



NATHAN SHOCK CENTERS
OF EXCELLENCE IN THE
BASIC BIOLOGY OF AGING

PILOT AWARDEE SPOTLIGHT



Principal Investigator:

Andrew Wojtovich, PhD

Co-Investigators:

Timothy Mackie, PhD & Brandon Berry, PhD

University of Rochester

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How does mitochondrial membrane potential affect lifespan in budding yeast?

Spotlight interview responses by Dr. Timothy Mackie

How did you become interested in aging?

I started hearing about biology of aging in graduate school. It seemed like a more holistic way to understand health than focusing on diseases as isolated phenomena.

Briefly describe your project in non-scientific terms. What questions are you trying to answer?

Mitochondria (the “powerhouse of the cell”) have an electrical membrane potential, much like a battery. It’s known that this membrane potential declines with age and can impair the function of energy-demanding organs, like the brain, the heart, or the skeletal muscle. This project asks if artificially increasing the mitochondrial membrane potential can increase lifespan in budding yeast.

What previous research or experience informed the development of this proposal?

The main tool for manipulating mitochondrial membrane potential is called mitochondria-ON (mtON) for its ability to turn mitochondrial function on with light. It was previously used by Drs. Berry and Wojtovich in the roundworm *Caenorhabditis elegans*. We want to replicate these findings in other models of aging, and yeast seemed like a natural next step.

What’s exciting about your project’s potential impact?

The ability to successfully manipulate mitochondrial membrane potential in yeast opens the door to a wide variety of new inquiries given the unparalleled ease of genetic manipulation in yeast.

If your project is successful, what is the next step?

We are going to test if restoring mitochondrial energy production is sufficient to extend lifespan. Our future studies will use genetic yeast mutants to elucidate how energy production can alter lifespan.

How has support from and collaboration with the Nathan Shock Centers helped further this project and/or your research overall?

The yeast model provides many opportunities for advance our work however, it would have been a tall order for me to get this off the ground by myself. The Shock Center has resources and expertise in yeast aging which are highly specialized and capable of doing very sophisticated experiments with minimal lead time.