

# ICMS NEWSLETTER



## News

- \* UM annual Open Day was held successfully
- \* UM hosts international symposium on nanobiomaterials
- \* UM-Tsinghua Joint Symposium on Modernization of Chinese Medicine in the AI Era
- \* 'Joint Laboratory for Quality Certification and Product Innovation of Chinese Medicines in Heilongjiang'
- \* UM scholar shares new development model of TCM innovation
- \* UM, Tianjin Institute of Industrial Biotechnology jointly organise symposium on Chinese medicine and synthetic biology

## Researches

- \* *Advanced Drug Delivery Reviews: Quality by Computational Design: Harnessing AI to Advance Rational Drug Development*
- \* *Journal of Advanced Research: Therapeutic role of caveolin family in stem cell fate and development for management of geriatric diseases: A scientometric study to an in-depth review*
- \* *Journal of Controlled Release: FormulationLAI: A physiology-based machine learning framework for accelerated development of long-acting injectable formulations*
- \* *ICMS PhD student receives the grant from NSFC for doctoral student*

# News & Updates



## The University of Macau's annual Open Day was held successfully

On 11 January, the University of Macau's annual Open Day was held successfully on Sunday. Under the theme "Elegance of Sachets, Fun of Coloring", the Institute of Chinese Medical Sciences (ICMS) set up an interactive experience platform. Through a series of activities, participants immersed themselves in the unique charm of traditional Chinese medicine culture blended with modern creativity, effectively promoting TCM knowledge.

ICMS staff prepared a rich array of TCM herbs in advance, including peppermint, mugwort leaves and lavender. These herbs not only boast fresh fragrances and decorative value, but also carry traditional medicinal benefits such as mosquito repellency and sedation – laying the groundwork for participants to engage in a "visible, perceptible and tangible" TCM experience. At the venue, attendees took part in hands-on TCM sachet making, selecting their favorite patterns and spices. Through practical creation, they gained an intuitive understanding of the profound heritage of traditional TCM culture, further sparking their interest in exploring the TCM field.

Beyond sachet making, the institute also hosted a TCM-patterned postcard coloring game. As participants engaged in artistic creation, they simultaneously learned TCM-related knowledge, fulfilling the event's "edutainment" objective. Additionally, ICMS prepared commemorative canvas bags for visitors, demonstrating thoughtful humanistic care.

The event was warmly received by participants. Many noted that they not only enjoyed the fun of handcrafting, but also deepened their understanding of TCM culture. Visitors also spoke highly of the educational environment and academic atmosphere at ICMS. For many, the event helped clarify their plans for academic research and career development in TCM-related fields.



## UM hosts International Symposium on Nanobiomaterials



On 13 January, the Institute of Chinese Medical Sciences (ICMS) at the University of Macau (UM) hosted the 'International Symposium on Nano-biomaterials'. The event brought together leading scholars from the Chinese mainland, Hong Kong, Macao, and the US to engage in in-depth discussions on cutting-edge topics, including nanobiomaterials, nanomedicine, and the modernisation of traditional Chinese medicine.

Prof. Chen Xin, director of ICMS and director of the State Key Laboratory of Mechanism and Quality of Chinese Medicine at UM, said that the field of nanobiomaterials is a key interdisciplinary area linking materials science, life sciences, and medicine. He emphasised its significant role in advancing innovation in both basic research and clinical translation. Prof. Chen Xin also highlighted that the symposium would help promote the integration of nanobiomaterials with traditional Chinese medicine and drive the research and development of innovative Chinese medicine formulations.

The symposium featured a series of presentations on frontier developments in nanobiomaterials. It fostered academic exchange and collaboration, strengthened the integration of nanotechnology, biomedicine, and traditional Chinese medicine research, and supported innovation across these interconnected fields.



