CMU GLOBAL CONNECTION

Edited by the Office of Global Affairs
cmucia@mail.cmu.edu.tw
yangly@cmu.edu.tw

Winter 2024

China Medical University, Taiwan
Newsletter Issue #11

China Medical University Hospital Opens the Proton Therapy Center

An International Cancer Center that Provides Patient-Centered Integrated Medical Services

The Proton Therapy Center of China Medical University Hospital has opened. This is the first proton therapy center in central Taiwan, showing a new milestone in CMUH entering international-level cancer treatment and progress of cancer treatment in Taiwan.

The Advantages of Proton Therapy

Compared with traditional therapies, proton therapy has the advantage of high precision. For treating tumors close to vital organs, proton therapy can accurately destroy cancer cells without damaging other critical cells. Unlike traditional X-ray radiotherapy, proton beams can be precisely controlled to reach the tumor and release maximum energy inside of it, which can greatly reduce the radiation dose to surrounding healthy tissue. Therefore, proton therapy can significantly reduce the common side effects of traditional radiotherapy, allowing patients to complete the treatment smoothly and protect healthy tissue. This is especially important for treating of childhood cancers, as proton therapy allows them to grow and develop normally.

With high precision and low side effects, proton therapy allows patients to receive higher doses of radiation therapy without increasing the risk of damage to healthy tissue. This will help improve treatment effectiveness, shorten treatment time, and reduce the risk of relapse. Long-term studies have shown that patients who receive proton therapy have significantly improved survival rates and their quality of life.

World-Class Facilities for Cancer Treatment

CMUH Proton Therapy Center is equipped with the most advanced treatment facilities, including the latest generation of superconducting cyclotron proton accelerator, which is highly efficient with a high dose rate and low power consumption. The proton beam is output through a 360-degree rotating gantry. With the use of a precise cone-shaped CT imaging positioning system and advanced pencil beam scanning technology, it can accurately target tumors in various parts of the body. These devices are able to monitor and adjust treatment progress, ensuring precise targeting every time, every day.

CMUH has many global partners in the field of cancer medicine, including the world's number one center, the MD Anderson Cancer Center, along with the University of Pennsylvania and the University of Washington. In addition, CMUH has joined the Particle Therapy Co-Operative Group. Through international cooperation, CMUH continues to make improvement in medical technology.

Benefit Patients with High-Quality Integrated Medical Services

In the past, proton therapy was only available in northern and southern Taiwan, making it inconvenient for people living in central Taiwan. The Proton Therapy Center of CMUH is the fourth center in Taiwan and the first in central Taiwan. It will be opened to all patients in need. Based on the patient-centered principle, through collaborative consultation and referral, patients can return to their original medical institution to continue treatment after proton therapy. Through a friendly one-stop medical care, we provide more convenient and high-quality medical services, bringing new hope and treatment options to cancer patients.

China Medical University Beigang Campus Established Taiwan's 1st Smart Chinese Herbal Medicine Garden

Taiwan's first Smart Chinese Herbal Medicine Garden, built by China Medical University, was completed at the Beigang campus. President Mien-Chie Hung invited Ms. Shu-Ya Hsieh, the Deputy Magistrate of Yunlin County, to participate in the opening ceremony and plant saplings together. The establishment of the Smart Chinese Herbal Medicine Garden symbolizes the integration of traditional agriculture and technology, and it is of great significance for cultivating talents and leading the development of precision agriculture.

The Smart Chinese Herbal Medicine Garden uses AI and IoT field sensors and actuators to develop a low-consumption, high-efficiency precision agriculture system. A smart carbon rights cloud system was introduced to create a modular plant carbon storage system, which helps achieve the goal of net zero carbon emissions.

Through cooperation with AgriTalk Technology Inc., the Smart Chinese Herbal Medicine Garden uses technology from Quanta Computer and Chunghwa Telecom. The herbs grown in the garden are intelligently managed by students from the Beigang campus through the IoT field sensors and actuators. The data collected is transmitted from Beigang back to the Department of Chinese Pharmaceutical Sciences and Chinese Medicine Resources at the Taichung campus via cloud technology and then analyzed in the laboratory using AI to remotely control the garden and achieve precision agriculture.

"The Smart Chinese Herbal Medicine Garden has introduced environmental data monitoring, irrigation, fertilization and heat dissipation systems to achieve standardized control. By monitoring and collecting planting data through an automated planting management system, the growth status of plants can be tracked at any time. In addition, students can apply their professional knowledge through practice to understand the best cultivation and management methods for planting, which also meet the government's sustainable development goals (SDGs)." said President Mien-Chie Hung.

