Cryo-Electron Tomography of Genetically Engineered Mini *T. brucei*

Associate Professor Cynthia Y. HE  
Department of Biological Sciences  
Centre for BioImaging Sciences  
National University of Singapore

**Abstract**

*Trypanosoma brucei* contains a subpellicular array that is composed of >100 stable microtubules crosslinked to each other, forming a bird cage-like structure underneath the plasma membrane. Development of the subpellicular array is tightly linked to biogenesis of the flagellum and the flagellum attachment zone and crucial for cell morphology, during the cell cycle as well as the life cycle development. In this study, we used cryo electron tomography to visualize the 3D organization of the subpellicular microtubule array in genetically engineered mini *T. brucei* cells. 3-dimensional spatial relationship between the flagellum, FAZ and the subpellicular microtubules was analyzed. The results provide an ultrastructural model on how the flagellum drives helical cell movement by modifying the arrangement of the subpellicular array.

**About our Speaker**

Research Interest  
*Trypanosoma brucei* causes African sleeping sickness in humans and Nagano in cattle, bringing huge economic burdens to many developing countries that can least afford it. Though largely neglected in the past, the studies of *T. brucei* and related pathogens have attracted great attentions in global health research in the recent years, including major funding support from the Bill and Melinda Gates Foundation. As a model system, the single-celled *T. brucei* is one of the earliest divergent eukaryotic organisms studied in laboratories. Genomic databases of *T. brucei* and related species are complete. Development in advanced molecular genetics methods such as inducible expression and RNAi allows rapid characterization of protein functions. Furthermore, *T. brucei* has a simple cellular anatomy with a single copy of nucleus, mitochondrion, flagellum, and Golgi, suitable for fluorescence microscopic and electron microscopic studies. Duplication and segregation of these organelles take place in a strict temporal and spatial order, allowing rapid and reliable identification of cell cycle stages in an unsynchronized population. Using *T. brucei* as a model organism, we study the organization of cellular structures and the regulation of their co-ordinated duplication/segregation during cell cycle.

**Selected Publications**