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State Key Laboratory of Quality Research in Chinese Medicine (University of Macau)

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ICMS NEWSLETTER

News

* Over 300 experts and scholars discuss Chinese medicine and innovative technologies
* ICMS Academic Staff Seminar Series generates enthusiastic response
* ICMS holds online exchange meeting with Tianjin Institute of Industrial Biotechnology
* ICMS hosts the 3rd RAP Postdoc & MYS Seminar
* ICMS and Dongguan Traditional Chinese Medicine Hospital sign cooperation agreement
* UM SKL-QRCM, Hubei Shizhen Laboratory co-organise seminar
* UM students win award in academic essay competition
* UM holds Global Academic Symposium to promote international cooperation
* ICMS successfully holds the 1st Symposium on Computational Pharmaceutics

Visits

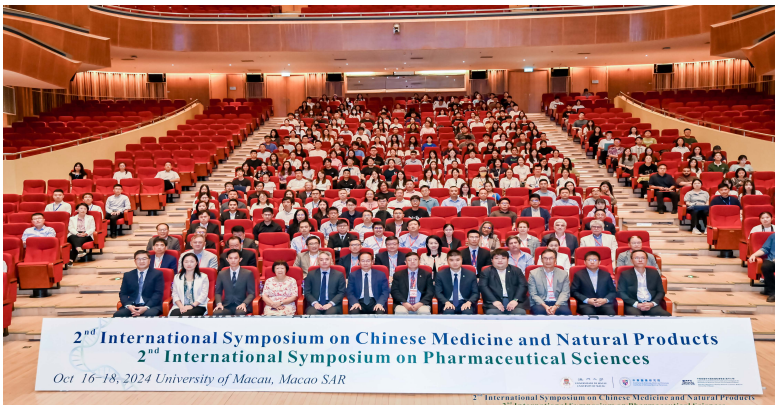
* UM vice rector leads delegation to visit top US universities to promote academic and research collaboration
* Delegation from Macau Pooi To Middle School visits ICMS
* Delegation from Universidade Nacional Timor Lorosa'e visits ICMS

Researches

* *Analytical Chemistry* Girard derivatization-based enrichment strategy for profiling the carbonyl submetabolome in biological samples
* *Nature Communications* The Chemistry of Phytoplankton
* *Chemical Reviews* Development of an artificial intelligence model for virtual screening of mRNA lipid nanoparticle delivery systems
* *Scientia Sinica Vitae* Mechanism-oriented quality research system for traditional Chinese medicine

News & Updates

Over 300 experts and scholars discuss Chinese medicine and innovative



The 2nd International Symposium on Chinese Medicine and Natural Products (Macao) and the 2nd International Symposium on Pharmaceutical Sciences (Macao), organised by the Institute of Chinese Medical Sciences (ICMS) and the State Key Laboratory of Quality Research in Chinese Medicine (SKL-QRCM) of the University of Macau (UM), commenced with an opening ceremony at UM on October 16-18. The two symposia have brought together over 300 experts, scholars, researchers, and students from Portugal, France, South Korea, Mexico, the US, Malaysia, Singapore, mainland China, Hong Kong, and Macao to discuss cutting-edge research and innovative technologies in Chinese medicine and pharmaceutical sciences. In his welcome remarks, Prof. Ge Wei, vice rector of UM, highlighted UM's strong commitment to research and development of Chinese medicine and talent cultivation, as well as the significant progress UM has made in the industrialisation of Chinese medicine. He added that UM will continue to support the development of SKL-QRCM and promote international exchange and cooperation in Chinese medicine.

Prof. Chen Xin, director of ICMS and SKL-QRCM of UM, said that the symposia provide a platform for sharing cutting-edge research, fostering international cooperation and exchange in the fields of Chinese medicine and natural products. The two symposia will feature a total of 38 presentations covering a wide range of topics related to Chinese medicine and innovative technologies.

