

عنوان مقاله:

A Brief Look at the Enigma of Protein Aggregation : Unraveling Mechanisms, Exploring Implications, and Proposing Therapeutic Strategies

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خلاصه مقاله:

Protein aggregation is a complex process that plays a key role in the development of various diseases, including neurodegenerative disorders, metabolic conditions, and systemic amyloidoses. This brief review summarizes the current understanding of the mechanisms behind protein aggregation, its impact on disease progression, and potential treatment approaches. We extensively researched recent influential publications, critically evaluated relevant articles, and synthesized key concepts, emerging trends, and promising research areas. Genetic mutations, environmental stress, and aging all contribute to the misfolding and aggregation of proteins. The aggregation process is influenced by thermodynamic and kinetic factors, involving stages such as nucleation, elongation, and the formation of aggregate structures. Biological systems, including molecular chaperones, the ubiquitin-proteasome pathway, and autophagy, play crucial roles in preventing and managing protein aggregates. Pathological protein aggregation is associated with diseases such as Alzheimer's, Parkinson's, prion diseases, cataracts, type II diabetes, and systemic amyloidoses. The review also emphasizes the potential of therapeutic strategies, such as small molecule inhibitors, immunotherapy, modulation of proteostasis pathways, nanotechnology, and gene therapy, in addressing these debilitating diseases. A comprehensive understanding of protein aggregation mechanisms and the development of effective therapeutic interventions offer hope in the fight against these diseases. This review provides current insights and recommends future research directions, highlighting the significant implications for human health and treatment innovation.

کلمات کلیدی:

Protein Aggregates, Neurodegenerative Diseases, Protein Folding, AMYLOIDOSIS, Molecular chaperones, Therapeutics

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