

~ Research Spotlight ~

Penn Dental Researchers Studying Mice Brought Back from Final Shuttle Mission

It is not every day that researchers get access to a mouse that has been to space and back, but investigators at Penn Dental Medicine did just that this summer, gaining samples from mice that were brought back on NASA's final space shuttle mission.

So while the shuttle program may have ended with the landing of Atlantis July 21, 2011, it meant the start of a new round of studies for Dr. Elisabeth Barton, Associate Professor, Department of Anatomy & Cell Biology, and her postdoctoral fellow Anastasios Philippou. Dr. Barton's lab, which focuses on the mechanisms of muscle repair, was among 25 labs and the only one from the University of Pennsylvania to receive samples from 15 mice, gaining the opportunity through past work with NASA and encouragement from Penn Dental Medicine Board of Overseer Dr. David Tarica (D'83), who also had connections with the

shuttle program.

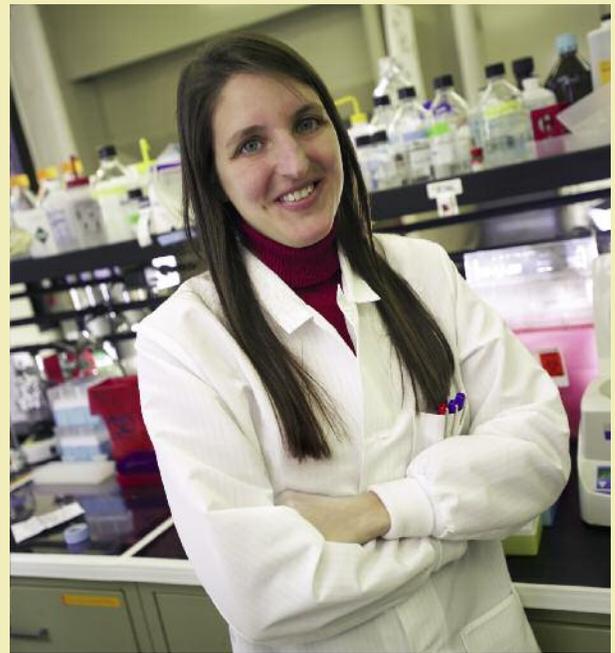
"We had just completed a grant from NASA, studying how muscles sense load and the molecular pathways involved, but all of our experiments involved stretching tissues and cells in the lab," says Dr. Barton.

"Because of this previous work with NASA, we were able to write a proposal to study samples taken from mice that went up on the shuttle for a different experiment," continues Dr. Barton, who received masseter and limb muscles from the shuttle mice.

"When you're in space, there's no load on your muscles, and we want to understand the consequences."

Dr. Barton and Philippou study the sarcoglycan complex, a combination of proteins in muscle cells. On earth, leg muscles bear the weight of an organism whenever it's standing, but without gravity there is nothing to support. The mouth muscles involved in chewing, however, are less dependent on gravity to function.

"Our first experiments will be on the histology, or the appearance of the cells of these muscles," says Philippou. "Then



Dr. Elisabeth Barton's Penn Dental Medicine lab was one of 25 nationwide to receive samples brought back on NASA's final space shuttle mission.

we'll look at them at the molecular level."

"We're looking for clear differences in loading between jaw muscles and limb muscles in mice," Dr. Barton adds. "We can use the database we developed in our previous NASA work to see how important this complex is to load sensing."

The sarcoglycan complex is also involved in diseases such as muscular dystrophy. Understanding how these proteins are involved with the weakened muscles of those with the disease could also help astronauts prevent similar atrophy that stems from long periods of living in microgravity.

"If we could use this complex to trick the muscles into thinking they're loaded, that would be a great advantage for astronauts," says Barton. "Comparing limb and jaw muscles will also allow us to see whether there are effects of microgravity on muscles beyond the lack of load."



Postdoctoral Fellow Anastasios Philippou at the NASA lab to collect the muscle samples.