ICMS Academic Staff Seminar Series generates enthusiastic response

The Institute of Chinese Medical Sciences (ICMS) at University of Macau held a weekly Academic Staff Seminar Series on Monday mornings, aimed at providing a platform for scientific exchange among professors and students to enhance communication within the institute. This academic year, Prof. OuyangDefang, Prof. Lu Jiahong, Prof. Chen Meiwan, Prof. Chen Xiuping, and Prof. Li Chihua have delivered fascinating lectures, sharing cutting-edge research in areas such as traditional Chinese medicine, pharmaceutical sciences, computational pharmaceutics, and pharmaceutical regulatory science. The seminars have attracted active participation from a large number of faculty and students, with the lecture hall filled to capacity and generating enthusiastic responses. During the Q&A sessions, participants actively posed questions, creating a lively atmosphere for exchange. In the future, ICMS will continue to organize the Academic Staff Seminar Series to promote academic exchange among professors and students and to advance the innovation and inheritance of Chinese medicine.

ICMS holds online exchange meeting with Tianjin Institute of Industrial Biotechnology

The Institute of Chinese Medical Sciences (ICMS) at University of Macau and the Tianjin Institute of Industrial Biotechnology (TIB) have initiated a joint doctoral program in synthetic biology of traditional Chinese medicine to boost talent development and research collaboration. An online meeting was held on October 9 for discussions of enhancing doctoral education and management and fostering closer ties in Chinese medicine research. Both parties plan regular exchanges to track research progress and leverage mutual strengths to advance high-level scientific talent cultivation in the field.

This year, ICMS and TIB also established the 'Joint Laboratory of Synthetic Biology of Traditional Chinese Medicine' to promote collaborative R&D, personnel exchange, talent training, and technology transfer, aiming to accelerate innovation in traditional Chinese medicine and enrich young scientific talent training.

ICMS hosts the 3rd RAP Postdoc & MYS Seminar

On December 11, the Institute of Chinese Medical Sciences (ICMS) and the State Key Laboratory of Quality Research of Chinese

Medicine (SKL-QRCM) at University of Macau (UM) hosted the 3rd RAP Postdoc & MYS Seminar. Organized by the ICMS RAP Postdoc & MYS Studies Committee, the event aimed to enhance research capabilities and foster collaboration among

young scholars. In his opening remarks, Prof. Chen Xin, director of ICMS and SKL-QRCM of UM, emphasized the seminar's goal of strengthening cooperation and highlighted ICMS's commitment to innovation in Chinese medicinal research. The seminar featured presentations from sixteen ICMS research assistant professors (RAPs), postdocs, and Macao Young Scholars (MYS) on topics such as the therapeutic effects of Chinese medicine, regulatory science, and drug delivery systems.

ICMS and Dongguan Traditional Chinese Medicine Hospital sign cooperation agreement

On December 13, the Institute of Chinese Medical Sciences (ICMS) at University of Macau (UM) and the Dongguan Traditional Chinese Medicine Hospital signed a cooperation agreement, discussing ways to promote exchanges and cooperation in traditional Chinese medicine. Both parties explored next steps and innovative collaboration models. Prof. Chen Xin, director of ICMS and SKL-QRCM of UM, noted the institute's achievements since 2002 in areas like quality research, new medicine development, pharmacology, and formulation. The agreement will facilitate academic and cultural exchanges, and they aim to deepen cooperation with the hospital by sharing resources and strengths to explore new paths in traditional Chinese medicine.

The Dongguan Traditional Chinese Medicine Hospital, established in 1965, is

renowned in Dongguan and southern China. Prof. Ye Guohua, Party Secretary of the hospital, expressed excitement for the collaboration, hoping to enhance academic exchanges, talent cultivation, research cooperation, and technology transfer. This partnership is expected to bring new vitality and momentum to the development of traditional Chinese medicine.

UM SKL-QRCM, Hubei Shizhen Laboratory co-organise seminar

On December 7, the State Key Laboratory of Quality Research in Chinese Medicine (SKL-QRCM) of the University of Macau (UM) and Hubei Shizhen Laboratory co-organised the Traditional Chinese Medicine Frontier Seminar. The seminar aimed to explore new directions in the advancement of Chinese medicine, promote the development and innovation of Chinese medicine, and provide an exchange platform for clinical research and basic research in Chinese medicine. It was well attended by Chinese medicine experts, researchers, faculty, and students.

