KMU Newsletter

Kaohsiung Medical University, Taiwan

Kaohsiung Medical University

Kaohsiung Medical University (KMU), established in 1954, is the first private medical university in Taiwan, located in Sanmin District, Kaohsiung City. It has long been a key institution in southern Taiwan for medical education, clinical services, and biomedical research. Since its founding, KMU has focused on teaching, research, healthcare, and social service, aiming to cultivate healthcare professionals with both strong expertise and humanistic care.

Upgraded from Kaohsiung Medical College to university status in 1999, KMU has developed into a comprehensive medical university. It now comprises seven colleges, including Medicine, Dentistry, Pharmacy, Nursing, Health Sciences, Life Sciences, and Humanities and Social Sciences, offering integrated programs from undergraduate to doctoral levels.

KMU also operates a strong network of affiliated hospitals, including Chung-Ho Memorial Hospital, Gangshan Hospital, Hsiaokang Hospital, and Cijin Hospital, which serve as key teaching and community healthcare centers in southern Taiwan.

In addition, KMU actively promotes internationalization and interdisciplinary collaboration, partnering with global institutions to enhance students' international perspectives and research capacity. It is widely recognized as one of Taiwan's leading universities in medical education and research.

KMU Newsletter

Kaohsiung Medical University, Taiwan

Director Lin Ming-Hong is currently the Director of the Laboratory Animal Center at Kaohsiung Medical University and an Associate Professor in the Department of Microbiology and Immunology, School of Medicine. He is dedicated to research on tumor immunology and disease mechanisms.

In addition, Dr. Lin is involved in teaching immunology-related courses, supporting education in medical and biomedical sciences at both undergraduate and postgraduate levels.

In addition to his academic and research roles, Dr. Lin is responsible for the overall operation and management of the university's Laboratory Animal Center, promoting animal care systems, research support services, and related review mechanisms, continuously optimizing animal research environments and management processes.

In recent years, he has led the Laboratory Animal Center team to obtain AAALAC International accreditation, demonstrating the university's commitment to excellence in both animal welfare and research quality, and its alignment with international standards.

1. How does the Center For Laboratory Animals support research activities while meeting international standards such as AAALAC accreditation?

The Center for Laboratory Animals upholds the principle of "grounded in regulations while striving for excellence," achieving international standards through rigorous and systematic management. All administrative operations comply with Taiwan's Animal Protection Act and CDC biosafety regulations, while incorporating the Guide for the Care and Use of Laboratory Animals (Guide 2018) and AAALAC International SOPs.

In terms of facilities and operational procedures, the Center implements the "five-flow management" system—personnel flow, material flow, water flow, airflow, and information flow—to maintain overall environmental quality. For example, strict access control and gowning procedures are enforced, one-way material flow is adopted to prevent cross-contamination, and individually ventilated cages (IVCs) and environmental monitoring systems are installed.

Furthermore, through oversight by the Institutional Animal Care and Use Committee (IACUC) and university-level supervision mechanisms, all research activities are conducted in a regulated and compliant environment.

2. In actual animal experimentation, how do you balance research efficiency and animal welfare?

Director Lin emphasized that animal welfare is not merely a consideration within experiments, but a core principle throughout the entire research process. He pointed out that "good animal welfare is an essential prerequisite for obtaining stable and reproducible scientific data," and it also serves as an important indicator of a progressive and humane society.

Based on this philosophy, the center actively implements various environmental enrichment measures, such as providing shelter spaces for mice, chew toys for rabbits, and arranging interactions between animal care staff and pigs. These efforts aim to meet animals' natural behavioral needs, reduce stress, and further improve their physiological and psychological stability.

Regarding the balance between research efficiency and animal welfare, Director Lin noted that environmental enrichment was once regarded as an optional measure. However, with evolving international trends, it has now become a fundamental and necessary standard. To ensure consistency and reliability of experimental data, all animals within the same research project must be provided with uniform socialization and environmental enrichment conditions.

