



Soft Living Active and Adaptive Matter



Principles of cell circuits for tissue composition: Insights into the stability and vulnerability of our tissues

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Abstract:

Our organs and tissues are made of different cell types that communicate with each other in order to achieve joint functions. However, little is known about the universal principles of these interactions. For example, how do cell interactions maintain stable cell composition? And what is the role of these interactions in tissue-level diseases where the healthy balance in the tissue is disrupted such as excess scarring following injury known as fibrosis? In this talk, I will discuss a mathematical model we developed to capture the behavior that emerges when two populations of cells support each other's survival and division. Using the theory we revealed the requirement on cell-cell interactions to maintain a dynamical balance of healthy cell-type ratios in a tissue. Finally, I will discuss how we extended the model to explore the tissue vulnerability in response to injury. Using this modeling framework, we explain which injuries may lead to a pathological fibrotic state and predict new therapeutic approaches to avoid and reduce fibrosis.

Date:
03/27/2023

Time:
9:00 AM-10:15 AM (PT)

About the speaker:

Miri Adler completed a BSc in Physics at the Technion and obtained an MSc and a PhD in Physics at the Weizmann Institute with Prof. Uri Alon, studying design principles of biological circuits. In her postdoctoral research working jointly with Prof. Ruslan Medzhitov at Yale University and Prof. Aviv Regev at the Broad Institute of MIT and Harvard, Miri developed theoretical frameworks to uncover universal principles of the collective behavior of cells at the tissue level.

Miri received a Fulbright scholarship, EMBO postdoctoral scholarship, Zuckerman STEM leadership program fellowship, and the Israel National Postdoctoral Award Program for Advancing Women in Science. Currently she is an associate research scientist at the Tananbaum Center for Theoretical and Analytical Human Biology at Yale University.



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