National Cancer Centre Singapore
SingHealth

Simultaneous Identification and Profiling of Tumour-Specific T-cells by Mass Cytometry

Date & Time: 30th October 2017, Monday, 8am to 9am
Location: Peter & Mary Fu Auditorium, NCCS level 4
Speaker: Dr Michael Fehlings, Director of Scientific Affairs, immunoSCAPE



Bio: Michael obtained his PhD in Immunology studying the interaction of human antigen-presenting cell with *Helicobacter pylori* at the Charité Berlin and the Max Planck Institute for Infection Biology in Berlin. In 2014, he moved to Singapore for a post-doctoral fellowship at the Singapore Immunology Network with Dr Evan Newell, where he focused on investigating tumour-specific T-cells using mass cytometry and multiplexed combinatorial peptide-MHC tetramer technology. Michael co-founded and now serves as Director, Scientific Affairs of immunoSCAPE, a spin-off company from the lab of Dr Evan Newell at SIgN, A*STAR, that is specialised in high-dimensional immune cell profiling and antigen-specific T-cell discovery in oncology, infectious and autoimmune diseases.

Abstract: immunoSCAPE leverages the high-dimensional immune profiling capabilities of mass cytometry combined with a unique technology for the identification of antigen-specific T-cells to support the development of immunotherapy strategies in cancer and immune-related diseases. In cancer, there is now strong evidence that immunotherapy-mediated tumour rejection can rely on tumour-specific (neoantigen-specific) $CD8^+$ T-cells. Consequently, the discovery of neoantigens becomes extremely invaluable for personalised cancer immunotherapies. Although in silico pipelines exist, that are capable of successfully predicting non-synonymous mutations potentially giving rise to tumour-specific neoantigens, it is not clear how accurate these methods are in identifying immunogenic and therapeutically relevant epitopes, given that T-cell epitope usage can be influenced by many factors. Moreover, analysis of T-cells in cancer patients is challenging due to the need to detect rare antigen-specific T-cell populations in samples that are usually limited in volume and availability. We are applying mass cytometry (a.k.a. cytometry by time of flight, CyTOF) in conjunction with combinatorial peptide-MHC tetramer staining and high-performance dimensional analysis tools to achieve broad MHC-class I epitope mapping with high sensitivity for rare antigen-specific T-cells and concurrent in-depth characterisation of these cells at the single-cell level. We will show examples of applications of this technology on a murine tumour model that is susceptible to checkpoint blockade immunotherapy and on different human cancers, demonstrating its utility in the identification and deep profiling of tumour-specific $CD8^+$ T-cells in mice and men, and the assessment of the biological activity of checkpoint blockade immunotherapy. By providing insights into the nature of neoantigen-specific T-cells, immunoSCAPE's unique target discovery and high-dimensional immune profiling platform is a valuable tool for the development of novel diagnostic and therapeutic strategies.