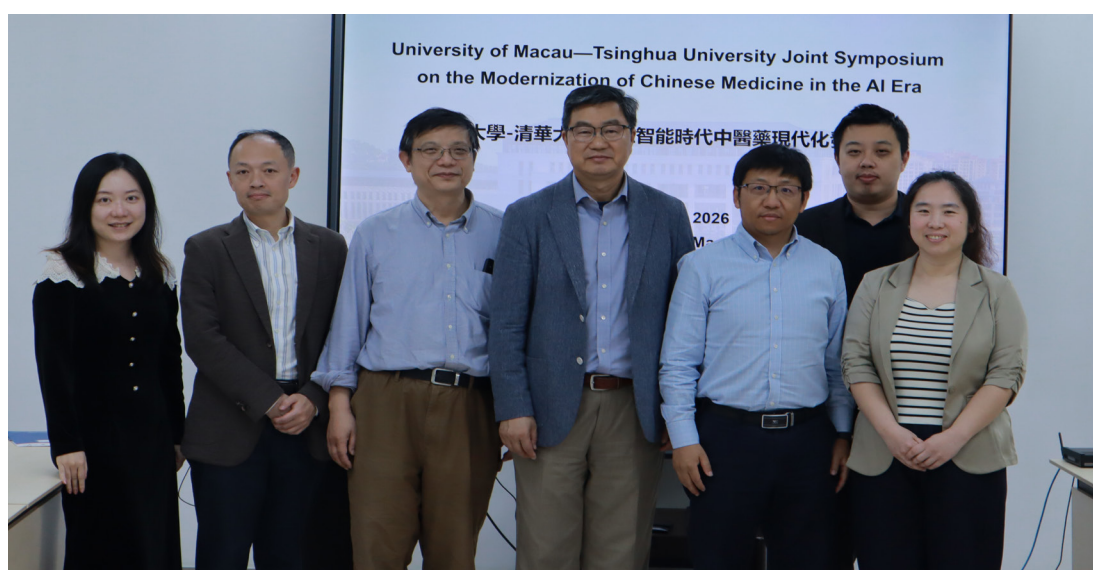
## UM–Tsinghua Joint Symposium on Modernization of Chinese Medicine in the AI Era held at UM



On 16 January, the Institute of Chinese Medical Sciences (ICMS) hosted the ‘University of Macau–Tsinghua University Joint Symposium on the Modernization of Chinese Medicine in the AI Era’ at UM. The symposium brought together scholars, faculty members, and students from UM and Tsinghua University to discuss how artificial intelligence (AI) and emerging computational approaches can support evidence building, standardisation, and translation of Traditional Chinese Medicine (TCM).

The event commenced with a welcome address by Prof. Chen Xin, director of ICMS and director of the State Key Laboratory of Mechanism and Quality of Chinese Medicine at UM. Subsequently, Prof. Li Shao, Academician and Director of the Institute of TCM-X at Tsinghua University, delivered the featured lecture titled “AI, network pharmacology and TCM.” Following this, featured presentations were delivered by Prof. Liu Changsong and Prof. Wang Liting from Tsinghua University, as well as Prof. Hu Yuanjia, Prof. Lu Jiahong, and Prof. Song He from UM. Their presentations covered frontier directions spanning AI, network pharmacology, biomedical informatics, neuropharmacology, regulatory sciences, and biocatalyst redesign, providing an interdisciplinary platform for academic exchange on the modernization of TCM.

This activity strengthened academic exchange between UM and Tsinghua University across AI, engineering, pharmacology, and TCM, and laid a foundation for future scientific collaboration and talent development in the modernization of Chinese medicine in the AI era.



## 'Joint Laboratory for Quality Certification and Product Innovation of Chinese Medicines in Heilongjiang' inaugurated at UM



On 04 February, the University of Macau (UM) and the Heilongjiang Academy of Chinese Medicine Sciences held a plaque unveiling ceremony at UM to mark the establishment of the Joint Laboratory for Quality Certification and Product Innovation of Chinese Medicines in Heilongjiang. The inauguration signifies a deepening of collaboration between Macao and Heilongjiang in research on quality standards and product innovation in Chinese medicine.

