澳門大學
UNIVERSIDADE DE MACAU
UNIVERSITY OF MACAU

中藥機制與質量全國重點實驗室
Laboratório de Referência do Estado para Mecanismo e Qualidade da Medicina Chinesa
State Key Laboratory of Mechanism and Quality of Chinese Medicine

中華醫藥研究院
Instituto de Ciências Médicas Chinesas
Institute of Chinese Medical Sciences

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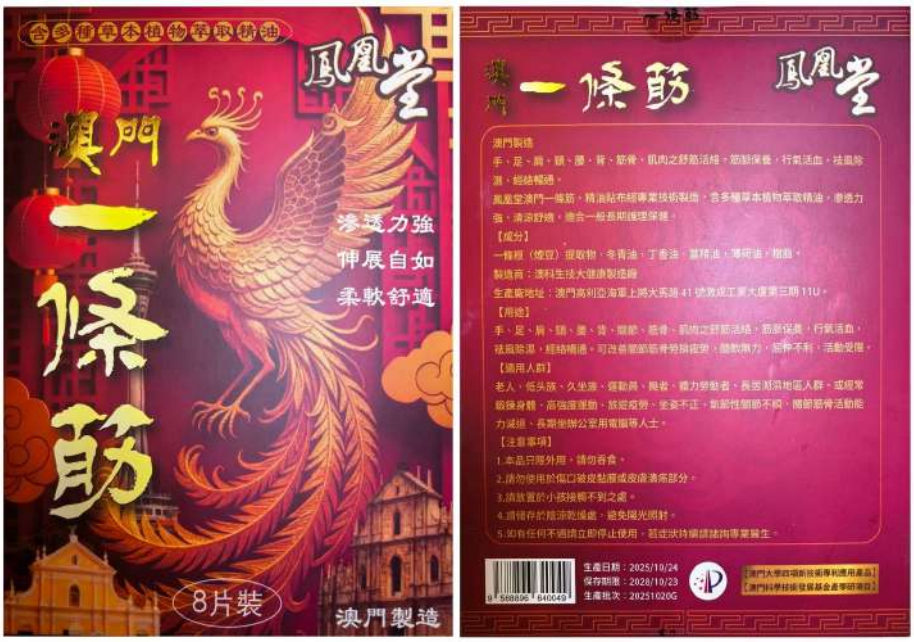
News & Updates

Topical patch co-developed by UM enters production and reaches market



'Macao Yat-Tiu-Gan', a topical Glycine tabacina patch developed through a collaboration between a research team led by He Chengwei, associate professor in the Institute of Chinese Medical Sciences and the State Key Laboratory of Mechanism and Quality of Chinese Medicine (SKL-MQCM) at the University of Macau (UM), and Macau International Biomedical Technology Limited, has entered production and is now available in pharmacies across Macao.

He notes that the project is a strong example of deep industry-academia collaboration, combining UM's research strengths with the company's expertise in product manufacturing. The UM team conducted systematic studies on the active components, pharmacological effects, and mechanisms of *Glycine tabacina* (a folk medicinal herb native to Fujian and Taiwan) extracts. These findings led to the successful development of the 'Macao Yat-Tiu-Gan' patch. The patch is designed to relieve joint and muscle pain in the neck, shoulders, lower back, and legs caused by prolonged sitting or physical activity, providing consumers with a safe, effective, and easy-to-use topical Chinese medicine product. Looking ahead, the research team plans to develop more health products based on distinctive medicinal herbs, supporting the global reach of 'R&D in Macao, Made in Macao' Chinese medicine brands.

Sub-Committee 2 Meeting of Western Pacific Regional Forum for the Harmonization of Herbal Medicines held at UM

The Sub-Committee 2 Meeting of the Western Pacific Regional Forum for the Harmonization of Herbal Medicines (FHH) took place at the University of Macau (UM) from 27 to 29 October. Delegates from the Chinese mainland, Hong Kong, Macao, South Korea, Japan, and Vietnam attended the meeting in person or online to discuss emerging issues in the harmonisation of standards and regulatory frameworks of herbal medicines within the Western Pacific region.