The seminar featured five academic presentations, which were given by Chinese medicine expert Zhang Liutong, President Chen Gang, and Prof. Xiang Nan from Hubei University of Chinese Medicine; Prof. Chen Xin, director of ICMS and SKL-QRCM of UM; and Wang Shengpeng, assistant director of SKL-QRCM of UM. In addition, UM Rector Song Yonghua met with the delegation from Hubei Shizhen Laboratory and held in-depth discussions on cooperation in research and development of Chinese medicine, talent cultivation, transformation of research results, and collaborative innovation.

Both parties expressed their commitment to leveraging the science and technology talent, technology platforms, and natural resources of Macao and Hubei to promote academic exchanges in Chinese medicine, accelerate the integrated development of the Chinese medicine industry in the two places, and enhance the international influence of Chinese medicine.

UM students win award in academic essay competition

On November 25, a paper co-authored by Lam Cho Yi and Ye Jing, undergraduate students from the Faculty of Education, and Xue Dongmei, a doctoral student from the Institute of Chinese Medical Sciences (ICMS) at University of Macau, won a 'new talent award' in the 'Macao University Students' Academic Essay Competition in Celebration of the 25th Anniversary of Macao's Reunification with the Motherland'.

The paper, titled' Factors Influencing Participation in Experiential Learning Activities in Intercultural Communities under "One Country, Two Systems" and Model Construction: A Case Study of University of Macau Residential Colleges', was supervised by Prof. Bian Ying, assistant director and doctoral supervisor of ICMS. The competition was organized by the Macao Scholars Development Association and Macau

Student Home, with guidance from the Beijing Office of the Central People's Government in the Macao SAR and other offices. Over 500 students from more than 70 institutions participated. The judging panel selected 75 outstanding papers from 255 submissions. The winning papers were published by Macau Academic Journal and the Commercial Press.

UM holds Global Academic Symposium to promote international cooperation

The UM Global Academic Symposium commenced on December 1-3 at the University of Macau (UM). With the aim of promoting global academic exchange and strengthening international partnerships, the symposium has brought together over 50 scholars from 23 institutions across Australia, New Zealand, Singapore, South Korea, and Japan to share their research findings and advances in cutting-edge technologies, and to explore potential research collaboration.

In his opening remarks, UM Rector Prof. Song Yonghua highlighted the university's proactive approach to expanding international cooperation, its commitment to nurturing talent with a global perspective. In recent years, UM delegations have visited a multitude of universities and research institutes in Australia, New Zealand, Singapore, South Korea, and Japan.

The symposium consists of four parallel sessions covering fields including business administration, engineering, computer science, mathematics, materials science, pharmacology, and regulatory science, hosted by UM's Faculty of Business Administration (FBA), Faculty of Science and Technology (FST), Institute of Applied Physics and Materials Engineering (IAPME), and Institute of Chinese Medical Sciences (ICMS) at University of Macau.

ICMS's parallel session, themed 'Traditional and Integrative Medicine, Pharmaceutical Science, and Regulatory Science', brought together biomedical experts from Australia, New Zealand, Singapore, South Korea, and Japan. A total of 15 presentations were given, covering research areas such as immunotherapy targets, cancer diagnosis, challenges and opportunities in the internationalisation of Chinese medicine, innovative drug discovery, disease mechanisms and treatment, pharmaceutical patents, and clinical data discovery and analysis techniques.

UM will continue to promote the mutual development of the global academic community, expand its international influence, and strive to become a major player in the international academic arena and address current global challenges.

ICMS successfully holds the 1st Symposium on Computational Pharmaceutics

From December 14 to 16, 2024, the 1st Symposium on Computational Pharmaceutics – Artificial Intelligence and Modeling in Pharmaceutical 4.0 was successfully held at the IInstitute of Chinese Medical Sciences (ICMS) at University of Macau. The three-day event attracted renowned experts from around the world, aiming to gather top researchers, practitioners, and industry experts to discuss the latest advancements and challenges in computational pharmaceutics.

During the opening ceremony, Prof. Ge Wei, Vice Rector (Research) of the University of Macau, delivered an opening speech. He highlighted the potential of artificial intelligence in pharmaceutical fields and the university's commitment to promoting technological innovation and interdisciplinary collaboration.