Prof. Xu Jian, vice rector of UM, highlighted the university's commitment to promoting research on Chinese medicine. She stressed that the establishment of the joint laboratory will further integrate research and industrial resources in Macao and Heilongjiang, contributing to the high-quality development of the Chinese medicine industry. Prof. Ning Xia, representing the vice president of the Heilongjiang Academy of Chinese Medicine Sciences, said that the laboratory will support quality improvement, product innovation, and the alignment of research outcomes with international standards.

The Joint Laboratory will focus on developing quality standard systems for Chinese medicinal materials and proprietary Chinese medicines, conducting research and development in key testing technologies, creating high value-added products, and exploring pathways for international certification. It will also promote mutual recognition between Heilongjiang medicine standards and relevant technical specifications in Macao and overseas, while exploring a collaborative development model spanning research and development, certification, and market application.



## UM scholar shares new development model of TCM innovation



On 24 March, the University of Macau (UM) held the 32nd UM Scholar Research Forum, where Prof, Lin Ligen, professor in the Institute of Chinese Medical Sciences and the State Key Laboratory of Mechanism and Quality of Chinese Medicine and associate head of the Department of Pharmaceutical Sciences in the Faculty of Health Sciences at UM, delivered a talk titled 'Traditional Chinese Medicine (TCM) Chemical Biology: A New Developing Model for TCM Innovation'. The talk was well attended by students, faculty, and members of the public.

During the talk, Prof, Lin Ligen discussed the role of traditional Chinese medicine chemical biology in driving the modernisation, innovation, and research and development of TCM. He explained that this interdisciplinary field integrates methodologies from Chinese medicine chemistry, molecular biology, systems biology, and other areas, and aims to elucidate the mechanisms of TCM action by examining the interaction between chemical components and biological systems. Prof Lin also presented his research team's findings on Chinese bayberry and wild chrysanthemum, and showcased the practical application of traditional Chinese medicine chemical biology in TCM development.





## UM, Tianjin Institute of Industrial Biotechnology jointly organise symposium on Chinese medicine and synthetic biology

On March 27, the University of Macau (UM) and the Tianjin Institute of Industrial Biotechnology (TIB) of the Chinese Academy of Sciences jointly organised a symposium on Chinese medicine and synthetic biology, as well as the 2026 academic meeting of the UM-TIB Joint Laboratory for Synthetic Biology and Chinese Medicine. Held in Tianjin, the event brought together nearly 100 experts and scholars from around ten universities and research institutes in Macao and the Chinese mainland to promote interdisciplinary dialogue and cooperation between Chinese medicine and synthetic biology, and to showcase the latest research achievements of the joint laboratory.