This was the first FHH meeting to be hosted by Macao since the establishment of the FHH Permanent Secretariat in the city. Speaking at the opening ceremony, UM Vice Rector Ge Wei said that UM will continue to leverage its strengths in quality research in Chinese medicine, promote the harmonisation of the standards of herbal medicines in the region, support the FHH Permanent Secretariat in strengthening cooperation among FHH members, and foster the development of FHH in the area of herbal medicine regulation.

Li Shaoping, head of the FHH Permanent Secretariat and Distinguished Professor at UM, presented a report on the harmonisation of the standards of herbal medicines. Delegates shared their progress in their respective herbal medicine regulatory systems. They also visited the UM Macao Centre for Testing of Chinese Medicine to explore opportunities for closer cooperation among FHH members.

UM hosts 1st GBA Immunity and Disease Summit

The 1st Guangdong-Hong Kong-Macao Greater Bay Area Immunity and Disease Summit was held at the University of Macau (UM) on 28 November. Under the theme 'Immunity and Human Health: New Frontiers', the event provided a high-level platform for academic exchange on basic immunology research, the prevention and control of immune-related diseases, and immunotherapy and health promotion. It brought together leading experts from across the Greater Bay Area to drive innovation and development in immunology in the region.

The summit was jointly organised by the Molecular Immunology Division of the Chinese Society of Biochemistry and Molecular Biology, the Institute of Chinese Medical Sciences (ICMS) at UM, and the School of Medicine at Jinan University. Dong Chen, an academician of the Chinese Academy of Sciences and a renowned immunologist, delivered a keynote speech, sharing the latest breakthroughs and future trends in international immunology. The event also brought together distinguished experts, scholars, and industry representatives in the field of immunology from the Greater Bay Area. They engaged in in-depth discussions on key topics such as immunity assessment, immune regulation mechanisms, cell therapy, and immune health management.

Speaking at the summit, Deng Chuxia, dean of the Faculty of Health Sciences at UM, said that the summit's theme reflected the forefront of scientific research, offering significant value for fundamental studies while closely aligning with global public health challenges and the future of precision medicine. He added that research on the immunomodulatory mechanisms of Chinese medicine is a major focus of ICMS, and that the summit has injected new momentum into advancing Macao's academic strengths in immunology and Chinese medicine.

UM hosts forum on Hong Kong and Macao pharmaceutical industry development

The '2025 Forum on Hong Kong and Macao Pharmaceutical Industry Development—Learning from Neighbours: Fostering an Ecosystem for Medical and Pharmaceutical Advancement', jointly organised by the Centre for Pharmaceutical Regulatory Sciences (CPRS) at the University of Macau (UM), the Hong Kong Association of the Pharmaceutical Industry (HKAPI), the Pharmaceutical Society of Macao, and the Department of Pharmacology and Pharmacy at the University of Hong Kong (HKU), was held at UM on 6 December. The event brought together over 100 experts, scholars, government representatives, and industry professionals from Hong Kong, Macao, and the Chinese mainland to engage in in-depth discussions on key topics, including pharmaceutical policies and regulations in the Guangdong-Hong Kong-Macao Greater Bay Area (GBA) , pharmacovigilance, clinical research and real-world data applications, and accessibility of innovative treatment options. The forum aimed to promote collaborative innovation in the biopharmaceutical industry and support the development of a pharmaceutical ecosystem.

At the opening ceremony, Hu Yuanjia, director of CPRS; Chan So Kuen, senior executive director of HKAPI; Chow Shing Fung, associate professor in the Department of Pharmacology and Pharmacy at HKU; and Carolina Ung Oi Lam, secretary-general of the Pharmaceutical Society of Macao, delivered welcome remarks.

They expressed hope that, as collaboration in the pharmaceutical sector across the GBA continues to deepen, the forum will help build an effective platform connecting industry, academia, government, research, and medical institutions, foster a more adaptable and sustainable pharmaceutical ecosystem, accelerate the translation of cutting-edge technologies, and support the introduction of new drugs to the market.