Although such measures may increase management costs and resource input in the short term, the stabilization of animals' psychological states can effectively reduce variability in experimental data. In the long run, this not only does not compromise research efficiency but also contributes to improving overall research quality and effectiveness.

3. During the promotion of laboratory animal management and research support, what are the most common problems or challenges faced by researchers?

One of the most common challenges faced by researchers is the risk of infection control. Due to limited facility space, once an infection occurs, there is often insufficient isolation capacity, which may result in the need to cull all animals within the same room. This leads to significant losses in both research data and cost.

In addition, the Center is currently operating at approximately 80–90% capacity. The increasing demand for specialized experimental spaces, particularly for animal behavior studies, has made facility availability a major constraint, often requiring researchers to wait in line for access.

4. What are the key priorities for the Center for Laboratory Animals in its future development?

The Center's future development priorities focus on sustaining international accreditation, upgrading infrastructure, and advancing digital transformation. In terms of accreditation, the Center will continue to maintain full AAALAC accreditation to remain aligned with international standards.

Regarding digitalization, the Center plans to implement comprehensive digital systems for training certification, animal protocol review, housing fee calculation, and environmental monitoring. These systems will be integrated with the university's internal platforms to enable real-time management, allowing application and payment processes to be completed online and significantly reducing administrative workload.

Meanwhile, key infrastructure—such as air conditioning systems that have been in operation for over 20 years—will undergo continuous assessment and upgrading to improve overall facility quality and operational efficiency.

5. In immunology-related research, what role do animal models play in disease mechanism studies and experimental design?

In immunology research, animal models play a critical role in validating scientific concepts. Whilein vitro experiments are useful for preliminary hypothesis testing, immune responses involve complex gene-centered regulatory mechanisms that must be verified within an in vivo physiological environment.

Taking tumor immunology as an example, Director Lin emphasized that tumors should be implanted into mice with an intact immune system to observe the authentic interactions between the immune system and tumors. Compared to studies conducted in immunodeficient mice that only observe tumor growth, this approach better reflects real physiological conditions and provides greater scientific value.

For more details, please check the following links: https://sites.google.com/view/mhlinlab/

KMU Newsletter
Kaohsiung Medical University, Taiwan

Orthopedic Research & Regenerative Medicine Team

Abstract

This study focuses on the molecular mechanisms and therapeutic strategies of osteoarthritis and bone regeneration in aging populations, aiming to develop innovative approaches to improve cartilage repair and enhance bone healing.

Read more

With Taiwan entering a super-aged society, musculoskeletal disorders such as osteoarthritis, osteoporosis, and fractures have become major health concerns. However, effective treatments targeting cartilage degeneration and bone repair remain limited.

This research team investigated the therapeutic potential of epigallocatechin-3-gallate (EGCG) and parathyroid hormone fragment PTH1–34 in both traumatic and age-related osteoarthritis. Results showed that EGCG can induce autophagy and inhibit chondrocyte apoptosis, while PTH1–34 improves joint conditions through direct effects on cartilage without altering subchondral bone structure.

In addition, the study explored advanced treatment strategies using intra-articular injection of lipid nanoparticle-encapsulated drugs combined with low-intensity ultrasound. The findings demonstrated improved drug stability, enhanced cartilage matrix production, and reduced inflammation, contributing to better disease outcomes.

Furthermore, in bone repair research, thrombin was shown to promote bone regeneration in diabetic models, achieving optimal healing within eight weeks. The team also revealed that exosomes derived from different stem cell sources exhibit distinct molecular characteristics that influence chondrocyte differentiation, providing new insights into regenerative medicine.

Application and Highlights

Recognized by Stanford University as one of the World's Top 2% Scientists (2024–2025).

Recipient of multiple National Innovation Awards, including Academic Research Innovation and Advancement Awards.

KMU Newsletter

Kaohsiung Medical University, Taiwan

Awarded Outstanding Research Project, Research Achievement, Patent, and Technology Transfer Awards across multiple years.

Recipient of the Best Exhibition Award at the 2024 Taiwan Innotech Expo (Ministry of Economic Affairs).