Speakers from institutions like Uppsala University, the University of Surrey, the University of Helsinki, MIT, Pacific University, the University of Copenhagen, the University of Toronto, Peking University, and others shared research on AI in drug delivery and computational pharmaceutics applications in drug discovery, high-performance computing, robotics, and big data analysis. Industry experts also participated, advancing AI in the field.

The Symposium facilitated communication and collaboration among academia, industry, and government. The University of Macau will continue to support AI development in pharmaceutical fields, contributing to public health.

The successful hosting of this conference highlights Macau's growing international influence at the crossroads of artificial intelligence and pharmaceuticals, infusing new energy into the region's technological innovation and sustainable development.

Academic Visits

UM vice rector leads delegation to visit top US universities to promote academic and research collaboration

To strengthen ties with English-speaking higher education, Prof. Rui Martins, Vice Rector of UM, visited top universities in California and Nevada. The visits resulted in signed agreements aimed at fostering cutting-edge research and joint talent development with global competitiveness from November 18 to 22. At Stanford University, the UM delegation engaged with Mr. Reed Sprague, executive director of Stanford Medicine Industry Relations, and others to explore advanced research projects and potential collaborations in big data, biostatistics, and clinical acupuncture. Both sides agreed to enhance scientific research and talent cultivation.

At UC Berkeley, Prof. Martins discussed the Visiting Student Researcher Programme and the desire for more student and faculty exchanges in health sciences and management with Global Engagement Office representatives.

UCLA's meeting with Prof. Cindy Fan focused on research collaboration in business, economics, and Chinese medicine, with agreements on student and faculty exchanges,

dual degrees, and seminars.

At USC, Prof. Martins signed a memorandum with Prof. Anthony Bailey and Prof. Vassilios Papadopoulos to promote collaboration in medicine, pharmacology, and health sciences. The UM delegation also discussed further cooperation with USC faculty.

At UCI, the UM delegation met with Prof. Alexandre Chan and Prof. Robert McCarron, agreeing to establish cooperation in pharmacology and health sciences research and talent cultivation.

At UCSD, the UM delegation met with Prof. Lisa Ordóñez and Prof. Eric Yorkston to discuss academic collaboration, student and faculty exchanges, and joint talent programmes.

At SDSU, Prof. Martins signed a student exchange agreement with Prof. Cristina Alfaro, aiming to strengthen research collaboration and organize joint seminars in public health and business administration.

The UM delegation also visited UNLV, where Prof. Martins signed a memorandum with Prof. Chris Heavey to build a cooperation platform in tourism and hospitality management, supporting Macao's development as a tourism hub.

These visits have significantly expanded UM's cooperation with US West Coast universities, focusing on student and faculty exchanges, research collaboration, and joint seminars in business, tourism, pharmacology, and health sciences. The UM delegation included key faculty from UM's business, health sciences, and Chinese medicine programs.

Delegation from Macau Pooi To Middle School visits ICMS

On November 5, Macau Pooi To Middle School's 17 students and teachers visited Institute of Chinese Medical Sciences (ICMS) at University of Macau, exploring its role in the "Belt and Road" initiative. Dr. Cheang Wai San, Assistant Professor of ICMS welcomed the delegation and introduced the institute's mission and its potential in industry cultivation. The visit enhanced students' knowledge of Chinese medicine, sparking interest in its vastness and scientific foundations. They observed advanced research techniques and outcomes, highlighting Chinese medicine's global health potential and significance for future medical

