Contribution ID: **2** Type: **not specified**

Keynote 1, Prof. Poul Nissen: Structure and Dynamics of Membrane Transport Proteins

Wednesday 9 October 2019 13:15 (40 minutes)

Using membrane protein crystallography, small-angle scattering techniques, and cryo-EM, and also a range of biochemical and biophysical methods such as electrophysiology, single-molecule FRET, and molecular dynamics simulations, we have obtained deep insight into the functional cycle of primary active transporters of the P-type ATPase family. These transport ATPases are fundamental to physiology, and malfunctions are linked to diseases such as neurological and cardiovascular disorders.
The transmembrane gradients for the key cations Na+, K+, and Ca2+ are generated by Na+,K+-ATPase and Ca2+-ATPases. In brain, Na+,K+-ATPase activity accounts for an estimated 40-70% of total ATP hydrolysis and potentiates e.g. Na+ and K+ channels for their activity in action potentials, membrane potential, and Na+ coupled transport of e.g. glucose, metabolite, neurotransmitters, Ca2+ efflux, pH and Cl- control. Ca2+-ATPases maintain steep calcium gradients, internal Ca2+ stores, and cytoplasmic free calcium at accurate levels that define and potentiate calcium signalling pathways.
Lipid flippases, also of the P-type ATPase family (P4-ATPases) maintain asymmetric lipid distributions in biomembranes. Their activity potentiates membrane dynamics, but the structure and function of lipid flippases remained enigmatic until recently. We determined the first structures of lipid flippases using cryo-EM and revealed at the same time a detailed insight into lipid recognition and autoregulation.
The talk will cover methodological approaches supporting the functional and mechanistic insight we have gained.

Presenter: Prof. NISSEN, Poul (Aarhus University)

Session Classification: Keynotes and Short talks 1