



Seminar

Massively Parallel Combinatorial Genetics in Human Cells

Date:

31 August 2015 (Monday)

Time:

9:30 am – 10:30 am

Venue:

Room 407 - 408, 4/F,
Li Ka Shing Medical Sciences Building,
Prince of Wales Hospital

Speaker:

Dr Alan S. L. Wong
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Abstract:

The systematic analysis of combinatorial genetic interactions, which play significant roles in regulating complex biological traits, has been limited in the throughput and order of complexity of genetic combinations that can be studied through current methods. Harnessing the power of synthetic biology and next-generation sequencing technologies, we developed CombiGEM (Combinatorial Genetics En Masse) as a powerful platform for high-throughput functional characterization of combinatorial genetic perturbations in human cells. CombiGEM enables rapid, scalable assembly of high-order barcoded combinatorial genetic libraries, and multiplexed quantification of all library members by using next-generation sequencing technologies. The genetic elements included in CombiGEM libraries can be arbitrary, including microRNAs, gene expression/knockdown constructs, synthetic-biology circuit components, and programmable CRISPR-Cas genome editing tools. The speaker applied CombiGEM to create high-coverage combinatorial libraries comprising two-wise and three-wise barcoded genetic components in a lentiviral delivery system for efficient and stable genomic integration in human cells. The speaker identified genetic combinations that synergistically sensitize drug-resistant cancer cells to chemotherapy and/or inhibit cancer cell proliferation, providing insights into complex genetic networks. More broadly, this method will enable high-throughput profiling of multifactorial genetic combinations that regulate a myriad of phenotypes relevant to biomedical, biotechnology, and basic science applications.

All are welcome. For inquiries, please contact Miss Kenez Chow at 3763 6089.