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Coiled-coils on lipid membranes : a new perspective on membrane fusion

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STELLINGEN

1. The distinct shape of concentration dependent thermal unfolding curves of peptide oligomers is a feature that can be used to practically determine the oligomeric number of the oligomers in solution.
(This thesis, Chapter II)
2. The fusogenic peptide K, its variant K_{GW} , and the peptide chains of the lipopeptides LPK, LPK_{GW} and CPK incorporate into neutrally charged lipid membranes as amphipathic α -helices with their helical axis parallel to the membrane interface.
(This thesis, Chapters III - VI)
3. In the membrane bound helix of K, snorkeling of lysine side chains contributes significantly to a more favourable peptide-membrane interaction.
(This thesis, Chapter VI)
4. Confining coiled-coil forming peptides on a membrane interface can increase their lipid binding as well as their homocoiling propensity.
(This thesis, Chapters III - VI)
5. When bound in a coiled-coil complex, peptides show specific IR amide I band patterns with distinct contributions from solvent accessible and inaccessible amide bonds. The same applies to amphipathic α -helices incorporated parallel into lipid membranes.
(Manas et. al. *J. Am. Chem. Soc.* **2000**, 122, 9883.; This thesis, Chapters III & V)
6. The helical content observed for membrane tethered E or K does not arise from monomeric solvated helices, but from homomeric E coiled coils and membrane incorporated, monomeric K, respectively.
(Robson Marsden et. al. *Angew. Chem. Int. Ed.* **2009**, 48,2330.; This thesis, Chapters III - V)
7. Analysis methods, based on graphical linearization such as the van't Hoff plot were developed long before computers and nonlinear curve fitting routines and should thus not be applied anymore. The program *FitDis!* contributes to fulfill this demand.
(Beechem, *Methods in Enzymology* **1992**, 210, 37.; This thesis, Chapter II)
8. The induction of curvature stress in the membrane is a common principal in both membrane fusion triggered by fusion proteins and artificial membrane fusion triggered by coiled-coil forming lipopeptides.
(Beechem, *Methods in Enzymology* **1992**, 210, 37.; This thesis, Chapters III-VI)
9. A scientist should always try hard, to disproof his own hypothesis.
10. After working long on a topic, one might overrate its importance, because no one likes to admit that they wasted their time.