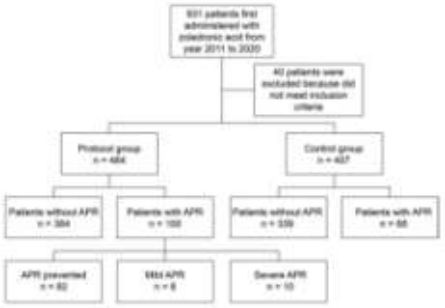


Fig. 1 Workflow of participant selection in the study APR: acute phase response

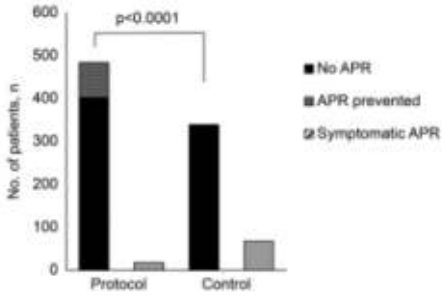


Fig. 2 Comparison of APR incidence following zoledronic acid infusion between protocol and control groups

KMU Newsletter
Kaohsiung Medical University, Taiwan

Dual-Pathway Strategy Against Air Pollution–Induced Skin Damage

Abstract

This study investigates the molecular mechanisms of particulate matter–induced skin damage and develops protective strategies through dual activation of the AhR and Nrf2 pathways, aiming to enhance skin barrier function and reduce oxidative stress.

Read more

Air pollution, particularly particulate matter (PM), has been recognized as a major factor contributing to skin barrier disruption and oxidative damage. However, effective strategies to prevent and mitigate these harmful effects remain limited.

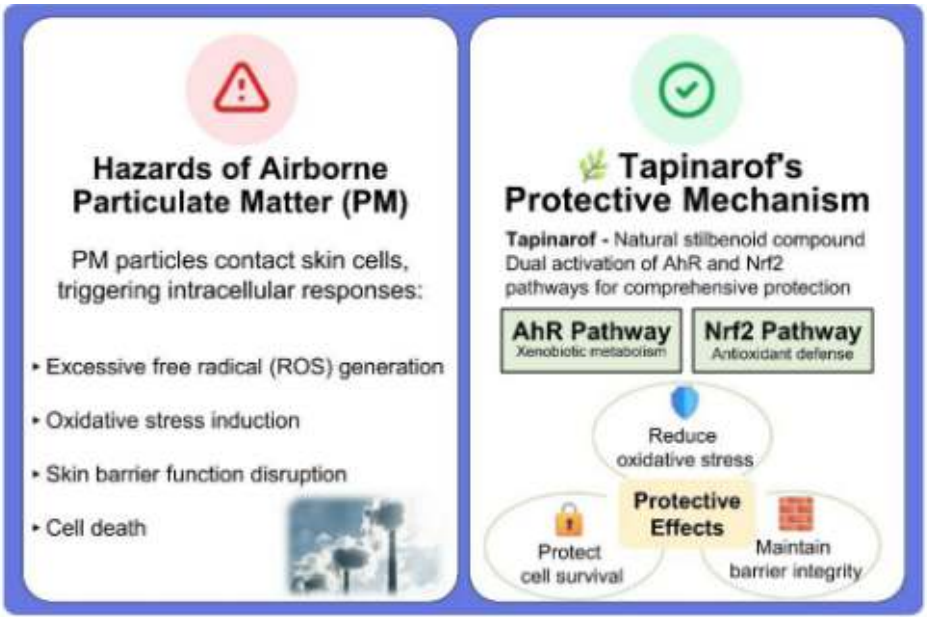
This research focuses on the dual activation of the aryl hydrocarbon receptor (AhR) and nuclear factor erythroid 2–related factor 2 (Nrf2) pathways to counteract PM-induced skin injury. Through molecular and cellular studies, the findings demonstrate that activation of these pathways can enhance antioxidant defense mechanisms and maintain skin barrier integrity.

In addition, the study explores natural compounds and extracts with protective properties against environmental stressors, including ultraviolet radiation and pollutant exposure. These findings provide a scientific basis for developing novel dermatological therapies and functional products aimed at preventing skin damage and improving skin health.

