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Structural design of polyelectrolyte-protein nanocarriers for targeted drug delivery

Tuesday, 21 March 2023 16:00 (2 hours)

Co-assembly of oppositely charged polyelectrolytes with proteins is a well-studied approach for designing stimuli-responsive nanocarriers for targeted drug delivery. [1,2] However, the complexity of protein structure limits the ability to predict and tune properties of the formed nanoparticles. The ultimate goal of our research is to reveal the main triggers for the morphological transition of protein/polyelectrolyte complexes, their encapsulation efficacy and particles stability by systematic study of complexes formed by block copolymers with proteins and encapsulated ionic drug. Using scattering and microscopy techniques, we showed that block copolymers consisting of a weak polyelectrolyte block and a neutral hydrophilic block co-assemble with proteins at pH close to protein isoelectric point and the morphology of the formed particles can be tuned by varying pH and nature of proteins. Moreover, we observed that formed protein/polyelectrolyte complexes with an excess of a charge can be used for encapsulation of an oppositely charged drug thus allowing us to use one carrier for both protein and drug delivery, and to design nanocapsules with such tunable properties as charge, stability and size.

[1] C.L. Cooper et al. COCIS 2005, 10, 52
[2] A. Skandalis; A. Murmiliuk et al. Polymers 2020, 12(2), 309

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