

Hope on the horizon for patients with post-traumatic stress disorder

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Researchers at Wake Forest Baptist Medical Center and the U.S. Department of Veterans Affairs (VA) are teaming up for a research project aimed at advancing the treatment of military personnel suffering from post-traumatic stress disorder (PTSD) and traumatic brain injury (TBI).

"PTSD and mild TBI are serious problems for our vets coming home from Iraq and Afghanistan," said Dwayne W. Godwin, Ph.D., a neuroscientist at Wake Forest Baptist and co-principal investigator on the project. "It's a problem that will only continue to grow in the future as our troops return home from these conflicts. This challenge provides a unique opportunity to learn more about this disorder from data that exists on a well-defined pool of patients who have been medically evaluated and tested."

Using a high-tech tool for [brain activity](#) imaging called magnetoencephalography (MEG), researchers will conduct neurological tests on [military veterans](#) with and without a PTSD diagnosis, and with varying levels of impairment. The participants will be asked to perform tasks, similar to games, which engage the parts of the [brain](#) involved in executive function – determining what to do, how to do it, and assessing the relative risk of a situation – while sitting in the scanner. Researchers will then compare the images of brain activity from individuals with PTSD and/or mild TBI with the images of individuals without the condition to see whether these particular [parts of the brain](#) function differently between people with and without the disorder.

PTSD not only affects [military personnel](#) – it can happen to anyone after experiencing or witnessing traumatic events, such as being attacked, a natural disaster or human tragedy. In the aftermath of the September 11 attacks, many of the first responders developed PTSD as a result of the devastation they observed.

The causes of this disorder are not well understood, however. "We know that there are social factors – such as what kind of support network an individual has – as well as genetic factors that may determine what kind of PTSD a person will experience and how severe it will be, but it's still largely misunderstood for a disorder that affects so many people," Godwin said. "It's important to have a group of individuals in whom the disorder is well-defined in order to study it effectively."

PTSD may often be accompanied by [traumatic brain injury](#), especially in combat veterans. Military personnel who have experienced a concussion, for example, are more likely to also have PTSD than individuals who haven't had any TBI. So researchers are hoping to determine if there is an interactive effect between the two conditions, and if the symptoms of PTSD are exaggerated in an individual who also has TBI, as opposed to an individual without it.

"PTSD is accompanied by a range of different symptoms that may reflect changes in underlying brain networks that relate to executive control," Godwin said. Many of those affected by PTSD possess a heightened awareness called hypervigilance. "These individuals may have a range of symptoms, including difficulty concentrating, exaggerated responses to normal things, irritability, experience anger management issues, have more risky behaviors, disruptions or trouble sleeping," he said. "It's a disorder that has a large impact on a person's ability to navigate through daily life."

In addition to assessing functional brain networks with MEG, the

investigators will examine the structure of white matter pathways of the brain to see whether the physical connections between brain areas may also differ among those with and without the disorder. The major goal of the study is to define biomarkers of PTSD and TBI so that doctors will have a way to very quickly identify patients with PTSD and get them treatment without delay, as well as to chart their progress in response to treatment.

"The MEG is a special form of imaging," Godwin said. "It provides information that you can't get easily, or at all, with other methods. When a person thinks something, we can immediately detect the underlying brain processes. It's not 'mind reading', because we can't tell what the content of the thought may be, but with the right kind of test, we can resolve patterns of activation that relate to executive function. We're in a very special place with our ability to answer these kinds of questions using this type of imaging."

MEG is a brain imaging technique that measures the magnetic fields emitted by brain cells (neurons), allowing the mapping of brain activity with great precision in the time scale in which the brain operates. Wake Forest Baptist is one of only about 35 clinical sites in the country, and the only site in North Carolina and surrounding states, to use MEG. It is non-invasive, highly sensitive and accurate, and completely safe, as patients are not exposed to radiation.

"This is a very exciting collaboration for us," Godwin said. "If we can find biomarkers of PTSD, there's hope that we'll be able to improve diagnosis and treatment. It's an incredible challenge, but we have a great team."

Provided by Wake Forest Baptist Medical Center

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