World Academy of Science, Engineering and Technology
International Journal of Bioengineering and Life Sciences
Vol:11, No:11, 2017

Molecular Basis for Amyloid Inhibition by L-Dopa: Implication towards Systemic Amyloidosis

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Abstract : Despite the fact that amyloid associated neurodegenerative diseases and non-neuropathic systemic amyloidosis have allured the research endeavors, as no curative drugs have been proclaimed up till now except for symptomatic cure. Therapeutic compounds which can diminish or disaggregate such toxic oligomers and fibrillar species have been examined and more are on its way. In the present study, we had reported an extensive biophysical, microscopic and computational study, revealing that L-3, 4-dihydroxyphenylalanine (L-Dopa) possess undeniable potency to inhibit heat induced human lysozyme (HL) amyloid fibrillation and also retain the fibril disaggregating potential. L-Dopa interferes in the amyloid fibrillogenesis process by interacting hydrophobically and also by forming hydrogen bonds with the amino acid residues found in amyloid fibril forming prone region of HL as elucidated by molecular docking results. L-Dopa also disaggregates the mature amyloid fibrils into some unorganised species. Thus, L-Dopa and related compounds can work as a promising inhibitor for the therapeutic advancement prospective against systemic amyloidosis.

Keywords : amyloids, disaggregation, human lysozyme, molecular docking
Conference Title : ICPP 2017 : International Conference on Protein and Proteomics
Conference Location : Dubai, United Arab Emirates
Conference Dates : November 24-25, 2017

Open Science Index, Bioengineering and Life Sciences Vol:11, No:11, 2017 publications.waset.org/abstracts/67120.pdf