

# Next-Generation Platforms for Immune Engineering and Drug Discovery



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**Wednesday, March 17, 2021  
12:00-1:00PM**

**Abstract:** We seek to develop new single-cell technologies for immune response analysis and the discovery of precision immunotherapeutics. Adaptive immune responses confer protection against cancers and infectious agents, but can also lead to pathological autoimmunity when misdirected against self proteins. A more detailed understanding of the diverse antibody and T cell receptor functions that comprise our immune memory will provide insights to enhance protection against infectious agents, accelerate vaccine design approaches, and reveal new pathways for autoimmune disease therapeutics and cancer eradication.

Ongoing efforts in the DeKosky lab are developing a suite of high-throughput single-cell platforms for comprehensive analyses of adaptive immunity. We seek to capture a more complete picture of the genetic and functional diversity of single human immune cells, and provide new ways to study immune development and discover potent therapeutic molecules. This presentation outlines recent work and several unpublished findings and case studies that reveal the biophysical mechanisms of antibody:virus interactions, discover improved and potent human antibodies, and inform the design of biologics and anti-cancer therapeutics. These molecular techniques are revealing the quantitative principles that shape adaptive immunity and provide new molecular design strategies to accelerate human drug discovery.