High-Dimensional Profiling Of Human Antigen-Specific T Cells: Asking T Cells What They ‘See' In Cancer

Dr Evan NEWELL
Singapore Immunology Network (SIgN)
A*STAR

Abstract
Blood and tissue samples taken as part of clinical studies and trials can provide critical information on the roles of the immune response in patient outcome. However, the cellular compositions of these samples are often highly diverse and important information can be lost if rare cells are overlooked. For instance, antigen specific T cells are critical initiators and orchestrators of the adaptive immune response but cells specific for any given pathogen or cancer can be exceedingly rare, especially in blood.

Here, the utility of high dimensional mass cytometry analysis together with rapidly evolving computational analysis tools will be discussed. By this approach, cells can be probed with unprecedented detail by simultaneously evaluating surface marker expression, functional capacity and antigen-specificity. For T cell antigen-specificity, this analysis can be performed in conjunction with a highly multiplexed method based on peptide-MHC tetramers, which allows simultaneous assessment of >500 different antigen specificities in a single sample.

Application of these approaches to identify and phenotypically profile virus and cancer specific T cells will be described. In addition to the possibility of finding novel therapeutic targets, a long-term goal of this work is to discover more accurate biomarkers of clinical outcomes (e.g., responsiveness to immunotherapy) based on the high-dimensional characteristics of antigen-specific T cells.

About the Speaker
Evan Newell completed his B.Sc. in Immunology at McGill University and Ph.D. in Physiology focusing on the electrophysiological properties of immune cells under the guidance of Dr. Lyanne Schlichter at the University of Toronto. He then moved to California for a post-doctoral fellowship at Stanford University with Dr. Mark Davis, where he initiated the use of mass cytometry for the study of antigen-specific cells using heavy-metal labeled peptide-MHC tetramers. Evan joined SIgN July 2012.