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Effect of Salt Concentration on the Composition of Elastin-Like Polypeptides in the Condensed Coacervate Phase

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Abstract

Elastin-Like Polypeptides (ELPs) are thermo-responsive polymers which could potentially be used as vehicles for drug delivery. The nanoparticle vehicles are called micelles and the basic structure is made of ELP-foldon. This ELP-foldon has a head group (foldon) that is hydrophilic and three tails (ELP) that are hydrophobic. Above a certain temperature, the transition temperature (T_t), the hydrophobic tails aggregate together to form spheres with the hydrophilic headgroups on the outside. Inside the micelles, linear ELP and drugs can be captured. Although micelles can form without linear ELP, they are bigger when it is present. At lower temperatures the ELPs are fully soluble and exist as one solution phase, but at higher temperatures there exists two liquid phases. Even though they are both liquids, one is more viscous than the other. The less viscous phase is mostly water and the more viscous one is a condensed phase called a coacervate. Coacervate consists of a high concentration of protein, but still contains a significant amount of water. It appears as glue-like substance with a slight yellow tinge. The concentration of linear ELP may depend on the concentration of salt in solution and since the body naturally contains salt, knowing this relationship would be useful in designing micelles for drug delivery. We varied the concentration of salt in linear ELP to see its effect on the volume of the condensed coacervate at different temperatures.