Issue 7 2025

ZJU MEDICINE

SHOWCASING THE BEST OF ZHEJIANG UNIVERSITY SCHOOL OF MEDICINE

Crafting Medical Marvels

Dialogue with PENG Shuyou

The Fastidious Gut

Mystery of Small Intestinal Nutrient Supply

Fueling the Aging Brain

Understanding Energy-efficient Neural Computation

ZUSM at A Glance

Zhejiang University School of Medicine (ZUSM), founded in 1912, is one of China's best and oldest higher medical education institutions. Located in Hangzhou – one of China's most picturesque cities – ZUSM is organized across the School of Basic Medical Sciences, School of Brain Science & Brain Medicine, School of Public Health, School of Nursing, 7 clinical medical schools (School of Clinical Medicine, School of Obstetrics and Gynecology, School of Pediatrics, School of Stomatology) and a healthcare partnership network composed of 8 affiliated hospitals, numerous non-directly affiliated hospitals and cooperative hospitals. It is home to more than 35,000 faculty members and over 8,300 students.

ZUSM believes that every global partner is unique and each project is irreplaceable. We collaborate with global partners for a better response to future medical challenges and strive to build a healthier future for all.

浙江大学 医学院
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CONTENTS

PENG Shuyou: The Blade that Carved a Medical Legend

PENG Shuyou

Professor of Surgery, Chief Physician, Doctoral Supervisor
Honorary Fellow of the American College of Surgeons
Honorary Fellow of the Royal College of Surgeons of England
Honorary Fellow of the European College of Surgeons
Honorary Fellow of the National Academy of Surgery, France

As a versatile surgeon, what led you to specialize in pancreatic cancer research?

Since the first pancreaticoduodenectomy (PD) in 1935, pancreaticoenteric anastomotic leakage (PAL) has remained a significant medical challenge. Activated pancreatic fluid is highly destructive, leading to fatal complications such as intra-abdominal bleeding and infection upon entering the abdominal cavity. In 1953, as a student, I observed Professor YU Wenguang perform China's first PD at the Second Affiliated Hospital Zhejiang University School of Medicine (SAHZU). Although the surgery was successful, the patient later developed PAL. As medical professionals, we must venture into uncharted territories; I was determined to tackle the challenge.

You overcame the challenge of PAL by replacing 'suturing' with 'binding.' Could you share the story behind that approach?

Initially, I focused on refining the suturing techniques, but I soon hit a wall. The traditional methods left gaps around the thread, requiring denser stitching. Paradoxically, denser stitching created more needle punctures, which led to even more gaps. Then, the idea of "binding" occurred to me. The pancreas is solid, while the intestine is hollow and layered like a sleeve—could binding them together be the solution? After extensive animal trials, I applied this method to a patient in 1996, successfully preventing PAL. Subsequently, over 300 operations at SAHZU and other hospitals confirmed its effectiveness, and the approach was soon adopted nationwide.

Your 'curettage and aspiration approach' and 'PMOD' have reshaped surgical history. How did you achieve this breakthrough?

Regarding liver cancer, the "king of cancers," I had long been seeking a method to excise liver tissue without damaging the blood vessels. Inspired by the use of ultrasonic scalpels in hepatectomy, I wondered: could curettage be used to scrape liver tissue? Using makeshift tools like pen barrels and stethoscope tubes, I carefully scraped the liver tissue, layer by layer, during an operation, revealing intact blood vessels. But I didn't stop there. After curettage, the tissue needs to be aspirated, and when encountering small vessels, instruments need to be switched for coagulation. Could the dozens of instruments used in the traditional procedures be combined into one? After extensive exploration and thought, I developed the PMOD (Peng's Multifunctional Operational Dissector), which combines cutting, separating, aspirating, and coagulating functions. The device allows surgeons to perform nearly all operations—except suturing—without frequently changing instruments.

In your medical career of over 70 years, you have nurtured many of the field's leaders. What message do you have for young doctors and medical students?

As a doctor, always prioritize your patients' well-being and dedicate yourself wholeheartedly to their care. Be vigilant in identifying issues, think critically to analyze them, and conduct in-depth research to find solutions. In clinical practice, no two cases are identical, and no operation is flawless. Therefore, it is essential to continuously refine the treatments, avoid complacency, and embrace innovation. Only through constant improvement can we make progress, develop, and surpass ourselves.

> ***In surgery, one must never cling to conventions. Replicating techniques is simple, while challenging the norms is hard. Innovation requires courage.*** "

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HUANG Haojie: A Pioneer in Translational Medicine

HUANG Haojie

Qiushi Chair Professor, Zhejiang University
Director, Institute of Urologic Science and Technology, The First Affiliated Hospital, Zhejiang University School of Medicine (FAHZU)
Former President, The Society for Basic Urologic Research (SUBR)

> *We focus on basic and translational research with the goal to advance science and medicine by addressing major unmet clinical needs, pivotal scientific questions, and technological bottlenecks.*

Having worked overseas for 27 years, what motivated you to join Zhejiang University School of Medicine?

My research in the U.S. centered on basic and translational studies on prostate cancer, a commonly diagnosed urologic cancer in men, with multiple projects advanced to clinical trials.
When considering to be back in China, I was primarily interested in research-oriented hospitals. FAHZU stood out for many reasons:
Firstly, the Department of Urology at FAHZU has an outstanding clinical team with exceptional clinical resources and expertise, an ideal place for translational research.
Secondly, it is an open secret that attracting renowned, talented scholars worldwide to build a comprehensive, collaborative, and competitive research team is a top priority of Zhejiang University and the Medical School.
Lastly, Zhejiang Province, ZUSM, and FAHZU are all fully committed to investing basic and translational research, offering the state-of-the-art facilities and robust infrastructure to build scientific teams and research environment.

What emerging trends deserve attention in your field?

Metastasis and therapeutic resistance in prostate cancer remain the major challenges. While hormone therapy is the mainstay treatment for metastatic prostate cancer, most cases relapse post-treatment—a critical clinical hurdle. The androgen receptor (AR), a transcription factor, plays a pivotal role in prostate cancer progression. Recent studies stress that genomic mutations and chromatin/epigenetic remodeling induced by hormone therapy drive tumor lineage plasticity, a key mechanism of resistance. Additionally, despite prominence of immunotherapy in cancer treatment, poor responsiveness in prostate cancer patients remains an urgent need.

Having dedicated years to prostate cancer research, what breakthroughs have you achieved since returning to China?

Our lab focuses on AR function and regulation. A recent discovery in my laboratory revealed that AR acts as a master suppressor of tumor-intrinsic innate immune responses, profoundly inhibiting prostate cancer's response to immune checkpoint blockade intervention. This finding opens new avenues for developing effective immunotherapies. We also pioneered Proteolysis-Targeting Chimeras (PROTACs) to degrade therapy-resistant transcription factors—a cutting-edge strategy to overcome treatment resistance. These innovations have allowed us to file national and international patents. Furthermore, we have successfully mastered the skills to generate immune cell-engaging organoids from prostate cancer patients, creating a powerful platform for screening drug screen and clinical testing of novel therapeutics, particularly immunotherapies such as CAR T cell treatments.

What advice would you share with young clinicians pursuing research?

For physician-scientists, it would be powerful if their research could align with clinical challenges. Their excellence in both clinical practice and research will undoubtedly enable precise diagnosis and treatment of diseases.
I strongly recommend young doctors to leverage their clinical strengths and passions to tackle impactful questions within their specialties, which I believe will attract resource and financial support from university and hospital. It is my sincere hope that more and more young clinicians will excel not only in patient care but also in transformative research, driving the future of medicine.

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Cell-Microenvironment Interaction Discipline Innovation Introduction Base

In 2024, Zhejiang University School of Medicine was awarded the "Cell-Microenvironment Interaction Discipline Innovation Introduction Base" under the "111 Center", a prestigious initiative launched by the Ministry of Education and the State Administration of Foreign Experts Affairs . This program aims to enhance the development of world-class disciplines at Chinese universities by attracting top-tier international talent and research teams, thereby advancing scientific innovation and global influence.

The "Cell-Microenvironment Interaction Discipline Innovation Introduction Base" (hereafter, the Base) is led by Professor YING Songmin, Executive dean of Zhejiang University School of Medicine and recipient of the National Science Fund for Distinguished Young Scholars. The overseas academic leadership is spearheaded by Professor Ian David Hickson, Fellow of the Royal Society and the Academy of Medical Sciences, and Professor at the University of Copenhagen. The Base is anchored in Zhejiang University's Double First-Class Disciplines in Basic Medicine, leveraging high-caliber platforms such as the State Key Laboratory of Brain-Machine Intelligence, the Key Laboratory of Cancer Prevention and Intervention, China National Ministry of Education, the National Pilot School by the Ministry of Education of China, and the Sino-German Center.

Centered on the study of cells and their microenvironment, the Base focuses on unraveling the molecular mechanisms underlying non-communicable diseases, particularly malignant tumors and neuropsychiatric disorders. Its research is organized around three core themes: cell-microenvironment interaction, its role in tumor biology, and its implications for neuropsychiatric diseases. Through international expert collaboration and talent development, the Base aspires to establish itself as a globally leading research hub in cell-microenvironment interaction. It aims to drive academic innovation, elevate the global competitiveness of Zhejiang University School of Medicine, and contribute to China's "Healthy China 2030" national strategy.

