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Decorated vesicles - Interactions between α -synuclein and lipid membranes

Wednesday, 15 March 2023 11:00 (40 minutes)

α -Synuclein is a small neuronal protein that associates with lipid membranes. The membrane interactions are believed to be crucial to both its healthy and disease functions. The healthy functions are associated to synaptic plasticity and neurotransmitter release, while for certain conditions, the protein instead aggregates into amyloid fibrils forming so-called Lewy bodies, which are hallmarks for Parkinson's disease. Here, the amyloid formation can be triggered by the presence of lipid membranes with associated protein.

In this presentation, I will focus on how α -synuclein associates with lipid membranes, and on the consequences of this association. The protein has a non-uniform charge distribution, and the binding is controlled by anisotropic patchy electrostatic interactions. We further show strong cooperativity of α -synuclein binding to lipid membranes, meaning that the affinity of the protein to a membrane is higher where there is already protein bound compared to a bare membrane. This leads to regions at the membrane with high protein density, which also induces membrane deformations. In cases where there is excess free protein in solution, the vesicles decorated with bound protein may trigger α -synuclein amyloid formation.

Session

Interaction lipids/polymers/membrane proteins

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Session Classification: Molecular interactions at the membrane surface