REU adventure en La Isla del Encanto! [1]

Enviado por Claudia Santana Monterrey [2] el 30 julio 2015 - 6:21pm

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Before coming to Puerto Rico this summer I had no idea what to expect. I had heard what a beautiful island it was, as well the rich culture I was going to find; however, the idea of spending ten weeks here collaborating with research was still scary. Today, 2 months into the program. I

am glad to say that I would not change this experience for any other. This has been a wonderful learning adventure for me. I learned not only about soft matter and my topic of research, but also about “la Isla de Encanto”, its history, culture and more important its people. Additionally, I spent time with an exceptional group of students who were also part of the REU, and who I am proud to call my friends now.

From an academic point of view, I spent this summer studying the mechanical properties of rat-tail tendons that had been submerged in simulated body fluids in order to allow for mineralization. The tendon is a fibrous connective tissue that is composed of type I collagen and a non-collagenous matrix (including proteoglycans). Tendon injuries are very common. Some examples include Achilles tendinopathy, degeneration and rupture of the tissue. When an injury occurs, the integrity of the tissue and its function is compromised. Mineralization of type I collagen tissues, such as fascicles, has shown that as the minerals adhere to the collagen, the mechanical properties of such tissue varies, and the fascicle becomes more rigid (Young’s Modulus increases). . Studying how the adherence of minerals to tendon tissue affects the mechanical behavior of the tissue and could contribute to finding methods of treatment towards tendon healing. With that in mind, our research will try to answer how the mineralization of rat-tail tendon affects the mechanical properties of such tissue. We hypothesize that the tendons that have been submerged in Simulated Body Fluids (SBF) for mineralization will have different mechanical behavior (greater young’s modulus) than those that haven’t been exposed to minerals.

The model systems developed in this research experience allowed us to test the ways in which the mineralization of the tissue affected the mechanical behavior of the tendon. The system included submersion in water, PBS, and SBF, testing at different tensile rates and different incubation periods.

The average results did not show a significant difference in elastic modulus values. SBF samples’ elastic modulus did not show a significant increment when compared to the elastic modulus of the tendons submerged in standard solution (PBS). An increment in elastic modulus for samples submerged in SBF would have meant that the minerals present in in the SBF solution went through the tendon membrane and adhered to the collagen, making the material more resistant to external forces and breakage. The similarity in elastic modulus values indicates that the minerals

present in SBF might have not penetrated the tendon membrane. The membrane might not be permeable for calcium, which is the main mineral present in SBF. Future experiments will include injection of fluids into the tissue.

And now, it’s time to say goodbye to this REU experience. I would like to thank all the UPRM staff that made this exciting activity possible, as well as the students. Thank you very much! Will see you in the next adventure!

Tags:

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Links
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