59 Scholars from China Medical University and Healthcare System were Honored as "The World's Top 2% Scientists" in the 2024 Stanford Elsevier Top 2% Scientists List

The 2024 Stanford Elsevier Top 2% Scientists List was released in September 2024. China Medical University and Healthcare System had more scholars listed than any other private university in Taiwan. A total of 59 scholars appeared on the Career-long (1960-2023) Impact Ranking list, and 57 scholars appeared on the Single Recent Year (2023) Impact Ranking list. This demonstrates CMU's strong research capabilities and outstanding contribution to the international academic community.

International Collaborations and Events

New Chapter of Collaboration in Traditional Medicine: CMU and Kyung Hee University Established Joint Research Laboratory

China Medical University and Kyung Hee University (South Korea) established a joint research laboratory with the cooperation of two centers: Acupuncture and Moxibustion Scientific Research Center (AMSRC) and Chinese Medicine Research Center (CMRC).

CMU and KHU have continued to deepen the cooperative relationship since signing an MOU agreement in September 1974. The Chinese Medicine Research Center (CMRC) of CMU was established in 2014 and has long been dedicated to the promotion of the traditional medicine. CMRC has made significant achievements in education, research, disease prevention, herbal medicine development, academia-industry cooperation, and international collaboration.

Kyung Hee University is a comprehensive university renowned for medical sciences. It has more than 40 research institutes, including the Acupuncture and Moxibustion Scientific Research Center (AMSRC). AMSRC is renowned for its research on acupuncture and meridian phenomena and has made outstanding achievements in clarifying the neurophysiological mechanisms of acupuncture and mapping the nerve functions of acupoints using medical imaging technology.

"Through the cooperation between CMU and KHU, AMSRC and CMRC will be able to achieve breakthrough progress in the field of traditional medicine and expand the potential of traditional medicine application in modern medicine," said President Mien-Chie Hung. "The establishment of a joint research laboratory between the two universities is an inspiring milestone and symbolizes the commitment to future innovation in the fields of traditional medicine and acupuncture research. We look forward to groundbreaking research results from the new generation of researchers," said Professor Hi-Joon Park, the Director of AMSRC.

2024 Tang Prize Master's Forum: Contemporary Development of Type-2 Diabetes Treatment and Obesity Control

The Tang Prize is a biennial international award founded by the Taiwanese entrepreneur Samuel Yen-Liang Yin and is the most representative international prize awarded by Taiwan. The 2024 laureates in the field of biopharmaceutical science include Dr. Joel F. Habener, Dr. Svetlana Mojsov, and Dr. Jens Juul Holst, "for the discovery of GLP-1 (7-37) as an insulinotropic factor and the development of GLP-1 (7-37)-based anti-diabetic and anti-obesity drugs." On October 1, 2024, CMU invited Dr. Svetlana Mojsov and Dr. Jens Juul Holst to attend the 2024 Tang Prize Master's Forum co-organized by CMU and Tang Prize Foundation.

During the forum, Dr. Svetlana Mojsov gave a keynote speech on the topic of "Chemistry Matters: From A Putative Peptide to Efficient Therapeutics for Diabetes and Obesity" and Dr. Jens Juul Holst gave a keynote speech on the topic of "Incretin hormones as a basis for treatment of obesity." They explained how they discovered GLP-1(7-37), the difficulties they encountered during the research, and how they overcame the difficulties to develop GLP-1(7-37) into a drug for treating diabetes and controlling obesity.

After the keynote speech, the panelists were invited to discuss about the significant contribution and forward-looking development of GLP-1(7-37) to the treatment of diabetes and weight loss. The forum was held in a hybrid format; both on-site and online participation was opened, allowing more scholars to attend and interact. The 2024 Tang Prize Masters Forum was a huge success, and the attending scholars, teachers, and students all benefited a lot.

Outstanding Awards

Academician Dr. Jaung-Geng Lin, Chair Professor of CMU, Received the 2024 National Medical Model Award

Dr. Jaung-Geng Lin is Taiwan's first PhD in traditional Chinese medicine and acupuncture. He has devoted his life to acupuncture research and has made significant contributions, especially in the field of acupuncture pain relief. Dr. Lin has extensive clinical experience in evidence-based Chinese medicine and acupuncture and has been recognized by the World Health Organization (WHO). He has promoted Taiwan's Chinese medicine research to the world and is truly a pride of Taiwan.