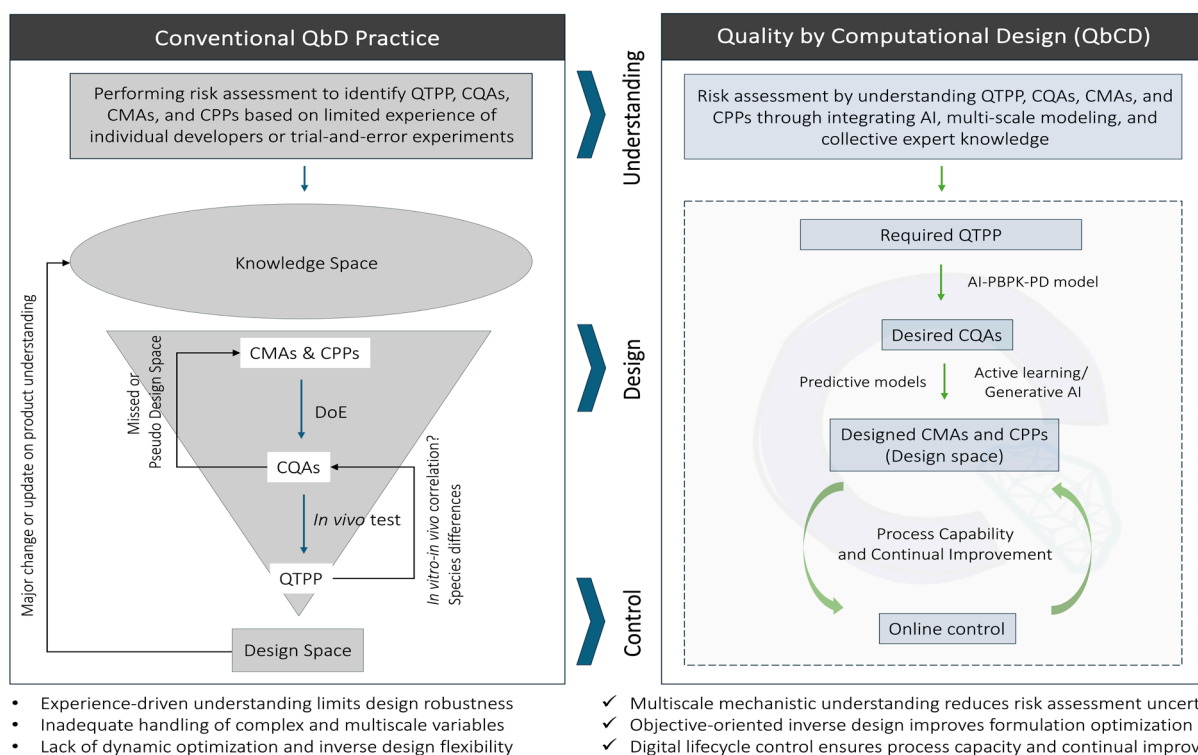
Prof. Lu Jiahong and Prof. Wan Jianbo, deputy directors of the UM Institute of Chinese Medical Sciences, attended the event. The symposium featured 12 academic presentations on various topics. Prof Lu presented on the AI-driven discovery of Chinese medicine compounds for neuropharmacological advancements, while Prof Wan presented on the chemical defence system of panax species. During the meeting, experts engaged in panel discussions on the role of synthetic biology in driving the development of the Chinese medicine industry, as well as the opportunities and challenges involved in industrialising TCM natural products using synthetic biology.



# Research Highlights

## Quality by Computational Design: Harnessing AI to Advance Rational Drug Development

The pharmaceutical Quality by Design (QbD) principle aims to reduce risk and improve efficiency across the drug development lifecycle. However, it predates the widespread adoption of artificial intelligence (AI) and does not fully leverage computational pharmaceuticals. This limitation is particularly evident in complex drug product development, where conventional QbD relies on empirical knowledge and labor-intensive experimentation, making it difficult to address multi-modal and multi-scale variables, dynamic optimization, and clinically oriented inverse design. Recent advances in computational pharmaceuticals provide a new foundation for drug development. In this context, a team led by Prof. Ouyang Defang (ICMS and SKL-MQCM) proposes Quality by Computational Design (QbCD), a novel paradigm integrating computational pharmaceuticals into the QbD framework to enable mechanism-based and clinically guided formulation design. The authors define the QbCD framework, detailing its core components, workflow, advantages, and regulatory considerations, and further propose practical implementation guidelines to enhance model credibility and ensure regulatory compliance. Key enabling technologies—including AI, physical modeling, and in vivo modeling—are introduced to support applications across drug development stages. The research has been published in the internationally renowned journal *Advanced Drug Delivery Reviews*.

