CRBM External Seminars 2024
BIOLuM
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Lipid signalling in the nucleus

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Aurélia E. Lewis is an Associate Professor and research group leader at the Department of Biological Sciences at the University of Bergen, Norway. She studied biochemistry at the university of Orléans, France, and earned her MSc at Brunel University, UK (1995) and PhD in cell biology from Birmingham University, UK, in 2000. From 2000 to 2006, her postdoc work focused on signalling pathways in the context of cell proliferation and differentiation of different cell types at UPENN, USA and then in Bergen, Norway. Later, her research took her to nuclear phosphoinositides signalling as a researcher at the proteomics platform PROBE, then as a group leader at the Department of Biological Sciences. Her lab has mapped phosphoinositide interactomes formed in nucleus (PMID: 21048195 & 34048982) and aim to identify altered networks in pathologic states for which the phosphoinositides metabolic pathways are known to be altered, particularly in cancer. Her group is therefore interested in addressing the following questions: 1) What are the functions of these interactions? 2) Which protein-PI interactions are functionally disrupted in cancer and contribute to its development?

Abstract

Cell function is dependent upon the coordinated and dynamic formation of biomolecular interaction networks between molecules of diverse biochemical properties. While protein-protein interactions have been a major focus, proteins are also regulated by important signalling lipid molecules, namely the phosphorylated derivatives of phosphatidylinositol (PtdIns), collectively known as phosphoinositides (PIs). PIs are implicated in the control of a myriad of cellular functions, particularly from cytoplasmic membranes, where they are perceived as spatial organisers of proteins. However, a nuclear PI cycle also exists, which is regulated independently of the cytoplasmic PI pathway. PIs have been implicated in nuclear processes such as transcription, pre-mRNA splicing/processing as well as proliferation and cell cycle regulation. However, the precise mechanisms by which PIs regulate these processes are largely less understood.
Our lab focuses on protein-PI interaction networks and we analyse their composition, regulation as well as their functional roles in the cell nucleus. In addition, our goal is to understand how these networks are remodelled in healthy and pathological states where the PI metabolic pathways are known to be altered (particularly in cancer). I will present published as well as new data on the identification of phosphatidylinositol(4,5)bisphosphate (PtdIns(4,5)P2), PtdIns(3,4,5)P3 and effector proteins as well as their potential roles in the nucleus.

Selected publications

F Mazloumi Gavgani, M Skuseth Slinning, A Papdiné Morovicz, V Smith Arnesen, D C Turcu, S Ninzima, CS D'Santos and AE Lewis (2021). Nuclear phosphatidylinositol 3,4,5-trisphosphate interactome uncovers an enrichment in nucleolar proteins. **Molecular & Cellular Proteomics**. 20, 100102.

F Mazloumi Gavgani, T Karlsson, IL Tangen, A Papdiné Morovicz, V Smith Arnesen, D C Turcu, S Ninzima, K Spang, C Krakstad, J Guillermet-Guibert and AE Lewis (2021). Nuclear upregulation of class I phosphoinositide 3-kinase p110β correlates with increased 47S rRNA levels in cancer cells. **Journal Cell Science**. 134(3):jcs246090. doi: 10.1242/jcs.246090.

A Papdiné Morovicz, F Mazloumi Gavgani, M Skuseth Slinning, RG Jacobsen, Diana C. Turcu and AE Lewis. (2022). Phosphoinositide 3-kinase signalling in the nucleolus. Review. **Advances in Biological Regulation**. 83:10843.