

Seminar Announcement

From Studying Hypoxia-driven Cancer-evolution and Brain-injury To Developing Therapies for Cancer and Dementia

Date: 10 June 2016 Friday

Time: 4pm

Venue: Classroom 1, SBS

Speaker: Assoc/Prof. Newman Sze
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Abstract

Ischemia caused by restriction of blood supply to tissues leads to hypoxia that is a key pathological component of the major human diseases – ischemic heart disease/heart failure, stroke/dementia and cancer evolution/malignancy – which together account for more than 50% of deaths each year both locally and globally. Over the past 10 years, my lab is systematically studying hypoxia model systems for each of the three medical conditions using cell lines, animals and clinical samples by advanced proteomics and systems biology approaches. The data provide synergistic understanding and insight on the hypoxia-driven pathologies of these major human diseases.

Tumor progression is driven by selective pressure on the cancer cells exerted by the hypoxic microenvironment, leading to the clonal evolution to malignancy. In order to decipher the underlying molecular mechanism, we employed quantitative proteomic method and biochemical assays to study hypoxic cancer cells' secretome, cellular proteome and chromatome. This holistic strategy uncovered many novel pathways that promote cancer cells survival and evolution, and cancer immune suppression.

Concurrently, we have studied hypoxic-ischemic brain injury, degenerative protein modifications (DPMs) and aggregation. We discovered for the first time a 'vicious cycle' of brain tissue damage induced by hypoxic-ischemic brain injury that critically dysregulated key enzymes mediating protein degradation and repair in the affected tissues, leading to accumulation of DPMs damaged proteins and subsequent protein misfolding and aggregation, resulting in neurodegeneration and dementia. Now, we are translating the knowledge from our discovery-driven research to develop effective therapy for cancer treatment, and for dementia prevention and treatment.