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Developing New Productive Forces and Establishing China's First International Journal of Minimally Invasive Surgery

Laparoscopic, Endoscopic and Robotic Surgery (LERS) (CN 33-1421/R, ISSN 2468-9009) is the first diamond open-access, peer-reviewed international academic journal in the field of minimally invasive surgery in China, sponsored by Zhejiang University (Sir Run Run Shaw Hospital). Launched in 2018, it was indexed by internationally renowned databases Embase, DOAJ, and Dimensions in 2019. In 2020, LERS was selected for China's Excellence Action Plan for Science and Technology Journals (High-Impact New Journal category). After obtaining its CN number through rigorous review by the National Press and Publication Administration in 2021, LERS was officially published. In 2022, it was indexed by Scopus, and in 2024, it was indexed by the ESCI database. LERS has also been honored with awards including the Outstanding Science and Technology Journal Award in Zhejiang Province, Fast Publication Award and Best Paper Award of KeAi. It has been selected for the "Exhibition of China's Top-quality Journals" at the Beijing International Book Fair three times. Since its establishment, LERS has steadily advanced in quality and efficiency, while gaining international recognition for its academic rigor and influence.

Building an International Editorial Team

The Editor-in-Chief, Professor CAI Xiujun, the president of Sir Run Run Shaw Hospital, Zhejiang University School of Medicine, is an international pioneer in minimally invasive surgery. The Editorial Board comprises worldwide experts in the field of laparoscopic, endoscopic and robotic surgery, with international members accounting for 60%. Editorial manager WANG Jin and editor ZENG Qingjie have studied and trained in the United States and the United Kingdom, possessing global perspectives and proficiency in language skills.

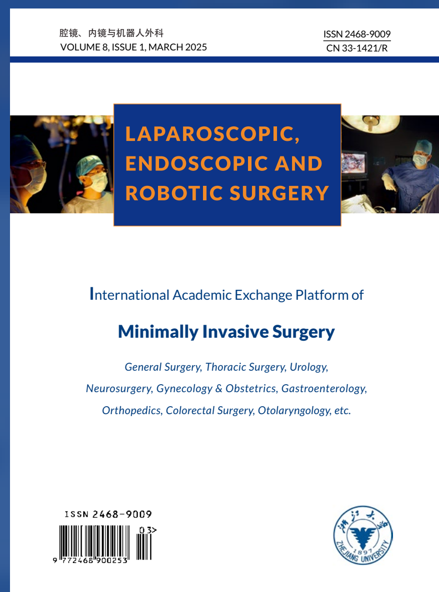
Enhancing the Global Academic Impact

LERS's reputation and global influence continue to grow, with 78% of authors hailing from over 70 countries, including the United States, the United Kingdom, Germany, Canada, Australia, and Japan. Over 70% of reviewers are international scholars, and the readership spans nearly 100 countries, with 90% of readers located overseas. Its publications are widely cited internationally.

Abiding by International Standards

LERS employs the Editorial Manager submission system and uses the CrossCheck anti-plagiarism system. It strictly implements the peer review process. As a member of the Committee on Publication Ethics, it strictly adheres to global academic publishing ethics. At the meantime, LERS follows the editorial and publishing guidelines set by the International Committee of Medical Journal Editors to ensure editorial quality and eliminate academic misconduct.

Expanding Multimedia Outreach and Improving Dissemination Capabilities



LERS promotes its content through multiple platforms, such as Elsevier, Scopus, ScienceDirect, and its official website. Leveraging Clarivate Analytics' services, LERS precisely targets potential authors and readers globally. Its WeChat platform has pushed out over a hundred promotional articles, strengthening its visibility among domestic audiences.

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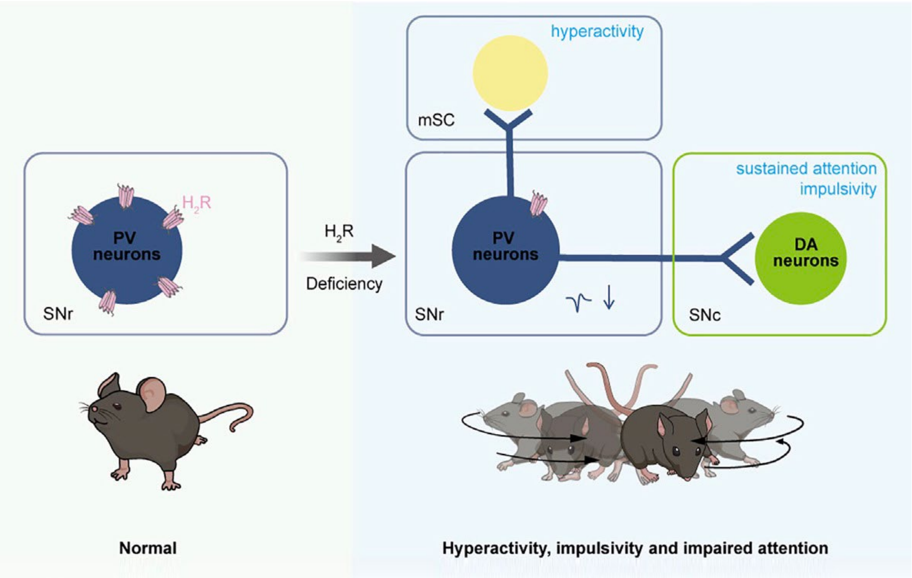
New Mechanism in ADHD and Potential Drug Target

In a recent study published online by *Neuron* on January 8, 2025, a research team from Zhejiang University School of Medicine and Zhejiang Chinese Medical University, led by Professors HU Weiwei and CHEN Zhong, revealed new insights into Attention Deficit Hyperactivity Disorder (ADHD). The study, for the first time, reveals that the lack of histamine H_2 receptors (H_2R) on parvalbumin-positive (PV^+) neurons leads to hyperactivity, impulsivity, and attention deficits in mice, facilitating understanding the underlying mechanisms of ADHD. This study also provides a new precise drug target for ADHD treatment.

ADHD is a common neuropsychiatric disorder that affects around 4% of the global population, with core symptoms including inattention, hyperactivity, and impulsive behaviors. It is widely believed to be associated with dysfunction in the dopamine system. Currently available medications, such as methylphenidate, can be effective; however, they are associated with several side effects, including the potential for addiction. Thus, it is urgent to explore new mechanisms of ADHD and identify specific drug targets.

The research team, which has been focusing on the role of histamine receptors in major brain diseases for a long time, selectively deleted the H_2R from PV^+ neurons by using Cre/loxp technology. The results demonstrated that these mice display hyperactivity, impulsivity, and attention deficits, while other functions, such as mood, learning, memory, and social behavior remain unaffected. Further analysis of both ADHD mouse models and human patients with ADHD revealed a significant decrease in H_2R expression on PV^+ neurons in the substantia nigra pars reticulata (SNr). Following specific knockdown of H_2R expression in SNr PV^+ neurons, researchers observed similar ADHD-like behaviors in mice. Interestingly, administration of an H_2R agonist to the SNr could alleviate these behavioral abnormalities.



The team subsequently employed in vivo single-cell recordings, ex vivo electrophysiology, optogenetic recordings, and chemogenetic manipulations to investigate the neural circuits that underlie these behaviors. They discovered that the lack of H_2R reduced the excitability of PV^+ neurons, which in turn disinhibited downstream dopamine neurons in the substantia nigra pars compacta (SNc) and neurons in the medial layer of the superior colliculus (mSC), leading to the manifestation of ADHD-like behaviors. Interestingly, the study revealed that the SNc-projecting and mSC-projecting PV^+ neurons play distinct roles in the regulation of ADHD-like behaviors.

These findings not only enhance our understanding of the pathophysiology of ADHD, but also reveal a novel role for H_2R in the brain. H_2R in PV^+ neurons serves as a potential drug target for ADHD treatment.

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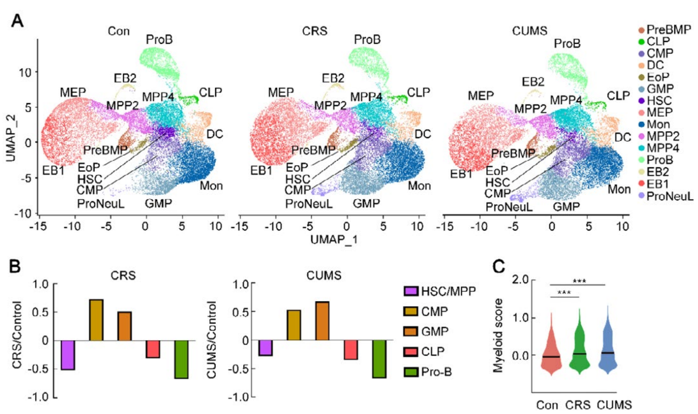
Vasopressin Drives Aberrant Myeloid Differentiation of Hematopoietic Stem Cells, Contributing to Depression in Mice

Stress, including high-altitude hypoxia, radiation, and psychological stress, can disrupt the immune system and induce depression. Hematopoietic stem cells (HSCs) can directly sense neuroendocrine signals and maintain immune system homeostasis. However, the specific role and mechanisms of HSCs in stress-induced depression remain unclear. On October 22, 2024, the research group directed by LU Xinjiang from the Zhejiang University School of Basic Medical Science in the journal ***Cell Stem Cell***. The study elucidates the role and mechanism of arginine vasopressin (AVP) in mediating the brain-bone marrow axis under stress conditions, revealing the specific molecular mechanisms by which neuroendocrine signals influence myeloid differentiation of HSCs.

