City University of Hong Kong

Joint MBE/BMS Seminar

Date: November 26, 2014 (Wed)

Time: 11:00am

Venue: Room 2405, 2/F, AC2

Title:

Investigating human tissue heterogeneity using quantitative single-cell transcriptomics

Speaker:

Dr Angela Wu, Stanford University, USA

Abstract:

The field of single-cell whole transcriptome analysis is growing rapidly to achieve profiling of rare or heterogeneous populations of cells. We compared the performance of various commercially available single-cell RNA amplification methods in both microliter and nanoliter volumes. We benchmarked each method to conventional RNA-seq of the same sample using bulk total RNA, as well as to multiplexed qPCR. In doing so, we were able to systematically evaluate the sensitivity, precision, and accuracy of various approaches to single-cell RNA-seq. Our results show that it is possible to use single-cell RNA-seq to perform quantitative transcriptome measurements of single cells, that it is possible to obtain useful gene expression measurements with a relatively small number of sequencing reads, and that when such measurements are performed on large numbers of cells, one can recapitulate both the bulk transcriptome complexity as well as the distributions of gene expression levels found by single-cell qPCR. We subsequently used microfluidic-based RNA-seq to profile single cells of the developing mouse lung, and adult human colon respectively to dissect their tissue heterogeneities, discover novel cell types, as well as investigate biological mechanisms.

Biosketch

Angela Wu is currently a post-doctoral scholar at Stanford University in the Department of Bioengineering. She obtained her Ph.D. also from Stanford University in Bioengineering; her Ph.D. thesis started the field of microfluidic chromatin immunoprecipitation (ChIP). Her Ph.D. work focused on microfluidic designs to enable ultrasensitive profiling of protein-DNA binding via low cell number ChIP, and this technology is now being used in various other labs in biological applications. Angela Wu is a Siebel Scholar and was the recipient of a Bio-X interdisciplinary fellowship award. She is currently using single-cell genomics techniques to dissect the cellular heterogeneity of colorectal cancer in order to investigate cancer cell self-renewal and its associated transcriptional signatures.