

Study seeks new ways to detect sensory issues in TBI patients

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Tonia Rex, Ph.D., is working to develop new tests to detect audio and visual dysfunction in traumatic brain injury (TBI) patients. Credit: Anne Rayner

Vanderbilt researcher Tonia Rex, Ph.D., is accustomed to performing studies in her lab with a goal of translating the findings into better diagnoses and treatment tools for the visually impaired.

Her most recent grant will provide a new experience in her research career—her first-ever clinical study.

"Quantitative Evaluation of Visual and Auditory Dysfunction and Multi-Sensory Integration in Complex TBI Patients" is a three-year, \$2 million Department of Defense-funded grant to develop objective tests to detect sensory dysfunction in [traumatic brain injury](#) (TBI) patients. In turn, the outcome measures will be used to create diagnostic tools for future clinical trials to test potential therapies.

Rex's research focuses on discoveries that can lead to treatments for vision loss due to trauma.

Her most recent project involves a multi-disciplinary team that will incorporate both civilian and military participants.

"With the increased incidence of TBI in the military and with more recognition of these kinds of injuries in sports, more people are talking about TBI," said Rex, associate professor of Ophthalmology and Visual Sciences at Vanderbilt University Medical Center (VUMC). "As many as 80 percent of TBI patients are self-reporting problems with hearing and vision, but are able to pass the standard clinical tests and are being sent on their way. They are frustrated.

"These patients are having problems with blurriness, [light sensitivity](#) and reading. They have difficulty hearing voices in a noisy background and problems with vertigo and they were told for years that nothing was wrong.

"We now know there is a close association between sensory (audio and visual) dysfunction and TBI. Our thought is that this study might be able to identify quantitative measures of these self-reported symptoms and in doing that, we might also help diagnose TBI."

Rex has assembled a team of investigators from VUMC, Vanderbilt University, the Tennessee Valley Healthcare System (Nashville and Murfreesboro) and the Intrepid Center at Fort Campbell to administer the tests, which will take place at the sites.

The teams will look at blunt force trauma in the civilian population and TBI injuries from blasts in the military group, which includes active and veteran participants.

Rex hopes to be able to not only give patients a diagnosis, but provide a better understanding of why they are experiencing deficits that are impacting quality of life.

"All of this information is going to better inform our research and potential therapeutic interventions because we will know what to target. My whole goal is to be able to treat people some day, and we can't treat them if we don't understand what is going on."

According to the study, 3 million people in the United States suffer from TBI every year. The chronic nature of the dysfunctions include: difficulty reading, which can prevent educational goals and limit work opportunities; light sensitivity, which can cause headaches and significant discomfort causing patients to avoid daylight; and hearing difficulties that contribute to depression, decreased social and emotional function and decreased cognitive function.

Recruiting for the clinical trial is expected to begin in January. Participants will undergo a series of assessments during a daylong session.

"Our study is a collaboration of audiologists, ophthalmologists, neurobiologists, imaging science engineers, electrophysiologists and sensory integration experts," Rex said. "We know that TBI studies have

been done, but they often focus on one assay. With the large collaboration that we have developed, we will spread our testing to multiple specialties, converging and bringing the power of each one to layer onto the other so that we will get a cohesive analysis from the same individual.

"We have brilliant minds and strong expertise collaborating on this project. The information we learn will be shared with clinicians who are treating these patients. I hope this research can alter patient care."

Provided by Vanderbilt University

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