NATHAN SHOCK CENTERS OF EXCELLENCE IN THE BASIC BIOLOGY OF AGING

PILOT AWARDEE SPOTLIGHT

Michael Lustgarten, PhD

Assistant Professor
Jean Mayer USDA Human Nutrition Center on Aging at Tufts University

2022 JAX NSC Pilot Award
Impact of a Whole Food, High-Soluble Fiber Diet on the Gut-Muscle Axis in Aged Mice

---

How did you become interested in aging?
In my mid 20's, after reading Dr. Roy Walford's book, "Beyond the 120 Year Diet", I made the decision to study aging as a career. However, my initial undergraduate degree was not in a science-related discipline, so I went back to school to take the required undergraduate classes for potential entry into graduate school, followed by joining an aging-focused lab as a graduate student.

Briefly describe your project in non-scientific terms. What questions are you trying to answer?
The gut microbiome is associated with the health and function of many organ systems, but with the goal of testing causation, interventions aimed at optimizing gut microbiome composition are sparse. With that in mind, our group designed a custom whole food, high- soluble fiber diet (HSFD) that we expected would have a positive impact on gut microbiome composition and function. Then, could these alterations to the gut have a positive impact on muscle mass and physical function, in the absence of exercise training? In other words, could a HSFD have a positive impact on the gut-muscle-axis in aged mice?

What previous research or experience informed the development of this proposal?
Short chain fatty acids (SCFAs) are produced when soluble dietary fiber is fermented by gut bacteria. In young mice, SCFAs positively impact muscle mass and function, but whether an intervention that is known to increase gut bacterial production of SCFAs (HSFD) could positively impact muscle-related measures in aged mice had yet to be evaluated.

What's exciting about your project's potential impact?
Being able to potentially improve muscle-related measures with dietary change, and without exercise training!

If your project is successful, what is the next step?
If a HSFD is able to positively impact the gut-muscle axis in aged mice, the next step would be to test a similarly structured diet in older adult humans. An advantage of this study is that dietary intake can be controlled, whereas in people, dietary compliance may limit the amount of soluble fiber that is consumed, as most do not eat high soluble fiber-containing diets.

How has support from and collaboration with the Nathan Shock Centers helped further this project and/or your research overall?
Support from the Nathan Shock Center has helped tremendously, as the feeding study and measurements of whole-body lean mass, individual muscle masses, and physical function were performed at the Jackson Laboratory. In addition, fecal and blood samples were collected, which we recently sent for analysis of gut microbiome composition and circulating SCFAs, respectively. These additional measures will allow us to collectively evaluate the impact of a whole food, high-soluble fiber diet on the gut-muscle axis in aged mice.