

Behind the Science: Interviews with Early Career JLB Authors

by Alan Hsu



Effect of extracellular vesicles from *S. aureus*-challenged human neutrophils on macrophages

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Q: Where did your journey in science begin (what inspired you to pursue a career in science)?

A: I came to science through a combination of factors. First, from my love of gardening and the natural world, where, as child I was always trying to grow one thing or another under different conditions. And second, following in my grandfather's footsteps in becoming a pharmacist. Through working as a pharmacist, I found that I also wanted to participate in building our understanding of how the immune system fights infection, leading me to pursue research.

Q: How did you choose your current research topic and interest?

A: Ever since I can remember, I have been passionate about diseases caused by infectious agents. As a pharmacist, I was particularly interested in antimicrobial stewardship, and avidly followed literature on novel antibacterial drugs. Working in the hospital, I saw how inflammation during an infection often contributed substantially to disease severity, and my attention shifted from microbes to humans. My interest has since turned to focus on more host-directed therapies to fight infection, with a focus on dampening excessive inflammation

Q: Could you use a few lay sentences to describe/summarize your findings in this paper?

A: We studied extracellular vesicles (EVs) released from neutrophils when they are exposed to bacteria. The EVs are attached to both DNA and bacteria, and as expected, the bacteria contributes to inflammation. When the DNA and bacteria are removed, the vesicles are no longer inflammatory, and instead lead to an increase in macrophage antigen presentation proteins, which are proteins required to activate our more specific immune responses.

Q: What was the most exciting or memorable moment(s) during the process of this research?

A: We were pretty excited by the clear-cut finding that when you remove the DNA and the bacteria from EVs, that they increase expression of macrophage presentation proteins.

Q: What was the biggest hurdle or challenge associated with this story?

A: Earlier in the research project, we had an interesting result using a chemical inhibitor, and we were performing some follow-up where the results didn't make sense. So we went back to the first experiments and tried to repeat them using a different formulation of the inhibitor. To our surprise, we could never repeat those initial findings. Getting one result

and then another with a different formulation really does stress the importance of rigor, controls, and good documentation in science.

Q: Besides your PI is there anyone that significantly helped you in your path to become a scientist?

A: My parents always encouraged my love of nature and my inquisitiveness. I have also watched my husband's research career grow over the years, and worked together with him on a project looking at historical tornadoes in Australia, which is where we are both from. I really love the detail-oriented elements of this research, and so I started down my own path in research at CMU. My PI is always so supportive, and we've also had a lot of fun with our research over the years.

Q: What's next for you?

A: In the short term, I am really interested in exploring how DNA is tethered to the EVs, and whether it plays a role in inflammation. Longer term, I hope to continue working with extracellular vesicles in the context of immunology, as this is the field I am really passionate about.

Q: What would your advice be for junior or incoming Ph.D. Students who want to pursue a career in science and perhaps your field?

A: At CMU, I get to mentor undergraduate students frequently, and I see how important it is to be able to find a place where new lab members feel supported by colleagues in a positive environment. Also, one of the most valuable lessons I've learned is that failure is part of science, and that accepting and embracing failure can often lead to the best successes. It is different than anything in any other position I've held in life, where it could be acceptable that things could be wrong.

Q: Tell us something interesting outside of being a scientist about yourself

A: Outside of being a scientist, I really love gardening. Nothing tastes as good as a tomato you grew yourself. I also head out every summer to the Plains States to chase storms with my husband.

Q: Anything you would like to add.

A: Thank you for the opportunity to highlight our work, and I hope to encourage any other non-traditional scientists to follow their passion.