BDR SEMINAR(Kobe & online hybrid)

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Thursday, June 27, 2024

10:00-11:00 1F Auditorium, DB Building C, Kobe / Broadcast online via Zoom Zoom meeting URL will be announced on the event day by e-mail. ". In principle, this seminar is open only to BDR members.

Toward a holistic and quantitative stem cell state landscape

Summary

The Allen Institute for Cell Science aims to understand the principles by which human induced pluripotent stem cells (hiPSCs) establish and maintain robust dynamic localization of cellular structures, and how they transition between states during differentiation and disease. Single-cell imaging and analytics are advancing at a breakneck pace via the collection of large-scale, systematic cell image datasets and the application of quantitative image-based data science methods. This is, therefore, a key moment in the arc of biological research to develop methods and analyses that integrate the spatiotemporal observables of the physical structure and organization of the cell with molecular observables, and to update the concept of a holistic cell state. We propose a conceptual framework for holistic cell states and state transitions that is practical and useful and enables integrative analyses and modeling across many data types. We are developing computational approaches to quantify cell organization and cell function within this framework in undifferentiated hiPSCs, differentiated endothelial cells and beyond. We are also exploring appropriate experimental, computational, and theoretical frameworks to test hypotheses within the holistic cell state framework with a focus on our current model system for state transitions being an induced early differentiation EMT along the mesodermal lineage. Along the way we have had to develop image analysis, visual analysis, data analysis, and simulation tools, which we release openly and, in some cases, develop further for greater community accessibility and useability.

Host: Katsuyuki Shiroguchi

