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

SEMINAR

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Hosted by Assoc. Prof Liou Yih-Cherng

# Cell Renewal Quality Control and Chromosome Plasticity


*By* **Xuebiao Yao**

*Professor and Director, MOE Key Laboratory for Cellular Dynamics, University of Science & Technology of China*



In mitosis, accurate chromosome segregation depends on kinetochores that connect centromeric chromatin to spindle microtubules. The centromeres are connected to individual microtubules via a kinetochore constitutive centromere associated network (CCAN). However, the molecular organization and regulation of CCAN remains elusive. By use of cryo-electron microscopy and functional analyses, we have recently revealed the molecular basis of how human CCAN interacts with duplex DNA and facilitates accurate chromosome segregation. The overall structure relates to the cooperative interactions and interdependency of the constituent sub-complexes of the CCAN. Surprisingly, CENP-N does not bind to the RG-loop of CENP-A but to DNA in the CCAN complex. The DNA binding activity is essential for CENP-LN localization to centromere and chromosome segregation during mitosis, which is also tightly regulated by CDK1 phosphorylation. Phase separation of biomolecules drives the formation of subcellular compartments with distinct physicochemical properties. These compartments, free of lipid bilayers and therefore called membraneless organelles, have emerged as a new paradigm to account for subcellular organization and cell fate decisions. I will also discuss our recent studies linking phase separation to mitotic spindle, heterochromatin, and centromere assembly and their plasticity controls in the context of the cell division cycle.


***About the Speaker***

*Xuebiao Yao graduated with a PhD from the University of California-Berkeley in 1995 followed by a postdoctoral fellowship at the University of California-San Diego. He initiated his tenure-track assistant professorship in University of Wisconsin in 1997, and then built MOE Key Laboratory for Cellular Dynamics in University of Science & Technology of China.*

*Dr. Yao's research interest stems from cell renewal and quality control. His team had identified several key regulators of centromere and delineated the structure and spatiotemporal dynamics of centromere assembly using innovative chemical probes and optical reporters. He received many recognitions such as Giannini Scholar Award, Georgia Cancer Coalition Distinguished Scientist Award, David Burgess Award etc. He is an American Gastroenterological Association Fellow.*

*Dr. Yao is a Vice-President of Chinese Society for Cell Biology, the Secretary of Asian Pacific Organization of Cell Biology, and the Editor-in-Chief of IFCB society journal Cell Biology International.*