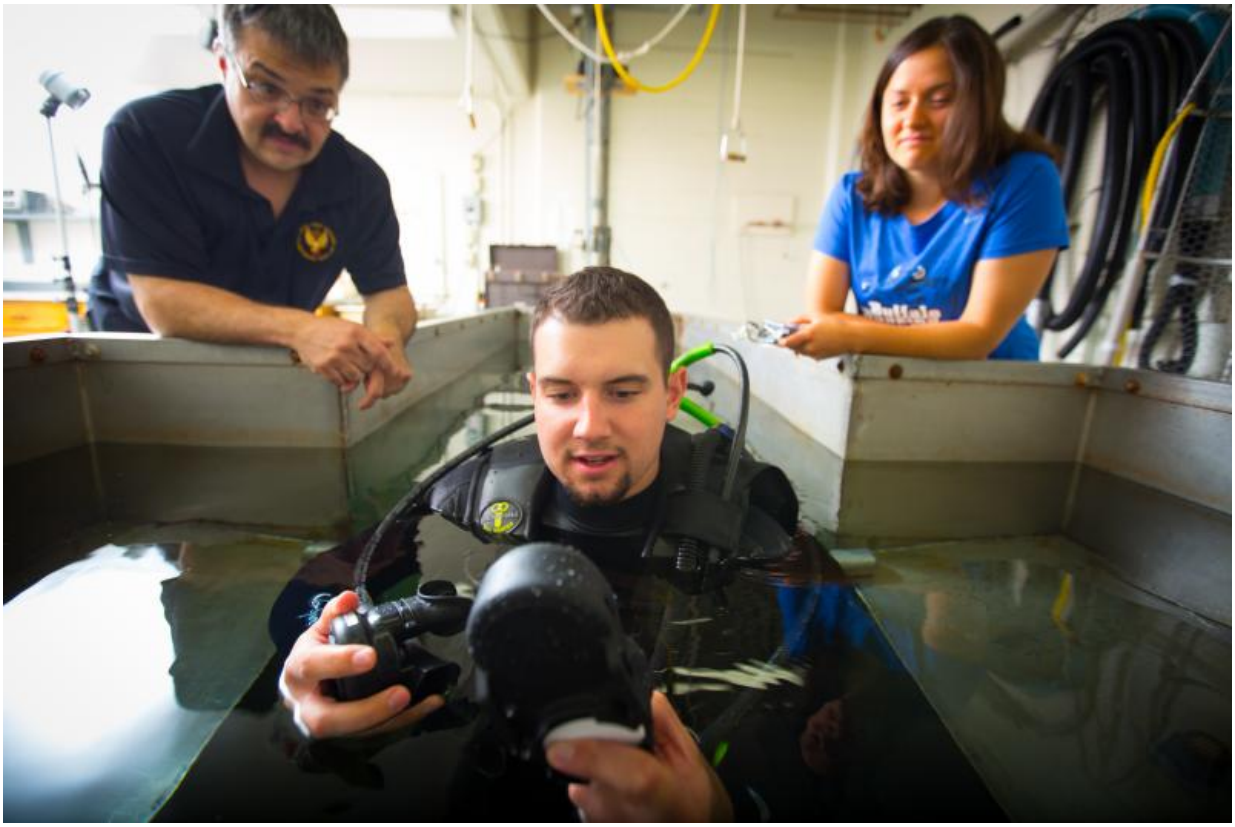
Researchers to study dangers of diver dehydration for US Navy

July 9 2015, by Michael Andrei



David Hostler, left, chair of exercise and nutrition sciences at UB, begins research on a UB study examining the dangers that dehydration presents for U.S. Navy divers. Working with Hostler are diver Connor Meyer, a biology and exercise science major at Virginia Military Institute, and UB physical therapy major Laura Barnes. Credit: Douglas Levere

Researchers at the University at Buffalo School of Public Health and Health Professions will study the dangers that dehydration presents for U.S. Navy divers, examining diver physiology both during and after underwater activities.

The project's results will aid in developing Navy diving protocols to prolong endurance and make missions safer for divers. In addition, if the research finds that rehydrating while diving is ineffective, it could influence Navy planning for potential development of in-water rehydration systems.