Application and Highlights

Recipient of the Award of Patent Approval, Kaohsiung Medical University (2025).
Awarded Outstanding Teaching Award, College of Pharmacy, Kaohsiung Medical University (2024–2025).
Principal Investigator of NSTC-funded research project on coordinated activation of AhR and Nrf2 signaling against PM-induced epidermal barrier dysfunction (2025).
Industry–academia collaboration (NKUST–KMU) on developing novel oral nutritional

supplements from sesame by-products to alleviate chemotherapy-induced peripheral neuropathy. Holder of four granted invention patents, with one additional patent under application.



KMU Newsletter

Kaohsiung Medical University, Taiwan

KMU Laboratory Animal Care Program Receives International Re-Accreditation at the Highest Level

KMU has long been committed to advancing biomedical research while upholding academic ethics and animal welfare. Recently, KMU received official notification from the Association for Assessment and Accreditation of Laboratory Animal Care International Board of Trustees confirming that its "Laboratory Animal Care and Use Program" has once again achieved Full Accreditation, the highest level of international recognition.

AAALAC International is a globally recognized accreditation organization with high credibility. Its accreditation signifies that an institution meets rigorous international standards in animal care, facility environment, program management, and research ethics. Since first obtaining Full Accreditation in 2018, KMU has continuously refined its systems and management practices in alignment with international guidelines. This marks the third time KMU has received this distinction, demonstrating a well-established and mature framework for laboratory animal care and use. KMU noted that this continued recognition reflects the collective and sustained efforts across the university.

From institutional support and oversight by the Institutional Animal Care and Use Committee (IACUC), to the contributions of successive directors of the Laboratory Animal Center, professional veterinarians, administrative and animal care staff, as well as research teams, all have played vital roles in ensuring the effective implementation of these standards.

In practice, KMU actively implements the internationally advocated 3Rs principles—Replacement, Reduction, and Refinement—while further integrating the concepts of Respect and Responsibility to establish a comprehensive 5Rs framework. This framework serves as a guiding principle for laboratory animal care and use. KMU emphasized that animal welfare is not only a matter of research ethics but also closely linked to research quality; proper care ensures more stable and reliable scientific outcomes.

Looking ahead, KMU will continue to enhance its laboratory animal care and management systems, strengthen research ethics governance, and align with international standards. Through these efforts, the university aims to advance biomedical research while upholding respect for life and fulfilling its social responsibility.

KMU
Newsletter
Kaohsiung Medical University, Taiwan

KMU Newsletter
Kaohsiung Medical University, Taiwan

KMU President Ming-Lung Yu Receives Ministry of Education Academic Award for Outstanding Contributions to Hepatitis C Research

Ming-Lung Yu, President of Kaohsiung Medical University (KMU), has been awarded the 69th Ministry of Education Academic Award in the field of Biological and Agricultural Sciences. This prestigious national honor recognizes his long-term dedication to hepatitis C research, spanning epidemiology, clinical treatment, and public health strategies. His highly integrated research achievements and international impact once again demonstrate KMU's strong capabilities in medical research and clinical translation.

Since beginning his research on viral hepatitis in 1992, President Yu has devoted more than three decades to translating scientific findings from the laboratory into clinical practice and public health policy. Through large-scale screening programs in southern Taiwan, he identified high-prevalence areas and estimated the national hepatitis C prevalence rate at approximately 3.28%, affecting around 500,000 people. These findings became a critical foundation for Taiwan's hepatitis prevention policies and established the country's leading role in global hepatitis C research.

In the area of treatment strategies, during the interferon era, President Yu promoted response-guided personalized treatment, improving treatment efficacy from 12% to 24%. By combining interferon with ribavirin, cure rates increased further to 65%. With the introduction of direct-acting antiviral agents, he helped drive Taiwan's shift from passive treatment to proactive screening and early intervention, significantly improving overall treatment outcomes and coverage.

