Conformational equilibrium, dynamics and oligomerization of membrane transporters under *in situ* conditions explored with EPR spectroscopy

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Membrane proteins often excurse through a broad conformational landscape and a channel, transporter or receptor activity is often achieved through large-scale domain movements. Thus a mechanistic description of the function necessitates an understanding of the conformational changes and equilibrium dynamics. Electron Paramagnetic Resonance (EPR) spectroscopy is a potential tool for structural investigation of proteins in the membrane or even in the cellular environment. I will demonstrate the application of PELDOR/DEER spectroscopy to observe conformational changes [1] and equilibrium dynamics of an ABC exporter and the oligomeric structure of a solute carrier (SLC) transporter in proteoliposomes. On the other side, determining biomolecular structures and their conformational changes at high resolution has primarily been achieved after isolating the target molecule from its native environment. This approach masks the effect of the cellular conditions, which may significantly modulate biomoelcular structure and dynamics. The cysteine-free nature of the outer membrane proteins and the intrinsic reduction of spin labels those cross the outer membranes in *E. coli* enable selective spin labeling and DEER/PELDOR spectroscopy for outer membrane proteins in whole cells and isolated membranes [2]. Using the cobalamin transporter BtuB, I will demonstrate the application of the *in-cell* EPR to observe structure and conformational changes [2,3,4] in *E. coli* and to follow protein-ligand interaction using orthogonal labels in native outer membranes [5].

References:

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