The forum featured a series of academic presentations. Kevin Lam, chief pharmacist in the Preparatory Office for the Hong Kong Centre for Medical Products Regulation, outlined the current state of drug and medical device regulation in Hong Kong, along with the centre's development strategy and recent progress. Lei Chi Ieong, head of the Department of Registration in the Pharmaceutical Administration Bureau of the Macao SAR government, explained Macao's drug and medical device regulatory system, as well as national policies that support Macao's pharmaceutical sector. Michael Yim, chief pharmacist in the Drug Office in the Department of Health of the Hong Kong SAR government, introduced Hong Kong's pharmacovigilance system, which oversees the entire life cycle of drugs and enables proactive, continuous quality monitoring. Song Menghuan, research assistant professor in the Institute of Chinese Medical Sciences (ICMS) at UM, demonstrated the use of pharmacovigilance tools through a case study on attention deficit hyperactivity disorder. Cheung Ching Lung, director of the Real-World Study and Application Centre (RWSAC), discussed opportunities for collaboration in clinical research across the GBA from a Hong Kong perspective, and shared the strategic goals and latest developments of the Greater Bay Area International Clinical Trial Institute and RWSAC. Li Yichong, director of the Greater Bay Area International Clinical Trials Center, provided an overview of the policy environment, current landscape, and future prospects for biomedical policies and clinical trials in the GBA within the national context.

Carolina Ung Oi Lam; Hu Hao, professor in UM ICMS; Andrea Chang, board member of HKAPI and chair of the HKAPI GBA taskforce; and Fien Tong, head of the HKAPI GBA taskforce, joined the speakers for further discussion. They also called for stronger cooperation among universities in the GBA to provide research and decision-making support for the government.

The forum was supported by UM ICMS and the Macao Society for Medicinal Administration. Guests attending the forum included Ung Choi Kun, president of the Macao Wisdom Humanities Encourage Political Association; Jack Wong, founder of Asia Regulatory Professionals Association; Leung Shek Ming, lecturer in the Department of Pharmacology and Pharmacy at HKU; and Li Chihua, assistant professor in ICMS.

The 1st ICMS Academic Symposium and Collaborative Retreat — Uniting Minds for Development and Advancing Innovation Through Collaboration

From 6 to 7 December, the Institute of Chinese Medical Sciences (ICMS) at University of Macau (UM) successfully held its first “The 1st ICMS Academic Symposium and Collaborative Retreat” at the Zhuhai Ocean Spring Resort. Under the theme “Focusing on Frontiers, Advancing Innovation, and Building a Collaborative Ecosystem,” the event brought together 35 Principal Investigators (PIs) and Research Assistant Professors across the institute. Through a combination of closed door discussions, flash academic talks, and round table dialogues, participants collectively reviewed ICMS’s future research priorities, strengthened internal collaboration mechanisms, and drafted a strategic blueprint for high quality institutional development.

The retreat was chaired by Chen Xin, Director of ICMS, who delivered welcoming remarks. Prof. Chen emphasized that the retreat aimed to serve as a “closed, cross team, and high intensity” exchange platform to refine the institute’s mid to long term research strategy and implementation roadmap. He also highlighted the importance of breaking down barriers between research teams, fostering substantive scientific collaboration, and welcoming newly joined colleagues to cultivate a culture of openness, trust, and mutual support.

During the “Research Flash Talk” session, each PI presented a concise overview of their group’s unique research focus, core technological platforms, shared resources, and collaboration needs. Professor Xin Chen opened the session by sharing his team’s latest progress in targeting TNFR2 for autoimmune disease treatment and tumor immunotherapy, introducing the high specificity TNFR2 inhibitor development platform and accessible disease model repositories. The discussions were lively and constructive, leading to complementary exchanges of expertise and the preliminary formation of potential collaborations.

Wan Jianbo, Deputy Director of ICMS, subsequently delivered a comprehensive review of ICMS’s development over the past five years, highlighting achievements in discipline building, talent cultivation, research platform expansion, and key academic outputs—laying a solid foundation for the institute’s next phase of strategic growth.

