MedicalXpress

Damage to key brain region important in predicting cognitive function after pediatric TBI

July 14 2015

Disruptions in a key brain region can explain the varied outcomes after a traumatic brain injury (TBI) in children and adolescents, according to research published July 15 in *The Journal of Neuroscience*. Post-injury outcomes vary widely, and injury severity can only explain some of this variance. Combining data from brain imaging and recording, researchers at the University of Southern California and UCLA found that disruptions in the structure and function of a brain region called the corpus callosum could explain the variance in cognitive outcomes.

TBI is the leading cause of death and disability in children and adolescents. One of the most commonly damaged brain areas is the corpus callosum, a large band of nerve fibers that connects the two hemispheres of the brain. Damage to this area can cause cognitive deficits that can persist for years in some children.

For this study, the researchers used diffusion-weighted imaging (DWI) to assess the structural integrity of the corpus callosum in children and adolescents who had recently sustained TBI. To assess corpus callosum function, the researchers used electroencephalography (EEG) recordings to measure the amount of time it took for signals to spread from one hemisphere to the other during a visual perception task. Slower spreading times indicated poor function. The researchers found that:

- Half of the TBI group had slow corpus callosum function, while

the other half didn't differ very much from healthy controls.
- The group with slow function had more structural damage in the corpus callosum and also performed the worst on cognitive tests.
- Structural damage to and poor function of the corpus callosum were associated with poor cognitive performance.

While both the imaging and recording data could predict cognitive function alone, combining the two data sets improved the researchers' ability to predict cognitive outcomes. "Our results indicate that data from EEG and DWI can provide biomarkers for predicting outcome following moderate-to-severe TBI," said lead author Emily Dennis, a postdoctoral researcher at the USC Keck School of Medicine. This could help clinicians identify patients who are at higher risk for poor outcomes and for whom targeted therapies may be developed, the researchers said.

Provided by Society for Neuroscience