

Global Solidarity for Fighting Infectious Diseases, Allergies, and Cancer: The Chiba University-UCSD Immunology Initiative

**YUICHI ODA, TOSHINORI NAKAYAMA, AND
HIROSHI KIYONO, SCHOOL OF MEDICINE, CHIBA UNIVERSITY**

U.S.-JAPAN HIGHER EDUCATION ENGAGEMENT STUDY (USJP HEES)

This case study is part of a larger study by the American Council on Education (ACE). This case study and the accompanying live, interactive database, real-time analysis, fact sheet, and infographics provide a foundation to capture U.S.-Japan higher education institutional partnership activities.

The goals of USJP HEES are to improve mutual understanding and cooperation within the U.S.-Japan higher education community and to capitalize on its strengths within the global higher education context.

The U.S.-Japan Higher Education Engagement Study is made possible through the generous support of the Japan Foundation Center for Global Partnership.

Visit www.acenet.edu/usjp-hees to learn more about the project.

Chiba University's partnership with the University of California San Diego is advancing immunology research and education in a big way. In 2016, Chiba University and the University of California San Diego (UCSD) launched a research partnership focusing on the development of preventive and therapeutic vaccines against infectious diseases, allergies, and cancers. Chiba initially committed US \$2 million over five years with a matching contribution from UCSD. The project facilitates joint research and exchanges between investigators and students on both sides of the Pacific, and builds on more than a decade of successful collaboration between Chiba University and the La Jolla Institute for Allergy and Immunology (LJI), located in UCSD's Science Research Park.

The Graduate School of Medicine at Chiba University has for more than 100 years contributed to advancements in allergy and immunology research. Immunology and the idea that many diseases are best addressed by boosting the body's own immune response have been popular in medical research and clinical treatment. Hundreds of millions of people worldwide have immune system dysfunctions, so the need to find new effective treatments is incredibly powerful and compelling.

Chiba University and UCSD created a visionary program where investigators with different expertise in immunology, infectious diseases, pathology, microbiology and internal medicine are working together to conduct advanced medical science research and training of next generation biomedical researchers. The partnership has created a network of affiliated laboratories with principal investigators from Chiba University, UCSD, and the La Jolla Institute for Allergy and Immunology, leading them to boost collaborative basic research of immune system diseases. The partnership is also strengthening ties between the researchers and industry in the hope of translating its discoveries into therapies for patients.

To this end, Chiba University, UCSD, and the La Jolla Institute for Allergy and Immunology have established a robust pipeline of talented scientists who can move research findings seamlessly from the lab bench to the hospital bedside. Both Chiba and UCSD are combining their data, knowledge, and resources to accelerate the development of novel preventive medicines and innovative therapeutics.

For example, MucoRice-CTB—a new form of cholera vaccine developed by Hiroshi Kiyono and his team, a core member of the Chiba University-UCSD Center for Mucosal Immunology, Allergy and Vaccine (cMAV)—is a shining example of what collaboration can achieve. MucoRice has several advantages over existing vaccines: allowing more stability at room temperature, lower risks of contamination, and higher effectiveness. MucoRice-CTB technology is being tested with other types of vaccines against emerging and re-emerging diseases, including allergies and cancers. To this end, this new mucosal vaccine platform is also being tested for the development of SARS-CoV-2 vaccines.

Chiba University and UCSD researchers are also working to uncover many of the mechanisms underlying allergic inflammations, and have established novel treatments such as sublingual immunotherapy for Japanese cedar pollinosis, a form of hay fever caused by pollen released by the endemic tree species *Cryptomeria japonica* that afflicts millions of people every year.

Drawing on more than 20 years of research on T-cell immunobiology, Motoko Kimura at Chiba University's Department of Immunology is now investigating the immunoregulatory role of the molecule CD69. Her team has found in mouse studies that anti-CD69 antibodies can help prevent inflammatory responses related, for example, to asthma, colitis, and arthritis. The finding may contribute for the creation of novel antibody therapy for the control of COVID-19-related lung inflammation. By collaborating with multinational

pharmaceutical venture companies, cMAV has established humanized anti-CD69 as well as anti-My19 antibodies, which is believed to be useful for the treatment of intractable inflammatory diseases. Kimura's research has also identified CD69 as a novel target for cancer immunotherapy. According to Kimura, powerful anti-tumor drugs called immune-checkpoint inhibitors are only effective for about 20 percent of patients, and are not applicable to patients suffering from autoimmune diseases.

Inspiring and training a new generation of medical researchers is another key aspect of the initiative. Chiba University and UCSD also created a new graduate program in immunology. Since 2014, every year 10 graduate students from Chiba are sent to LJI and UCSD for summer internships. In 2019, the Innovative Medicine Chiba Doctoral WISE program (iMeC-WISE) was launched with joint support from MEXT and Chiba University whereby graduate students are able to attain dual master's degrees or PhDs from both Chiba University and UCSD. The master's program includes nine majors: medical sciences, general pharmaceutical sciences, mathematics and informatics, Earth and environmental sciences, advanced science and engineering, creative engineering, fundamental engineering, environmental horticulture, and nursing. The four-year doctoral program is in frontier medicine and pharmaceutical sciences. iMeC-WISE provides students with financial support and the career development office as well as subsequent post-graduate employment positions to maximize each student's potential and build the foundation for career success. iMeC-WISE aims to foster the next generation of world-class researchers and innovators, who will contribute to the development of medical sciences, pave the way to novel therapies and drugs, and develop sustainable healthcare systems.

Looking Ahead

There are plans to expand the immunology initiative with activities extending throughout Asia and Europe. Chiba University has a vast amount of data on the microbiome and rare diseases in Japan, and there is significant opportunity for consolidating this data with partner institutes in Japan and beyond.