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## RSNA Press Release

### Older Patients Recover More Slowly from Concussion

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OAK BROOK, Ill.  
— Older individuals  
may have a more  
difficult time  
recovering from  
concussion,  
according to a new  
study published  
online in the journal  
*Radiology*.



*David Yen-Ting Chen, M.D.*

Mild traumatic brain injury (MTBI), or concussion, accounts for 75 percent of all TBI and represents an important public health problem. Difficulty in working memory is frequently reported in patients after concussion. However, neuropsychological tests, computed tomography (CT) and conventional magnetic resonance imaging (MRI) generally fail to reveal abnormal findings in these patients. Functional MRI (fMRI) has been increasingly used in assessing patients with MTBI.

"Old age has been recognized as an independent predictor of worse outcome from concussion, but most previous studies were performed on younger adults," said the study's lead author, David Yen-Ting Chen, M.D., from the Department of Radiology at Shuang-Ho Hospital, Taipei Medical University, in New Taipei City, Taiwan.

For this study, Dr. Chen and colleagues used fMRI to evaluate the effect of age on working memory performance and functional activation in the brain after MTBI. The researchers performed fMRI exams on 13 young adults (21-30 years old) and 13 older adults (51-68 years old) with MTBI and 26 age- and gender-matched controls. The first fMRI scan was performed within one month post-injury. A follow-up scan was performed six weeks after the first exam. The researchers then analyzed

#### At A Glance

- Researchers used functional MRI to study the effect of age on memory performance and brain activation patterns after concussion.
- Young patients initially showed hyperactivation of certain brain regions after concussion, but improved after six weeks. Older patients showed persistent hypoactivation.
- The results suggest that concussion might cause a more profound and lasting effect in older patients.



*Ying-Chi Tseng, M.D.*

post-concussion symptoms, neuropsychological test results and working memory activity in both groups.

The analysis revealed that while performing working memory tasks, the young patients with concussion had initial activation that was greater than normal, known as hyperactivation, compared to young controls in the right precuneus and right inferior parietal gyrus of the brain, whereas the older patients had hypoactivation (less than normal) compared to older controls in the right precuneus and right inferior frontal gyrus.

In comparing the patients in initial and follow-up study, the young patients had significantly reduced post-concussion symptom score at follow-up than at the time of the initial exam, but no significant change of the post-concussion symptom score was observed in the older patients, who also showed persistent hypoactivation.

"Taken together, these findings provide evidence for differential neural plasticity across different ages, with potential prognostic and therapeutic implications," said the study's co-author, Ying-Chi Tseng, M.D., from Shuang-Ho Hospital. "The results suggest that MTBI might cause a more profound and lasting effect in older patients."

The researchers hope that these findings might eventually lead to the development of separate management strategies for different age groups following concussion.

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"Effect of Age on Working Memory Performance and Cerebral Activation after Mild Traumatic Brain Injury: A Functional MR Imaging Study." Collaborating with Drs. Chen and Tseng on this paper were Hui-Ling Hsu, M.D., Ying-Sheng Kuo, M.D., Changwei Wesley Wu, Ph.D., Wen-Ta Chiu, M.D., Ph.D., Feng-Xian Yan, M.S., Wei-Shuan Wang, B.S., and Chi-Jen Chen, M.D.

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For patient-friendly information on MRI of the brain, visit [RadiologyInfo.org](http://RadiologyInfo.org).