EFFECTS OF NANOPARTICLES ON PROTEIN FIBRILLIZATION

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Abstract

Nanoparticles (NPs) are recognized to exhibit distinct physical and chemicalproperties compared with the same materials in the bulk form.[1] As they enterinto biological systems, they are immediately exposed to a variety andconcentration of proteins. The physico-chemical interactions between proteinsand NPs are influenced by the surface chemistry of the NPs. The formation ofprotein-NPs complexes rather than the NPs alone, determines the resultingbiological responses [2] which can affect protein function, such as fibrillogenesis.Protein fibrillation is common to many protein and it causes cerebral andsystemic amyloid disease.To identify the effects of NP surface chemistry on the fibrillation propensity ofproteins, the interactions between 2 -microglobulin and citrate-capped goldnanoparticles (AuNPs) have been investigated (Fig. 1). The interaction with twoamyloidogenic variants: (a) the truncated N6 and (b) the mutated D76N isincluded in the study in order to propose a fibrillization pathway.Different interaction modes and proteins conformations have been studied bynuclear magnetic resonance [3] and simulations at multiple levels (EnhancedMolecular Dynamics and Brownian Dynamics) that cover multiple length- andtimescales. [4] The results provide insights into the driving forces for the bindingof 2 -microglobulin proteins to citrate-capped AuNPs and the subsequent effectson the conformational changes of the proteins, which are crucial in the fibrillationprocess.

Keywords: nanoparticles, fibrils, amyloid

LITERATURE:

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