NUS National University of Singapore | Department of Biological Sciences, Faculty of Science

ON-SITE BIOLOGY COLLOQUIUM

Friday, 25 Oct 2024 | 4 pm | DBS Conference Room 1, Blk S3 Level 5

Hosted by Assoc Prof Lu Gan

Map to Block S3

Chromatin Modification and Transcription Dynamics in Living Cells

By **Hiroshi Kimura**

Professor in Cell Biology. Institute of Science Tokyo

Post-translational modifications on histones and RNA polymerase II (RNAP2) play a critical role in gene regulation. To detect the dynamics of these modifications in living cells, we have developed antibody-derived probes, including fluorescently labeled antigen-binding fragments (Fabs) and genetically encoded modification-specific intracellular antibodies (mintbodies), which consist of single-chain variable fragments (scFvs) and a fluorescent protein. The latter is particularly convenient for long-term and in vivo imaging, and we have recently established a pipeline to develop stable intracellular scFvs utilizing artificial intelligence-based methods. Using these probes, we have revealed that histone H3 Lys27 acetylation (H3K27ac) precedes RNAP2 transcription during steroid hormone stimulation in mouse cells and zygotic genome activation in zebrafish embryos. We also found that the initiation and elongating forms of RNAP2 show different localization and dynamics in living human cells. Based on these data, I will discuss how transcription is functionally organized and regulated in living cells.

About the Speaker

He graduated from Hokkaido University, Sapporo, Japan, and received his Ph.D. from the same institution in 1996 for his research on DNA replication. He then joined Prof. Peter Cook's lab at the University of Oxford, UK, as a postdoctoral fellow, where he studied transcription in the context of chromatin and nuclear structure. In 2002, he returned to Japan as an Associate Professor at Tokyo Medical and Dental University (TMDU), later moving to Kyoto, Osaka, and becoming a full professor at the Tokyo Institute of Technology (Tokyo Tech) in 2014. He work on the dynamics of transcription and chromatin in living cells, developing unique tools to track post-translational modifications on histones and RNA polymerase II. He is currently the Director of the Cell Biology Center at the Institute of Science Tokyo, a new university established in 2024 through the merger of TMDU and Tokyo Tech..