Single-cell RNA sequencing (scRNA-seq) was employed to reveal that an increase in myeloid progenitor cells (CMP and GMP) and a decrease in lymphoid progenitor cells (CLP and ProB) were observed in the bone marrow of mice with chronic unpredictable mild stress (CUMS, Figure 1). The scRNA-seq data also identified upregulation of S100A9 expression in HSCs, which mediated myeloid differentiation. Further in-depth analysis of scRNA-seq data, combined with ImmGen results, demonstrated that arginine vasopressin receptor 2 (AVPR2) was significantly more highly expressed in neutrophil progenitor-like cells (ProNeuL) and neutrophils compared to other cell types. Adoptive transfer of neutrophils treated with AVP promoted myeloid cell production in the bone marrow, while neutrophil-specific knockout of AVPR2 inhibited myeloid differentiation in mice. Subsequently, they confirmed that HSC-derived neutrophils could migrate into the brain through in vivo tracing techniques in CUMS mice. Transcriptomic sequencing of neutrophils revealed that AVP treatment upregulated IL36G expression in neutrophils, and hematopoietic cell-specific knockout of the IL36G receptor IL1RL2 suppressed myeloid cell production and neuroinflammatory responses in the brain.



This study demonstrated that the hematopoietic system plays a pivotal role in the pathogenesis of depression induced by stress, elucidating the mechanisms of the brain-marrow axis in the occurrence of depressive disorders (Figure 2). Furthermore, a monoclonal antibody targeting the IL36G-IL1RL2 pathway, which has already been approved for treating psoriasis in 2022, could potentially offer therapeutic benefits for treating depressive disorders in the future, thereby holding significant clinical implications.

Additionally, research showed that changes in the hematopoietic system, such as those induced by high-altitude hypoxia, can also contribute to the development of depression through mechanisms of myeloid cell differentiation, although these mechanisms differed from those induced by psychological stress. This work is still ongoing to further elucidate these molecular mechanisms. Furthermore, the role of myeloid cell differentiation in the incidence and progression of gastrointestinal tumors is also under in-depth exploration.

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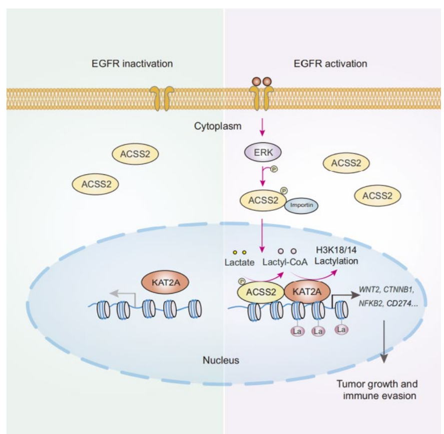
ACSS2 Acts as a Lactyl-CoA Synthetase and Couples KAT2A to Function as a Lactyltransferase for Histone Lactylation and Tumor Immune Evasion

Lactate, an inexorable product of glycolysis, serves as an instrumental energy source, a major gluconeogenic precursor, and a signaling molecule with important roles in diverse cellular functions, such as gene transcription and mitochondrial respiration. Lactate production can be greatly upregulated by hypoxia or the Warburg effect, which reflects increased uptake of glucose and production of lactate in cancer cells regardless of oxygen availability. Lactate can be converted into lactyl-CoA, which acts as the lactyl donor for enzymatic and nonenzymatic protein lactylation, thereby playing a role in cellular signaling. Histones, including histone H3 lysine (K) 14 and K18, are lactylated in a p53-dependent and p300-mediated manner, leading to homeostatic gene transcription in bacterially challenged M1 macrophages and promotion of wound healing, although it remains unclear whether p300 catalyzes the transfer of lactyl from lactyl-CoA to histones in vivo. Histone lysine lactylation (Kla) is also involved in macrophage transition from a proinflammatory state to a reparative state. Nevertheless, lactyl-CoA is much less abundant (25-350 times lower) than other acylCoAs. How lactyl-CoA is produced by yet unidentified lactyl-CoA synthetases for protein lysine lactylation in the presence of other ample acyl-CoAs is unclear. In addition, the regulation of histone lactylation and corresponding gene transcription in response to oncogenic signaling in cancer cells remains elusive.

On November 18, 2024, Professor LU Zhimin's team at Zhejiang Key Laboratory of Pancreatic Disease, the First Affiliated Hospital, Zhejiang Key Laboratory of Frontier Medical Research on Cancer Metabolism, Institute of Translational Medicine, Zhejiang University School of Medicine, in collaboration with TAO Yizhi's team at Rice University, published a research paper in the journal ***Cell Metabolism*** titled "ACSS2 acts as a lactyl-CoA synthetase and couples KAT2A to function as a lactyltransferase for histone lactylation and tumor immune evasion". This study identified for the first time a lactyl-CoA synthetase in mammalian cells, ACSS2, that directly converts lactate produced by LDHA to lactyl-CoA. When epidermal growth factor (EGF) activates the EGFR pathway, ERK phosphorylation-mediated nuclear translocation of ACSS2 facilitates the conversion of LDHA/ ACSS2/KAT2A complex formation, which acts as a lactyltransferase and promotes histone lactylation, gene expression, tumor growth, and immune escape.

EGFR induced the association of KAT2A with gene promoter regions and subsequent histone H3 lactylation in tumor cells. KAT2A binds to lactyl-CoA, and the crystal structure of the catalytic domain of KAT2A in complex with lactyl-CoA at 2.37 Å resolution shows that lactyl-CoA binds to the substrate binding pocket with the lactyl moiety pointing toward the end of a cavity surrounded by Loop 3 and Loop 2, within which R533 forms a hydrogen bond with the -OH group from the lactyl moiety. Site-directed mutagenesis indicates that R533 in this loop has an important role in the selective binding of lactyl-CoA over acetyl-CoA. Importantly, KAT2A acts as a lactyltransferase to lactylate histone H3 at K14 and K18, with maximum frequency around the transcription start sites of genes. Intriguingly, ACSS2, which was phosphorylated by ERK at S267, translocated into the nucleus, where ACSS2 formed a complex with KAT2A. Nuclear ACSS2 acted as a bona fide lactyl-CoA synthetase, bound to lactate and converted lactate and CoA into lactyl-CoA. ACSS2 produced lactyl-CoA at gene promoter regions, which compensated for low levels of nuclear lactyl-CoA and enabled KAT2A to lactate histone H3 K18 and K14 in the promoter regions of genes in critical pathways, such as the Wnt



and NFkB signaling pathways. ACSS2/KAT2A-mediated histone lactylation and subsequent expression of genes including ***CTNNB1, WNT2, WNT5A, RELA, NFKB2, IKKA, and CD274*** promoted GBM cell proliferation and immune evasion and brain tumor growth with prolonged mouse survival time. This also suggests that when KAT2A binds to different complexes, it not only catalyzes modifications such as acetylation and succinylation of histones, but also functions as a histone lactylation transferase.

Taken together, ACSS2 is a novel lactyl-CoA synthetase that acts synergistically with LDHA/KAT2A as a histone lactyltransferase to regulate the expression of genes critical for tumor progression. These findings emphasize the multifunctionality of ACSS2 and KAT2A in cellular activities and the novel function of ACSS2-KAT2A in epigenetic regulation. This study not only deepens the understanding of the mechanism of glucose metabolism in tumor cells, but also provides potential metabolic markers and molecular targets for the development of new anticancer therapeutic strategies, which will be an important guide for the development of anticancer drugs targeting the lactate modification of tumors.

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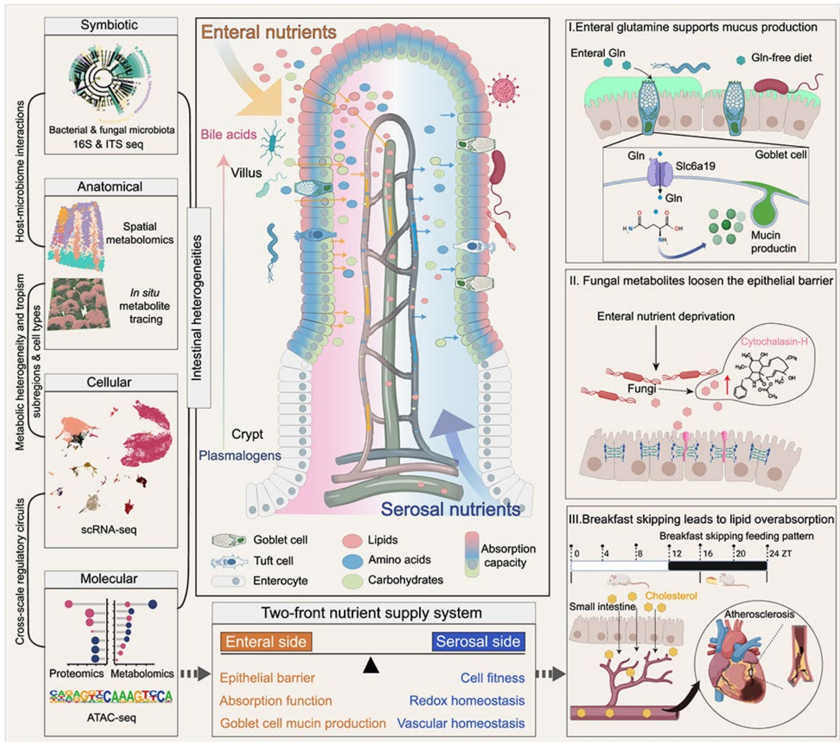
Unfolding the Mystery of Small Intestinal Nutrient Supply