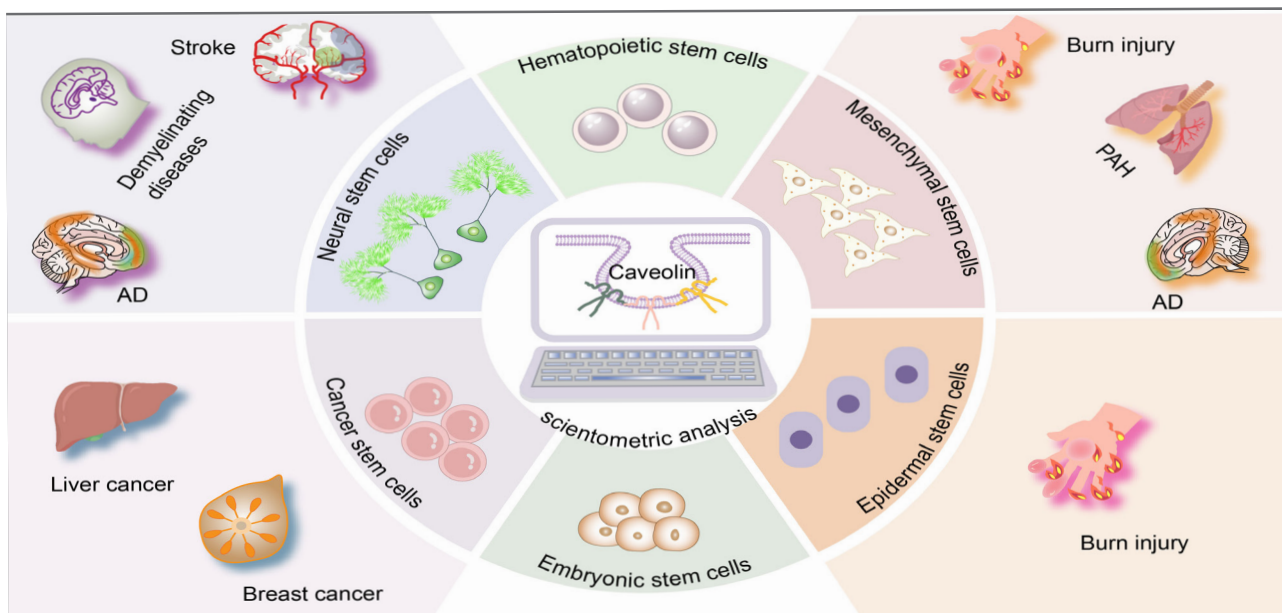


The comparison of conventional Quality by Design (QbD) practice and the proposed Quality by Computational Design (QbCD) paradigm.

*Advanced Drug Delivery Reviews*, 2026, 229, 115764

## Therapeutic role of caveolin family in stem cell fate and development for management of geriatric diseases: A scientometric study to an in-depth review

