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M. GREENHAM, M. SPENCER-SMITH, L. COLEMAN, P. ANDERSON, R. LEVENTER & V.A. ANDERSON. Social Functioning in Children With Brain Insult.

Objective: Until recently, the impact of early brain insult (EBI) has been considered to be less significant than for later brain injuries, consistent with the notion that the young brain is more flexible and able to reorganize in the context of brain insult. This study aimed to evaluate this notion by comparing social outcomes for children sustaining EBI at different times from gestation to late childhood.

Participants and Methods: Children with focal brain insults (N=164) were categorized according to timing of insult: Congenital, Perinatal, Infancy; Preschool, Middle Childhood and Late Childhood. Groups were similar on injury and demographic factors. Teachers completed the Strengths and Difficulties Questionnaire and Walker McConnell Scale of Social Competence and School Adjustment.

Results: Regardless of age at insult, children with EBI were at increased risk for social impairment compared to normative expectations. EBI before age 2 years was associated with most significant social impairment, while children with EBI in the preschool years and in late childhood recorded scores closer to normal. Lesion location and laterality were not predictive of social outcome, and nor was social risk. In contrast, presence of disability (seizures) and family function were shown to contribute to aspects of social function.

Conclusions: EBI is associated with residual social problems, which impact on children's relationships and social networks. Both insult and environmental factors contribute to social dysfunction

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T.D. VANNORSALL, V. RAO, N.G. CASCELLA, B. GORDON & D.J. SCHRETLEN. A Morphometric Analysis of Neuroanatomic Correlates of Cognitive Dysfunction Following Traumatic Brain Injury.

Objective: We previously demonstrated that long-term cognitive impairments of attention, psychomotor speed and memory correlate with global white matter (WM) atrophy in traumatic brain injury (TBI) survivors. Here we use voxel based morphometry (VBM) to explore the association between cognitive dysfunction and region-specific WM and gray matter (GM) abnormalities in the same sample.

Participants and Methods: Participants included 12 adults who sustained a moderate or severe TBI at least one year earlier, and 24 carefully matched healthy adults. All participants underwent brain magnetic resonance imaging and cognitive testing. Images were processed with statistical parametric mapping software (SPM5). We conducted multiple regression analyses of the combined samples to correlate regional WM and GM densities with performance on cognitive tests that showed the largest differences between the TBI and normal groups. All analyses controlled for age, sex, and handedness, and used a cluster-wise false discovery rate correction of $p < 0.05$.

Results: Widespread reductions in WM density correlated with poorer performance on tests of attention, psychomotor speed, and verbal learning/memory, but not visuospatial learning/memory. Slower psychomotor speed was also associated with localized reductions in GM densities. Many regions showing tissue density-cognition associations are consistent with those previously found to differ between the groups.

Conclusions: Poorer performance on tests that differentiate TBI survivors from healthy adults also correlate with greater reduction of region-specific tissue densities, particularly involving large WM tracts. These findings underscore the contribution of WM changes to long term cognitive dysfunction, especially involving attention and processing speed, following moderate and severe TBI.

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S. SORG, N. LUC, E. LANNI, M.W. BONDI, A.J. JAK, S. DEV, Y. CHANG, D. SCHIEHSER, D.C. DELIS, L.R. FRANK & L. DELANO-WOOD. Diffusion Tensor Imaging of Frontal White Matter in Veterans with Traumatic Brain Injury (TBI): Associations with Executive Functioning.

Objective: Veterans of Iraq and Afghanistan are at high risk for TBI and concomitant executive dysfunction. Few diffusion tensor imaging (DTI) studies have been done in this vulnerable population, and the relationship between WM microstructural integrity and executive functioning in TBI remains unclear. We examined whether WM integrity of frontal and callosal regions is related to executive dysfunction in OEF/OIF veterans with mild-moderate TBI.

Participants and Methods: Nineteen patients (blunt or blast force TBI; 17 male; mean age=30; mean education=13 yrs) were administered the Wisconsin Card Sorting Task (WCST). 3T DTI scans were collected (61 directions) and Tract-Based Spatial Statistics was used to extract mean fractional anisotropy (FA) values for tract centers of the following TBI predilection sites: corpus callosum (genu[CCg], body[CCb], and splenium[CCs]), dorsal prefrontal WM(DPFWM), and ventral prefrontal WM(VPFWM).

Results: WCST T-score for total errors significantly correlated with FA of the CCg ($r=0.61, p=0.006$), DPFWM ($r=0.80, p<0.001$), and VPFWM ($r=0.67, p<0.002$). Additionally, WCST T-score for perseverative responses significantly correlated with FA of the CCb ($r=0.52, p=0.02$), and DPFWM ($r=0.52, p=0.02$). Finally, adjusting for age and education, WCST categories completed significantly related to FA of the DPFWM ($r=0.59, p=0.01$) and VPFWM ($r=0.60, p=0.01$). CCs revealed no significant WCST associations.

Conclusions: Findings show that WM integrity in regions sensitive to neurotrauma is strongly associated with problem solving ability and cognitive flexibility in this sample of OEF/OIF veterans. Results further suggest that DTI assessment of frontal WM integrity may play a role in disentangling the complexities of the polytrauma (e.g., TBI, PTSD, etc) common to OEF/OIF veterans.

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V.A. ANDERSON, C. CATROPPA, C. GODFREY & J. ROSENFELD. Intellectual ability 10 years after traumatic brain injury in infancy and childhood: What predicts outcome? Intellectual ability 10 years after traumatic brain injury in infancy and childhood.

Objective: To compare intellectual abilities at 10 years post-TBI across severity groups and age at insult, and investigate risk of long-term intellectual impairments

Participants and Methods: Children with a diagnosis of TBI between 2 and 12 years (n=76) were recruited, on admission to the Royal Children's Hospital, Victoria, Australia, divided according to injury severity (mild, moderate, severe) and age at insult (2-7 years, 8-12 years) and assessed acutely, and at 12, 30 months and 10 years post-injury on a standard measure of intellectual ability. Recruitment was consecutive admissions and the study was prospective and longitudinal, with a between factor design, with injury severity and age at insult as the independent variables.

Results: Analyses of group differences identified a significant effect of injury severity for all cognitive measures, with more severe TBI associated with poorer outcome. Time since injury impacted outcomes for verbal skills only, and stable performances were observed between 30 months and 10 years post-TBI across all cognitive domains. Regression analyses showed that social risk and age at injury were important predictors of 10 year outcomes.

Conclusions: This study has confirmed the high risk of persisting and global deficits associated with severe TBI in childhood. Contrary to previous speculation about 'growing into deficits', children with severe TBI have more protracted recovery periods, but do not continue to lose ground. By 30 months post-insult recovery appears to stabilize and children begin to make appropriate developmental gains.

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