

Researchers develop groundbreaking test for PTSD

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A cutting-edge blood test discovered by Indiana University School of Medicine researchers could help more accurately diagnose military veterans and other people experiencing post-traumatic stress disorder,

and potentially provide more precise treatments and prevention.

A study led by psychiatry professor Alexander Niculescu, MD, Ph.D., and published this week in the high-impact SpringerNature journal *Molecular Psychiatry*, tracked more than 250 veterans in over 600 visits at the Richard L. Roudebush VA Medical Center in Indianapolis to identify molecules in the blood that can help track stress intensity. According to Niculescu's findings, the blood test can accurately identify people who are at risk of stress [disorders](#) or are experiencing them severely.

"PTSD is a disorder that affects a lot of veterans, especially those involved in combat. It's also an underappreciated and underdiagnosed disorder among the civilian population, whether it be the result of abuse, rape, violence or accidents" said Niculescu, who worked with other Department of Psychiatry and VA researchers on the study, as well as collaborators at The Scripps Research Institute and University of California Irvine. "Countless people are underdiagnosed with stress disorders, which may manifest themselves by drinking more, other addictions, suicide or violence. Our research has broader relevance for not just veterans but the general public."

The decade-long study looked at the expression of genes in the blood, starting with the entire genome, which has over 20,000 genes. Over the course of multiple visits, researchers tested participants in both low- and high-stress states—their blood analyzed for detectable changes in expression of genes between those two different states that could serve as biological markers (biomarkers) for stress. Researchers were able to narrow the study's focus down to 285 individual biomarkers (related to 269 genes) that can objectively help diagnose patients with PTSD, as well as determine the severity of their stress and predict future hospitalizations.

They also compared these biomarkers with other well-known markers of stress and aging, such as telomer length. The biomarker signature helped identify new potential medications and natural substances to treat stress disorders that could be paired in a personalized way with individuals.

"There are similar tests like this in other fields, like cancer, where a physician can biopsy the affected part of the body to determine the stage of disease. But when it comes to mental health, biopsying the brain isn't an option," Niculescu said "Our research is applying similar concepts from other areas of medicine, but we're engineering new ways that will allow us to track mental symptoms objectively, including stress, using blood, or so-called 'liquid biopsies.'"

Much like with his recent breakthrough in developing a [blood test](#) to measure pain, and his past work on suicide, Niculescu said this research could be life-changing for individuals who have been exposed to or are about to enter high-stress environments. Such biomarkers will allow doctors to classify people in terms of their current severity or risk for future stress disorders, which can guide career choices as well as treatment options. Additionally, the biomarkers could measure response to treatment in an objective, quantifiable manner.

"Untreated pain and stress can lead to suicide, that's how we became interested in these disorders, and decided to move upstream and see if we can better understand, treat and prevent them," Niculescu said. "We think that one of the key uses of our research would be to test people before they have symptoms of an illness to see who's at risk and possibly treat them early. It's much better to prevent things for the person, and for the health care system, than to treat somebody who is in an acute crisis."

With this study, Niculescu said the ultimate goal is prevention—pairing the ability to better predict those predisposed to PTSD with a more targeted approach to medicating those suffering from its affects. It's

preventive medicine done in a precise way, which aligns with the IU Grand Challenge Precision Health Initiative launched in 2016.

"We want to prevent the needless tragedy and suffering in people's lives. By understanding in a biological way a patient's illnesses and their mental health challenges, we could treat what they have better, preventing future episodes," Niculescu said. "I have an excellent team and group of collaborators, and we are excited to partner with other groups of experts and people who can carry this forward. There is a lot of good work being done in the field right now."

The study was supported by an NIH Director's New Innovator Award and a VA Merit Award. Moving forward, Niculescu's group looks to secure more funding through grants and private donations, as well collaborate with other institutions and organizations to advance these studies—with the hope that ultimately the cutting-edge tests developed at IU School of Medicine be implemented in clinical settings.

"If you treat a medical disorder in general, you improve someone's quality of life; sometimes you save lives. But if you treat a [mental health](#) disorder, you can change somebody's destiny," said Niculescu, who is also a practicing psychiatrist. "You can help change someone from being a person who suffers, is unhappy, is unemployed—maybe goes down the route of addiction, violence or suicide—to somebody who can become a happy, well adjusted, productive member of society. That's the challenge and the privilege—we can really change people's destinies if we do our job."

More information: *Molecular Psychiatry* (2019). [DOI: 10.1038/s41380-019-0370-z](https://doi.org/10.1038/s41380-019-0370-z)

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