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Blood test may offer new way to detect concussions

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Elevated levels of a protein in the serum of children with blunt head trauma were associated with intracranial lesions on computed tomography (CT) scan, according to a study of 152 youths from birth to age 21 years. Efforts are being made to reduce head CT scans in children with traumatic brain injury (TBI) due to risks from radiation exposure. As a result, researchers are looking for alternative ways to diagnose concussions.

Studies in adults have shown that glial fibrillary acidic protein (GFAP) may be a biomarker for TBI. GFAP is found in glial cells, which surround neurons in the brain. The protein is released into serum within an hour of TBI.

Linda Papa, M.D., M.Sc., an emergency medicine physician and researcher at Orlando Health, led a team that conducted a prospective controlled study to determine if GFAP was significantly elevated in the serum of youths with mild or moderate TBI compared with youths who suffered trauma that didn't affect the head. They also looked at the association between GFAP levels and intracranial lesions on CT scan.

The results are published in the report "Performance of Glial Fibrillary Acidic Protein in Detecting Traumatic Intracranial Lesions on Computed Tomography in Children and Youth With Mild Head Injury" (Papa L, et al. *Acad Emerg Med.* 2015;22:1274-1282, http://onlinelibrary.wiley.com/doi/10.1111/acem.12795/abstract).

"We have so many diagnostic blood tests for different parts of the body, like the heart, liver and kidneys, but there's never been a reliable blood test to identify trauma in the brain," Dr. Papa said in a news release. "We think this test could change that."

Subjects included patients who presented to three Level 1 trauma centers after head injury. They had Glasgow Coma Scale (GCS) scores of 9 to 15. Trauma patients without head injury served as controls and had GCS scores of 15 and normal mental status.

Blood samples were obtained from all subjects within six hours of injury, and serum GFAP levels were measured.

CT scans were performed in 152 patients with head trauma. Eleven percent had intracranial lesions, and all had GCS scores of 13 to 15. Serum levels of GFAP were significantly higher in those with intracranial lesions than those without lesions (1.01 vs. 0.18 nanograms/milliliter). The blood test had a sensitivity of 94%, a specificity of 47% and a negative predictive value of 98% for detecting intracranial lesions. The findings were similar for children of all ages.

"This simple blood test was nearly as accurate as a state-of-the-art CT scan," Dr. Papa said.

In addition, the median levels of GFAP increased incrementally from trauma controls (0.03 ng/mL) to those who had head trauma without TBI symptoms (0.09 ng/mL) to patients with head trauma and TBI symptoms (0.15 ng/mL) to those with intracranial lesions (1.01 ng/mL).

The authors noted that because blood samples were drawn within six hours of injury, they were unable to determine the accuracy of the test outside this window.

Researchers said in the news release that they plan to continue studying the blood test and hope it will be available commercially in the next five years.

Resources

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