University of Cyprus
Department of Biological Sciences

Postgraduate Seminars

Seminar Series 2018 - 2019

Prof. Jordan Chill

Department of Chemistry
Bar Ilan University, Israel

"NMR investigation of membrane-associated and membrane-targeting proteins"

Wednesday, 13 March 2019, at 17:00
Building CTF 01, Room 110, Panepistimioupoli Campus

This seminar is open to the public

Membrane-associated proteins, such as channels, pumps and receptors, are notoriously difficult to study by structural methods because they require a stabilizing surrogate lipo-environment, often making sample preparation and data acquisition challenging. At the same time biological processes occurring at the cell membrane, particularly protein-protein and protein-membrane interactions, are deeply involved in homeostasis and disease; indeed, over 50% of approved pharmaceuticals target this class of proteins. Thus, there is great motivation to reach a structural understanding of membrane protein biochemistry despite these objective challenges.

Two ongoing research efforts employing biomolecular NMR methods to provide a structural view of membrane-associated proteins will be presented in this seminar. In the first, we incorporated the bacterial potassium channel KcsA in lipoprotein nanodiscs, a native-like assembly amenable to structural studies. Using NMR we could monitor the open-to-closed monomer-to-tetramer transition in the cytoplasmic C-terminal domain of the channel and identify molecular determinants of tetrameric stability. We also gained insight into the molecular basis of binding of toxin inhibitors at its conduction pore. In the second, we focused on the N-terminal membrane-targeting domain of BteA, a cytotoxic effector of the human pathogen *Bordetella pertussis*. Membrane-binding of this four-helix bundle domain was studied with nanodisc membranes as well as with soluble phospholipid analogues, thereby locating the membrane-targeting motif which differs from previously described effectors. We confirmed these results using additional biophysical methods applied to membrane-like phospholipid bilayers. These two case studies demonstrate the utility of NMR methods in addressing questions in the structural biology of membrane-associated proteins.