The small intestine contains a two-front nutrient supply environment created by luminal dietary and microbial metabolites (enteral side) and systemic metabolites from the host (serosal side). Yet, it is unknown how each side contributes differentially to the small intestinal physiology. Here, we generated a comprehensive, high-resolution map of the small intestinal two-front nutrient supply environment. Using in vivo tracing of macronutrients and spatial metabolomics, we visualized the spatiotemporal dynamics and cell-type tropism in nutrient absorption and the region-specific metabolic heterogeneity within the villi. Specifically, glutamine from the enteral side fuels goblet cells to support mucus production, and the serosal side loosens the epithelial barrier by calibrating fungal metabolites. Disorganized feeding patterns, akin to the human lifestyle of skipping breakfast, increase the risk of metabolic diseases by inducing epithelial memory of lipid absorption. This study improves our understanding of how the small intestine is spatiotemporally regulated by its unique nutritional environment.

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Fueling the Aging Brain

As the core organ governing thought and consciousness, the brain consumes immense biological energy to maintain critical functions such as learning, memory, and emotions. To enable energy-efficient operation, the brain must finely regulate this process, achieving massive parallel information processing and storage at low energy costs. This high-efficiency, low-energy capability remains the ultimate goal of supercomputing and AI technologies, yet it is still beyond human technological reach. Moreover, energy regulation in the brain is closely tied to human health, as its imbalance is considered a major risk for neurological disorders, particularly age-related neurodegenerative diseases.

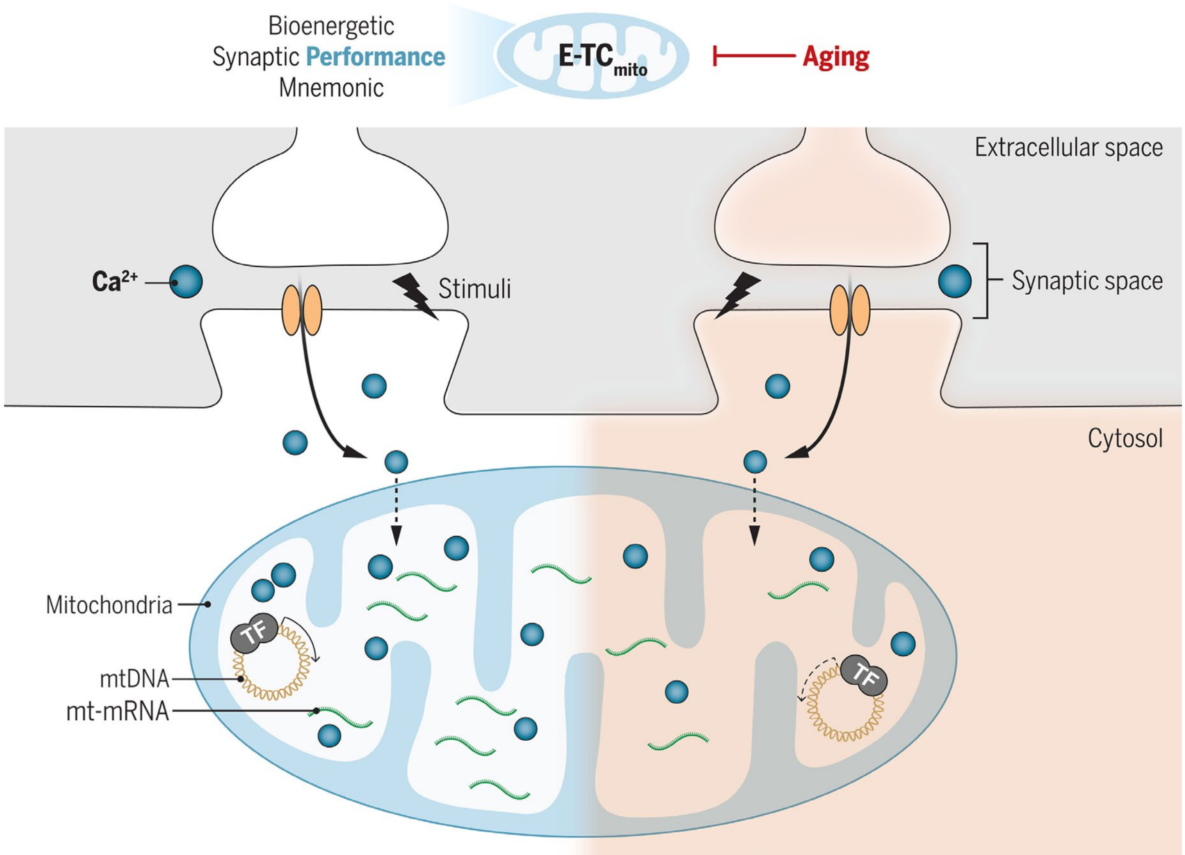
Whether it is the energy crisis posed by AI's high energy consumption or the challenges of cognitive decline in aging populations, these are critical issues for humanity. From a scientific perspective, understanding "how mammalian brains integrate energy, matter, and information—the fundamental elements of universe" offers not only pathways to mimic and surpass the brain's evolved "low-energy, high-efficiency" mechanisms but also opportunities to address age-related challenges. Focusing on this cutting-edge neuroscience question, Prof. MA Huan's team at Zhejiang University investigated the relationship between neuroplastic regulation of bioenergetics and cognitive aging. Their findings, published in ***Science*** under the title "Boosting neuronal activity-driven mitochondrial DNA transcription improves cognition in aged mice", provide a novel perspective and theoretical framework for understanding energy-efficient neural computation and combating cognitive aging.

Driving mitochondrial gene transcription with mental activity

The brain's hallmark is its ability to dynamically adjust the strength of neuronal connections based on activity and experience—termed synaptic plasticity. This plasticity relies on activity-driven transcription of nuclear genes, producing new proteins essential for learning and memorizing. Mitochondria, as the primary energy providers, are unique organelles with their own genome, and mitochondrial transcription is crucial for energy supply and biogenesis. The central question is: Can neuronal activity regulate mitochondrial gene transcription (E-TCmito), similar to its regulation of nuclear transcription? If so, this coupling would enable coordinated transformation of energy and matter to support information transmission and storage. Using mouse models, Prof. MA's team discovered that enhanced neuronal activity—whether during learning or artificially induced—significantly increased mitochondrial gene transcription near synapses. Further investigation revealed that this activity-mitochondrial transcription coupling depends heavily on mitochondrial calcium influx induced by neuronal activity. This process is regulated by mitochondrial CaMKII (CaMKIImito). Once mitochondrial calcium levels rise, calcium-responsive transcription factor CREBmito binds to the D-loop region of the mitochondrial genome, driving gene transcription. Notably, both CaMKII and CREB are traditionally considered as key regulators of nuclear gene transcription, and their newfound role in mitochondria challenges textbook definitions, showcasing their multifaceted functions in the nervous system. By dissecting these mechanisms, the team achieved precise molecular control over activity-driven mitochondrial transcription. They demonstrated that this process is essential for mitochondrial biogenesis, quality control, and the dynamic regulation of energy during neuronal activity—providing a foundation for maintaining synaptic function and cognitive processes such as learning and memorizing.

Can "mental exercises" rejuvenate the aging brain?

Research has shown that brain energy supply and cognitive ability decline with aging or neurodegeneration. The team observed that activity-driven mitochondrial transcription coupling weakens in aged brains. "We speculated whether enhancing this coupling could improve brain function and counteract cognitive aging," said Dr. LI Wenwen. Using transgenic mouse models, they confirmed that suppression of this coupling led to energy deficits and



cognitive impairments similar to aging-related neuropathology.

To address this, the team developed molecular tools to precisely enhance neuronal activity-mitochondrial transcription coupling. Experiments revealed that prolonged enhancement of this mechanism boosted mitochondrial gene expression during learning, increased energy supply, and significantly improved cognitive performance in aged mice. "This provides theoretical evidence that mental exercises can counteract brain aging," Dr. LI added. Unraveling this fundamental signaling mechanism in neurons not only deepens understanding of brain function but also offers a new molecular framework for combating cognitive decline. Ongoing translational research and drug development have shown encouraging results.

Implications for Energy-Efficient Artificial Intelligence

Elon Musk has highlighted that, beyond chip shortages, energy will be the next bottleneck for AI computation. Could the brain's low-energy information processing inspire solutions to AI's energy demands? Prof. MA's team recognized that the evolutionary mechanism of neuronal activity-mitochondrial transcription coupling might hold the key. Unlike traditional computers, which rely on uniform energy supply, the mammalian brain employs a unique "on-demand" energy strategy: mitochondria near synapses act as energy "packets" regulated by local neuronal activity. This discovery suggests that the brain achieves efficient, low-energy computation by dynamically regulating local energy production at each "data node" (synapse). "Revealing this fundamental coupling mechanism may help AI systems enhance computational efficiency while reducing energy consumption," said Prof. MA.

