

Biophysics of Protein Misfolding

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Normal cellular function of proteins depends critically on their productive folding into active functional forms. When the folding process goes wrong, it can have sinister consequences. A rapidly growing number of diseases is associated with protein misfolding, including neurodegenerative diseases such as Alzheimer's disease and Parkinson's disease. These conditions are characterized by the aggregation and accumulation of proteins into nanometer scale fibrillar deposits in the brain tissues of affected patients. The physics governing protein misfolding and aggregate formation has not been elucidated and is a key problem in contemporary biophysics. The image shows an atomic force micrograph of a variant of the human alpha-synuclein protein, which is implicated in the etiology of Parkinson's disease. We use nanometer scale imaging techniques to visualize the ultrastructure, dynamics, and interactions of these protein nanostructures.

