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The Research and Creative Experience for Undergraduates (RCEU) Program
at
The University of Alabama in Huntsville

**Effects of Water Temperature on Heart Rate and Core Temperature During Aquatic Treadmill
Walking in Adults with and without Multiple Sclerosis**

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Project Description

Multiple sclerosis (MS) is a degenerative, chronic, immune-mediated disease that leads to cumulative neurologic disability over several years. The body's immune system attacks and damages the central nervous system and the underlying nerve fibers. This damage interferes with the transmission of nervous signals between the central nervous system and results in decreased skeletal muscle function, muscular fatigue, and decreased ambulatory ability. Exercise interventions are currently being researched as potential improvement mechanisms for MS patients and helping to manage the physical demands being placed on the body of MS patients. Although exercise is beneficial, research shows that adults with MS continue to be physically inactive.

Another contributing factor to a lack of exercise participation are issues with increased core temperature. As an adult with MS exercises, it causes an individual's core temperature to rise. Previous research has shown that a rise in core temperature, exacerbates neurological symptoms. Therefore, changes in the exercise environment that allow an adult with MS to remain at a lower core temperature would be safer and achieve the necessary exercise recommendations. Hence, a clinical need exists to test new aquatic strategies to optimize the health-producing benefits of physical activity, while providing a safe exercise environment to help control core temperature. Against this backdrop, our primary goal is to determine what is the optimal water temperature for adults with and without MS to exercise in and maintain a safe core temperature.

Student Duties, Contributions, and Outcomes

Student Duties

The student will be expected to work closely with faculty mentor to perform following duties in the exercise physiology laboratory:

- Surveying current and relevant literature on MS and aquatic exercise during the 10-week period
- Creating and distributing participant recruitment flyers and emails
- Measuring and analyzing pre-and-post outcome measures (2 measures per person) such as: core temperature, heart rate, blood pressure, and functionality
- Preparation (daily), cleaning (once a week), and sanitation (once a week) of the underwater treadmill
- Conducting underwater treadmill walking sessions at different water heights (daily)

Tangible Contributions

- Ability to work with and become familiar with an underwater treadmill unit and ingestible thermostat monitoring system
- Opportunity to contribute to a journal paper or conference presentation, depending on the progress of the study

Specific Outcomes

- Knowledge of how to operate a self-contained underwater treadmill unit
- Understanding of exercise prescription and thermoregulation for adults with MS
- Ability to use the CoreTemp ingestible thermostat heat monitoring system
- Having a deeper understanding of the physiological impact of different aquatic temperatures on exercise performance and MS complications

Student Selection Criteria

This project is designed for students of junior or senior standing. Additionally, this project is open to students from all academic disciplines.

Faculty/Research Staff Mentorship

The faculty mentor will provide the daily supervision to the student. In addition, the student is expected to update the mentor with a weekly progress report and during bi-weekly meetings. The followings are the specifics.

- Weekly progress update report
 - Written together with the student
 - To discuss recruitment efforts, aquatic exercise physiology, collected data, any issues, and plans for the following week
 - Evaluation: the mentor will provide weekly feedback for all reports. Dr. Connors will assess and provide feedback on the writing, scientific progress, and quality of the analysis.
- Bi-weekly progress update meetings with the student will cover:
 - The results and any issues that have taken place.
 - Frequency of the meeting will be increased as needed throughout the summer.
 - Evaluation: Dr. Connors will provide detailed instruction for the on-going work and offer suggestions for improvement.