Bioprocessing Technology Institute
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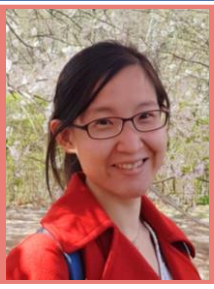
Integrating multi-modal analyses to reveal biological insights defining Epstein-Barr virus-positive and -negative cancer subtypes



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4 March 2024, 4.00pm

Seminar Abstract

The highly prevalent oncogenic Epstein-Barr virus (EBV) can drive oncogenesis with disrupted host immunity, causing malignancies including post-transplant lymphoproliferative disorders (PTLD). PTLD can also arise in the absence of EBV but the biological differences underlying EBV(+) and EBV(-) B cell PTLD and the associated host-EBV-tumour interactions remain poorly understood. Here, we integrated computational and multi-omics approaches to reveal the core differences between EBV(+) and EBV(-) PTLD, characterized by increased expression of genes related to immune processes or DNA interactions respectively, and the augmented ability of malignant B cells in EBV(+) PTLD to modulate the tumour microenvironment through elaboration of monocyte-attracting cytokines/chemokines. We create a reference resource of proteins that distinguish EBV(+) B lymphoma cells from those in EBV(-) B lymphoma including the immunomodulatory molecules CD300a and CD24, respectively. Moreover, we show that CD300a is essential for maximal survival of EBV(+) PTLD B lymphoma cells. Our comprehensive multi-modal analyses uncover the biological underpinnings of PTLD and offer new opportunities for precision therapies. Through this presentation, I hope to emphasise the utility of high-throughput omics analyses not only to identify biological correlates with disease, but more importantly, as a foundation to empower more robust hypothesis generation, discovery, and validation of biological insights when used in tandem with in vitro and in vivo techniques, with the potential for tangible impacts via influencing patient management.

About the Speaker

Dr. Jiaying Toh completed her Ph.D. in Immunology at Stanford University under the mentorship of Dr. Olivia Martinez and Dr. Purvesh Khatri, where she focused on B cell post-transplant lymphoproliferative disorder (PTLD), a lymphoma arising after organ transplantation, and the involvement of the Epstein-Barr virus (EBV) in the pathology of PTLD. Her research capitalised on the strengths of both computational and experimental biology techniques, combining them to result in the identification of immunological and tumour characteristics distinguishing between EBV-positive and EBV-negative PTLD. Currently, she is part of the Immune Cell Monitoring (ICM) group led by Dr. Andy Tan, where she is working towards the scalable development of effective and clinical-grade novel immunotherapies against cancer.

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