MESSAGE FROM THE GRAYSON-JOCKEY CLUB RESEARCH FOUNDATION

Q&A WITH DR. SOPHIE H. BOGERS

Grayson-Jockey Club Research Foundation

Dr. Sophie H. Bogers, of Virginia Tech's Marion duPont Scott Equine Medical Center, has conducted research focused on using stem cells to treat osteoarthritis in horses with specific aims of optimizing the anti-inflammatory properties of equine bone marrow-derived mesenchymal stem cells. Bogers currently serves as an assistant professor at Virginia Tech and was a 2015 recipient of the Klein Family Award from the Grayson-Jockey Club Research Foundation.

The award is a competitive program intended to promote development of promising investigators by providing a one-year salary supplement of $15,000. The award is named in memory of renowned horsewoman Elaine Klein and her late husband, Bertram. It is funded by the Klein family. What follows is a brief Q&A with Bogers.

COURTESY DR. SOPHIE H. BOGERS

Dr. Sophie H. Bogers

What first sparked your intellectual curiosity to explore this area of equine research? Have you studied this area of equine research before?

As an intern in Kentucky in 2010, I was exposed to the expanding industry of regenerative medicine and saw the detrimental effects musculoskeletal disease could have on horses' careers. Some benefits of regenerative therapies were being realized, but I wanted to understand their therapeutic mechanisms and how to enhance their potential. Being primarily interested in surgery and lameness, I wanted to ask questions about stem cells in the context of orthopedic disease. Of all the orthopedic diseases that face our horses, osteoarthritis is perhaps the most common and challenging as once the cycle of chronic inflammation and tissue breakdown begins it is impossible to stop or repair the damage. Dr. Jennifer Barrett mentored me to put these interests together in the context of my PhD, which explored how the physical and biochemical environment could affect the therapeutic potential of equine bone-marrow derived stem cells. I had no background in stem cell or molecular biology, so it was a learning curve. But with excellent mentorship and determination I was able to couple my existing knowledge of veterinary medicine with stem cell biology to do clinically relevant research.

What was the most significant finding from this research? What, if anything, surprised you about your findings?

We learned it can be therapeutically beneficial to alter the environment of stem cells before they enter the disease environment. For inflammatory conditions, such as the low-grade inflammation in osteoarthritis, this is important because stem cells need to be triggered into an anti-inflammatory state. It's not only the culture conditions that affect the stem cells, but also what horse they came from and the level of inflammation they encounter in the horse. We have known for a while that stem cells are sensitive to all sorts of donor-related and environment-related factors; it's just rewarding to find specific relationships and use them to a therapeutic advantage.

What did you learn about the research process through your project?

I knew the PhD would take a good degree of perseverance, especially when things don't go to plan. What I didn't fully appreciate was how important the relationships I built would be on the ease of doing my experiments. When it came to long hours of live-horse experiments, it was amazing the number of people who put their hands up to volunteer. It showed me the research process is about involving and motivating a range of people who just want to help horses and horse health. I also learned that it's important to personally embrace and be involved with all aspects of the research process because the continuity contributes to improved quality and professional development.

How will this research improve equine health and welfare?

Knowing how stem cells respond to their environment for therapeutic applications is the initial step to producing effective stem cell therapies. The ultimate goal is to produce an anti-inflammatory and regenerative stem cell therapy for osteoarthritis. The more basic research we do the more we will understand how to reach our ultimate goal. It is an extremely exciting goal to work toward because, if achieved, it will alter the outlook for so many of our horses with osteoarthritis, which is currently a progressive, degenerative disease with no cure.

Has this research led to additional projects?

That's the excellent thing about research...one question answered generates many more questions. We are keen to use similar concepts in other species and for different diseases. We will continue developing the techniques we used during these experiments.

What is next?

I am starting a faculty position at Virginia Tech. It will be exciting to continue to practice equine surgery as well as contribute to equine stem cell and orthopedic research. My mentors at Virginia Tech have been amazing, and it will be great to continue to work with them and also build other relationships outside the university. BH