Delegation from Universidade Nacional Timor Lorosa'e visits ICMS

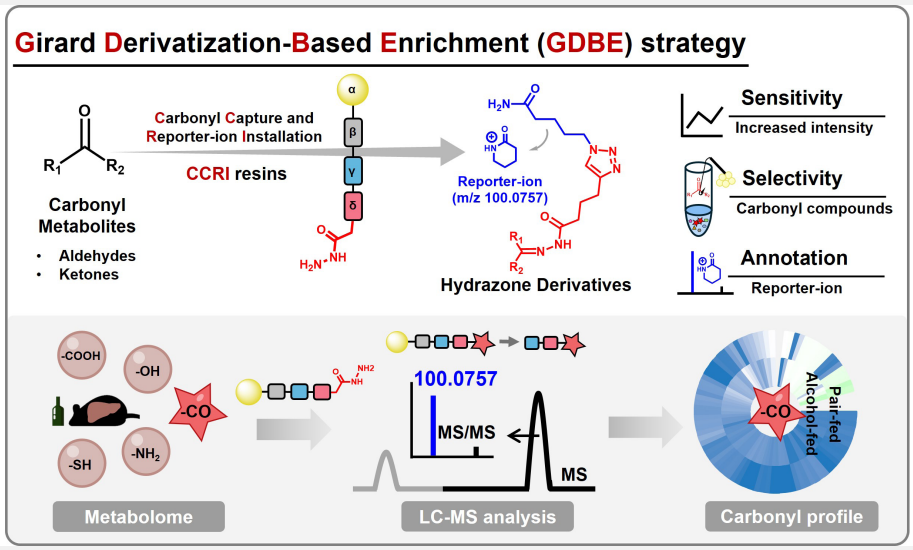
Prof. João Soares Martins, Rector of Universidade Nacional Timor Lorosa'e (UNTL), led a delegation to visit

the Institute of Chinese Medical Sciences (ICMS) and State Key Laboratory of Quality Research of Chinese Medicine (SKL-QRCM) at University of Macau on November 25. The delegation was warmly received by Prof. Chen Xin, director of ICMS and SKL-QRCM of UM. The visit highlighted ICMS's progress in TCM innovation and research. Discussions on research and potential collaborations were held, aiming to strengthen ties between UNTL and UM.

Research Highlights

Girard derivatization-based enrichment strategy for profiling the carbonyl submetabolome in biological samples

Numerous bioactive metabolites containing carbonyl groups, which detection is hindered by poor ionization efficiency and complexity of the sample matrix. To overcome these limitations, the team led by Wan Jianbo professor at ICMS, have developed a Girard derivatization-based enrichment (GDBE) strategy for capturing and profiling carbonyl metabolites in biological samples. A functionalized resin, named carbonyl capture and reporter-ion installation (CCRI) resins, was synthesized to capture carbonyl metabolites via a Girard reaction. After unwanted metabolites were removed, the hydrazone derivatives were cleaved from the resins and subjected to LC-MS analysis. GDBE strategy exhibits exceptional selectivity for enriching carbonyl metabolites and surpasses current detection limits by enhancing the MS sensitivity and facilitating structural characterization of hydrazone derivatives by a specific MS/MS fragmentation signature. Using the GDBE method, 957 potential carbonyl metabolites were identified in liver tissue from alcohol-fed mice, indicating the potential of this strategy for the efficient nontargeted profiling of the carbonyl submetabolome in complex biological samples. The research has been published in the internationally renowned journal *Analytical Chemistry*.



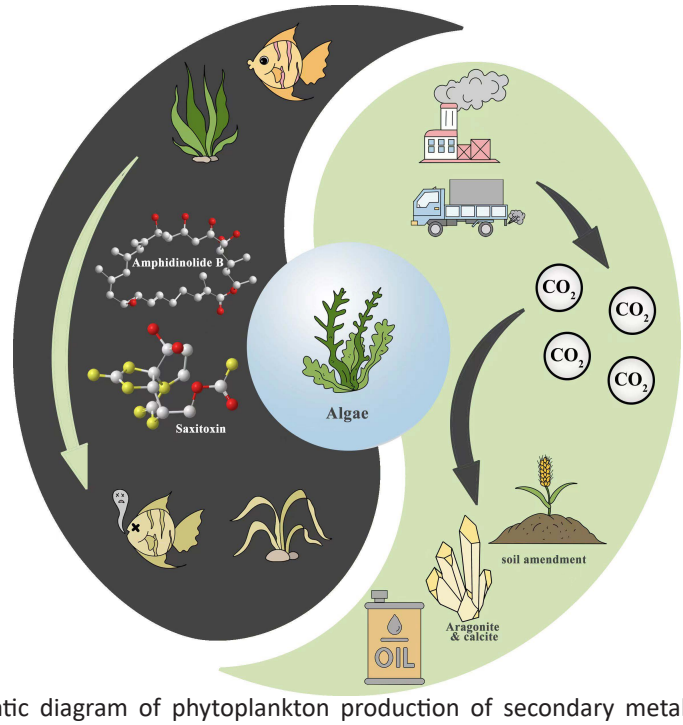
A schematic diagram of Girard derivatization-based enrichment (GDBE) strategy for comprehensive profiling of carbonyl metabolites in biological samples.

