Sub-group Meeting 2:

"Principles of microtubule regulation" (14:30 – 17:30)

Focus of the subgroup:

Microtubules are involved in a wide range of different cellular functions. They organize the intracellular space, serve as tracks for intracellular transport, build the mitotic apparatus that separates the chromosomes during cell division, and they are the major building blocks of complex structures such as the cilia, flagella and the centrosome. Many if not all of the functions of microtubules are mediated by interactions with specific proteins, commonly referred to as microtubule-associated proteins (MAPs), which range from simple microtubule binders to motile proteins (molecular motors) and proteins that are specifically localized to parts of the microtubule, such as the plus end. The functions of many MAPs have been explored in the past; however, it still is not well understood how different MAPs can selectively bind to subsets of microtubules, or only two a portion of a single microtubule filament. In this subgroup meeting we want to discuss new discoveries on mechanisms that could underlie selective interactions of MAPs with microtubules.

Poster talks:

To identify new exciting research in the field, we will select three poster abstracts for short talks in this session. Interested persons can also contact the organizer.

Organizer:

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Schedule:

14:30 Opening of the subgroup meeting

14:35 – 15:00
Jonathon Howard (MPI-CBG Dresden, Germany)
"Regulation of microtubule dynamics by polymerases and depolymerases"
Microtubules are highly dynamic polymers that transition between phases of growth and shortening. While this so-called dynamic instability is observed for purified tubulin in the presence of GTP, in cells the transitions are regulated by a large number of proteins that interact with the microtubule's plus end. Recent single-molecule in vitro experiments with the polymerase XMAP215 and the depolymerizing kinesin-8, KIP3p, have elucidated the mechanisms by which these proteins regulate the polymer dynamics and length.

schedule continued overleaf

15:00 – 15:25
Carsten Janke (CRBM, Montpellier, France)
"Tubulin modifying enzymes"
Microtubules are subject to a range of posttranslational modifications. Some of these modifications have been initially discovered on tubulin and are thought to play an important role in regulating microtubule functions. We have now discovered most of the enzymes that add and remove these modifications on tubulin, and first functional studies with these enzymes brought new insights into the functions of tubulin modifications.

15:25 – 15:50
Didier Job (Institute of Neuroscience, Grenoble, France)
"Tubulin tyrosination in cell division and morphogenesis: two faces for one cycle"
In most eukaryotic cells, alpha-tubulin contains a C-terminal tyrosine residue, whose presence or absence has dramatic consequences for both tumour progression and neuronal organization. Tubulin detyrosination in cells induces an apparent disruption of microtubule interactions with the cell membrane and anomalies in microtubule dynamics. Recent progress towards the identification of the molecular origins of these two types of microtubule perturbations will be briefly discussed. Possible mechanisms linking microtubule defects to cancer or neuronal development will be proposed.

15:50 – 16:15
Michel O. Steinmetz (Paul Scherrer Institut, Villigen, Switzerland)
"Structure-function relationship of CAP-Gly domains"
In all eukaryotes, CAP-Gly proteins such as the microtubule plus-end tracking proteins CLIP170 and dynactin/p150glued control important cellular processes including cell division, cell migration, and intracellular transport. Using a multidisciplinary approach, we recently established a structure-function relationship of CAP-Gly mediated protein interactions. The results of these studies and their implications for the tubulin detyrosination/tyrosination cycle will be presented.

16:15 – 16:40
Franck Perez (Institute Curie, Paris, France)
"A GTP-island model for microtubule dynamic instability"
Microtubules display dynamic instability, a process that is controlled by plus end tracking proteins like CLIP170. The localisation of these proteins at the plus ends of polymerizing microtubules might be linked to the presence of a GTP-bound tubulin at the ends of growing microtubules. We visualized GTP-tubulin in living cells with a recombinant antibody and found that GTP-tubulin was indeed present at the plus end of growing microtubules. Unexpectedly, GTP-tubulin remnants were also present in older parts of microtubules suggesting that GTP hydrolysis is sometimes incomplete during polymerization. Observations in living cells suggested that these GTP-remnants might be responsible for the rescue events in which microtubules recover from catastrophe.

16:45 – 17:00
Poster talk 1

17:00 – 17:15
Poster talk 2

17:15 – 17:30
Poster talk 3