NUS National University of Singapore | iHealthtech Institute for Health Innovation & Technology

"Innovating Health" Distinguished Speaker Seminar Series

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Microfluidic Cell Engineering for Immunotherapies

22 MAR 2024, FRI, 2 PM – 3 PM
NUS, College of Design and Engineering, Building E7, Level 3, Seminar Room 4

Adoptive cell therapy (ACT) is an immunotherapy that involves isolating immune cells (e.g., T cells) from a donor's blood, genetically modifying them to express chimeric antigen receptors (CARs) targeting cancer biomarkers, and reintroducing them into patients. Microfluidic technologies streamline this process by addressing multiple steps, including cell harvesting, isolation, activation, expansion, and transfection. Two microfluidic platforms, the lateral cavity acoustic transducer (LCAT) and droplet microfluidics, are developed in our lab and used in the cellular engineering process. LCAT isolates, transfects, and expands T cells. The acoustic electric shear orbiting poration (AESOP) device, based on the LCAT, efficiently delivers genetic material into a large population of cells simultaneously. These capabilities optimize therapeutic efficacy of engineered cells and combine with gene editing tools for specific in vivo targeting. Using droplet microfluidics, we constructed artificial antigen-presenting cells (aAPCs) for antigen-specific T cell activation. By trapping single cells in microfluidic droplet compartments, we could study 3D cell morphology, facilitating understanding of immune cell activation and synapses.

Speaker biography:
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