Analytical Chemistry, 2024, 96(52):20414-20424

The Chemistry of Phytoplankton

A research team led by Wang Shengpeng, assistant professor at ICMS and and the State Key Laboratory of Quality Research in Chinese Medicine, in collaboration with research teams from Lanzhou University and The Medical University of South Carolina, published a comprehensive review titled "The Chemistry of Phytoplankton", delving into the chemical realm of natural phytoplankton.

As important natural organisms for the absorption, fixation, and conversion of carbon dioxide, phytoplankton produce natural metabolites with complex chemical structures and diverse biological activities, making them a significant source for new drug development. The article provides a comprehensive overview of the role of phytoplankton in carbon dioxide absorption and fixation, as well as their specific secondary metabolites. It focuses on the structural identification techniques and total synthesis methods for these complex metabolites, and summarizes their biological activities. Additionally, the article reviews the impacts of biogeochemical environmental changes on harmful algal blooms (HABs) and the biospheric environment. Finally, it summarizes the methods and technologies for controlling and managing HABs. This article provides a scientific basis for the structural studies of complex secondary metabolites produced by phytoplankton, potential opportunities for drug development, and the control of harmful algae. The research findings are published in the top academic journal in the field of chemistry, *Chemical Reviews*.

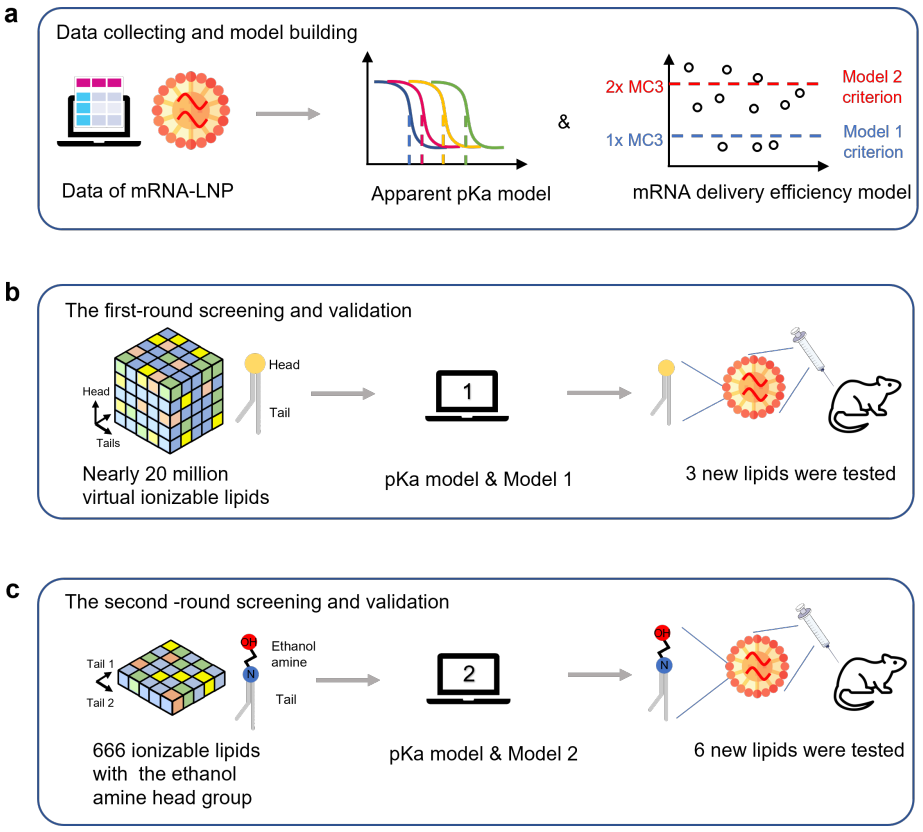


Schematic diagram of phytoplankton production of secondary metabolites and the role of phytoplankton in the carbon cycle.

