Coiled-coil biomaterials for biological applications

Shen, M.

Propositions

Accompanying the thesis:

Coiled-coil based Biomaterials for Biological Applications

1. Coiled coils are attractive building blocks for peptide- and protein-based biomaterials due to their excellent self-assembly properties, specific recognition, and responsiveness. (Chapter 1 of this thesis)
2. Coiled-coil based magnetic-activated cell sorting (MACS) has potential applications for the enrichment of genetically modified cells. (Chapter 2 of this thesis)
3. Efficient membrane fusion can be triggered by various coiled-coil derivatives, which can also facilitate *in vivo* drug delivery. (Chapter 3 and Chapter 4 of this thesis)
4. The PK_4 dimer is more fusogenic than the K_4 monomer, due to its higher affinity for the lipid membrane. (Chapter 4 of this thesis)
5. L-form division into multiple daughter cells can occur via membrane blebbing, tubulation, vesiculation, and fission. These unusual modes of proliferation make L-forms a suitable model to study primitive cells. (Errington, J. *Open Biol* **2013**, *3*, 120143.)
6. The successful fusion of L-forms enables the design of novel hybrid organisms which have many potential applications, inclusion producing novel bioactive molecules. (Chapter 5 of this thesis)
7. Peptide K induces membrane fusion in multiple ways: by forming a coiled coil with peptide E to bring opposing membranes into close proximity and by destabilizing vesicle lipid membranes. (Rabe, M. *et al. Biophys J* **2016**, *111*, 2162.)
8. Cell-liposome membrane fusion induced by coiled-coil peptides is an important step forward in the development of efficent liposomal drug delivery systems.
9. Multiple parameters can influence the fusogenicity of coiled coils, namely peptide length, self-assembly tendencies, and membrane affinity.
10. Stay Hungry, Stay Foolish.
11. Seeing is not always believing.