Immuno-engineered designer organoids for regulating the kinetics of B-cell development, antibody production, and translating therapeutics against B cell tumors

Wednesday, January 18
1034 Emerging Technologies Building
9:10 a.m. to 10:00 a.m.

Ex vivo immune organs can enable mechanistic understanding of the immune system, provide a deeper understanding of the mechanisms that lead a variety of immune-related malignancies, including B and T cell lymphomas, and more importantly, accelerate the translation of immunotherapies.

In this talk, I will discuss two complementary, designer strategies developed in my lab which recapitulates the anatomical microenvironment of a lymphoid tissue and provides the basis to regulate the kinetics of immune reaction as well as mimic a neoplasm-like heterogeneous microenvironment. These strategies could, in the long term, change the understanding of the initiation and progression of hematological tumors, allow primary bio-specimen analysis, provide prognostic values, and importantly, allow a faster and more rational screening and translation of therapeutic regimens.

Prof. Singh is an Assistant Professor of Mechanical Engineering at Cornell University, with graduate field faculty appointment in Biomedical Engineering as well as Material Science and Engineering. He received his postdoctoral training in Mechanical Engineering at Georgia Tech where he studied human stem cell reprogramming and differentiation, stem cell and mature cell adhesion, force response and mechanotransduction. Prior to that, he received his Ph.D. in Biomedical Engineering at The University of Texas at Austin. His lab is developing strategies to engineer adaptable, designer immune organoids and enabling technologies for mechanistic understanding of healthy and diseased immune cells. He has received funding from the National Institute of Health, National Science Foundation, and the Lymphoma and Leukemia Society, among others. He has published 30 peer-reviewed journal articles, including those in Nature Methods, Nature Materials, PNAS, Blood, Nature Protocols, Biomaterials, and Molecular Therapy. He is a recipient of the National Science Foundation CAREER Award, 2017 Society for Biomaterials Young Investigator award, 2015 Biomaterials Outstanding Research paper Award, 2014 CMBE Young Innovators award, 2014 CMBE-BMES Rising Star award, and his immune organoids research has been identified among Top 100 Discoveries of 2015 by Discover Magazine.