A study on the inhibitory effects of taxifolin on amyloid fibrillation of hen egg white lysozyme

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Abstract
Among therapeutic approaches for amyloid-related diseases, attention has recently turned to the use of natural products as effective anti-aggregation compounds. Although a wealth of in vitro and in vivo evidence indicates some common inhibitory activity of these compounds, they don’t generally suggest the same mechanism of action. In the present study, using a range of techniques including Thioflavin T and Nile red fluorescence assays, Congo red absorbance measurements, and atomic force microscopy the ability of taxifolin on the inhibition of HEWL amyloid fibrillation was investigated. Obtained results demonstrated that taxifolin exerts its inhibitory effect by binding to HEWL prefibrillar species. Furthermore, it’s binding results in diverting the amyloid pathway toward formation of very large globular, chain-like aggregates with low β-sheet content and reduced solvent-exposed hydrophobic patches. ThT fluorescence measurements show that the binding capacity of taxifolin is significantly reduced, upon generation of large protofibrillar aggregates at the end of growth phase. We believe these results may help design promising inhibitors of protein aggregation for amyloid-related diseases.

Keywords: Amyloid; Atomic Force Microscopy; Protein aggregation; Taxifolin