

# Understanding the biology of PTSD

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(Medical Xpress) -- The images of war often stay with those who have experienced it long after a conflict is over. While the physical wounds are apparent, we are learning more and more about the toll these conflicts take on a soldier's mental health, particularly in terms of post-traumatic stress disorder, or PTSD, and depression.

While traumatic events such as a car accident, natural disaster or an assault may trigger PTSD in some people in the general population, the data collected from troops who have served in combat, such as during the Vietnam War and the conflicts in Iraq and Afghanistan, suggest that in many cases, soldiers exposed to deployment-related stressors have endured a more potent PTSD trigger that involves constant, ongoing stress.

"We're seeing double the rate of PTSD in vets than in the general population," said Ananda B. Amstadter, Ph.D., assistant professor of psychiatry at the Virginia Commonwealth University School of Medicine and the Virginia Institute for Psychiatric and Behavioral Genetics.

In the general American adult population, who are not in the military, approximately 8 percent of the population will meet criteria for PTSD at some point in their lives. For returning veterans, the scientific data suggest closer to 20 percent of veterans will have symptoms of PTSD or experience another comorbid psychiatry condition, such as depression or a substance use disorder.

According Amstadter, an active researcher in the area of traumatic stress, many of the troops returning home from service in Iraq and Afghanistan - Operation Iraqi Freedom and Operation Enduring Freedom – suffer from ongoing stress brought about by lengthy deployments and multiple tours. The PTSD symptoms endured by this population is not always just related to one isolated incident or event, and the more times they return to war, the more likely they will develop a stress-related psychiatric condition, such as PTSD, she said.

Further, research based on both troops from the Vietnam War era, and the conflicts in Iraq and Afghanistan, suggest that troops involved with direct combat-related exposure, such as a bombing or attack, are more likely to experience PTSD compared to a service member who has been involved with other aspects of deployment that do not involve direct exposure to combat - for example, those in military intelligence.

Amstadter said that individuals who experience PTSD generally have a cluster of symptoms including re-experiencing or reliving the event, avoiding anything or anyone that is related or reminds them of the event, numbing and increased arousal.

Amstadter said that when a person re-experiences or re-lives the event, he or she may have repeated memories or thoughts or repeated disturbing dreams of the trauma; may feel like the trauma was happening again; may feel upset when something triggers memories of the trauma; and may have physical reactions when something reminds them of the trauma. Numbing involves avoiding thinking or talking about the trauma, avoiding activities or situations that are related to the trauma, proving unable to recall parts of the event and showing a decreased interest in activities, a disconnection from others, a restricted range of emotions and a sense of a shortened future. Increased arousal includes sleeping difficulties, concentration difficulties and an exaggerated startle response.

## PTSD and genomics

The focus of Amstadter's work is to understand the post-trauma trajectory of symptoms by examining the environmental factors, as well as the biologic or neuroendocrine, and genetic factors of PTSD. Through her research she hopes to help better predict the factors that differentiate individuals who either do not develop symptoms or who experience a naturalistic recovery, from those who develop long-lasting symptoms of a [mental health](#) disorder, such as PTSD.

“We know that PTSD is about 30 percent heritable,” Amstadter said. “In other words, genes account for about one third of the variance in risk for PTSD. We’re trying to identify exactly which genes are involved, and how the environment might moderate these relationships.”

“If we can determine which genes are involved and understand the effects of a particular variant we may be able to identify people that may need help in the aftermath of a traumatic event,” she said.

For example, according to Amstadter, some theories suggest that there are a handful of sequence variants that you could be carrying around your entire life and if you’re never exposed to a traumatic event, your risk for PTSD is no higher than if you had the other form of the gene. But, if you are exposed to a traumatic event and you have that specific gene, you could be at an increased risk for developing PTSD than somebody with the alternate form of that gene.

To date, Amstadter said researchers have identified a host of different genes by conducting molecular genetic studies. However, replication of this work has not been consistent and further research is necessary.

## Stress reactivity study

Through support from a National Institutes of Health grant, Amstadter and her team are examining the effects of combat history and PTSD status on stress reactivity in returning soldiers, and how their response to the stressor affects their drinking behavior, as well as the role of genetic variants that may play a role in stress-related drinking.

Amstadter and other mental health experts are seeing a lot of alcohol problems and other substance use issues in veterans returning from recent service. Some experts suggest that combat exposure and PTSD symptoms may lead some returning vets to feel like they are on edge all the time and they may be engaging in substance use to self-medicate.

“We are trying to identify the biological link between the effect of combat on somebody’s stress response and how that effects drinking in a controlled environment,” she said.

By collecting data, including a person’s demographics, past history, education level, the type of social support/family circle they had prior to military and personality characteristics, researchers are hoping to generate a snapshot of how a particular [soldier](#) might interact with the combat environment during deployment, and also to understand their risk for trauma-related symptoms once their deployment is over.

## **Combat exposure and fear conditioning**

In other work, Erin Berenz, a post-doctoral fellow with Amstadter, is looking at how combat exposure and PTSD affect fear conditioning in veterans. The study is testing the hypothesis that people with PTSD acquire responses to trauma-related stimuli quicker than people without PTSD. Their theory is that if somebody has PTSD then his or her fear conditioning system is ramped up, so it is really easy for him or her to gain a stress reaction or a fear reaction to particular stimuli and then it’s really hard for that feeling to extinguish, or go away and return to a

normal state.

Both the stress reactivity study and the fear conditioning study will pull from the same population sample of 240 veterans. Data from these participants will be gathered and analyzed in the coming months.

## **Collaboration with the Richmond VA**

Through a project supported by the Mental Illness Research, Education, Clinical Center or MIRECC, VCU is working closely with mental health experts at the Hunter Holmes McGuire Veterans Affairs Medical Center in Richmond to understand post-deployment mental health issues.

The majority of VAs across the country are part of a network based on their geographic location and VCU is part of the multi-site center Mid-Atlantic MIRECC, which is led by Duke University. There are 22 different MIRECC groups across the country, each focused on a different aspect of mental health as it relates to helping veterans.

Amstadter and Vladimir Vladimirov, M.D., Ph.D., assistant professor in the VCU Department of Psychiatry, together with Richmond-based researchers Treven Pickett, Psy. D., associate chief and supervisory psychologist for Mental Health Service, and Scott McDonald, Ph.D., and MIRECC researchers Jeannie Beckman, Ph.D., and Mike Hauser, Ph.D., are collaborating on a study that will examine microRNA collected from veterans who are combat exposed with and without PTSD. Further, their future work will examine genomics of PTSD – which includes the analysis of DNA and RNA – and not merely a genetic sequence.

Provided by Virginia Commonwealth University

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