A round table discussion centered on the upcoming restructuring of the State Key Laboratories, a major national strategic opportunity. Participants engaged in in-depth dialogue on optimizing ICMS’s research layout and integrating resources. The inaugural ICMS Academic Retreat was not only a platform for in-depth intellectual exchange but also a meaningful practice in team building and consensus formation. Moving forward, ICMS will take this event as a new starting point to foster a highly collaborative, open, and innovative research ecosystem, advancing towards its vision of becoming a world class, globally recognized center of excellence in Chinese medicine research.

ICMS delegation attends Guangzhou Pharmaceutical Holdings' 2025 Innovation Conference

From 26 to 27 December, Chen Xin, Director of both the Institute of Chinese Medical Sciences (ICMS) and the State Key Laboratory of Mechanism and Quality of Chinese Medicine, led a delegation to Guangzhou, upon the invitation of Guangzhou Pharmaceutical Holdings, to attend the "2025 Guangzhou Pharmaceutical Holdings Innovation Conference." The ICMS delegation included Wan Jianbo, Deputy Director of ICMS; Wang Shengpeng, Assistant Director of the State Key Laboratory; as well as Chou Chon Kit and Li Chihua, Assistant Professors of ICMS.

During the conference, Chen xin met with Li Xiaojun, Chairman of Guangzhou Pharmaceutical Holdings, and senior executives from its affiliated enterprises for in-depth discussions. He provided a comprehensive overview of the progress and future development plans of the State Key Laboratory of Mechanism and Quality of Chinese Medicine.

Both parties expressed strong consensus on further deepening collaboration, leveraging their respective strengths in traditional Chinese medicine (TCM) industrial resources and scientific innovation to jointly advance innovative TCM research and development, expedite the internationalization of TCM, and co-create a high-quality development framework for Guangdong-Macao cooperation in the TCM sector.

Additionally, during the event, Guangzhou Pharmaceutical Holdings conferred the titles of "Chief Expert Advisor" and "Senior Expert Advisor" upon Professor Chen Xin and Associate Professor Wang Shengpeng, respectively.

Research Highlights

ICMS secures prestigious 2025 "Nation's Needs" Key R&D Grant

The Macao Science and Technology Development Fund recently announced that ICMS has successfully secured approval for the 2025 "Scientific Research and Innovation Funding Program" under the Key R&D category (National Needs). This project focuses on a major scientific question proposed by the China Association for Science and Technology—"How does traditional Chinese medicine regulate human immune function?" It will study commonly used clinical Chinese medicines with the heat-clearing and qi-strengthening features, whose mechanisms remain unclear.