The acupuncture and moxibustion clinical research team of China Medical University, led by Dr. Lin, is Taiwan's most successful field in the internationalization of traditional Chinese medicine. Dr. Jaung-Geng Lin was nominated by the National Union of Chinese Medical Doctors' Association and won the 2024 National Medicine Model Award.

CMU Master's Student Dr. Fatima Daniela Marroquin Ramirez, Won the Academic Achievement Award for Outstanding Performance and The Appointing Campus Ambassador of Taiwan Alumni Association

Dr. Fatima Daniela Marroquin Ramirez, a Guatemalan master's student studying at CMU School of Dentistry, not only has excellent performance in academic grades but also actively participates in various extracurricular activities. During the two-year study at CMU, her average academic score was over 90 points. In extracurricular activities, she received the 4th International Postgraduate Research Virtual Conference Awardee and participated in the Eden Social Welfare Foundation's international volunteer work, serving in remote areas of Taiwan.

Because of her outstanding performances, Dr. Fatima Ramirez won the 2023 Academic Achievement Award for Outstanding Performance in the MOFA Taiwan Scholarship Program and was appointed as the campus ambassador of Taiwan Alumni Association.

CMU Assistant Professor Yu-Lin You Received the Yamaguchi Medal in the 12th Asian-Pacific Conference on Biomechanics

Assistant Professor Yu-Lin You, Department of Sports Medicine, focuses on the research of motion analysis, medical engineering, sports biomechanics, and sports injury prevention. She attended the 12th Asian-Pacific Conference on Biomechanics held in Malaysia and published a study titled "Effects of proximal-emphasized exercise equipment on balance for chronic stroke survivors." The outstanding publication made her stand out among international scholars and won the Yamaguchi Medal—the outstanding young scholar award. She is the sole Taiwanese scholar to win the award this year and the 4th Taiwanese scholar to have this honor over the years.

The award-winning paper aims to explore the effects of climbing machines on patients with chronic stroke. According to the results of this study, training through a climbing machine can more effectively improve patients' balance and walking ability compared to traditional rehabilitation therapy. The machine offers both active and passive (motor-driven) movement modes and can be combined with a body weight support system, making it suitable for stroke patients of varying abilities. This study not only expands the diversity of rehabilitation methods but also provides a new rehabilitation method for chronic stroke patients.

Research Breakthroughs

Coffee can Effectively Inhibit SARS-CoV-2 Variants: CMU President Mien-Chie Hung's Research Team Published Research Findings in the Journal *Cell & Bioscience*

Drinking coffee can be an effective method to prevent SARS-CoV-2 infection. The anti-COVID-19 research team led by CMU President Mien-Chie Hung has published a research article, "Coffee as a dietary strategy to prevent SARS-CoV-2 infection," in the journal Cell & Biosciences that verified that coffee consumption can inhibit infection of multiple variants of SARS-CoV-2.

According to the human trial, coffee consumption of 1-2 cups per day is sufficient to restrain the binding of the SARS-CoV-2 spike protein to human angiotensin-converting enzyme 2 (ACE2) and reduce transmembrane serine protease 2 (TMPRSS2) and cathepsin L (CTSL) activity. That is, coffee can inhibit multiple mechanisms of the SARS-CoV-2 virus, thereby preventing SARS-CoV-2 infections.

It has been more than five years since the global outbreak of SARS-CoV-2. Now all countries have relaxed their epidemic prevention measures, and people have returned to normal life. However, mutant viruses continue to appear, and the risk of infection or reinfection is inevitable. Vaccination remains the main strategy of prevention, but the antibodies decrease over time. Therefore, in addition to vaccination, consuming more nutrients that can inhibit infection or enhance immunity will help maintain our health. Coffee consumption can help maintain protection against SARS-CoV-2. However, coffee has both advantages (such as refreshing and antioxidant effects) and disadvantages (such as insomnia and increased blood pressure), so some people are not suitable for drinking coffee. The consumption of coffee should be determined based on personal physical condition, and the daily intake should not exceed the dietary recommendations.

Uncover the Secret of Genes of Taiwanese People Suffering from Depression and Bipolar Disorder! The Collaborative Team of CMU College of Public Health and An-nan Hospital Published Research Findings in the Journal *BMC Public Health*

Precision medicine has become a new trend, and gene therapy is one of the hot topics. The collaborative team led by Professor Jong-Yi Wang, CMU College of Public Health, and Dr. Chi-Yu Yao, attending physician of psychiatry (An-nan Hospital), confirmed that there are five main genes that cause Taiwanese to suffer from depression and bipolar disorder. Their study "Association between 14 candidate genes, PM2.5, and affective disorders" was published in the journal BMC Public Health and has received widespread attention.