Chemical Reviews, 2024, 124(23):13099-13177

Development of an artificial intelligence model for virtual screening of mRNA lipid nanoparticle delivery systems

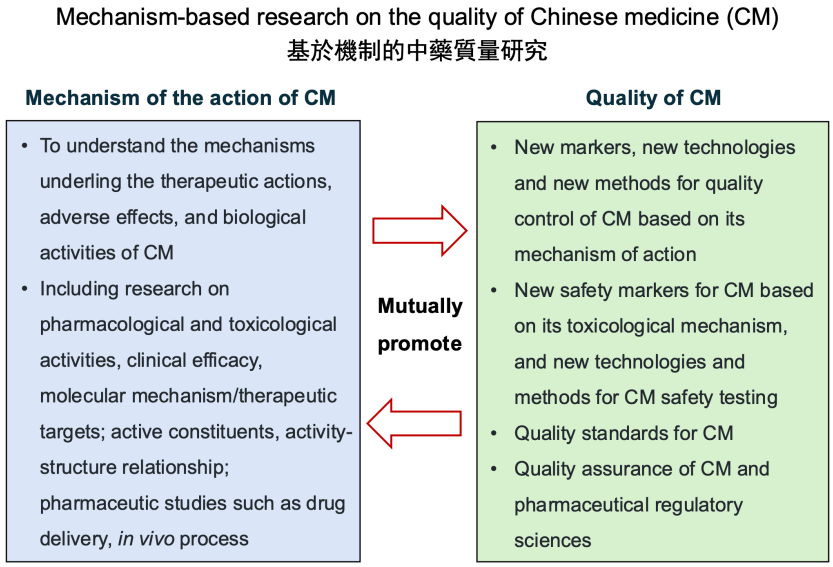
A research team led by Ouyang Defang, associate professor at ICMS, in collaboration with research teams from Fudan University, has made significant progress in the field of artificial intelligence (AI)-driven the development of mRNA lipid nanoparticle (LNP) delivery system. With AI models predicting two key properties of LNPs, apparent pKa and mRNA delivery efficiency, nearly 20 million ionizable lipids, the critical ingredient of LNP, were evaluated through two iterations of molecule generation and virtual screening. Seven newly identified lipids were comparable to or outperformed the control molecule DLin-MC3-DMA, while one of them exhibited efficacy akin to a superior control lipid SM-102. The developed AI model demonstrates potential in accelerating the development of mRNA drug products. The research results have been published in the internationally renowned journal *Nature Communications*.



Overview of AI-driven rational design of ionizable lipids for mRNA lipid nanoparticles.

Nature Communication, 2024, 15(1): 10804

Mechanism-oriented quality research system for traditional Chinese medicine



Research teams from the State Key Laboratory of Quality Research in Chinese Medicine (SKL-QRCM) of the University of Macau (UM) and the State Key Laboratory of Quality Research in Chinese Medicine of the Macau University of Science and Technology (MUST) co-authored a paper titled 'Mechanism-oriented quality research system for traditional Chinese medicine'. The paper was published in *Scientia Sinica Vitae*, a prestigious journal overseen by the Chinese Academy of Sciences, and co-sponsored by the Chinese Academy of Sciences and the National Natural Science Foundation of China.

The quality of Chinese medicine has always been a focus of research and industry attention. However, due to the unclear mechanisms of action, diverse sources and varieties, and complex composition of Chinese medicine, the industry has encountered difficulties in establishing a system to show the relationship between the quality of Chinese medicine and the efficacy and safety of clinical applications, which has hindered the high-quality development of the Chinese medicine industry.

The research teams conducted an in-depth analysis of the current state of quality research of Chinese medicine and proposed a mechanism-oriented approach to quality research of Chinese medicine, which elucidates the underlying logic of various segments of the Chinese medicine industry and highlights the clinical value of Chinese medicine. They also introduced new biomarkers, technologies, and methods for more precise quality control of Chinese medicine, thereby promoting the modernisation, internationalisation, and high-quality development of the Chinese medicine industry. The paper is a theoretical summary of more than a decade of scientific practice by researchers from the two laboratories, and will drive innovation in both models and concepts of quality research of Chinese medicine.

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November 2024

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