ASHBi SEMINAR

Inferring the rules of cell fate interactions using nonequilibrium physics and graph-based machine learning

Lecturer: Kyogo Kawaguchi, Ph.D.

Team Leadler, RIKEN BDR

Date Friday, 14 April 2023 *New!*

Time 11:00 – 12:00 [JST]

Venue Conference Room Onsite Only*

B1F, Faculty of Medicine Bldg. B

*Register via the right QR code

Abstract

Cells interact with each other during homeostasis and development to maintain, grow, and deform tissues. Despite modern high-throughput cell profiling technologies and high-resolution microscopy, identifying the rules of cell-to-cell interactions remains challenging due to the complexity of the problem and limited methods for perturbation experiments. Understanding the rules of the cell interactions that underly the robustness of multicellular systems is a fundamental question in biology, and exploring the universality of those rules is also an interesting problem from the perspective of physics. We have been seeking a systematic method of analysis that extracts rules from live tissue images and cell tracks. One approach, inspired by models of nonequilibrium physics, is to look at the spatial property of the fluctuation in the number of cell fate events (Mesa, Kawaguchi, Cockburn, et al., Cell Stem Cell 2018). Another approach is to conduct machine learning using spatio-temporal graphs constructed from cell tracks and cell contacts (Yamamoto, Cockburn, Greco, Kawaguchi, Plos Comp Biol 2022). In this talk, I will describe our progress in applying these approaches to various tissue regions, including the adult mouse homeostatic epidermis and the developing neural epithelia.

Organizer : Graduate School of Medicine
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