



ICTS Biophysics Seminar

Title : Design principles of complex cellular decision-making networks in cancer

Speaker : Mohit Kumar Jolly (Indian Institute of Science, Bengaluru)

Date : Monday, 14 October 2024

Time : 2:30 PM (IST)

Abstract : Elucidating the design principles of regulatory networks driving cellular decision-making is of fundamental importance in mapping and controlling cellular behaviour. Despite their size and complexity, large biological regulatory networks often lead to a limited number of cell-states/phenotypes. How this canalization is achieved remains largely elusive. Here, we investigated multiple different networks governing cell-state transition during cancer metastasis, and identified a latent design principle in their topology that limits their phenotypic repertoire – the presence of two “teams” of nodes engaging in a mutually inhibitory feedback loop. These "teams" are specific to these networks and directly shape the phenotypic landscape and consequently the cell-fate trajectories. Our analysis reveals that network topology alone can contain information about phenotypic distributions it can lead to, thus obviating the need to simulate them. We present experimental evidence of such "teams" in transcriptomic datasets across many contexts (cancer cell plasticity in breast cancer, melanoma, lung cancer etc.). Overall, we propose these “teams” as a network design principle that drive cell-fate canalization in diverse decision-making processes, and drastically reduce the dimensionality of the phenotypic space.

Venue : Chern Lecture Hall

Zoom Link: <https://icts-res-in.zoom.us/j/93584148169?pwd=C9lCxnzgxYmRNMFL2Oe4qaqqunC9VU.1>

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