



Biomedical Informatics Grand Rounds



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Single-Cell Functional Proteomics for Analysis of Molecular Signatures of Small Samples

**Wednesday, March 4, 2020 3 pm—4 pm
Health Science Center L3-LH6**

Abstract:

Cellular diversity is an intrinsic trait of any multicellular system. Despite extensive study of cells, their complexity still poses major challenges to the identification of key cellular subsets and targets that are responsible for human diseases. Recently, single-cell functional proteome has emerged as a research field of intense interest owing to the significant role proteins play in cell type identification, signaling transduction, proliferation and apoptosis, transcription regulation, inflammation, and cell communication. The major obstacle to this field is the lack of appropriate tools that can survey the full sets of proteins of important functions. In this talk, I will overview various highly multiplexed single-cell microbarcode technologies in my research group for highly multiplexed protein assays toward functional proteomic studies, and will discuss how such transformative technology should be translated towards precision diagnosis. Application to three areas including cancer signaling, immune response and neural stem cells will be discussed. Our study discovered that communication of cancer cells significantly alters their oncogenic signaling. Among all functional proteins, the cytokines secreted from a single cell are particularly difficult to analyze. Our microchip permits simultaneously measurement of gene expression of the same single macrophage cells by RNA sequencing. Through this multiomics approach, we found potential regulatory networks related with cytokine production in subsets of immune cells. We have also measured the cell communication factors produced by neural stem cells. With the current success, we are heading towards mapping of the entire functional proteome in single cells.

Bio:

Jun Wang is an Assistant Professor in the Department of Biomedical Engineering at Stony Brook University. Prior to joining SBU, he was an assistant professor in the Chemistry Department of SUNY Albany. He received postdoctoral training in the Department of Chemistry and the NanoSystems Biology Cancer Center at the California Institute of Technology. His research in Prof. James Heath's group includes cancer cell communication and stem cell studies on microchip. He obtained his Ph.D. in Biological Engineering from Purdue University where his research in Prof. Chang Lu's group was focused on single-cell microfluidics and gene delivery. He has received several top awards including Chorafas Foundation prize.

****CME Credit Available****

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