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Pioneering a Dual-Target Strategy Against Age-Related Pathologies

Zhejiang University study unveils a novel immunotherapeutic approach to combat cellular senescence and its associated disorders.

While the passage of time leaves its mark on our appearance, the silent accumulation of senescent cells within tissues drives systemic aging and chronic diseases. Research indicates that even 0.05% of senescent cells can trigger pathological organ dysfunction, contributing to conditions such as fibrosis, osteoarthritis, neurodegeneration, and cancer. Although the immune system serves as a frontline defense against senescence, immunosenescence often results in the escape of these "zombie cells." Restoring immune-mediated clearance of senescent cells has thus emerged as a pivotal therapeutic goal.

On December 2, 2024, a research team led by Prof. WANG Ben from the Institute of Translational Medicine of Zhejiang University and the Second Affiliated Hospital of Zhejiang University School of Medicine published a groundbreaking study in ***Nature Aging*** titled "A chimeric peptide promotes immune surveillance of senescent cells in injury, fibrosis and tumorigenesis". The team developed a chimeric peptide, E16-uPA_{24}, which acts as a molecular bridge to enhance immune surveillance of senescent cells, offering a novel strategy to alleviate age-related pathologies.

Dual-Target Design: Precision Targeting and Immune Activation

The study hinged on two key discoveries: (1) urokinase-type plasminogen activator receptor (uPAR) is hyper-expressed on senescent cells, serving as a specific surface marker; (2) The glutamate levels in aging individuals significantly decrease, and glutamate is strongly associated with the resting and activation of immune cells. Glutamate may serve as a regulator to initiate endogenous immune responses. Leveraging this, the team engineered E16-uPA_{24}—a chimeric peptide combining a uPAR-targeting sequence (uPA_{24}) with a glutamate polymer (16E)—to simultaneously anchor senescent cells and activate natural killer (NK) cells via metabotropic glutamate receptor 5 (mGluR5). "E16-uPA_{24} functions like a smart glue: one end binds senescent cells, while the other ignites NK cells' killing machinery," explained Prof. WANG, corresponding author of the study.

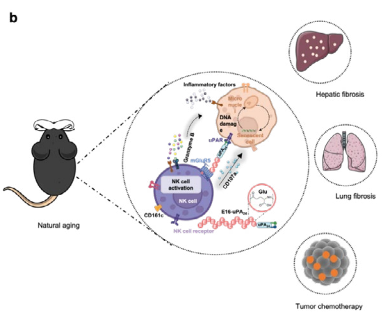
Rejuvenating the Immune Microenvironment: From Fibrosis to Natural Aging

In a carbon tetrachloride (CCl_4)-induced liver fibrosis model, mass cytometry (CyTOF) revealed that E16-uPA_{24} treatment reduced pro-inflammatory granulocytes (e.g., eosinophils) and boosted cytotoxic lymphocytes (NK and CD4+ T cells). Mechanistically, the peptide enhanced NK cell recognition by Load glutamate onto the surface of senescent cells, while directly stimulating mGluR5 to amplify Granzyme B secretion.

Notably, E16-uPA_{24} mitigated collagen deposition in chronic liver/lung fibrosis, attenuated acute injury, and extended healthspan in naturally aged mice. Moreover, the combination of the chimeric peptide with cancer chemotherapy not only induced tumor regression but also mitigated chemotherapy-induced lung toxicity—a dual therapeutic advantage with promising outcomes. Crucially, the therapy showed no signs of systemic hyperactivation, underscoring its translational potential.

Future Directions: Toward Clinical Translation

This study addresses the heterogeneity of senescent cells and the complexity of aging microenvironments by harnessing endogenous immunity for precision clearance. The team plans to optimize peptide delivery systems and explore applications in extending the lifespan of aging individuals. With advancing clinical translation, E16-uPA_{24} holds promise as a vital weapon against population aging challenges.



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AI Assistant Gives Pathologists Helping Hand in Cancer Detection

Artificial intelligence (AI)-enabled medical diagnostic tools are improving cancer screening accuracy, helping doctors arrive at more precise diagnoses and enhancing treatment quality.

Zhejiang University has recently launched OmniPT, an AI-powered universal pathology assistant integrating vision and language models for human-computer interaction. The model is currently deployed at the Department of Pathology, the First Affiliated Hospital, Zhejiang University School of Medicine(FAHZU), focusing on high-incidence cancers such as gastric, colorectal, and cervical cancers. The hospital in Hangzhou, Zhejiang Province, is the first clinical institution in China to use an AI-powered pathology assistant.

According to FAHZU, OmniPT has achieved multiple breakthroughs in laboratory testing, including cancer classification, grading, vascular/neural invasion identification, and prognostic marker discovery. Analyses and predictions by OmniPT have been 80 to 90 percent accurate across cancer types.

Most patients and their families are unfamiliar with the details of pathology examinations — work performed on tissue samples or cells in a lab. When biological samples from a patient are sent to a lab, experts undergo a rigorous process to understand the pathological changes and the nature of the disease in the specimen.

The role of the pathologist is to help reach an accurate diagnosis by applying rigorous empirical standards. However, China faces a severe shortage of pathology professionals.

"Many people may know that pediatricians are in short supply, but pathologists are even more rare. Currently, our country needs 150,000 to 200,000 pathologists, but there are only about 30,000 officially registered," said Professor ZHANG Jing, chair of the department of pathology and vice-president of the Yuhang campus of FAHZUI.

Beyond this massive gap, there are also regional imbalances. While cities like Beijing, Shanghai, and Hangzhou may be facing less severe shortages, the situation is dire in remote areas, he added. Additionally, the long training period further complicates the issue, as young pathologists often lack sufficient experience.

Against this backdrop, OmniPT, developed by Professor SONG Mingli's team from Zhejiang University's College of Computer Science and Technology, in collaboration with the First Affiliated Hospital, is facilitating fast, accurate clinical diagnosis.

By leveraging human-computer interaction and focusing on pathologists' needs, OmniPT significantly improves diagnostic efficiency and quality, helping to alleviate the shortage of professionals.

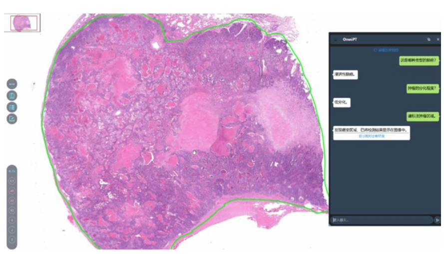
"It serves as an assistant to pathologists by handling repetitive tasks so that they can focus on final judgment," ZHANG said. He cited an example of counting mitosis, which is a critical task in diagnosing gliomas, tumors that occur in the brain or spinal cord.

"It can take at least 30 minutes to an hour to count a single pathology slide under a high-powered microscope," he said.

"OmniPT, however, can complete this task in less than 10 seconds. Its computational capabilities allow it to analyze findings in far greater detail than manual analysis. When it encounters 10 uncertain mitotic figures, it reports to a pathologist like me to make the final judgment," ZHANG added.

In collaboration with the hospital, SONG's team has focused on clinical needs. OmniPT accelerates the evaluation of slides, particularly details that might be overlooked by fatigued doctors. It handles over 90% of repetitive tasks, leaving only a small fraction for pathologists to assess.

"It assists us, but it doesn't drive us. We drive it. By leveraging AI in our workflow, we can solve challenging problems in pathology — particularly for people in remote regions or institutions with less experienced doctors. It greatly improves efficiency, reduces costs, and helps us avoid errors," ZHANG said.



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China's First Successful IVF Pregnancy Using a Comprehensive Breast Cancer Prevention Model of Single-Gene PGT Integrated with Polygenic Risk Scoring

"Congratulations, you're pregnant! HCG levels are doubling well, the ultrasound results are positive, and everything looks smooth so far~"

When Yingge (a pseudonym) heard these results, the tension, fear, anxiety, and dread of the past year dissolved into joy and anticipation. Thanks to the groundbreaking research conducted by the team led by Academician HUANG Hefeng from the Chinese Academy of Sciences, Yingge, who is 26 years-old, represents China's first successful pregnancy case using the application of a comprehensive breast cancer evaluation model that integrates single-gene preimplantation genetic testing (PGT) with polygenic risk scoring (PRS).

On November 30, 2024, Academician HUANG Hefeng and Professor ZHU Yimin, Director of the Reproductive Endocrinology Department at the Women's Hospital, School of Medicine, Zhejiang University (WHZJU), officially announced this milestone at the 2024 Zhejiang Provincial Academic Forum on Birth Defect Prevention.

This marks China's first use of polygenic risk scoring to evaluate hereditary tumor risk in embryos, signifying a major advancement in the prevention and control of genetic tumors at their source.

Three Generations of Tumor Diagnoses Spark Her Quest to Find Genetic Reasons

In June 2023, Yingge visited the Women's Hospital of Zhejiang University School of Medicine for fertility testing after nearly a year of unsuccessfully attempting to conceive. Examinations revealed adenomyosis and endometriotic cysts in her ovaries, leading to a diagnosis of primary infertility. While challenging, the hospital is familiar with such conditions. Therefore, Yingge underwent laparoscopic surgery to remove a right ovarian cyst, along with pelvic endometriosis lesion electrocoagulation and adhesion release.