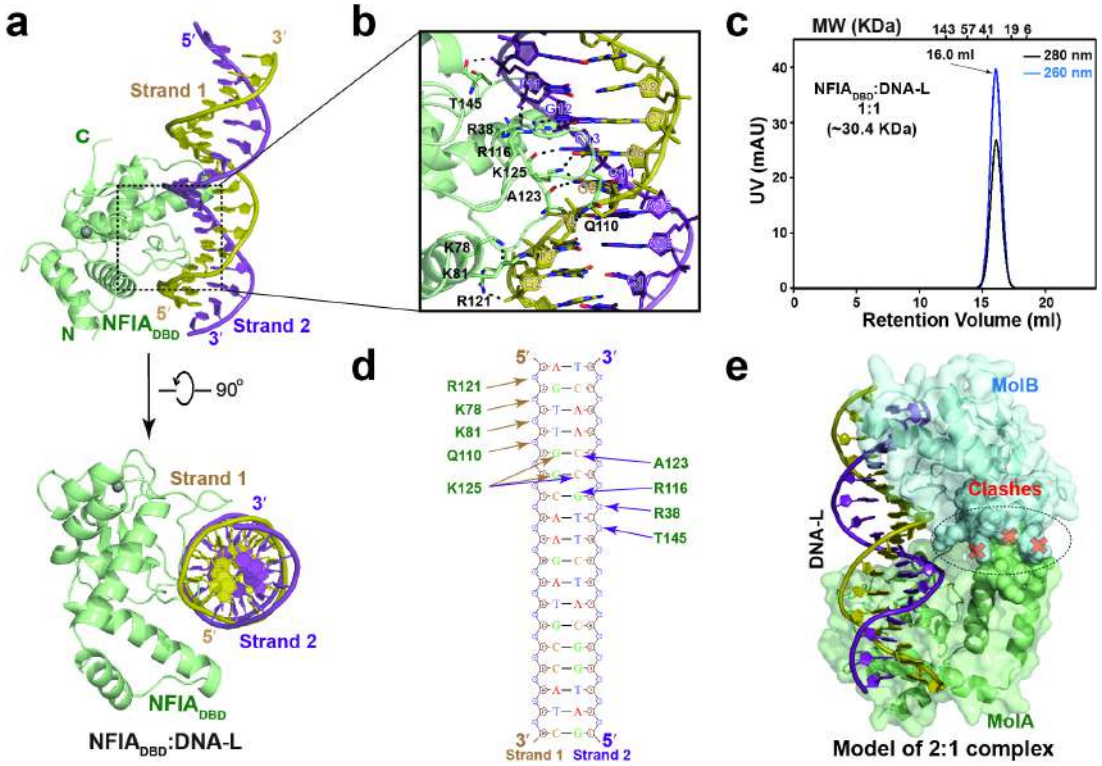
The research will take the globally important drug target TNF and its receptor signaling axis as the entry point, leveraging our institute's original contributions and research strengths in this field. It will integrate cutting-edge technologies such as artificial intelligence, single-cell and spatial multi-omics, and organoid models to conduct a full-chain study from active compound screening to animal validation. The goal is to uncover the modern scientific basis of the TCM principles of heat-clearing and qi-strengthening, and to develop new immune-regulating Chinese medicines and health products.

This project not only highlights our institute's scientific advantages in the critical research area of TCM-based immune and inflammation regulation, but also aims to provide innovative solutions for immune-related diseases, promote TCM technological innovation in Macao, and contribute to the "Healthy China" strategy.

The project is jointly led by Chen Xin, Director of ICMS and SKL-MQCM, Chen Xiuping, Assistant Director of ICMS, Lu Jinjian, Assistant Director of ICMS, and Zhang Shaoyi, Assistant Professor of ICMS.

Structural basis for genome-wide site-specific DNA recognition by Nuclear Factor IA

Nuclear Factor IA (NFIA) is a key transcription factor in neural development and lipid metabolism, but its DNA-binding mechanism has been unclear. A team led by Song He, Assistant Professor of ICMS and SKL-MQCM at UM, systematically characterized NFIA using structural, genomic, and biophysical approaches. They determined crystal structures of the NFIA DNA-binding domain (DBD) bound to DNA and showed that NFIA engages DNA as a monomer. Genome-wide profiling indicated binding to both TGGCA half-sites and the symmetric TGGCA(N3)TGCCA motif. Structural and mutational analyses identified residues R116, A123, and K125 as critical for sequence-specific recognition via contacts in the DNA major groove. These findings define a structural framework for NFIA-mediated gene regulation and support structure-guided discovery of active compounds—including traditional Chinese medicine candidates—to modulate NFIA pathways in conditions such as osteoarthritis. The research has been published in *Nature Communications.*

