Inhibitory Effect of Small Stress Molecules on Aggregation and Neurotoxicity of Prion Peptide 106-126

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Prion diseases are transmissible neurodegenerative disorders of protein conformation where the posttranslational modification of host-encoded prion proteinPrPc yields a high β-sheet content modified protein PrPsc which further polymerizes into amyloid fibrils. PrP106-126 is the key region for initiating conformational changes that leads the conversion of PrPc to PrPsc. Molecules which can destabilize and defunctionalize such proteins can serve as a potential tool in combating prion diseases. In microorganisms during stressed conditions, small stress molecules are formed to prevent protein denaturation and maintain protein stability and function. Therefore it is conceivable that they can prevent abnormal protein folding like amyloid formation. This work explores the effect of such small stress molecules on PrP106-126 amyloid formation. The characterization tools used for this study include turbidity, atomic force microscopy and cell viability assay. According to our results ectoine and mannosylglyceramide exhibited inhibitory effects against prion peptide aggregation and toxicity to human neuroblastoma cells. Our findings conclude that small stress molecules could be potential inhibitors for prion diseases.