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Parkinson's Disease Fibrils: Analyzing Aggregation Growth Properties in a Cell System

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Parkinson's Disease Fibrils: Analyzing Aggregation Growth Properties in a Cell System

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Parkinson's disease (PD) is the second most common neurodegenerative disease in the world. It occurs when neurons in the substantia nigra degenerate, leading to tremors, rigidity, slow muscle movement, and other physical and cognitive impairments. As of right now, there is no way to accurately diagnose PD prior to a post-mortem autopsy. In approximately less than 1% of PD patients, mutations in alpha-synuclein cause the protein to aggregate. There are five known mutations, and each cause slightly different aggregation outcomes depending on how the proteins misfold and clump together into fibrils. The purpose of our experiment is to generate these mutations in a cell system and test the cells to see how wild-type (WT) and mutated alpha-synuclein-expressing cells cause aggregation of the protein. Doing this in a cell system instead of in vitro will allow us to see how cellular lipids and proteins influence monomeric proteins to become integrated into fibrils, and how the aggregation properties differ across mutations. Additionally, completing experiments within a cell system will indicate what natural mechanisms cells have to remove or degrade monomers and fibrils, and how these removal pathways might be impacted by mutations. Studying the varying aggregation morphologies and growth patterns of these mutations will be a step in the right direction toward diagnosing PD and developing better treatments.