To innovate hepatitis prevention strategies, President Yu introduced the concept of "micro-elimination," targeting high-risk populations such as dialysis patients and residents in rural communities through efficient screening and treatment models. This approach extended medical services into communities and specialized care settings. Among dialysis patients, the treatment rate reached 93.6%, while 92.3% of dialysis centers achieved hepatitis C micro-elimination, with nearly half further reaching the milestone of "hepatitis C-free dialysis." These achievements have become an internationally recognized model for hepatitis C prevention and treatment.

His research findings have been published in leading international journals, including Journal of Hepatology, Gut, and Hepatology, and have been incorporated into multiple international clinical

guidelines, significantly enhancing Taiwan's global visibility in hepatitis prevention. President Yu has also received numerous prestigious honors, including the Outstanding Research Award from the National Science and Technology Council and the Achievement Award from the Asian Pacific Association for the Study of the Liver. He has also consistently ranked among the world's top 2% scientists, reflecting his far-reaching academic influence.

Beyond research, President Yu has actively contributed to medical education and talent cultivation, emphasizing the integration of clinical practice, teaching, and research. He has promoted interdisciplinary and international collaboration, driving KMU's continued development in hepatology and precision medicine. In recent years, KMU has steadily strengthened its research capacity and global partnerships, reinforcing its role as a leading medical institution in southern Taiwan and an international hub for medical education.

President Yu stated that the value of research lies in addressing clinical needs, improving patient health, and creating public benefit. Looking ahead, he plans to integrat e artificial intelligence and precision medicine to advance hepatitis risk prediction and health management, while continuing efforts toward hepatitis B prevention and elimination, as well as achieving a cure for metabolic dysfunction-associated steatohepatitis. He hopes Taiwan's experience can contribute meaningfully to global public health.

The Ministry of Education Academic Award is one of Taiwan's most prestigious academic honors. This award not only recognizes President Yu's long-term dedication and remarkable achievements but also highlights KMU's overall strength and international competitiveness in medical research and clinical application.

KMU Newsletter

Kaohsiung Medical University, Taiwan

KMU USR Projects Achieve Record Success, Winning Two Vision Magazine Awards through Industry–Academia–Government Collaboration

KMU delivered an outstanding performance at the 7th Vision Magazine University Social Responsibility (USR) Awards in 2026. Two of its USR projects stood out among 222 submissions from 55 universities nationwide, receiving the Model Award in the Well-being Co-Prosperity Category and the Excellence Award in the Industry Co-Creation Category. The awards were presented at the ceremony held on April 9, recognizing KMU's long-term commitment to social responsibility through integrating professional expertise with local needs.

The award-winning project, "Intergenerational Health Empowerment: Building a Sustainable, Age-Friendly Community in Cijin" (Cijin Project), brought together interdisciplinary faculty, students, and community partners to address the challenges of an aging population in Cijin District. Leveraging health data from Cijin Hospital, the project developed diverse community-based health initiatives tailored to older adults, including medication education, oral and respiratory health promotion, senior fitness programs, and health competitions to support functional ability and healthy aging.

Beyond physical health, the project also emphasized mental well-being and social participation. Activities such as music therapy, aromatherapy, and aesthetic programs were introduced to help alleviate depression and anxiety, enhance cognitive function, and improve quality of life. In addition, KMU students and community volunteers were trained as local guides to document life stories of senior residents, gradually building a cultural and health-integrated community platform unique to Cijin.

Another awarded project, "Sustainability Beyond Summer: Sustainable Development in Namasia and International Rural Communities" (Namasia Project), received the Excellence Award in the Industry Co-Creation Category. The project integrates talent cultivation, local needs, and regional revitalization, demonstrating a comprehensive model of sustainable development through cross-national collaboration. By connecting with industries in the Kaohsiung coastal industrial zone and partnering with the Liben-Yuan Foundation and the University of the Philippines Open University, the project established bilateral offices to promote international engagement, online learning programs, and shared educational resources.