Yingge was diagnosed with stage IV pelvic endometriosis and adenomyosis following her surgery. This indicates that assisted reproductive technology would probably be necessary in order to achieve pregnancy. At the hospital's reproductive endocrinology department, many patients share similar challenges, so Yingge felt reassured.

However, in July 2023, after undergoing a right breast duct excision for nipple discharge, she was diagnosed with intraductal papilloma. Despite the benign diagnosis, Yingge felt at risk because her mother had undergone surgery for ovarian and breast cancer, and her grandmother had suffered from fallopian tube cancer as well. Could this three-generation pattern point to a genetic cause?

Genetic testing for Yingge and her mother revealed that both of them carried a BRCA1 gene mutation. First identified in the 1990s, this gene is familiar to scientists. Since it is directly linked to hereditary breast cancer, people with BRCA1 or BRCA2 mutations face a significantly higher risk of developing breast and ovarian cancer compared to the general population.

Therefore, Yingge resolved to use third-generation IVF technology to eliminate the mutated BRCA1 gene, effectively "disarming" this hereditary "time bomb" in her generation.

While Yingge prepared for assisted reproduction, scientists aimed even higher.

Breakthrough in Source Prevention of Hereditary Tumors Achieved through Building a Comprehensive Risk Assessment Model

Tumor development involves familial clustering and genetic susceptibility, with certain mutations increasing the risk. For example, women carrying BRCA1/2 mutations face a cumulative breast cancer risk of 44-78% and 31-56%, respectively, by age 70. Third-generation IVF can block such high-risk genes, reducing the cancer risk for offspring.

While rare genetic variants such as BRCA1 and BRCA2 are known to elevate the breast cancer risk, these mutations account for only a small proportion of familial breast cancer cases. Genome-wide association studies (GWAS) have successfully identified numerous genetic loci that are associated with breast cancer susceptibility. However, the predictive power of individual variants remains limited. Polygenic risk scores (PRS), by aggregating the effects of multiple susceptibility loci, enable the construction of tumor risk prediction models to estimate an individual's likelihood of developing tumors.

However, this approach still cannot eliminate residual cancer risks that are attributable to polygenic inheritance. This raises a critical question: Can we expand from monogenetic interventions to polygenic strategies, developing synergistic approaches to further mitigate cancer risks?

Academician HUANG Hefeng proposed a novel strategy: during assisted reproductive procedures, embryos could undergo polygenic disease risk assessment via PRS for complex disorders. By screening and selecting embryos with the lowest polygenic disease risk for transfer, this approach aims to achieve the primary prevention of polygenic genetic diseases at the embryonic stage.

Her team has already successfully implemented this technology, offering an innovative solution for the source-level prevention of chronic diseases. Now, following approval from family lineage validation and reproductive ethics reviews, the team is leveraging Yingge's case to advance this methodology toward hereditary tumor prevention during the embryonic stage, marking a critical expansion of their pioneering work.

However, the construction of a PRS model that is capable of accurately predicting disease onset becomes a major challenge.

Academician HUANG outlined a strategy for developing a breast cancer PRS model by leveraging large-scale GWAS data. The team first tested and validated the risk-scoring algorithm using a cohort of 246,000 female controls and 18,483 breast cancer cases from the UK Biobank. To address the limited accuracy of the conventional PRS models—which perform well in European populations but underperform in non-European cohorts—the researchers recalibrated the model by incorporating East Asian population-specific locus weights and integrating screening-derived mutation loci that have been identified in Chinese breast cancer genomic studies. This enabled the construction of a China-optimized PRS model that is tailored to the genetic architecture of local populations.

Furthermore, recognizing that polygenic factors exert risk-modifying effects on breast cancer susceptibility genes, the team resolved to construct a comprehensive lifetime breast cancer risk assessment model that integrates three critical dimensions, including PRS for population-level risk stratification, rare pathogenic variants in breast cancer susceptibility genes, and a family history of breast cancer.

Following months of intensive research, HUANG's team announced the completion of this Comprehensive Lifetime Breast Cancer Risk Assessment Model.

Based on this model, both monogenic and polygenic pathogenic risks for embryonic breast cancer can be assessed simultaneously.

In March, 2025, Yingge underwent PGT guided by this model, yielding three genetically screened embryos. Following the successful treatment of her endometrial comorbidities, a single embryo, that was classified as low-risk by the integrated assessment, was transferred in November, 2025, culminating in a confirmed clinical pregnancy.

This achievement represents a dual milestone, as both China's innovative breakthrough in hereditary cancer prevention and another major advancement in the mission of HUANG's team to 'reduce chronic disease and tumor risks from the earliest stages of life, while eradicating hereditary birth defects.'

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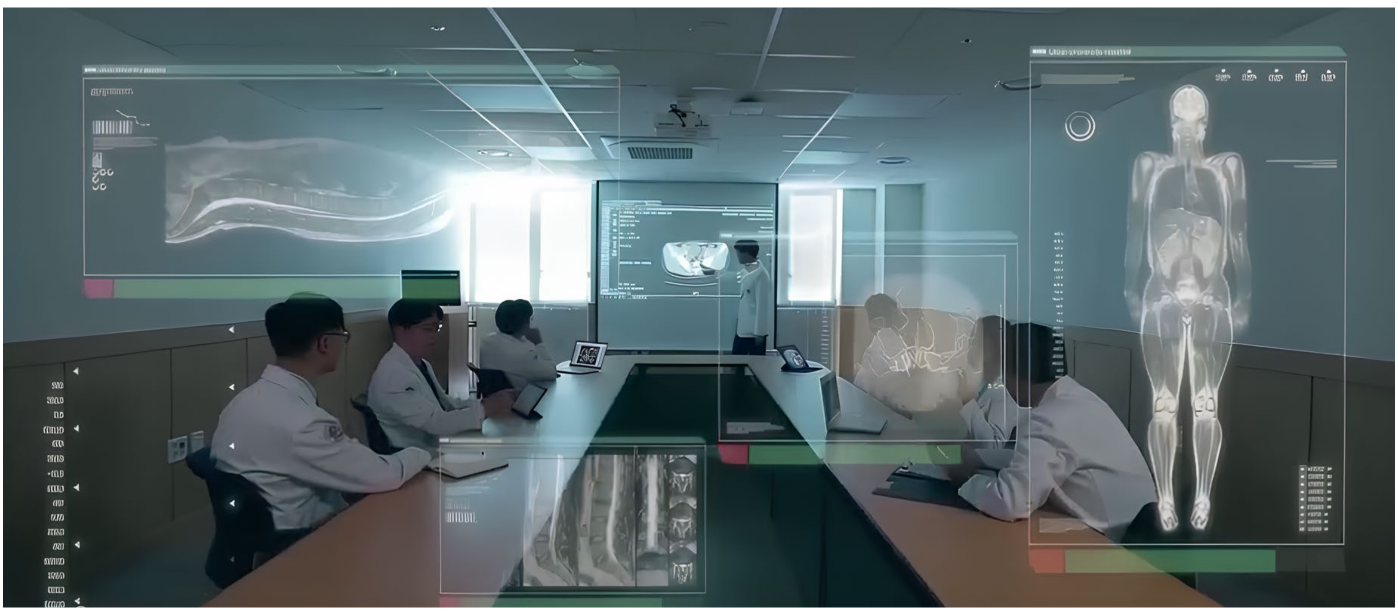
Empowering Medical Education with Artificial Intelligence

On September 5, Professor YANG from the School of Medicine at Zhejiang University led a problem-based learning (PBL) discussion session with a group of six students, centered around a real-world case. What made this session unique was the participation of the Qizhen Zhiyi AI Education Platform. During the session, students worked through the emergency response procedures and post-accident medical care for an injured motorcyclist who had lost consciousness after swerving to avoid a truck.

During the group discussion, LU presented the case overview: "Patient BAO, a 25-year-old male, was admitted following a traffic accident with immediate loss of consciousness, and presented with a large lacerated head wound and active hemorrhage on one side. Initial EMS assessment: Respiratory rate 18/min, carotid pulse 112/min, maintained on 100% oxygen via assisted ventilation." After completing the simulated admission process, Wang reported to the senior physician: "Patient immobilized on a spinal board, endotracheal intubation performed, rigid cervical collar applied, and IV access established. Current vitals: pulse 136/min, shallow respirations at 12/min. Preliminary diagnosis: cervical spine fracture."

After class, Professor YANG received detailed feedback from Qizhen Zhiyi AI. The platform recommended rotating the group members in order to foster participation and interaction and suggested incorporating more challenging discussions to enhance the group's critical thinking and innovation skills. This evaluation aligned with her own ratings and provided personalized advice to help students to develop "six core competencies."

"Since introducing the Qizhen Zhiyi AI, we've established an interactive teaching model that connects teachers, students, and AI," stated Professor LOU Min, Vice Dean of the School of Medicine. "The platform transcribes student discussions and provides real-time feedback, allowing teachers to monitor their knowledge acquisition and competency development." Recently, Zhejiang University launched the Qizhen Zhiyi AI Education Platform, an independently developed smart platform designed to help medical students to



acquire professional knowledge, hone their clinical skills, and develop core competencies. Tailored for teaching, learning, testing, and evaluation, it seeks to bridge the gaps in AI applications for medical education and innovative talents cultivation through model optimization and specialized training.

