THE GIS
SPEAKER SERIES

Genome Institute of Singapore
GIS

Spatial transcriptomics of the human small intestine

Professor Shalev Itzkovitz

Weizmann Institute of Science

Host: DasGupta Ramanuj

Thursday 13 June 2024
10.00am – 11.00am

GIS Seminar Room (Level 2)
60 Biopolis Street, Genome, Singapore 138672

About The Speaker

Professor Itzkovitz is the head of the department of Molecular Cell Biology at the Weizmann Institute. He is studying how single cells work together in mammalian tissues to collectively achieve physiological goals. He received several awards including the Rappaport prize for excellence in biomedical research, the Kimmel award for innovative investigation, the Human Frontiers Career Development Award, the EMBO young investigator award and an HHMI International Research Scholar award.

About The Seminar

The human small intestine is composed of repeating crypt-villus units, displaying highly variable microenvironments. Understanding intestinal function requires detailed exploration of functional diversity along the axes of this unit. We used spatial transcriptomics, spatial proteomics and imaging to reconstruct a comprehensive spatial expression atlas of the adult human proximal small intestine. We describe zonated expression and cell type representation for epithelial, mesenchymal and immune cell types. We find that migrating enterocytes switch from lipid droplet assembly and iron uptake at the villus bottom to chylomicron biosynthesis and iron release at the tip. Villus tip cells are pro-immunogenic, recruiting gamma-delta T cells and macrophages to the tip, in contrast to their immunosuppressive roles in mice. We also show that the human small intestine contains abundant branched villi, enriched at the tops of circular folds. Our study presents a detailed resource for understanding the biology of the adult human small intestine.