

Multiomics Analysis of the Immunome, Transcriptome, Microbiome, Proteome, and Metabolome in Term Pregnancy

Introduction: Preterm birth is the single largest cause of death in children under 5 years of age. Those neonates who survive a premature birth often suffer from various comorbidities extending well into adulthood. Recent technological advances in artificial intelligence, biological assays, and electronic health records provide novel opportunities to unravel the complex biology of pregnancy. Immunological changes during pregnancy are highly dynamic and involve multiple interconnected biological systems. I will discuss a series of studies to using single cell immune profiling, microbiome, and proteome, and transcriptome analysis of normal and pathological pregnancies, and novel machine learning approaches for integration of these modalities by accounting for prior knowledge, dataset modularity, and social determinants of health. The final section of the presentation will focus on integration of electronic health records data with biological assays to enable a precision-medicine approach to maternal and neonatal morbidity.