

NYCU-Tohoku Online Seminar



Organized by :
Tohoku University, Graduate School of Medicine,
National Yang Ming Chiao Tung University, College of Medicine
Endorsed by :
Tohoku University [Neuro Global International Joint Graduate program,
Tohoku University Brain Science Center



Date

Wednesday, October 7, 2026, 17:00 – 18:35 JST
(16:00 – 17:35TST)

1st Speaker

Jiun-I Lai (賴峻毅), MD, PhD.

Associate Professor, Institute of Clinical Medicine, National Yang Ming Chiao Tung University

Attending Physician, Division of Medical Oncology, Department of Oncology, Taipei Veterans General Hospital

Title

Multi-omics approach for novel therapeutic breakthrough in CDK4/6 inhibitor resistance for breast cancer



2nd Speaker

Motoaki Sugiura (杉浦元亮), MD, PhD.

Professor, Institute of Development, Aging and Cancer,
International Research Institute of Disaster Science,
Cognitive Neuroscience Application Center, Tohoku University

Title

Introduction to fMRI: How Do Human and Animal Behaviors Differ?



Program

17:00 JST (16:00 TST) Opening Remarks (10min)

17:10 (16:10) Lecture by, Jiun-I Lai , MD, PhD. (35min)

17:45 (16:45) Q&A (5min)

17:50 (16:50) Lecture by, Motoaki Sugiura, MD, PhD. (35min)

18:25 (17:25) Q &A (5min)

18:30 (17:30) Closing Remarks (5min)

Speaker : Jiun-I Lai, MD, PhD.

Title: Multi-omics approach for novel therapeutic breakthrough in CDK4/6 inhibitor resistance for breast cancer

Abstract:

CDK4/6 inhibitors are the backbone of therapy for hormone receptor-positive (HR+) breast cancer, yet resistance is near-universal and CDK6 overexpression is a well-established driver for which no targeted strategy exists. We took a multi-omics approach spanning chemical screening, epigenomics, proximity-labeling proteomics, structural modeling, and clinical transcriptomics to discover mechanisms that regulate CDK4/6 inhibitor resistance. From a screen of 160 kinase inhibitors, PIK-75 emerged as a compound that downregulates CDK6 and restores CDK4/6 inhibitor sensitivity in CDK6-overexpressing cells. We identified PIK-75 as a CDK7 inhibitor: it reduces RNA polymerase II CTD Ser5 phosphorylation and Pol II occupancy at the YAP1 promoter, suppressing Hippo-YAP output and CDK6. THZ1 and shRNA CDK7 depletion phenocopy this effect. ChIP-seq showed a global increase in promoter-proximal Pol II pausing that falls preferentially on oncogenic programs, and an elastic-net CDK7-activity signature derived from PIK-75/THZ1 concordant genes was validated across 14 external datasets and associated with outcome in clinical outcome. PIK-75 combined with abemaciclib reversed resistance in xenografts. Using another approach, performing comparative APEX2 proximity labeling of CDK6 identified the 14-3-3 protein YWHAB as a differential binding partner that sustains CDK6 protein stability by restraining proteasomal degradation, and YWHAB silencing depletes CDK6 and resensitizes resistant cells. Extending proximity labeling to YWHAZ mapped a previously undescribed interactome and showed that the functional species is a YWHAZ-YWHAB heterodimer, which engages the proteasome activator PA28 at a non-canonical interface by structural docking. In summary, our work unveils two mechanistic programs that modulate CDK4/6 inhibitor resistance.

Profile:

Dr. Lai is currently an Associate Professor at the Institute of Clinical Medicine, National Yang Ming Chiao Tung University, and an attending physician in the Division of Medical Oncology and Breast Center, Department of Oncology, Taipei Veterans General Hospital. His research focuses on tumor biology and stem cell biology, with particular interest in translating molecular and genomic insights into improved therapeutic strategies for breast cancer and other solid tumors. His work spans clinical oncology, cancer genomics, targeted therapy, treatment resistance, and real-world outcomes in advanced malignancies. Dr. Lai has authored peer-reviewed publications in journals including Journal of Clinical Oncology, The Oncologist, Clinical Epigenetics, BMJ Open, Journal of the Chinese Medical Association, and Journal of Cancer.

Speaker : Motoaki Sugiura, MD, PhD

Title : Introduction to fMRI: How Do Human and Animal Behaviors Differ?

Abstract :

Functional MRI (fMRI) is the most widely used noninvasive technique for visualizing human brain activity, with the particular advantage of reliably detecting activity in deep brain structures compared with other noninvasive methods such as EEG. In this lecture, I introduce three studies that illustrate distinct neural foundations for processes shared with other animals and those that are more specifically human. The first study examined neural responses during mate-choice decisions based solely on facial information in men and during mate-choice decisions based on behavioral information in both men and women. The second examined neural responses during social decision-making from a subjective, first-person perspective and during social decision-making based on conceptual understanding of the situation. The third examined neural responses to whole-body cooling and neural activity associated with individual differences in behavioral responses to ambient temperature. Across all three studies, neural responses associated with relatively basic, animal-common processes were observed in deeper brain structures, such as the amygdala, whereas responses associated with more complex, human-specific processes were observed in higher-order multimodal association cortices, such as the temporoparietal junction. Taken together, these findings support a comparative evolutionary perspective in which later-evolved neocortical areas override and reorganize the control exerted by evolutionarily older, deeper brain structures, enabling humans to transform more basic, animal-common processes through higher-order conceptual and social cognition.

Profile:

Dr. Sugiura is a Professor at Tohoku University, affiliated with the Institute of Development, Aging and Cancer (IDAC) and the International Research Institute of Disaster Science (IRIDeS), and leads the Cognitive Neuroscience Application Center (CogNAC). Since early in his career, he has conducted fMRI research on social cognition and the neural mechanisms of self-recognition, for which he received the MEXT Young Scientists' Award in 2010. His research investigates how humans understand themselves, others, and their social environment, integrating cognitive neuroscience with perspectives from psychology, philosophy, and the behavioral sciences. Through leading CogNAC, he has expanded this work toward interdisciplinary applications spanning the humanities, education, ethics, religion, and other fields. His broader goal is to understand the neural foundations of human cognition and behavior, and what makes human nature distinctive from an evolutionary perspective.