DEPARTMENT OF BIOMEDICAL SCIENCES
PRESENTS A SEMINAR

CityU 香港城市大學 City University of Hong Kong

INTEGRATIVE APPROACHES TO TACKLING EXPERIENCE-DEPENDENT OUTCOMES

Jonathan Tang, Ph.D.
Assistant Professor
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DATE: 28 November 2024 (Thursday)
TIME: 15:00 - 16:30
VENUE: G5-214, 5/F, Yeung Kin Man Acad Building, CityU

Abstract:
Early life experiences profoundly impact later outcomes, influencing molecular profiles, brain circuits, behaviors, subjective experiences, and mental health. To develop precise mental health interventions, it is crucial to understand the interrelationship between these levels. This presentation will outline a cross-disciplinary strategy developed by our team to investigate these complex interrelationships. Fundamentally, almost all biomedical endeavor would benefit from the ability to target specific molecules or cell populations. We are developing a scalable, generalizable platform to create sensors and effectors targeting diverse molecules and cells, with the goal of applying the reagents to dissect experience-dependent circuits. Our approach is based on the engineering of conditionally stable nanobodies, which depend on target molecule expression. To model experience-dependent action learning, we developed a closed-loop reinforcement system in mice. This dynamic method of behavioral modulation allows for real-time adjustments based on the animal's responses, to study how animal adapt their behavior for rewarding outcomes. This approach revealed behavioral dynamics and learning principles that could inform human behavioral therapies. Lastly, we propose a new integrative framework that combines structural biology and psychology to study subjective experiences observed in experience-dependent disorders. This talk will highlight how our integrative approaches not only advances our understanding of experience-dependent outcomes but also paves the way for novel diagnostic and therapeutic strategies.

Speaker:

Dr. Jonathan Tang is an Assistant Professor of Pediatrics at the University of Washington and Principal Investigator at the Seattle Children's Research Institute's Center for Integrative Brain Research. An Early-Stage Investigator with a broad, interdisciplinary background, Dr. Tang has developed innovative technologies to advance biomedical research, with potential in diagnostics and therapeutics. His work leverages biological learning principles and bioengineering to address challenges in detecting and manipulating specific live cell populations. His Ph.D. research at Harvard, under Dr. Connie Cepko, pioneered conditionally stable nanobodies, enabling targeted cell manipulation, and his postdoctoral work at Columbia University under Dr. Rui Costa led to a cutting-edge closed-loop system for studying action learning dynamics in freely moving animals. More recently, Dr. Tang's lab integrates large language models with structural biology and psychology to explore the physical basis of self-reported subjective experiences, setting the stage for advancements in mental health and neuroscience. An NIH K99/R00 awardee and having mentored over 50 students, Dr. Tang continues to make cross-disciplinary contributions to neuroscience, bioengineering, and artificial intelligence.

All are Welcome!

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