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Neutron Invisible detergents for solution structure determination of membrane proteins by Small-Angle Neutron Scattering

Tuesday 10 December 2019 13:00 (40 minutes)

We recently showed how stealth detergents, which are detergents where the H/D balance are head and tail groups are individually tuned to make them invisible to neutrons, could be synthesized and generally applied as a method for determining structures of membrane proteins in solution via small-angle neutron scattering (SANS) (1). With these stealth detergents, only the signal from the membrane protein remained in the SANS data. We demonstrated that the method was generally applicable for low-resolution structural investigations of membrane proteins by evaluating five very different membrane proteins (1,2). Recently we also showed how Size-Exclusion Chromatography could be directly coupled to SANS to yield a "SEC-SANS" setup that provided strongly improved sample quality of these challenging samples (3). By combining the two developments we obtain an experimental approach that improves solution structure determination of membrane proteins by SANS and simplifies the subsequent data analysis. We have used the approach to investigate different structural hypotheses for membrane proteins and I will show recently obtained and somewhat puzzling data from the pentameric magnesium transporter CorA to illustrate this.

[1] Midtgaard et al, FEBS Journal, 2018, 285(2) 357-371.
[2] Larsen et al, IUCR Journal, 2018, 5(6), 780-793.
[3] Johansen et al, Acta Cryst D, 2018, 74(12), 1178-1191.

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