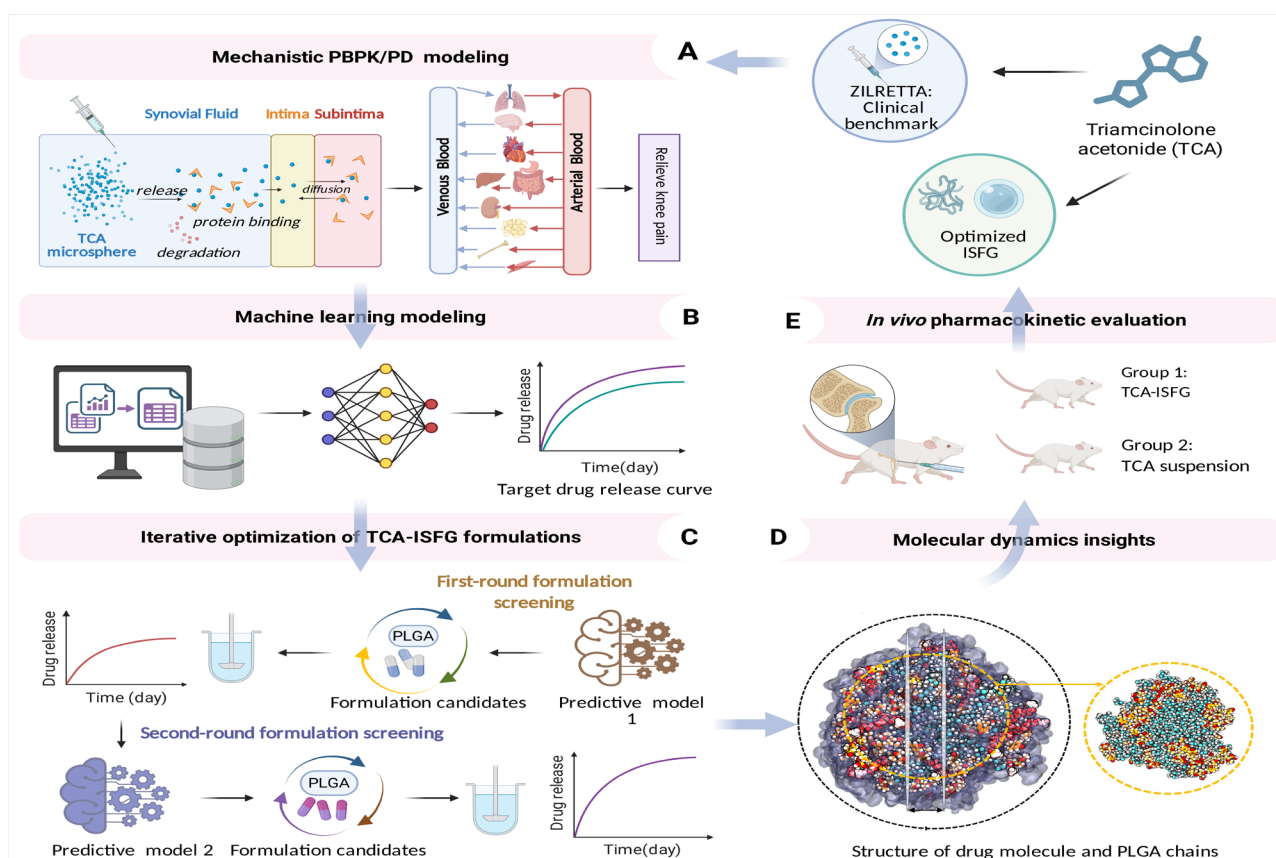
Caveolins (CAV), a family of integral membrane proteins, are the integral membrane proteins that play a crucial role in various cellular functions, including signal transduction, lipid metabolism, cell growth, migration, aging, and apoptosis. CAV plays a role in regulating stem cell fate for tissue repair and regeneration. Thus, based on scientometrics studies and comprehensive research, a team led by Li Yue Associate Professor of ICMS and SKL-MQCM, first investigated the mechanisms by which CAV regulates stem cell fate, impacting age-related diseases such as stroke, Alzheimer's disease (AD), breast cancer, and arterial hypertension. Overall, this work elucidates the influences and regulatory mechanisms of CAV on diverse stem cell populations and offers new perspectives on the management of geriatric conditions involving CAV and stem cell therapy. The review has been published in the internationally renowned journal *Journal of Advanced Research*.



Based on the scientometric analysis, this review elucidates the regulatory role of the Caveolin family on stem cells for therapeutic significance in geriatric diseases

# FormulationLAI: A physiology-based machine learning framework for accelerated development of long-acting injectable formulations

Long-acting injectables (LAIs) represent promising drug delivery platforms for chronic diseases management, but their clinical translation remains constrained by extremely long trial-and-error experiments, limited mechanism insights, and poor in vitro-in vivo correlation. How can we design LAI formulations more efficiently and predictably? To address this challenge, the team led by Dr Ouyang Defang of ICMS and SKL-MQCM first proposed a closed-loop computational framework that integrates PBPK modeling, machine learning, and molecular dynamics simulations. Using the commercial PLGA-based injectable Zilretta® as a benchmark, the study first defined the target in vivo exposure window required for efficacy using a PBPK/PD model. MD simulations elucidated key drug-polymer interactions enabling sustained release. Overall, This framework redefines the formulation paradigm: from empirical “formulate-and-test” to predictive “compute-and-validate”, and offers a scalable strategy for rational, efficient development of LAIs, reducing the formulation development time during the preclinical phase from the traditional 5-7 years to approximately 1-2 years. The work has been published in the *Journal of Controlled Release*.



Overview of the paradigm shift in LAIs formulation development: from empirical trial-and-error to computer-driven design.

