BDR SEMINAR (Kobe & online hybrid)

Co-sponsored by BDR Diversity WG and BDR Launchpad

Itai Yanai

Institute for Systems Genetics, New York University, Grossman School of Medicine

Friday, February 21, 2025

11:00-12:00

1F Auditorium, DB Building C, Kobe / Broadcast online via Zoom

Zoom meeting URL will be announced on the event day by e-mail.

※This seminar is open only to BDR members.

A "tale of tails" and cellular adaptation

Summary

One of the most notable changes along the evolutionary lineage to apes and humans is the loss of the tail — an attribute that distinguishes them from monkeys such as the bonnet macaques (Macaca radiata) shown on the cover. I will first discuss how an insertion of a transposon into the non-coding part of TBXT, a gene important for tail development, may explain how our ancestors lost their tails 25 millions years ago. In the second part of this talk I will discuss cellular plasticity as an important driving force underlying cancer progression and drug resistance. I will discuss our new work on how cellular adaptation to cancer therapy occurs along a resistance continuum. In this work we found that resistance develops through trajectories of cell state transitions accompanied by a progressive increase in cell fitness, which we denote the 'resistance continuum'. This cellular adaptation involves a step-wise assembly of gene expression programs and epigenetic reinforcement of cell states. These processes are underpinned by phenotypic plasticity/dedifferentiation, physiological adaptation to stress and metabolic reprogramming. Our results support the notion that stemness programs, commonly viewed as a proxy for phenotypic plasticity, enable adaptation, rather than providing a proximal resistance mechanism. Through systematic genetic perturbations, we identify an acquisition of progressive metabolic dependencies, exposing a spectrum of vulnerabilities that can be potentially exploited therapeutically. The concept of the resistance continuum highlights the dynamic nature of cellular adaptation and calls for complementary therapies directed at the mechanisms underlying adaptive cell state transitions.

Host: Yu-Chiun Wang
Laboratory for Epithelial Morphogenesis, BDR
Contact: yu-chiun.wang@riken.jp

RIKEN Center for Biosystems Dynamics Research (BDR)