American College of Neuropsychopharmacology

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Cannabis-like Chemicals made Naturally in the Brain Combat PTSD and Other Stress-related Disorders

HOLLYWOOD, FL (December 4, 2012) – New studies find that cannabis-like chemicals called "endocannabinoids", which are made naturally in the brain, protect against the negative effects of stress on mood. In addition, reduced levels of these marijuana-like chemicals may contribute to post-traumatic stress disorder (PTSD), developed in response to witnessing the traumatic events of 9/11.

A new study led by Alexander Neumeister, MD, Director of the Molecular Imaging Program for Mood and Anxiety Disorders at New York University, used brain imaging technology to show that patients suffering from PTSD have higher levels of the protein in brain, called the "cannabinoid-1 (CB1) receptor", which is activated by endocannabinoids.

The researchers used positron emission tomography (PET) scans to measure CB1 receptor densities in the brains of sixteen medication-free PTSD patients and sixteen healthy control subjects who were not exposed to trauma.

CB1 receptor levels were higher in the PTSD patients in areas of the brain, such as the amygdala, which play a role in anxiety disorders, compared with levels in the non-traumatized healthy control subjects. Other research has shown that CB1 receptor levels usually increase in response to reduced endocannabinoid activity. PTSD therefore may be related to decreased activity of cannabis-like chemicals in the brain. Moreover, medications that boost brain endocannabinoid levels could potentially treat symptoms of PTSD.

In a companion study, led by Rachel Yehuda, a Professor of Psychiatry and Neuroscience at Mount Sinai School of Medicine in New York, individuals suffering from PTSD resulting from first-hand witnessing of the traumatic events of 9/11 had reduced levels of endocannabinoids in their blood.

The scientists sampled blood from forty-six individuals who were in close proximity to the World Trade Center at the time of the 9/11 attacks, and measured levels of plasma endocannabinoids.

Individuals who developed PSTD symptoms after witnessing the traumatic events of 9/11 had lower blood levels of a cannabis-like chemical called 2-arachidonoylglycerol (2-AG).

Blood levels of endocannabinoids, such as 2-AG, are thought to be closely related to those in the brain, supporting the idea that decreases in brain levels of endocannabinoids contribute to the symptoms of PTSD.

A third study, led by Matt Hill, Ph.D., an Assistant Professor at Hotchkiss Brain Institute, University of Calgary, provided direct evidence for the involvement of endocannabinoids in influencing vulnerability to the negative effects of stressful events on mood.

Hill and colleagues found that rats exposed to chronic stress had increased anxiety-like behaviors and decreased levels of endocannabinoids in the amygdala. Blocking the breakdown of endocannabinoids in the amygdala of rodents protected them against the effects of chronic stress on anxiety.

According to Hill, this “research demonstrates that endocannabinoids are a crucial component of the brain mechanisms that help adapt to stressful experiences.” Hill also notes “the current data suggest that loss of endocannabinoid activity in the amygdala following chronic stress contributes to hyper-activation of this brain structure and the development of anxiety."

Taken together, the findings from these three studies provide compelling evidence that brain endocannabinoid levels play a key role in anxiety disorders and that the development of new drugs that facilitate endocannabinoid signaling in brain may be a novel treatment strategy for anxiety disorders.

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