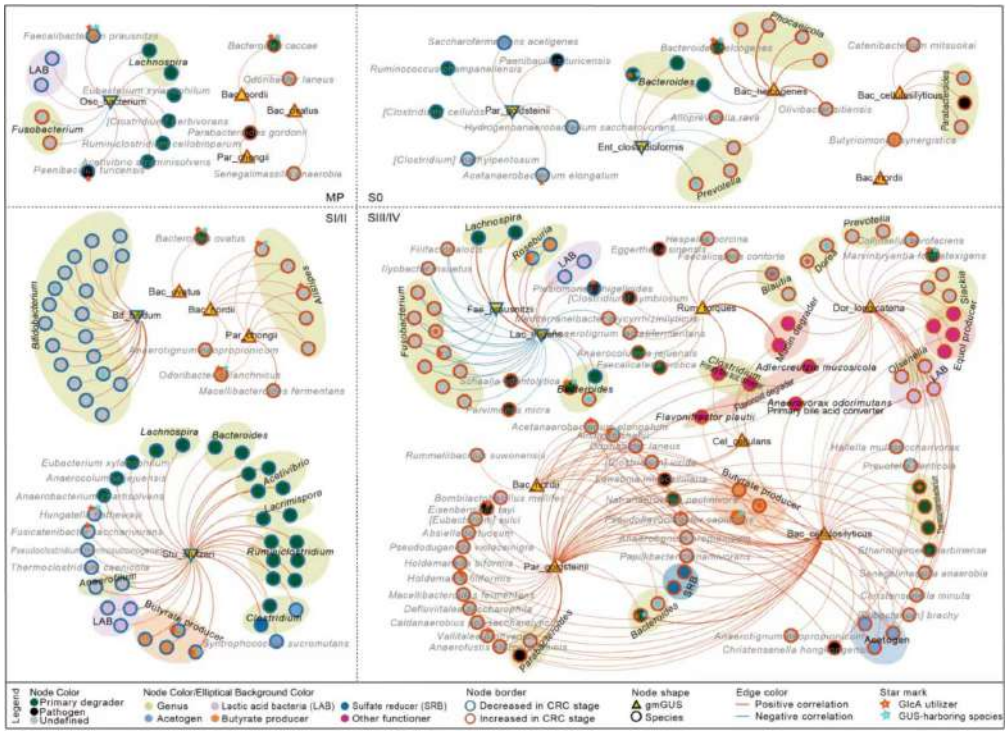


Crystallographic and functional experiments show that NFIA can bind symmetric DNA sequences as a monomer. This work establishes a structural model for monomeric NFIA–DNA recognition, providing a structural reference and framework for understanding regulation by NFI-family transcription factors.

Nature Communications, 2025, DOI: 10.1038/s41467-025-67641-4

Gut microbial β-glucuronidases and their role in the microbiome-metabolite axis in colorectal cancer

The onset and progression of colorectal cancer (CRC) are closely linked to gut dysbiosis and associated metabolic disturbances. β-Glucuronidases (GUSs) are a crucial class of metabolic enzymes widely distributed in human gut microbiota. They can reverse the glucuronidation "detoxification" pathway catalyzed by uridine diphosphate-glucuronosyltransferases (UGTs) highly expressed in human liver, playing important roles in maintaining the metabolic homeostasis of various biologically important endogenous compounds (e.g., bilirubin, steroid hormones, bile acids) and the disposition of exogenous substances (e.g., drugs, dietary or environmental carcinogens). A team led by Yan Ru, Professor of ICMS and SKL-MQCM first systematically mapped the dynamic dysregulation of 550 microbial GUSs across CRC stages, revealing their potential for early diagnosis and prognosis. By constructing a "microbiota-GUS-metabolite" axis, researchers found stage-specific perturbations, including harmful bacteria enrichment and metabolic pathway disruption. Notably, GUS from Bacteroides cellulosilyticus was shown to upregulate tumor cell RNA transcription and DNA replication. Overall, this work deciphers the functional axis linking gut microbes to CRC progression, providing a foundation for novel GUS-targeted diagnostic and therapeutic strategies. The research has been published in the internationally renowned journal *Nature Communications.*

