An Innovative Therapy to Combat Parkinson's Disease using Arginine as an Inhibitor for Alpha-Synuclein Aggregation

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Parkinson's disease is a neurodegenerative disorder and its root cause is the aggregation of the protein α-synuclein, which leads to neural cell death. There exists no technique through which the aggregation process can be reversed. Number of epidemiological studies has shown increased risk of Parkinson's in populations exposed to pesticides. I have investigated the role of arginine as an inhibitor in pesticide induced α-synuclein aggregation and developed this as an innovative therapy to combat Parkinson's disease. Arginine, a natural, readily available amino acid has been reported as an aggregation suppressor and protein structure stabilizer. This non-toxic compound has been used to inhibit the progression of Parkinson's disease. α-synuclein was expressed in E.coli cells and then purified. Gel electrophoresis was performed to confirm expression and purification of α-synuclein followed by the western blot analysis to detect and separate native protein. This was followed by incubation and aggregation of α-synuclein in the presence of rotenone (representative pesticide), arginine and rotenone+ arginine. Thioflavin T spectrofluorimetry was used to analyze the solutions. My finding was that, arginine was able to arrest aggregation of α-synuclein in all stages. This can be a promising therapeutic strategy to slow down aggregation of α-synuclein in this progressively neurodegenerative disorder. It is innovative, economically viable and easily available. It is a safer, preventive and prophylactic therapy and thus can be quite effective.