In terms of teaching, Qizhen Zhiyi AI has developed a multidimensional evaluation framework that assesses students' mastery of both general and professional knowledge, their ability to present accurate, comprehensive narratives, their higher-order thinking skills—such as critical thinking and problem-solving—and their communication and collaboration abilities, particularly in relation to doctor-patient interactions. The system will be integrated into team-based learning (TBL), case-based learning (CBL), and tutorial sessions at the School of Medicine, to enhance the interactive teaching quality.

In terms of learning, the platform offers personalized resources and technical support, featuring a vast array of multimodal materials, including medical texts, pathological images, and 3D anatomical models. It also supports interactive AI conversations and the learning of history tracking. By analyzing the teachers' illustrations and the corpus of class videos, the platform generates diverse learning scenarios to help students to review and reinforce both their foundational and clinical knowledge effectively.

In terms of testing, Qizhen Zhiyi AI utilizes the standards of the Medical Licensing Examination to conduct comprehensive knowledge analysis. This enables teachers to gain insights into students' overall performance and identify areas where students may have knowledge gaps. The platform also provides personalized improvement suggestions based on students' deficiency profiles.

In terms of evaluation, the Center for Quality Education Control analyzes data from Qizhen Zhiyi AI to adjust the teaching strategies promptly, ensuring ongoing improvement in educational quality. At the end of each term, the platform generates detailed supervision reports, providing data to support the Center in managing and improving the educational quality in the upcoming semester.

"In March, leveraging its advantages in educational and technological talent, Zhejiang University established the Research Center for AI in Education (RCAIED), launched 'Zhihai Platform,' a next-gen AI science and education platform, issued the Red Book of College Students' Artificial Intelligence Literacy (2024), and initiated over 100 AI-empowered teaching reform and research projects," stated JIANG Quanyuan, Vice Dean of Undergraduate School and Director of Teaching Affairs Office. "We also introduced mandatory AI general education courses and a broad range of interdisciplinary AI courses, aiming to make AI education accessible to all students, everywhere, and at any time." Traditional medical education relies heavily on textbooks, in-class instruction, and clinical internships. However, this approach is hindered by long educational programs, limited resources, and a lack of real-time feedback, lagging behind the emerging innovations in medical technology. Therefore, there is an urgent need for AI integration and educational reform to empower the new generation of information technology.

"To address this gap, Zhejiang University developed Qizhen Zhiyi AI, integrating extensive medical databases from eight affiliated hospitals to provide corpora for AI, preparing it for application in medical education. This integration facilitates efficient collaboration and the sharing of quality teaching resources, advanced technologies, and clinical data," stated WU Fei, Director of the Institute of Artificial Intelligence. The School of Medicine has launched 14 "AI for Education" teaching reform projects, covering various medical disciplines, which strongly support the deep integration of AI in education.

"Medicine is now one of the most integrated disciplines with AI. The application of AI in medical education is inevitable, bringing about significant changes and even disruptive transformations through its concepts, content, methods, and evaluations. New opportunities and challenges are arising for the innovative development of medical education," stated LI Xiaoming, Vice President of Zhejiang University and Secretary of the Party Committee at the School of Medicine. In recent years, the university has actively planned AI education, incorporating AI into all aspects of teaching, education, and talent cultivation and exploring new paths for digital empowerment.

Zhejiang University will further deepen the application of AI in medical education, enhance AI literacy, transform the teaching philosophies, innovate the learning approaches, simulate real-world teaching scenarios, and promote comprehensive teaching reforms. The goal is to achieve personalized learning, differentiated teaching, and scientific evaluation, advancing "AI plus" reforms in the cultivation approaches, school-running methods, management systems, and support mechanisms, thereby invigorating the development of medical education as a whole.

A Study Tour to UK Starts the New Year

Students from the School of Medicine, Zhejiang University visited London and Cambridge for a study tour during the 2025 winter vacation. They visited the world's first-class institutions, like the University of Cambridge, Imperial College London, King's College London, University College London, etc. There, they explored cutting-edge research directions and advancements in the medical field, gained hands-on experience of using advanced medical technologies like point-of-care ultrasound (POCUS), and deepened their understanding of how AI has accelerated medical research innovatively.

Students visiting the School of Clinical Medicine, University of Cambridge.

Students visiting the Cambridge Science Park.

The final group presentations.

Students learning about clinical POCUS.

ZHANG Mengxue:
The visit to the UK has been really rewarding for me. Not only have I acquired helpful knowledge from the lectures, but I have also gained hands-on experience with clinical POCUS and developed a profounder understanding of how technological advancements influence diagnoses. In addition to the lectures, we explored the campuses and laboratories, tasting an exotic kind of academia.

ZHAO Liyu:
From the visit, I have gained a profound understanding of the UK's healthcare system, finding it to be people-centred. I have also found that the models for training medical students vary significantly across countries. During my visit, I was fortunate to meet many outstanding professors, whose professionalism and teaching methods were truly inspiring.

Students visiting the University of Oxford.

Students attending a lecture about AI and medical imaging.

ZHANG Jinhan:
The visit felt like a feast that left me truly satiated. We explored four world-renowned institutions in the UK and participated in lectures delivered by outstanding professors over a period of 14 days. Their topics ranged from AI to neuroscience, and even aging research. Each lecture was like a window, through which I discovered infinite possibilities when AI is applied to the field of clinical medicine.

Golden Blessings, Renewed Aspirations: ZUSM Enters a New Era

As the Chinese New Year approaches, Zhejiang University School of Medicine ushered in the Year of the Snake with vibrant celebrations, uniting staff and students through a series of cultural and academic events.

First National Youth Medical Staff Practical Innovation Competition

On November 9, 2024, the final of the first National Youth Medical Staff Practical Innovation Competition was held in Hangzhou, Zhejiang Province. The competition was hosted by the Chinese Education, Science, Culture, Health and Sports Trade Union and jointly organized by the Zhejiang Provincial Education Trade Union, Zhejiang University Trade Union, and the School of Medicine, Zhejiang University. The competition aims to build a platform for young medical staff to achieve success and innovation, and to promote their growth and development. 45 outstanding contestants from 26 provinces (autonomous regions, municipalities) and Xinjiang Production and Construction Corps participated in the competition. After the "roadshow + defense" and other rounds, the first, second, and third prizes were awarded.

During the competition, young medical staff under the age of 40, focused on providing solutions to issues at the clinical front line and promoting the application of innovative achievements. The competition explored a new "innovation-oriented" model of skills competition, effectively stimulating the innovation and creativity of young medical staff. It was divided into three categories: clinical medicine, traditional Chinese medicine, and medical technology. Since its launch, it has received positive responses from various regions, with enthusiastic participation by young medical staff. After recommendations from provinces (autonomous regions, municipalities) and a review by the organizing committee, 174 innovative projects were shortlisted for the national competition. These projects cover specialties including internal medicine, surgery, gynecology, pediatrics, stomatology, traditional Chinese medicine, Chinese herbal medicine, acupuncture, rehabilitation, medical devices, laboratory medicine, experimental medicine, imaging, and pharmacy, fully demonstrating the innovative and practical achievements of young medical staff at the clinical front line. Based on the specialties involved, the competition appointed 132 experts to conduct preliminary evaluations, selecting 45 outstanding projects to compete in the national final.

The final followed the format of a "roadshow + defense". During the roadshow, each project team demonstrated the innovation and clinical effectiveness of their projects to the judges and the audience through vivid presentations and explanations. During the defense session, the judges conducted in-depth inquiries and provided feedback on their scientific rigor, practicality, innovation, and real-world impact. After fierce competition, a number of innovative and outstanding projects stood out. These projects will play a positive role in promoting deep integration of medical innovation and practical application, cultivating medical talent with innovative thinking and creative abilities, improving the innovation system of the healthcare industry, and enhancing the quality of the medical services.

Over 40 medical workers from Hong Kong and Macao were invited to watch the competition on-site. Contestants had in-depth discussions with their counterparts on topics including medical technology innovation, the preservation and development of traditional Chinese medicine, and integrated healthcare development between mainland China and the two regions.

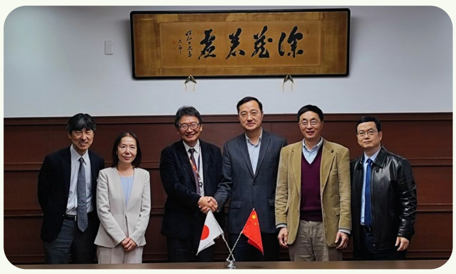
ZUSM Delegation Visits World-Class Universities

In January 2025, HUANG Hefeng, Academician of the Chinese Academy of Sciences and Dean of the School of Medicine, Zhejiang University, led a delegation to visit the Chinese University of Hong Kong, the Li Ka Shing Faculty of Medicine of the University of Hong Kong, the Hong Kong Academy of Medicine, the Hong Kong Hospital Authority, the Prince of Wales Hospital, and Queen Mary Hospital. The visit deepened exchanges and cooperation with the medical colleges and government institutions of Hong Kong in the fields of medical education, clinical research and healthcare. During the visit, the School of Medicine signed a memorandum of cooperation with Li Ka Shing Faculty of Medicine, the University of Hong Kong.

