Biomedical Informatics Grand Rounds
Wednesday, May 10, 2023 3:00 pm – 4:00 pm

Computational analysis of functional interactions in pancreatic tumor microenvironment

Subhajyoti De, Ph.D.
Associate Professor with tenure, Rutgers Cancer Institute of New Jersey Lab
Member, Center for Cancer Metabolism and Immunology
Member, Precision Medicine in Cancer Initiative

Remote Access
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Meeting ID: 956 1719 7636 Passcode: 924293
In-Person talk: Medical and Research Translation (MART) Building, Room location 7M-0602

Bio: Dr. Subhajyoti De is a tenured Associate Professor in the Department of Pathology at Rutgers University. His research group uses systems biology approaches to identify fundamental principles of evolvability of tumor genomes and tumor-microenvironment interactions, and applies that knowledge to advance precision medicine. Dr. De received his PhD from University of Cambridge, UK and did his postdoctoral research at Dana Farber Cancer Institute with Human Frontier Sciences Program fellowship, before starting his own group. Dr. De is also an educator, mentor, and inventor. He is a Fellow of the Rutgers Leadership Academy and an Associate Editor for NAR – Cancer, a peer-reviewed journal from the Oxford University Press.

Abstract: Cell-cell interactions are the foundations of tissue organization and function. Degeneration of tissue architecture and abnormal cell-cell interactions in the tumor microenvironment are ubiquitous in all solid cancers. Interactions among tumor, immune, and stromal cells and the extracellular matrix play key roles in tumor progression, invasion, immune modulation, and response to treatment. We will present Neighbor-seq, a method to identify and annotate the architecture of direct cell–cell interactions from the undissociated cell fractions in single cell sequencing data and use that to establish the cellular interactome in normal tissues and tumors of pancreas. Next, we use network graph-based spatial statistical models with spatial transcriptomic data to gain insights into modularity and spatial heterogeneity in the pancreatic tumor microenvironment. Finally, using a novel method called SAHMI we show that, intercellular interactions, in part, are influenced by tumor-resident microbes, which affect cell-type-specific gene expression and pathway activities, including cell motility and immune signaling. Taken together, multi-species, multimodal interactions involving tumor, stromal, and immune cells, and also microbes appear to modulate the course of tumorigenesis and outcome.

Educational Objects:

- To understand the importance of cell-cell interactions in tissue organization and function, and their role in tumor microenvironment.
- To learn about Neighbor-seq, a method to identify and annotate direct cell-cell interactions in single cell sequencing data.
- To understand the use of network graph-based spatial statistical models in gaining insights into modularity and spatial heterogeneity in the pancreatic tumor microenvironment.
- To gain an understanding of the multi-species, multimodal interactions involving tumor, stromal, immune cells, and microbes, and their potential impact on tumorigenesis and outcome.

Disclosure Statement: The faculty and planners have no relevant financial relationship with ineligible companies whose primary business is producing, marketing, selling, re-selling, or distributing health care products used by or on patients.

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