# Herapan Sulfate Biosynthesis and Autophagy Regulation

ID# 2018-4820



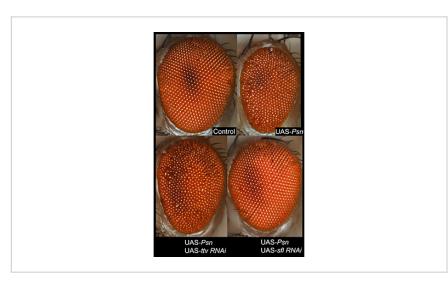


Fig 1. Reduced HS Levels Lowers Toxicity

# **Technology Summary**

Basal levels of autophagy affect lifespan and loss of autophagy leads to neurodegeneration. Heparan sulfate (HS) proteoglycans are abundant carbohydrate-modified proteins found on cell surfaces and in the extracellular matrix. Results implicate HS as a suppressor of autophagy and reductions of HS biosynthesis activate autophagy in neuronal, muscle, and other cell types.

Reducing HS biosynthetic gene function increases lifespan, resistance to ROS stress, and protects cells in models of aggregated-protein-mediated death or deficits in removal of damaged mitochondria. Increasing autophagy can rescue neurons and muscle cells in vivo from cell death produced by toxic protein accumulation or failure of mitochondrial surveillance and recycling. HS synthesis therefore represents a potential target for interventions to suppress accumulation of aggregated proteins or defective mitochondria.

# Application & Market Utility

Through its effect on autophagy, HS biosynthesis may represent a novel target for the treatment of neurodegenerative disorders. Initial studies have confirmed that inhibition of HS biosynthesis successfully rescues neurodegenerative phenotypes in Drosophila models for Alzheimer's and Parkinson's Disease and heparan sulfate-mediated regulation of autophagy is represented in human cells. Initial studies also demonstrate that inhibition of HS biosynthesis increases animal resistance to oxidative stress and overall lifespan, suggesting that therapeutic effect may be broad.

# **Next Steps**

Research is ongoing. Inventor, Dr. Scott Selleck, is working with collaborators to validate best targets within the HS biosynthetic pathway, develop novel therapeutics, and confirm results in vivo (mouse). The researchers seek academic and/or industr

# **TECHNOLOGY READINESS LEVEL**

1-3

#### Seeking

Investment | Licensing | Research

### **Keywords**

- Autophagy
- Heparan sulfate
- Aging-Related Diseases
- Neurodegeneration
- Alzheimer's Disease

#### Researchers

#### Scott Brian Selleck

Department Head, Biochemistry & Molecular Biology

Online Bio

### Claire Reynolds-Peterson

PhD Student (Graduated)

#### **Originating College**

Eberly College of Science

# Office of Technology Management Contact

Long, Melissa mkl137@psu.edu 814-865-5730



Invent Penn State is a Commonwealth-wide initiative to spur economic development, job creation, and student career success. Invent Penn State blends entrepreneurship-focused academic programs, business startup training and incubation, funding for commercialization, and university-community collaborations to facilitate the challenging process of turning research discoveries into valuable products and services that can benefit Pennsylvanians and humankind. Learn more at invent.psu.edu.

Penn State is an equal opportunity, affirmative action employer, and is committed to providing employment opportunities to all qualified applicants without regard to race, color, religion, age, sex, sexual orientation, gender identity, national origin, disability or protected veteran status.