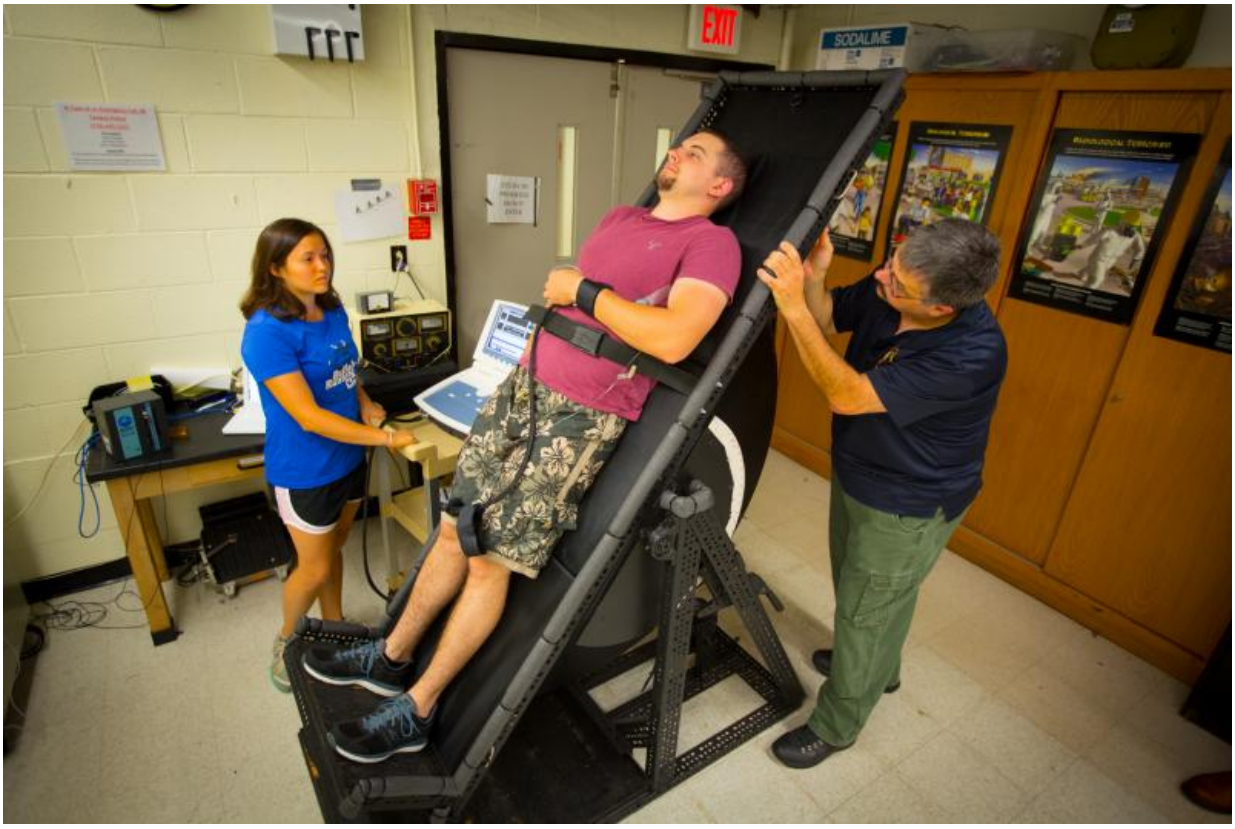
"Dehydration risk is especially high for divers who remain underwater for prolonged periods of time, and is a risk factor for decompression sickness, or DCS," said David Hostler, chair of the UB Department of Exercise and Nutrition Sciences in the School of Public Health and Health Professions and principal investigator on the three year study. A more common result of immersion dehydration is poor physical performance when the diver exits the water and has to perform a mission on land.

While others in the field have documented what happens to the body in the first few hours following prolonged immersion, little is known about the long-term aspects of recovery.

"This could affect performance on multi-day and consecutive day missions," Hostler said. "Our study will illuminate the issue by examining the integrated behavior of the divers' bodies immediately following a mission: What happens to the body overnight and how quickly do the divers achieve a full recovery?"

Simulating diving environments in a hyperbaric chamber

Hostler cited UB's unique capabilities as a key reason for the latest award to the university, noting that UB has previously performed research for the Office of Naval Research and Naval Sea Systems (NAVSEA).



From left, UB physical therapy major Laura Barnes and diver Connor Meyer, a biology and exercise science major at Virginia Military Institute, work with David Hostler, chair of exercise and nutrition sciences at UB, in his lab. Credit: Douglas Levere

He said UB's hyperbaric chamber, located on the South Campus in the Center for Research and Education in Special Environments (CRESE), is a resource in one of the most advanced facilities in the world to

simulate environmental stress, and one of only a handful of labs that study diver performance and safety.

"We can study divers at depth in a hyperbaric chamber that can be flooded and temperature-controlled to simulate nearly any diving environment on the planet," Hostler said. "That portion of the study will begin next year, following the beginning phase of research in the immersion tank, which is also located here in the CRESE lab on the South Campus."

Results of the nearly $260,000 study will add to existing knowledge in the Navy's Undersea Medicine program, and will also be applicable to civilian, sport and commercial divers, Hostler said.

Investigating dehydration and rehydration

Hostler explained that the UB research will seek to answer the question of when and how to rehydrate divers.

He noted that there are several ways divers lose fluids – sweating, brought on by exertion, warm water and heavy activity, or extended time in a tight wetsuit.

"Normally, some of your blood, slowed by gravity, will pool in your extremities – your arms and legs," Hostler said. "The pressure of the water during diving forces some of that blood to your center. Your heart responds to the extra volume by triggering a response in your kidneys to remove the excess fluid. That means you need to urinate more, and more often."

"Breathing dry air also contributes to dehydration," he said. "The compressed air in your cylinder removes moisture from your body as you breathe it. The longer your dive, the more moisture you'll have lost.

The impact is greatest in cold water diving, where the lungs are warming the cold air, and moisture is lost as a result."

Hostler added that unless you're diving in water near the normal body temperature, your body reacts to the cold by narrowing down the blood vessels in your extremities, which also contributes to dehydration.

Hostler said that when divers leave the water, blood returns back to the arms and legs, creating an instant dehydration of up to two liters of fluid. He said that rapidly drinking that much fluid could be difficult or impractical for military divers, depending on conditions of the mission.

"A big reason for our study will be to determine if there is any value in rehydrating continuously underwater. At this time there is no scientific data to support this, one way or the other."

Provided by University at Buffalo