NATHAN SHOCK CENTERS OF EXCELLENCE IN THE BASIC BIOLOGY OF AGING

PILOT AWARDEE SPOTLIGHT

Valentina R. Garbarino, PhD

Assistant Professor
UT Health San Antonio

2024 San Antonio NSC Pilot Awardee

Effect of lactoferrin supplement on age-related brain changes in an aged heterogenous mouse model

---

How did you become interested in aging?

My interest in aging research originated during my undergraduate training, when I developed a fascination with the unique physiology of the long-lived naked mole-rat. My curiosity in their exceptional 30-year lifespan and resistance to extreme environmental, social and biological stressors drove my entire desire to pursue graduate training in the biology of aging. On top of that, I have always held a special regard for our elderly population, recognizing their value and vulnerability, and had hopes that my research training could help me to address clinically relevant topics on age-related brain processes and diseases that could ultimately be translated to human populations.

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

My NSC Pilot award was aimed at evaluating whether the addition of a simple dietary supplement with a milk protein called lactoferrin was able to initiate changes in the brains of aged mice that made them more similar to young animals. I wanted to understand if there were specific proteins and associated biological pathways that were alterable with the addition of lactoferrin into the normal diet of genetically diverse mice meant to more translationally imitate human diversity.

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

Several previous publications inspired me to ask whether lactoferrin supplementation could alter pathways affected by aging, that might ultimately extend lifespan and healthspan in animals as they age. These included studies in inbred wild-type mice that showed alteration in multiple outcomes (behavioral, inflammation, metabolism) where aged lactoferrin treated mice resembled young control mice in these outcomes more than when compared to aged matched controls. Other studies that evaluated lactoferrin supplementation in C. elegans that extended lifespan after just one day of supplementation and even a clinical Alzheimer's disease study with promising results inspired my interest with this multifunctional protein.

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

The most exciting aspect of this project, in my opinion, is the ease (inexpensive, readily available in encapsulated form) in which lactoferrin supplementation could be clinically implemented to combat age-related changes either alone or in combination with other disease-specific targeted interventions. Lactoferrin, as an endogenously present protein that is easily attainable from exogenous sources has a very low risk for side effects, and is already available commercially, and relatively inexpensively. If it is proven to be effective against age-related processes and pathologies, it could easily be added as a supplement either alone or as part of a targeted combination therapy.

NATHAN SHOCK CENTERS OF EXCELLENCE IN THE BASIC BIOLOGY OF AGING

PILOT AWARDEE SPOTLIGHT

Valentina R. Garbarino, PhD

Assistant Professor
UT Health San Antonio

2024 San Antonio NSC Pilot Awardee

Effect of lactoferrin supplement on age-related brain changes in an aged heterogenous mouse model

---

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

The next steps for lactoferrin in my lab are to independently evaluate the utility of lactoferrin levels within the body to serve as a biomarker indicator of pathology in neurodegenerative disease. Lactoferrin measured minimally-invasively though saliva samples could provide opportunity for disease detection that might be especially valuable in populations that do not have access to state-of the-art diagnostic and treatment facilities for neurodegenerative disease. These studies will also help to inform on the biological processes that occur in lactoferrin biology with age to potentially identify pathways that can be therapeutically targeted with lactoferrin supplementation or otherwise. The long-term goal of this collaborative work is to unite the lactoferrin intervention work with the biomarker studies to conduct a clinical study/trial in the context of aging and Alzheimer's disease.

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

This project initiated from a submission to the National Institute on Aging (NIA) Interventions Testing Program (ITP) to propose evaluation of the lifespan extending potential of lactoferrin provided as a dietary supplement. This submission fostered collaborations with senior members of my local San Antonio Nathan Shock Center, but also supported an introduction to the ITPs Primary Investigators at the other two national Nathan Shock Center sites. These individuals were instrumental in the strengthening of this project through the provision of tissues from young and old mice, which supported the favorable review of my pilot project and ultimately resulted in successful pilot funding. I am now funded by another pilot to explore the biomarker arm of the lactoferrin project with plans to develop a larger grant after combining these two projects as strong preliminary data.