, and case managers, successfully optimizing clinical workflows. Through the dual-driven strategy of ICT and AI, Hualien Tzu Chi Hospital has not only enhanced healthcare workforce productivity but has also enabled healthcare professionals to devote more time and attention to the people of Hualien and Taitung, building a more inclusive and equitable future for rural healthcare.









QUARTERLY IMPORTANT EVENTS

Summer Slimming Program – Fat Loss Challenge.

Organizer:
Precision Sports Medicine and Health Promotion Center (PSMHPC)
Co-Organizer:Division of Health Service

2026/06/01-2026/06/05

IR840 Conference Room, 8F,
International Academic Research Building, KMU

To promote a healthier campus, Kaohsiung Medical University launched the Summer Fitness Challenge – Body Fat Reduction Competition. Organized by the Precision Sports Medicine and Health Promotion Center, the program combines exercise training, health education, fitness assessment, and team challenges to encourage regular physical activity, healthy lifestyle habits, and long-term self-health management among faculty, staff, and students.



Assessment staff explain the participants' InBody body composition analysis results.



Satisfaction survey and participant prizes for the Summer Slimming Program – Fat Loss Challenge.



Assessment staff assist participants with waist circumference measurement.



Assessment staff assist participants with the InBody body composition assessment.

QUARTERLY IMPORTANT EVENTS

2026 International Conference on Tropical Medicine and Infectious Diseases

Organizer:
Center for Tropical Medicine and Infectious Disease Research、K.M.U. M. Sc. Program in Tropical Medicine
Co-Organizer:
Division of Infectious Diseases, Kaohsiung Medical University Chung-Ho Memorial Hospital

2026/05/22 08:30-17:00

Venue:
Audiovisual center, Li-Hsueh Building, KMU

The international symposium, organized by the Center for Tropical Medicine and Infectious Diseases in collaboration with the Graduate Program in Tropical Medicine, invites experts from around the world in the fields of tropical medicine and infectious diseases to deliver keynote speeches. This event provides participants with the latest research updates and offers a valuable opportunity for local professionals and scholars to engage in academic exchange with international researchers.



Chao-Ying Pan, Deputy Director-General of the Department of Health, Kaohsiung City Government, graced the event with his presence.



Opening Remarks by Director Chun-Yu Lin



Group photo of speakers and guests

QUARTERLY IMPORTANT EVENTS

2026 International Conference on Medical Education: Physician Development in the Era of AI and Simulation: The Future of Competency-Based Medical Education

Organizer:
College of Medicine, Center for Medical Education and Humanizing Health Professional Education, Kaohsiung Medical University Chung-Ho Memorial Hospital

2026/06/03 08:30-16:00

Venue:
Audiovisual center, Li-Hsueh Building, KMU

This symposium focused on Competency-Based Medical Education (CBME), exploring the integration of artificial intelligence, simulation, and digital technologies in developing and assessing physicians' competencies.







Indigenous Cultural Exploration Series—Community Exchange with the Rukai People of Jiamu Village: Recalling the 2009 Typhoon Morakot Disaster

Organizer:
Indigenous Health Care and Cultural Sustainability Research Center
Co-Organizer:
Indigenous Student Resource Center, Kaohsiung Medical University

2026/03/28-2026/03/29

Jiamu Community Activity Center,
Changzhi Baihe Permanent Housing Settlement

Students were guided into the Rukai community of Jiamu to learn about the community's history and hear residents' memories of Typhoon Morakot. Through hands-on activities—including traditional songs and dances, the preparation of *abai*, and the making of floral headdresses—students received guidance from community elders and local artisans, gaining a deeper understanding of the cultural significance and craftsmanship embodied in these traditions. The activity strengthened students' knowledge of and respect for Indigenous cultures, fostered awareness of cultural preservation and transmission, and promoted meaningful intergenerational and cross-cultural exchange.



Group Photo of Event Participants



Introduction to the History of the Jiamu Community



Practice of Traditional Community Songs and Dances



Preparation of Traditional Community Cuisine



Learning to Weave Traditional Floral Headdresses



Q&A and Exchange Session

KMU
Kaohsiung Medical University

RESEARCH CENTER QUARTERLY REPORT

Publisher: Ming-Lung Yu /President
Convener: Ya-Ling Hsu /Vice President for Research & Development
Chief Editor: Chia-Yang Li /Associate Vice President for Research & Development
Administrator: Chun-Chen Lin
Hao-Ya Chang
Issue Day: Aug 2026

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