Poster Presentation

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Low resolution models of membrane proteins in detergent micelles and nanodiscs

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Membrane transport systems play a crucial role in the regulation of essential cellular functions. Understanding the structural-functional relationship for this class of proteins is of due importance on the background of a detailed view of cellular functions and their regulation. Functionality of membrane proteins is often depending on the lipid environment, also reflected by specifically bound lipid molecules found in membrane protein crystal structures. Therefore, it is favorable to do functional and structural characterization in a lipid-based platform. Nanodiscs, consisting of two copies of an amphipathic scaffold protein wrapped around a lipid bilayer patch, are such a synthetic membrane model system. They represent a more native environment compared to bicelles, liposomes and detergent micelles. Reconstitution of membrane proteins in nanodiscs is bringing them back into their native local environment. A prerequisite for studies of membrane proteins in nanodiscs is a detailed understanding of the reconstitution process and the corresponding driving forces. For an initial structural characterization small angle x-ray scattering (SAXS) is applied, yielding parameters like particle dimensions and low resolution models. For selected membrane transport proteins the structural features of detergent solubilized and nanodisc reconstituted targets are compared. These analyses yield valuable information on the oligomeric state and structural rearrangements upon reconstitution of membrane proteins into lipid surroundings as well as insights into the mechanism of nanodisc assembly.

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