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: 26 September 2018, Wednesday
Time: 11:00AM – 12:00PM
Venue: Level 3, IMCB Seminar Room 3-46, Proteos, Biopolis

Speaker: Dr. Kian Peng Koh, Department of Development and Regeneration, Stem Cell Institute Leuven, KU Leuven, Belgium
Title: Dynamics of cell-state specific *Tet1* and *Oct4* gene activity signal an epigenetic roadmap in cellular reprogramming and differentiation

Global changes in gene expression and DNA methylation orchestrate the balance between pluripotency and cell fate commitment in early mammalian development. Conversely, reprogramming somatic cells to induced pluripotent stem cells involves re-activation of pluripotency genes and global DNA demethylation. Here, we used murine transgenic lines harboring dual fluorescent reporters of the master pluripotency gene *Oct4* and the 5-methylcytosine dioxygenase *Tet1*, to chart a temporal order of their gene activities at cell-state specific cis regulatory elements following pluripotency entry in reprogramming intermediates. A transient phase of global gene repression accompanies full *Tet1* gene activation, precedes progressive waves of induction of pluripotency and meiotic genes culminating with full *Oct4* activation, and distinguishes phases of global DNA demethylation in the final stages of induced pluripotency. The results offer insights into the basis for epigenetic differences between embryo-derived and induced pluripotent stem cells. The coordination between Oct4 and Tet1 gene function during reprogramming switches to antagonism during embryonic differentiation, when loss of Tet1 causes ectopic Oct4 expression and lineage skewing. Together, our studies define stage- and locus-specific interactions between chromatin factors, DNA methylation and gene expression during cell fate changes.

Biography:
After obtaining a PhD in Pharmacology from Yale University (CT,USA) in 2004, Kian Peng Koh was among the first returning A-STAR National Science Scholars. During his time with A-STAR, he was seconded to S*BIO Ptd Ltd to gain experience in drug discovery. That industry experience sparked his interest in epigenetics and motivated him to return to academia in 2007 with an American Heart Association postdoctoral fellowship. Under the supervision of Anjana Rao at Harvard Medical School, Kian Peng co-discovered the Tet-Eleven-Translocation (TET) family of DNA dioxygenases, which have since caused much excitement as the *bona fide* "DNA demethylases." In 2011, Kian Peng moved to the Stem Cell Institute Leuven as independent investigator under the Odysseus program in Belgium. His current interests are to investigate how the genetic and epigenetic links between TET, metabolism and DNA methylation in early

development contribute to the etiology of late-onset diseases including neurodegeneration and cancer.