Invitation

2019. 9. 24 (Tuesday)
9:30 - 11:30

Seminar on
Biophysical Physiology and Pathology based on Super-Resolution Microscopy

We created an opportunity in which we can learn some of the best parts of the recent developments and applications of super-resolution microscopy. We invited three leading scientists in this field, who greatly contributed to recent developments of the technology and applications of super-resolution microscopy. Your participation in this seminar is very welcome.

First Speaker: **Prof. Tijana Jovanovic-Talisman**
City of Hope Comprehensive Cancer Center

Title: **Advancing molecular medicine with quantitative single molecule localization microscopy**

Single molecule localization microscopy (SMLM) can detect single molecules with nanoscale precision. However, it is technically challenging to rigorously quantify receptors in clinical samples: cells from patient tissues and extracellular vesicles secreted by patient cells. To successfully analyze these samples, we tailor our imaging techniques, data analyses, and counting algorithms. We applied our approach to tissue samples from patients with breast cancer; HER2 copy numbers showed a significant positive correlation with detected densities from quantitative SMLM. Additionally, we assessed extracellular vesicles isolated from plasma of patients with pancreatic cancer. We identified a pancreatic cancer-enriched vesicle population and defined vesicle heterogeneity.

Second Speaker: **Prof. Christophe Leterrier**

Aix Marseille Université, CNRS

Title: **The axonal cytoskeleton at the nanoscale**

We use Single Molecule Localization Microscopy (SMLM) to map the nanoscale architecture of actin-based structures within the axon. In the axon initial segment, a key compartment for the maintenance of neuronal polarity, we resolved a highly organized assembly encompassing the periodic actin/spectrin scaffold and its partners: ankyrin, myosin. We have also visualized new actin structures along the axon shaft: rings, hotspots and trails, and are now resolving their molecular organization and functions. For this, we develop a combination of versatile labeling, correlative acquisition and quantitative analysis strategies that allow for high-content, nanoscale interrogation of the axonal architecture.

Third Speaker: **Prof. Paul S. Maddox**

Department of Biology
University of North Carolina at Chapel Hill

Title: **A systems approach to understanding regulation of mitotic nuclear positioning and telophase reassembly based on high resolution light microscopy**

The nucleus is a complex organelle that ultimately controls cell fate. Each cell division, the nucleus must be disassembled, its genetic material divided equally, and then reassembled. This complex event occurs rapidly and involves numerous protein players. We have probed the biophysical mechanisms that position the nucleus prior to disassembly and thus that govern reassembly. Using high resolution imaging, protein depletions, and computer modeling, we show that regulation of nuclear positioning depends on regulation of microtubule motors and reassembly is achieved by action of balanced protein import and export of visco-elastic regulatory proteins. To further this work, we are developing high-resolution (1.4 NA and higher) light sheet microscopy methodologies.

Venue: **OIST Central Building Room C209**

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