Undergraduate Students Test Bone and Muscle Experiments Aboard Reduced-Gravity Flights

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Students from the University of North Carolina at Pembroke take a minute from testing the Cori Cycle to enjoy being airborne. Image Credit: Candace Langston

Changes in environments can alter the results of most science experiments. More specifically, a reduced-gravity environment can have dramatic (and unexpected) affects on investigations. Just ask the students of Boise State University and the University of North Carolina (UNC) at Pembroke, who participated in reduced-gravity education flights this summer.

From June 3 to 10, the undergraduate student teams flew over the Gulf of Mexico in the zero-gravity (zero-g) airplane and tested their science experiments. Students spent many long hours during several months preparing for flight.

Boise State University conducted an experiment to learn how Teriparatide, a pharmaceutical that treats osteoporosis, affects bone density loss in microgravity by observing calcium fluctuations in bone cells. To conduct their investigation, bone cell samples were incubated with a fluorescent dye. During each parabola, the team photographed the reaction activity between cell samples exposed to Teriparatide, as well as control samples not exposed to the pharmaceutical. When asked about the results of their experiment, the team was pleased with the findings.

“Our results look extremely promising,” said Nic Baughman, Boise State team member. “We found that cells exposed to Teriparatide show an increase of calcium levels compared to the samples not exposed.”

UNC Pembroke was interested in investigating how microgravity affects the Cori Cycle, the process of converting pyruvate into lactic acid to provide energy for muscles to perform during intense exercise.

“Our team really believed the Cori Cycle would slow down in microgravity,” said Candace Langston, UNC Pembroke team member. “We figured the absence of gravity would prevent the molecules from bonding together to initiate the process.”

To their surprise, the Cori Cycle *sped up* in microgravity.

“We were surprised the hypothesis was (the) opposite of the results,” Langston said. “We’re still unsure of why.”

To conduct their experiment, the UNC Pembroke team examined a mixture of enzymes that initiate the Cori Cycle under an ultraviolet spectrophotometer. During times of microgravity, the team measured the reaction rates of the enzymes.

Although the students participated in the Reduced Gravity Education Flight Program to work and learn, they also had plenty of time to gain new skills, have fun, enjoy the flight and experience something many people have not.

“Our first priority was to test our experiment, but we did take time to relish in the moments of being airborne,” Langston said.

When asked about their overall impression of the Reduced Gravity Education Flight Program, both teams were thrilled with the entire experience.

“Although the opportunity to test a science experiment in zero-g was incredible, the entire process of planning and preparing the investigation stretched my limits, in a good way, as a student and deepened my passion for science,” Langston said.

“Both the experiment and preparing the proposal was both challenging and fun,” Baughman said. “Our technical proposal was about 82 pages. Also, we had to fund our experiment, which required applying for grants, and I definitely obtained a new skill. We were fortunate to have three businesses donate materials for hardware. I think the reduced-gravity program is the best learning experience for undergraduate students.”

The Reduced Gravity Education Flight Program serves students and teachers from across the country. The next set of flights is scheduled for November. Students part of the Minority University Research and Education Program will test experiments and join the select few who can say they rode the “weightless wonder.”

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