Institute of Molecular and Cell Biology

A*STAR

SEMINAR ANNOUNCEMENT

We would like to invite you to attend this seminar hosted by Prof. Wanjin Hong:

Date: 30 July 2018, Monday

Time: 11:00AM – 12:00PM

Venue: Level 3, IMCB Seminar Room 3-46, Proteos, Biopolis

Speaker: Dr. Meng Wang, Baylor College of Medicine, USA

Title: Seeing Unseen, Knowing Unknown - Application of Stimulated Raman Scattering Microscopy in Revealing Lipid Metabolic Regulation

Lipid molecules are crucial for various cellular responses, and their misregulation results in such human diseases as metabolic disorders, neurodegenerative diseases, and cancers. As in proteins, the physiological and pathological activities of lipid molecules are tightly associated with their spatial distribution and temporal dynamics. The ability to track specific lipid molecules *in vivo* is essential for understanding their physiological impacts and regulatory mechanisms. Using stimulated Raman scattering (SRS) microscopy, we quantitatively imaged lipid distribution at the whole organism level in live *Caenorhabditis elegans*. Using hyperspectral SRS microscopy, we profiled lipid composition at the single lipid droplet level in living cells and revealed the changes of lipid composition in association with hepatic steatosis. Through incorporation of isotope labeling/tracing into SRS microscopy, we directly visualized the temporal dynamics of specific lipid molecules during their transportation between cells and tissues. Based on these new technological platforms, we revealed an environment-microbe-host metabolic axis controlling mitochondrial dynamics and lipid metabolism through NR5A-Hedgehog signaling, and uncovered a novel neuroendocrine signaling mechanism linking olfactory sensation and lipid mobilization. We also conducted the first SRS-based forward genetic screens in *C. elegans*, and identified 58 mutants that confer different phenotypes in lipid content and distribution. Further characterization of four mutants from the screen discovered the new role of the BMP signaling pathway in regulating mitochondrial activity and lipid catabolism. Together, these studies demonstrate the biological application of SRS microscopy, and reveal its power in discovery of new genes and pathways in regulating lipid dynamics under both physiological and pathological conditions.

Biography:

Dr. Meng Wang is an HHMI investigator, Associate Professor and Robert C. Fyfe Endowed Chair on Aging at Baylor College of Medicine. She received B.S. from Peking University and Ph.D. from University of Rochester. She joined the faculty at Baylor in 2010. Her research focuses on molecular mechanisms governing aging, reproduction and metabolism and their interrelationship, through harnessing the power of functional genomics, metabolomics and optical biophysics.