Mini-symposium

Friday 14 October 2022 from 10.15 – 12.00

Venue: MBG Auditorium (1871-120), Dept. Molecular Biology and Genetics, AU

From 10.15-10.45

"Allosteric Control of Hsp70 Protein Folding Activity"

Prof. Wayne A. Hendrickson
Dept. Biochemistry and Molecular Biophysics,
Columbia University

Heat-shock proteins of 70 kDa (Hsp70s) are vital for all of life and notably important for protein folding. Hsp70s use iterations of ATP binding and hydrolysis in one domain to control the binding and release of client polypeptides in a second domain. ATP-fueled cycles of Hsp70 activity promote proper protein folding by blocking or reversing the aggregation of misfolded intermediates, often stress induced. To explain functional characteristics of Hsp70 DnaK and structure-inspired mutants, we developed a theoretical model of allosteric equilibria among Hsp70 conformational states: when in ATP, a restraining state (R) restricts ATP hydrolysis and does not bind client peptides, whereas a stimulating state (S) hydrolyzes ATP rapidly and binds substrates well but with rapid binding kinetics. ATP hydrolysis uncouples the allosteric interactions, and clients are then caught in tight complexes until ejected by ATP rebinding. This model for allosteric regulation is supported by structures in the postulated S state, by biochemical tests and additional mutations, and by *in cristallo* hydrolysis reactions in the ATP-binding domain.

From 11.00-11.30

"Potassium transporters and channels in bacterial survival"

Prof. Dr. Inga Hänelt
Membrane Biochemistry, Institute of Biochemistry, Biocenter
Goethe-University, Frankfurt

Potassium ion homeostasis is essential for bacterial survival, playing roles in osmoregulation, pH homeostasis, regulation of protein synthesis, enzyme activation, membrane potential adjustment and electrical signaling. I will discuss the roles of the three major bacterial potassium uptake systems, the ion channels TrkAH and KtrAB, the proton-coupled potassium transporter KUP and the potassium pump KdpFABC, based on their molecular structure and function. In particular, I will highlight the regulation of the individual systems by phospholipids and nucleotides, nucleotide second messengers and phosphorylation, which links back to bacterial physiology.

From 11.30-12.00

"Evolution of Na^+/K^+- and plasma membrane H^+-ATPases – which pump came first? (and where did P4 ATPases come from?)"

Prof. Michael Palmgren
Department of Plant and Environmental Sciences, Section for Transport Biology
University of Copenhagen, Denmark

In animals, the plasma membrane is energized by the Na^+/K^+-ATPase. In plants, plasma membrane H^+-ATPases energize the membrane but here the energy currency is H^+. In my presentation, I will try to trace back the evolution of these pumps and discuss which pump came first. Finally, I will speculate about the origin of P4 ATPases.

Hosted by: Prof. Poul Nissen