
RSNA Press Release

Post-Traumatic Stress Disorder Linked to Specific Head Injuries in Children

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Media Contacts:

Maureen Morley Marijo Millette Zerfoss
(630) 590-7754 (630) 590-7727
mmorley@rsna.org mzerfoss@rsna.org

OAK BROOK, Ill. - Researchers have now isolated common areas of the brain that can predict the onset of post-traumatic stress disorder (PTSD) in children who have experienced closed head injury (CHI), according to a study appearing in the August issue of the journal *Radiology*.

Closed head injuries are typically found in events where the brain is subject to sudden deceleration, such as in car accidents. Not all patients who have experienced CHI develop symptoms of PTSD. People with PTSD often suffer from altered memory, including flashbacks to the event, intrusive memories at inappropriate times, and persistent distressing dreams.

One of the most common symptoms of PTSD is re-experiencing-the patient relives the traumatic event or portions of the event. The study, conducted by researchers at the Johns Hopkins Medical Institutions in Baltimore and the Hospital of the University of Pennsylvania in Philadelphia, showed significant correlation between the presence of injuries in specific brain areas with the onset of re-experiencing.

"Although our research should be confirmed with a formal multicenter trial, our results may indicate regions of the brain that, when injured, may increase or reduce (depending on the region) the probability of PTSD symptoms developing," said lead author Edward H. Herskovits, M.D., Ph.D.

The study included 94 children, adolescents and young adults who had experienced CHI. Through comprehensive mapping of brain injuries, or lesions, using magnetic resonance imaging (MRI), Dr. Herskovits and his colleagues were able to identify common physical areas of the brain that can predict the onset of PTSD symptoms.

Symptoms of PTSD may not manifest themselves until up to a year after the original injury. Radiological mapping of lesions just after CHI may help physicians determine which patients are most likely to experience PTSD.

Specifically, the study found that lesions in the limbic system on the right actually inhibited

re-experiencing symptoms. Lesions in the limbic system on the left had no inhibiting effect, and re-experiencing symptoms were more prevalent. The limbic system, in previous imaging studies, has been shown to play pivotal roles in emotional behavior, memory and attention.

Other manifestations of PTSD, such as hyperarousal, including fear, nervousness and helplessness, as well as avoidance of stimuli associated with the trauma, also correlated to specific regions of the brain in patients suffering from these symptoms in this study.

"However, PET [positron emission tomography] and functional MR researchers haven't been able to examine people with avoidance and hyperarousal, since it's difficult to elicit these symptoms in a scanner," cautioned Dr. Herskovits.

Nevertheless, the findings indicate a pattern to the injury of specific regions of the brain and the onset of PTSD. "These results may aid physicians in predicting who's at risk for developing PTSD, perhaps leading to early therapy," said Dr. Herskovits.

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Radiology is a monthly scientific journal devoted to clinical radiology and allied sciences. The journal is edited by Anthony V. Proto, M.D., School of Medicine, Virginia Commonwealth University, Richmond, Virginia. *Radiology* is owned and published by the Radiological Society of North America, Inc. (<http://radiology.rsna.org>).

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"Distribution of Brain Lesions and PTSD." Collaborating with Dr. Herskovits on this study were Joan P. Gerring, M.D., Christos Davatzikos, Ph.D., from Johns Hopkins Medical Institutions, and R. Nick Bryan, M.D., Ph.D., from the University of Pennsylvania.