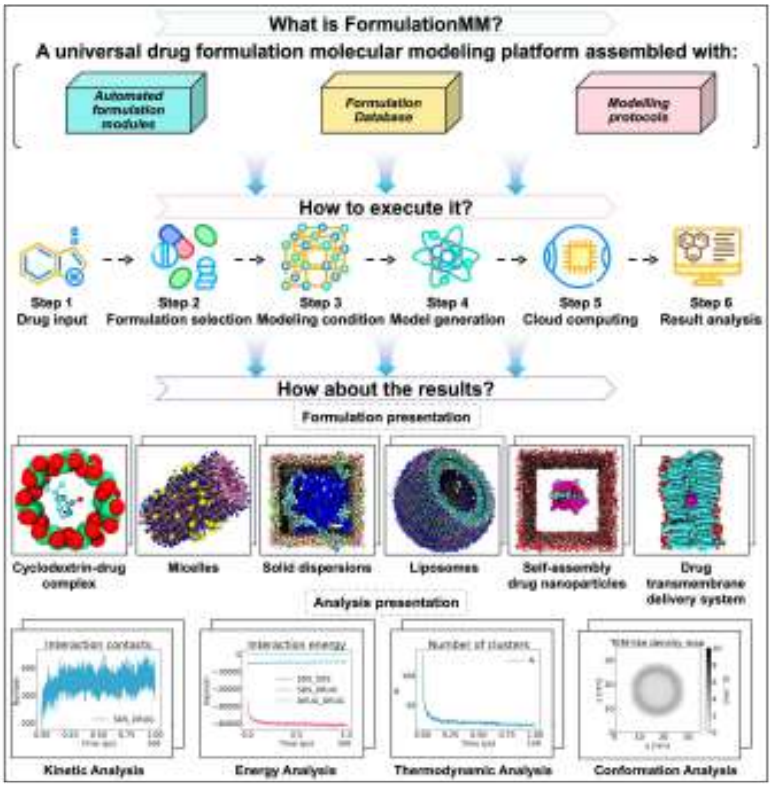


Dynamic network characteristics of the Microbiota-GUS-Metabolite (MGM) axis during CRC progression. Stage-specific co-abundance networks were constructed using differential species and GUSs of respective stages. The number of GUS-associated species, glucuronic acid utilizers, GUS-harboring species, and associations increased steadily with CRC progression. These shifts of GUS pattern may echo the shift of substrate spectrum throughout carcinogenesis and the disruption of glucuronidation homeostasis, which potentially contribute to CRC development.

Nature Communications, 2025,16:1066y

Formulation MM: A Universal Computer-driven Drug Formulation Platform

Classical computer-aided drug design answers “Will this ligand bind?”, whereas computer-driven drug formulation answers the downstream but equally critical question “How can this drug be physically made and delivered?”, thereby bridging the long-standing gap between molecular modeling and drug-formulation science through physics-based and fully automated multiscale simulation. To build this bridge, the team led by Prof. De-fang Ouyang, introduced FormulationMM, an innovative platform utilizing physics-driven molecular modeling to explore drug formulation mechanisms. FormulationMM features a pharmaceutical formulation algorithm, a comprehensive excipient database, and robust modeling protocols, ensuring a streamlined workflow for the generation, simulation, and analysis of drug formulation. It automatically generates forcefield parameters for drug molecules and excipients, supporting six formulation types: cyclodextrin-drug inclusion, micelles, liposomes, solid dispersions, self-assembling drug nanoparticles, and transmembrane drug delivery systems. Our results closely match experimental findings and demonstrate high predictive accuracy and reliability. The platform is accessible through a continuously updated website (https://formulationmm.computpharm.org), offers a practical platform to support drug formulation research and development, with the potential to advance the growing field of computational pharmaceutics. The research have been published in the internationally renowned journal Journal of Controlled Release.

