PMSF and SFN Reduce Alpha-synuclein Aggregation in a Yeast Model of Parkinson’s Disease

Noah Kozub
Providence College

Taylor Brysgel
Providence College

Christopher Yerxa
Providence College

Follow this and additional works at: https://digitalcommons.providence.edu/bio_students

Part of the Biology Commons

Kozub, Noah; Brysgel, Taylor; and Yerxa, Christopher, "PMSF and SFN Reduce Alpha-synuclein Aggregation in a Yeast Model of Parkinson's Disease" (2020). Biology Student Scholarship. 2. https://digitalcommons.providence.edu/bio_students/2

This Poster is brought to you for free and open access by the Biology at DigitalCommons@Providence. It has been accepted for inclusion in Biology Student Scholarship by an authorized administrator of DigitalCommons@Providence. For more information, please contact dps@providence.edu.
PMSF and SFN Reduce Alpha-synuclein Aggregation in a Yeast Model of Parkinson’s Disease

Noah J. Kozub, Victoria M. Haak, Zachary P. Sexton, OP, and Nicanor Austriaco, OP
Department of Biology, Providence College, Providence, RI 02918

ABSTRACT
Parkinson’s Disease, PD, is the second most common neurodegenerative disease in humans. PD is marked by Lewy body formation in the brain, which disturbs the dopamine transfer system across neurons. Previous studies have shown that the protein, α-Synuclein, is a major contributor in the formation of Lewy bodies. In this study, we modeled α-Synuclein aggregation in the Budding Yeast, Saccharomyces cerevisiae and treated the cells with Phenylmethylsulfonyl fluoride (PMSF) in one trial, and Sulforaphane (SFN) in another. Our goal was to see how PMSF and SFN might affect aggregation, while also monitoring the health of the yeast. Our Preliminary data has suggested that a 4mM concentration of PMSF and 200μg/ml of SFN significantly reduces protein aggregation. Our lab will continue to investigate the role of PMSF and SFN in the prevention and breakdown of α-Synuclein aggregates.

INTRODUCTION
The protein α-Synuclein is found in the neurons of mammalian cells. Although not fully understood, it has been hypothesized that α-Synuclein plays a role in membrane binding and the monitoring of neurotransmitter concentrations. Using yeast as a model organism has shown to be an affective way of observing these human proteins because of its ability to mimic the aggregation and cytotoxicity of α-Synuclein in human pathology. After imaging cells that were overexpressing α-Synuclein, drug therapies were introduced to see how they might affect protein aggregation. Phenylmethylsulfonyl fluoride (PMSF) and Sulforaphane (SFN) have shown the ability to alleviate protein aggregation.

FIGURE 2: Overexpression of Human α-synuclein in Yeast Triggers Aggregation

FIGURE 3: PMSF and Sulforaphane (SFN) Reduce α-synuclein Aggregation in Yeast

FIGURE 1: Parkinson’s Disease has been linked to alpha-synuclein aggregation in Lewy Bodies

ACKNOWLEDGEMENTS
Our laboratory is supported by NIH grant NRMS R15 GM110578 awarded to N. Austriaco and P20GM103430 awarded to the RI-INBRE Program for SURF training.


- α-Synuclein aggregates and is toxic in budding yeast.
- PMSF and SFN appear to alleviate protein aggregation.

CONCLUSIONS