MedicalXpress

Evidence of genetic link to PTSD in soldiers exposed to childhood trauma

September 16 2014

While abnormalities in the adrenergic and noradrenergic systems, both integral in the fight-or-flight response, are thought to play a role in the development of post-traumatic stress disorder (PTSD), until now there has been no genetic evidence of this connection. A collaborative study just released by researchers at Columbia University's Mailman School of Public Health and the University of Michigan found an interaction between the ADRB2 gene and childhood adversity. For individuals with two or more experiences of childhood trauma, such as abuse, genotype was associated with risk for adult PTSD symptoms. These findings are significant for the study of the physiology of PTSD, for the treatment and prevention of stress-related illnesses, and may have implications for treating pain, which has also been linked to the ADRB2 gene.

This is the first report of genetic risk factors for PTSD in National Guard soldiers and adds to the developing evidence base on the role of genetic influences in PTSD. Findings are online in *JAMA Psychiatry*.

The researchers analyzed results from 810 Ohio National Guard soldiers who took part in the Ohio National Guard Study of Risk and Resilience, all of whom reported having experienced a potentially traumatic event in their lives. Nearly three-quarters of the guardsmen had been deployed to combat zones including in Iraq and Afghanistan, and 42 percent had seen active military combat. Service members were asked about their childhood exposure to experiences of physical, sexual, or emotional abuse, or witnessing of violence between parents. Soldiers were further asked about adult trauma, including 33 categories of deployment-related

and non-deployment events, and then evaluated for PTSD symptoms using a 17-item PTSD checklist. A replication cohort of predominantly African-American female civilians enrolled in the Grady Trauma Project in Atlanta was evaluated for childhood adversity, adult trauma, and PTSD symptoms in a similar fashion.

"We found strong evidence that the ADRB2 gene SNP (defined as Single Nucleotide Polymorphism) was associated with PTSD in our group of male soldiers who were predominantly of European American ancestry," said Sandro Galea, MD, DrPH, chair of Epidemiology at the Mailman School of Public Health and senior author. "Of particular note is the finding that the identical interaction took place in the control group of civilians. Together these outcomes suggest that the ADRB2 gene interacts with childhood adversity and either result in a vulnerability or resilience to developing PTSD symptoms following adult trauma."

Soldiers with the AA genotype of the rs2400707 SNP, located in the promoter region of the ADRB2 gene were the most resilient to adult PTSD symptoms, given exposure to two or more types of childhood adversity; those with the AG genotype had an intermediate risk of adult PTSD symptoms, and those with the GG genotype had the greatest risk of adult PTSD symptoms. No differences by rs2400707 genotype were observed for those with less than two types of childhood adversity. This suggests that having two or more types of childhood adversity may represent a different childhood experience during critical developmental periods, according to Galea.

The question of whether the genetic risks for developing PTSD are similar in other populations that are exposed to different traumas at different periods in their lives remains to be further tested, noted Galea. "However, our findings that the ADRB2 factor might be shared by men and women, African Americans and European Americans, and military

and civilians is consistent with the idea that some genetic risk factors for PTSD might be common across populations and even shared by other stress-related disorders, such as depression."

Lifetime trauma exposure was also a strong predictor of PTSD symptoms, regardless of rs2400707 genotype. This was not unexpected since epidemiologic studies have identified severity of trauma exposure as a major risk factor for PTSD. In the current study, significant interaction between genetic variance and lifetime adult trauma exposure was not observed. "This suggests that genetic variance in interaction with childhood trauma alone can influence adult PTSD symptom severity," said Galea.

"By understanding how PTSD develops, we are better positioned to employ effective prevention and intervention strategies in the military and beyond," said Israel Liberzon, MD, University of Michigan Professor of Psychiatry and first author of the study. "With these data, we will help patients suffering from the strains of PTSD earlier on, and prevent unnecessary pain, suffering and stress."

"While additional investigations are clearly needed to confirm the existing findings and identify new ones, these data provide an important lead for both examining the pathogenesis of PTSD and developing specific and effective prevention and intervention strategies," noted Galea.

Provided by Columbia University's Mailman School of Public Health