In addition, the Namasia Project collaborated with local indigenous cooperatives, enterprises, and the Forestry and Nature Conservation Agency to promote stingless bee cultivation as part of regional revitalization efforts. This initiative has built a cross-industry, cross-community, and international collaboration network, cultivating talents with both global perspectives and local engagement capabilities while supporting the sustainable development of local industries.

According to KMU Vice President Fan-Hao Chou, the university places strong emphasis on inter-disciplinary integration and local engagement, actively connecting industry, communities, and international partners to promote sustainable development. He noted that health extends beyond the healthcare system and is deeply rooted in human interaction and cultural participation. Receiving two USR awards highlights KMU's achievements in social innovation and collaborative engagement across sectors.

Project leader Shih-Chun Yang stated that the Cijin Project has developed diverse community-based "prescriptions" rooted in local needs while integrating teaching and practice to cultivate socially responsible and interdisciplinary talents. Meanwhile, Chih-Neng Hsu, leader of the Namasia Project, emphasized that cross-disciplinary and international collaboration will enable universities to respond effectively to local challenges while nurturing the next generation with sustainability awareness and global competence.

KMU has long been dedicated to advancing university social responsibility. Moving forward, the university will continue to deepen cross-sector collaboration and international partnerships, strengthen industry–academia cooperation and talent development, and work toward a shared vision of mutual prosperity between universities and society, creating long-term and sustainable value for both local communities and industries.

KMU
Newsletter
Kaohsiung Medical University, Taiwan

KMU Newsletter

Kaohsiung Medical University, Taiwan

A New Era of Transnational Medical Research: KMU Partners with Dr. Hui-Kuan Lin to Establish the "International Collaborative Laboratory"

To deepen international academic exchange and enhance global research impact, Kaohsiung Medical University (KMU) announced its collaboration with Dr. Hui-Kuan Lin, Lifetime Professor of the Department of Pathology at Duke University School of Medicine and Academician of Academia Sinica, to officially establish the "International Collaborative Laboratory" (ICL). This partnership marks a major milestone for KMU in advancing its integration into the global biomedical research landscape. Moving forward, both parties will adopt a hybrid virtual–physical collaboration model to achieve global synergy, establishing an Asia-leading, internationally connected center for cross-disease mitochondrial and translational metabolic research at KMU.

KMU stated that the newly established International Collaborative Laboratory is not merely a traditional laboratory, but a knowledge convergence and innovation hub. The ICL is built upon three core pillars: "Co-Research," "Co-Mentorship," and "International Advisory." Under the Co-Research framework, KMU's clinical insights will be integrated with Duke University's cutting-edge technologies to conduct groundbreaking transnational research designs. Meanwhile, an international talent pipeline will be established, through which Dr. Hui-Kuan Lin will co-supervise students and postdoctoral researchers. In addition, annual strategic reviews will be conducted to ensure that research directions remain forward-looking and globally impactful.

In terms of operational structure, KMU will serve as the primary on-site institution, providing comprehensive clinical and experimental infrastructure, while Duke University will function as the overseas hub, connecting top-tier international teams and key core technologies. Dr. Hui-Kuan Lin, as a leading global scholar, will personally participate in co-supervision, co-research, and strategic advisory roles, assisting in the facilitation of international resource integration. To ensure continuous progress and seamless talent exchange, the ICL will implement a structured multi-layered operational rhythm. Both parties will hold regular dual-track virtual meetings to monitor flagship research projects and the development of jointly supervised researchers. Every six months, bilateral exchanges will be launched, sending KMU students or postdoctoral researchers to overseas laboratories for short-term research training to acquire key technologies, while also inviting Dr. Lin's research team to visit Taiwan for on-site guidance, enabling in-depth collaboration and potential technology transfer.

KMU emphasized that the establishment of the ICL not only aims to achieve world-class research outcomes but also focuses on cultivating the next generation of globally minded physician-scientists and interdisciplinary researchers. Through this deep partnership with Dr. Hui-Kuan Lin and Duke University, KMU aspires to create a sustainable international research ecosystem. The ICL is envisioned as an evolving and continuously value-generating global collaboration platform, further enhancing KMU's international academic reputation and research impact.

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