Institute of Molecular and Cell Biology
A*STAR

SEMINAR ANNOUNCEMENT

We would like to invite you to attend this seminar hosted by Prof. Wang Yue:

Date: 12 September 2014, Friday
Time: 10:00AM – 11:00AM
Venue: Level 3, IMCB Seminar Room 3-46, Proteos, Biopolis

Speaker: Dr. Peng Weng Kung, Research Scientist, Singapore-MIT alliance for Research and Technology, Singapore
Title: A Novel Functional Phenotyping Approach for Molecular Medicine

One of the key barriers in translating basis science and clinical research into routine practice is the presence of large variations in human phenotype, which is further complicated by the influence of environment (e.g., diet, lifestyle). Recent emergent of system biology (e.g., genomic, epigenomic, proteomic and metabolomics) serves as the foundation of molecular-basis medicine which will leads the forefront of future evidence-based clinical practices. Current phenotyping profiling is largely performed by expensive, tedious, and bulky analytical tools such as mass spectroscopy and nuclear magnetic resonance. We propose to explore a new logical framework to understand the relationship between the crucial dynamic responses of living cells to artificially introduced stress (which mimic the pathological stress), to retrieve the functional information in phenotyping. Such approach does not rely on the conventional correlation biomarker (e.g., antigen) which may often be affected by secondary or downstream events.

We have recently developed a low-cost magnetic resonance relaxometry (MR) technology, and shown that by measuring the proton relaxation rates in less than 10 µL of blood, one can directly deduce the relative magnetic susceptibility of the bulk cells within a few minutes. Such rapid and sensitive blood screening system can be used to monitor the fluctuation of the bulk magnetic susceptibility (BMS) (in almost real-time manner) of biological liquids/cells, where unusual BMS is related to a number of pathological states. In this talk, the speaker would like to share some of the latest MR developments; (i) monitoring the growth *Plasmodium* spp. in malarial infection and exploit the MR system for rapid, label-free malarial screening at point-of-care, (b) on how the functionally phenotyping of oxidative stress susceptibility can be used to stratify diabetic patients (in conjunction with conventional glucose index) into sub-groups based on their risk of developing secondary complications, and (c) strategies to understand congenital blood disorders (e.g., thalassemia).

Biography:
Weng Kung is currently a Research Scientist at SMART, Singapore. He received his PhD in electrical engineering Osaka University, Japan under the Japanese Science and Technology Ministry (Monbusho) Scholarship. In 2009, he joined MIT by winning the prestigious inaugural SMART Postdoctoral Fellowship Award, during which he developed a low-cost miniaturized magnetic resonance system (a dumbed-down version of NMR) and successfully applied to rapid malarial screening. He further pushed the technology forward, by developing a new magnetic phase diagram to describe various magnetic phases of cells which found to be correlated with various pathological conditions. Weng Kung is passionate about frugal engineering and applies his engineering know-how to understand how pathological oxidative/nitrosative stress affecting the cells/tissues, and pushing forward molecular-basis of phenotyping in medicine.

ALL ARE WELCOME *(No registration required)*