NATHAN SHOCK CENTERS OF EXCELLENCE IN THE BASIC BIOLOGY OF AGING

PILOT AWARDEE SPOTLIGHT

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Characterize senescent cell secretome in selected long-lived birds and mammals

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How did you become interested in aging?

As an evolutionary biologist, I have been fascinated by the different life-history traits from different species since I was an undergraduate student. Longevity is one of the major life-history traits that varies between individuals, populations and species. There are organisms, in vertebrates and even in endotherms, that show negligible aging phenotypes. According to the life-history tradeoffs, adaptation for one life-history traits (longer lifespan in this case) should have negative effects on other traits because recourses and energy are limited. Consequently, I am very interested in the question “do other life-history traits suffer for the organisms that show negligible aging phenotypes”.

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

For the USC-Buck NSC pilot grant, I am studying cellular senescence in long-lived birds and mammals, and compare them to species that have normal or short lifespan. In this project, we are focusing on the metabolic and secretary phenotypes of the senescence cells in these long-lived animals.

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

As I mentioned above, my background is in evolutionary biology during my undergraduate, graduate, and first post-doctoral training. Luckily, I did my second post-doctoral training with Dr. Judy Campisi, who is one of the foremost experts in cellular senescence. Naturally, I incorporated my previous evolutionary background and knowledge obtained in Campisi lab to develop this proposal.

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

I think there are many different aspects that the project is potentially very impactful. First of all, cellular senescence has been intensively studied in recent year, but those studies focused mostly on laboratory rodents and human cells. We actually have very limited knowledge on cellular senescence in other species. Studying cellular senescence in other species would allow us to better understand cellular senescence and its roles in other organisms. Secondly, aging is a very complicated biological process. To study complex biological processes, evolution has been proven to be a powerful tool. By using the evolutionary and comparative approach, it allows us to study how natural selection has dealt with the problem. And this could be a short-cut to understand the question compares to studies that focused on short-lived laboratory model species.

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

Hopefully this project could narrow down some factors that are common for long-lived birds and mammals regarding their cellular senescence phenotypes. Then we would focus on these factors to see whether manipulating these factors would result in phenotypic changes of cellular senescence. Both on the numbers of senescent cells after stressors and aging, and also on the secretary phenotypes of senescence cells.

How has support from and collaboration with the NSCs helped further this project and/or your research overall?
Support from USC-Buck NSC is invaluable for me and for this project. Drs. Judy Campisi and Birgit Schilling have been my long-time mentors for many of my projects, not limited to this one. The Cellular Senescence and Beyond Core (CSBC) at the USC-Buck NSC also provides newly developed cutting-edge proteomic workflow to measure the secretary phenotypes of senescent cells. Moreover, Drs. Jianhua Zhang and Victor Darley-Usmar from the Mitometabolism Core at UAB NSC also provided major supports and mentorship for my projects.