

CRBM external seminar

Thursday, October 12th 11:00 am Salle Marcel Dorée

Microtubule regulation by structural MAPs: from outside to inside the tube

Isabelle ARNAL

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Isabelle ARNAL got her PhD thesis at the Institute of Structural Biology in Grenoble under the supervision of Richard WADE in 1998. She then joined the EMBL of Heidelberg in Germany for a post-doctoral position in Anthony HYMAN's and Eric KARSENTI's groups. In 2001, she was recruited by the CNRS as CRCN in Denis CHRÉTIEN's group in Rennes. In 2009, she was awarded an ATIP-Avenir grant to start her team at the Grenoble Institute of Neurosciences. She is working on the molecular mechanisms underlying microtubule and actin regulation by neuronal effectors and on how these mechanisms contribute to fundamental processes such as neuronal differentiation and plasticity

Abstract

Microtubules are dynamic polymers alternating between phases of growth and shrinkage, a behavior known as dynamic instability. In highly differentiated cells such as neurons, dynamic microtubules co-exist with stable microtubules characterized by a reduced tubulin turnover. Among the numerous factors involved in the regulation of microtubule behavior, structural MAPs have been primarily defined as proteins interacting along the microtubule surface where they promote microtubule assembly and stabilization. Using biomimetic assays and various cell models, combined with light imaging and cryo-electron microscopy technics, we aim at understanding the molecular basis of the interaction between neuronal structural MAPs and the cytoskeleton. I will present our recent work about two structural MAPs, MAP6 and Adenomatous Polyposis Coli, which regulate microtubule properties through very different microtubule binding modes involving interaction with the outer and/or inner surface of microtubules.

Selected publications

Serre L*, Delaroche J, Vinit A, Schoehn G, Denarier E, Fourest-Lieuvin A, **Arnal I*** (2023) The mitotic role of adenomatous polyposis coli requires its bilateral interaction with tubulin and microtubules. *J Cell Sci* 136: jcs260152.

Cuveillier C, Delaroche J, Seggio M, Gory-Fauré S, Bosc C, Denarier E, Bacia M, Schoehn G, Mohrbach H, Kulić I, Andrieux*, **Arnal I***, Delphin C*. (2020) MAP6 is an intraluminal protein that induces neuronal microtubules to coil. *Science Adv* 6:eaaz4344.