In January 2025, the Asia-Pacific Medical Education Conference 2025 (APMEC) was held in Singapore. HUANG Hefeng, Academician of the Chinese Academy of Sciences, Dean of the School of Medicine, Zhejiang University and Dean of the International School of Medicine, Zhejiang University, led a delegation to attend the conference. During the closing ceremony, the host officially announced that the next conference will be co-hosted by Zhejiang University and the National University of Singapore.

In October 2024, ZUSM delegation visited Seoul National University in South Korea.

In November 2024, ZUSM delegation visited Kyoto University.



In November 2024, ZUSM delegation visited the University of Tokyo in Japan.

Explore New Potential in Cooperation with WHO

In November 2024, the Second International Forum to Implement the WHO Roadmap on Public Health and Emergency Workforce: Competency-based Education, organized by the School of Public Health at Zhejiang University, welcomed over 200 guests from 31 globally-renowned universities across 22 countries and regions.

Focusing on WHO competency-based public health education, the event aimed to deepen the discussions, foster collaboration, and further promote the implementation of WHO's competency-based educational tools, to advance the globalization of public health education.

During the conference, a cooperation signing ceremony between Zhejiang University's School of Public Health and WHO was held. Both parties will work together to implement WHO's competency-based educational tools

among PHILA members, strengthen the public health research and practice, and enhance the quality and standards of international public health education.

Cooperation with Fujita Health University Embarks on a New Journey

In December 2024, a delegation led by Yukio Yuzawa, President of Fujita Health University, visited Zhejiang University School of Medicine. During this visit, Zhejiang University School of Medicine and Fujita Health University signed a memorandum of cooperation, marking a new phase of collaboration. The delegation also toured the First Affiliated Hospital of Zhejiang University School of Medicine to gain insights into the school's cutting-edge technologies and research achievements in the field of clinical medicine. Additionally, both sides explored potential cooperation in the fields of nephrology and rehabilitation therapy.

In 2022, Zhejiang University signed a memorandum of cooperation with the Aichi Prefectural Government, representing the university's first collaboration with a Japanese governmental body. This new partnership between the School of Medicine and Fujita Health University will further promote academic and cultural exchanges with universities in Aichi Prefecture, enriching the scope of collaboration between the two parties.

Top UK Universities Visit ZUSM for Academic Collaboration

01

On November 4, 2024, Professor Patrick Maxwell, Dean of the School of Clinical Medicine at the University of Cambridge, visited Zhejiang University School of Medicine and participated in the 2024 Joint Symposium on Frontiers in Transplantation and Regenerative Medicine. Scholars from both institutions presented cutting-edge advancements in transplant oncology and transplant immunology, and engaged in animated discussions on critical challenges within the field.

02

On November 5, 2024, Professor Diana Eccles, Dean of the Faculty of Medicine at the University of Southampton, and Vice Dean Professor HOU Ruihua visited ZJU School of Medicine. The two parties held in-depth talks on the mechanisms for international collaboration and outlined concrete plans for future joint initiatives in the fields of medical education and research.

03

From November 24 to 27, 2024, Professor Mark Middleton, Head of the Department of Oncology at the University of Oxford, led a delegation to Zhejiang University to attend a series of ZJU-Oxford Cancer Biology Academic Events. During the visit, Professor Middleton engaged in in-depth discussions with students from the “4+1” Joint Training Program in Basic Medicine, attended the inaugural Basic and Clinical Symposium on Cancer Biology co-hosted by the First Affiliated Hospital and the Second Affiliated Hospital, and presided over the unveiling ceremony for the Liangzhu Laboratory-Oxford Joint Research Center.

MA Yilin: a Pioneer in the Infectious Disease

MA Yilin, who was born on September 1st, 1928, is a professor of infectious diseases, chief physician, and doctoral supervisor at Zhejiang University. Throughout his career, he has received several awards, including the Second Prize for Scientific and Technological Progress from the Ministry of Health, two First Prizes, and multiple Second and Third Prizes for Scientific and Technological Progress by Zhejiang Province. Professor MA previously held several professional positions, including member of the Standing Committee of the Chinese Medical Association Division of Infectious Diseases and Parasitology, director of the Zhejiang Provincial Branch and deputy director of the Zhejiang Provincial Schistosomiasis Prevention and Research Committee. He also served as a Review Panel Member for the Life Science Professional Group at the National Natural Science Foundation of China (NSFC). Additionally, he served as the Editor-in-Chief for the fourth and fifth editions of Infectious Diseases. Since 1992, he has been a recipient of the Special Government Allowance issued by the State Council. In recognition of his lifelong contributions to the field, Professor MA was honored with the Lifetime Achievement Award and Senior Expert Committee Member title by the Zhejiang Medical Association, as well as receiving a Lifetime Contribution Award from the Infectious Diseases Society of the Chinese Medical Association.

Formative Years that Shaped a Medical Calling

China's healthcare system was neglected, with rampant infectious diseases, before Professor MA enrolled at Zhejiang Medical College. His father suffered from filariasis and Professor MA also tragically witnessed his younger brother die from fever and convulsions at the age of two, following ineffective treatments by a folk healer consisting of acupuncture and herbal remedies. In stark contrast, another brother, who contracted meningitis, was saved by oral sulfonamide therapy provided by a Zhejiang Medical College graduate from a neighboring village. These polarizing experiences in Professor MA's youth solidified his determination to study medicine in order to alleviate suffering among underserved communities.

In 1944, Zhejiang Pharmaceutical College relocated to Linhai County in Zhejiang Province, the hometown of Professor MA, and started local enrollment. Professor MA seized this opportunity and was admitted to the school in 1945. A year later, the college moved back to Hangzhou and was renamed Zhejiang Medical University. Reflecting on his early years there, Professor MA recalled severe shortages of teaching molds and materials: the textbooks were English photocopies purchased from Hangzhou's Longmen Bookstore, and the anatomy bones were self-sourced by the students. Despite these challenges, the faculty comprised nationally-renowned scholars and overseas-educated elites. Among them, Professor WANG Weisong from the School of Anatomy left an indelible mark. His lucid lectures were matched by his bravery in rescuing ZHAO Caiyun, a student activist who was arrested by Kuomintang authorities for engaging in progressive activities, at great personal risk to himself. Another influential figure was the institution's esteemed president, Professor WANG Jiwu, who also became a role model for an entire generation of medical students, MA Yilin included, with his rigorous academic ethos and selfless dedication.

The six years that he spent at Zhejiang Medical University was a key stage in Professor MA's life and laid a solid foundation for his future professional life.

Devotion to The First Affiliated Hospital, Zhejiang University School of Medicine

In 1953, following his medical service in Jiangxi, Professor MA transitioned to Zhejiang Medical College (FAHZU). Dedicating himself to clinical frontline duties, he was progressively elected as Party Branch Secretary of the Infectious Diseases Department and a member of the Hospital Party Committee. Concurrently, he was appointed director of both the department and its teaching and research division. In 1959, he was honored as Advanced Worker in Socialist Construction of Zhejiang Province, in recognition of his exemplary contributions.

Medical histories and laboratory results formed the basis of diagnosis and treatment at that time. FAHZU prioritized the quality of documentation, mandating that patients' medical records should be truthfully documented in legible handwriting without any alterations, and that the lab reports should be neatly attached to the back of files. For urgent daily test results, reports should first be clipped to the front page of the patient's medical record for the attending physician to review during the morning rounds before being formally filed—a protocol that was strictly observed. Professor MA vividly recalled Director YU Zhifei once criticizing interns for failing to follow this procedure, remarking that their written records were so unclear like jiaguwen (oracle bone script, an ancient Chinese script notorious for being indecipherable). For new patient admissions, it was necessary to document a summary of their medical history, preliminary diagnosis, and treatment plan. Discharge documents had to be personally reviewed and signed by the department director after residents presented them in detail before archiving. Internal medicine residents are also expected to master various clinical procedures, including lumbar puncture, bone marrow aspiration, liver biopsy, and sigmoidoscopy, as well as artificial pneumothorax, pneumoperitoneum, venous cutdown, and other techniques, to ensure that critical care is provided promptly. Professor MA has rigorously upheld these exemplary practices to strengthen and elevate the quality of patient care.

With societal progress and the rising living standards, coupled with the increasing emphasis of the Party and the nation on medical technology, Professor MA, as the leading figure in infectious disease medicine, has dedicated his career to bridging clinical practice and scientific research. After assuming the role of doctoral advisor in 1990, Professor MA wholeheartedly committed himself to nurturing new generations of medical professionals. To date, he has mentored 12 doctoral students, many of whom now serve as disciplinary leaders in the field of infectious disease medicine. Their contributions have been instrumental in advancing FAHZU toward its designation as the National Center for Infectious Diseases.

Now 97 years old, Professor MA Yilin still maintains a deep affection for FAHZU 's infectious diseases discipline, continuing to offer outpatient services, conduct research, and publish academic papers. To keep abreast of the global advancements, he taught himself computer skills in his late 1970s in order to access online resources and consult his younger colleagues. Since the age of 78, he has had 24 articles published in Chinese Medical Association-affiliated (CMA) core journals. Reflecting on his career, Professor MA emphasizes that: "A physician's duty carries a sacred weight—we serve human lives, bearing responsibilities far heavier than most professions. Having chosen this path, one must persevere without regret."

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