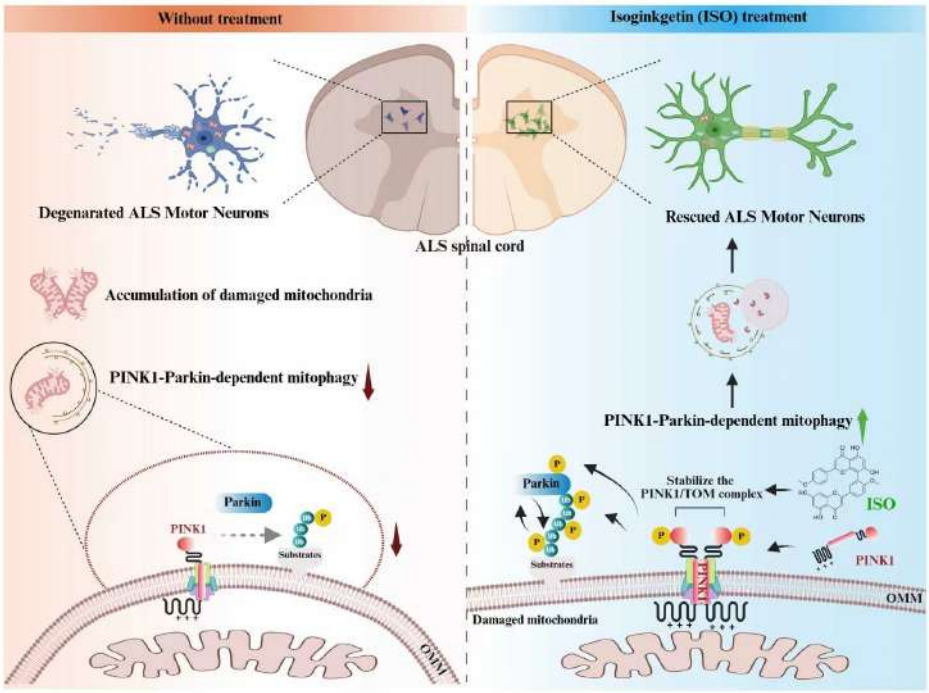


Departing from traditional trial-and-error methods, FormulationMM leverages molecular dynamics simulations to gain atomic-level insights into the interactions between drug molecules and excipients, serving as a powerful 'virtual laboratory' for the rational development of universal drug formulations.

Journal of Controlled Release, 2025, 10:114237.

Isoginkgetin antagonizes ALS pathologies in its animal and patient iPSC models via PINK1-Parkin-dependent mitophagy

Mitochondrial dysfunction is widely recognized as a key driver of aging and neurodegenerative diseases, with mitophagy acting as an essential cellular mechanism for the selective clearance of damaged mitochondria. While pharmacological activation of mitophagy has been reported to exert benefit effects across multiple neurodegenerative diseases, its functional relevance in amyotrophic lateral sclerosis (ALS) remains poorly characterized. The research team led by Su Huanxing, Professor of ICMS and SKL-MQCM at UM validated a significant impairment of PINK1-Parkin-dependent mitophagy in ALS motor neurons by utilizing post-mortem spinal cord tissues of ALS patients provided by the Netherlands Brain Bank, as well as motor neurons derived from three types of induced pluripotent stem cells carrying ALS-causative mutations. Subsequently, via a high-content screening model, the team identified that isoginkgetin (ISO), a compound isolated from Ginkgo biloba, could stabilize the PINK1-TOM complex and promote PINK1-Parkin-dependent mitophagy, thereby effectively eliminating damaged mitochondria and significantly delaying motor neuron degeneration and disease progression in cross-species ALS models. Collectively, this study lays a solid foundation for the development of novel therapeutic agents that are independent of the currently known clinical drugs for ALS. The relevant findings have been published in the internationally journal EMBO Molecular Medicine.



ISO, a Ginkgo biloba derived mitophagy inducer, enhances stabilization of the PINK1-TOM complex on the outer membrane of dysfunctional mitochondria, and then promotes PINK1-Parkin-dependent mitophagy to remove impaired mitochondria, thus protecting against motor neuron loss and slowing down the development of ALS.

EMBO Molecular Medicine, 2025, 17:3193-3173.

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 # Co-first author; * Corresponding author

Institute of Chinese Medical Sciences

State Key Laboratory of Mechanism and Quality of Chinese Medicine

Address N22 Research Building
University of Macau
Avenida da Universidade
Taipa, Macau, China

Phone +853 8822 4685

Fax +853 2884 1358

Mail icms.enquiry@um.edu.mo
sklmqcm@um.edu.mo