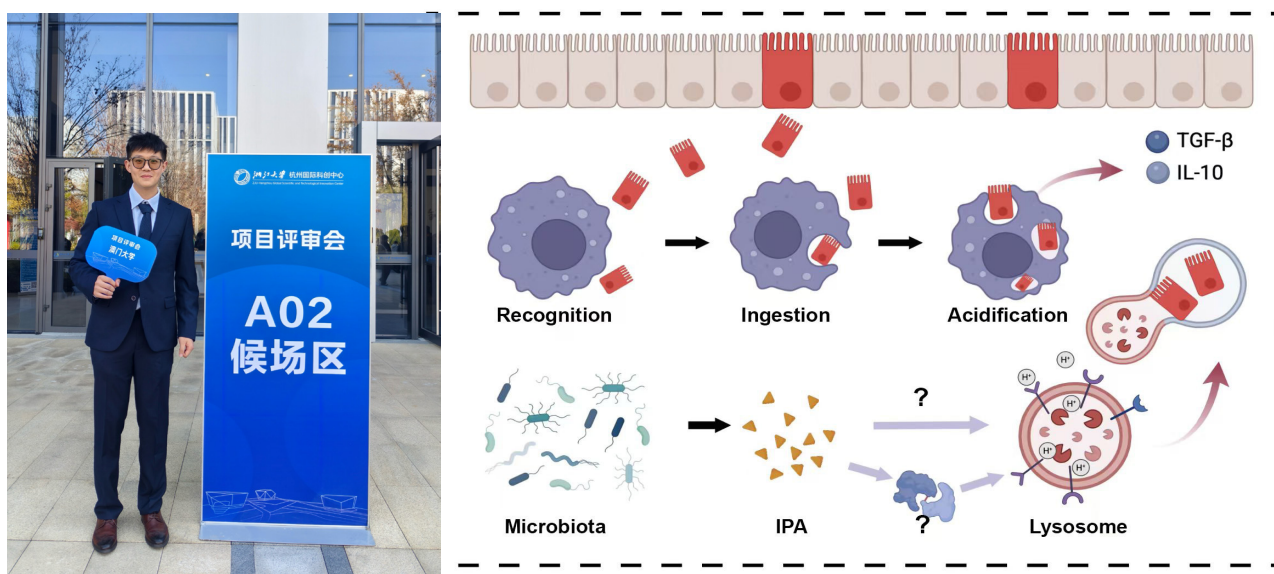
*Journal of Controlled Release* 2026, 389, 114418

# ICMS PhD student receives the grant from National Natural Science Foundation of China for doctoral students

A project proposed by Ren Zhengyu (supervised by Prof. Lu Jiahong), a 2024-entry PhD student at the Institute of Chinese Medical Sciences (ICMS), titled “Indole-3-propionic acid alleviates inflammatory bowel disease by enhancing efferocytosis: mechanism and therapeutic potential” has been successfully funded by the National Natural Science Foundation of China (NSFC) as part of its “2025 NSFC Young Student Basic Research Project (Doctoral Student Program).” This project is one of only two approved projects in Macau this year.

The project focuses on the effects and mechanisms of natural products on inflammatory bowel disease (IBD). Taking indole-3-propionic acid, a naturally active substance, as the core research target, it aims to explore new approaches and strategies for alleviating IBD by regulating efferocytosis. Efferocytosis is a key physiological process by which the body clears apoptotic cells and maintains inflammatory homeostasis; its dysregulation is closely associated with the onset and progression of IBD. The successful implementation of this project is expected to reveal the specific molecular mechanisms by which indole-3-propionic acid regulates efferocytosis, enrich the theoretical framework of anti-inflammatory actions of natural products, and identify the regulation of efferocytosis as a novel target and strategy for the treatment of inflammatory diseases.

This project is part of the NSFC Doctoral Student Program, which was first piloted in 2023. The program supports full-time doctoral students with a funding period of 2–3 years. The University of Macau is among the second-batch pilot universities. The successful approval of this project application fully demonstrates the sustained support and significant achievements of the university and ICMS in cultivating the independent research capabilities of doctoral students.



Zhengyu Ren, PhD student at the Institute of Chinese Medical Sciences and Work model for proposal

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January 2026

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