Current genetic research mainly focuses on cancer and chronic diseases. Schizophrenia was found to have genetic factors many years ago, but in Taiwan, the genes related to depression and bipolar disorder still need confirmation. In previous genetic studies, there were few relevant variables or no pairing. The research team included 14 candidate genes based on international journal literature, and after rigorously matching a total of 10 demographic and environmental variables, used a more advanced generalized estimating equation (GEE) analysis to discover that the genes for depression include ANK3, BDNF, CACNA1C, and GRID1, and the genes for bipolar disorder include CACNA1C, GRID1, and SIRT1. This accurate finding showed great significance in preventive medicine for mental illness.

As mental illness is becoming more common, doing genetic testing for health checks is an important part of public health. Through research, it was found that CACNA1C and GRID1 are the main genes that Taiwanese people suffer from depression and bipolar disorder. However, having these genes does not mean that you will definitely suffer from the corresponding diseases; mental ability and physical health status are more important factors. The research team used rigorous methods to identify the five main genes that cause depression and bipolar disorder in Taiwanese people, which is of great significance in both academic research and medical practice.

CMU Professor Bing-Fang Hwang Participated in the International Diabetes Research Team of GBD and Published Research Findings in the Journal *Lancet*

Diabetes is an important public health issue worldwide. Professor Bing-Fang Hwang, Dean of CMU College of Public Health, participated in the international diabetes research team under the Global Burden of Disease (GBD) study by the Institute for Health Metrics and Evaluation (IHME), and their research "Global, regional, and national burden of diabetes from 1990 to 2021, with projections of prevalence to 2050: a systematic analysis for the Global Burden of Disease Study 2021" was published in the international journal Lancet.

The IHME GBD diabetes international collaboration team used the latest evidence and analytical framework for global disease, injury, and risk factor research to map the diabetes prevalence and burden in 204 countries and regions around the world between 1990 and 2021 by location, age, and gender, and estimated the proportion of type 1 and type 2 diabetes in 2021. The burden of type 2 diabetes was estimated by analyzing the attributable risk factors for environmental and occupational factors, tobacco use, high alcohol use, high body mass index (BMI), dietary factors, and low physical activity. Furthermore, they made predictions of the global prevalence of diabetes in 2050.

"The 52.2% of the global disability-adjusted life year (DALYs) for type 2 diabetes can be attributed to high BMI. From 1990 to 2021, the contribution of high BMI to DALYs increased by 24.3%. By 2050, it is estimated that more than 1.31 billion people will be suffering from diabetes," Professor Hwang explained. "Type 2 diabetes accounts for the majority of diabetes cases and is preventable. It is even reversible if diagnosed early with good management. However, all evidence shows that the global prevalence of diabetes continues to increase, mainly due to multiple risk factors that lead to the increase of the obese population, including eating habits with low fruit, low vegetables, low whole grains, high red meat, high processed meat, high sugar, low fiber, and lack of exercise."

The prevention and control of type 2 diabetes remains an ongoing challenge. It is important to understand that the attributable risk percentages for diabetes burden may be different in different populations so that preventive strategies can be taken according to individuals, time, and place under multiple and complex inducing factors.

Colchicine can Reduce the Risk of Liver Cancer: CMU Graduate Student Jung-Ju Lin Published Research Results in the Journal *Cancers*

Under the guidance of professors and doctors from China Medical University and Hospital, Jung-Ju Lin, a master's student at CMU Institute of Biomedical Sciences, obtained the analytical data from the iHi Platform and discovered the potential of colchicine in preventing liver cancer. Her research, "Unlocking Colchicine's Untapped Potential: A Paradigm Shift in Hepatocellular Carcinoma Prevention," was published in the international medical journal Cancers (with an impact factor of 5.2), showing her excellent performance in academic research.

Jung-Ju Lin is currently the clinical trial coordinator of CMUH. With a nursing background, she has witnessed the helplessness of many liver cancer patients in her clinical experience of more than ten years. Therefore, she aims to deepen her medical knowledge, so she decided to study at CMU Institute of Biomedical Sciences, hoping to find new ways to prevent liver cancer and reduce its incidence from a research perspective. Through analysis of the CMUH iHi platform, it was found that the risk of liver cancer in patients who used colchicine in the long term was reduced by nearly 19%. From a clinical perspective, this means that physicians can make interventions earlier, especially for patients who have already been diagnosed with liver cancer.

This research finding not only provides a new direction for the prevention strategies of liver cancer but also brings new hope to millions of high-risk people around the world. It will surely become an important guide for future liver cancer research and treatment.