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Scientific Formal (Paper) Presentations

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SESSION: SSC12

Diffusion Tensor Imaging and Neuropsychological Performance in Post-acute Blast-induced Traumatic Brain Injury among U.S. Military Veterans

Date/Times

- **DATE: Monday**
- **TIME: 11:10 -11:20 AM**
- **LOCATION: N229**

PARTICIPANTS

- Thomas M Malone BA - Nothing to disclose.
- Jacob Bolzenius BA - Nothing to disclose.
- Mark Colijn MS - Nothing to disclose.
- Evan Schulze BA - Nothing to disclose.
- P. T Roskos PhD - Nothing to disclose.
- Richard R Bucholz undefined - Nothing to disclose.
- Jeffrey D Stout undefined - Nothing to disclose.

SUBSPECIALTY CONTENT

- Neuroradiology

PURPOSE

Operations Iraqi Freedom and Enduring Freedom have resulted in a returning veterans with an approximately 20% exposure rate to blast-induced mild traumatic brain injury (mTBI)[1]. Standard neuroimaging (MRI/CT) lacks sensitivity to mTBI; however, some research has shown evidence that Diffusion Tensor Imaging (DTI) can identify white matter injury [2, 3]. DTI measures the local diffusion profile of tissue and can characterize the microstructural integrity of white matter. In this study, we compared DTI derived fractional anisotropy (FA) values in veterans with post-acute blast mTBI versus healthy controls (HCs) and examined the association between FA and neuropsychological measures.

METHOD AND MATERIALS

Data were acquired using a 3T Philips Achieva scanner. Participants included: 10 veterans with blast mTBI (average of 51.30 months post-injury) and 10 HCs. DTI data were pre-processed using FSL 5.0 and regions of interest (ROIs) were hand-traced using FSLview. The ROIs consisted of the genu and splenium of the corpus callosum and the anterior and posterior limbs of the internal capsule, bilaterally. Average FA values from each ROI were calculated for statistical analysis.

RESULTS

Comparison of FA values using independent sample t-tests showed significant differences between groups in the posterior limb of the internal capsule, bilaterally ($p < .05$). There were also significant correlations between internal capsule FA values and attention, delayed memory, and psychomotor test scores. Higher mean internal capsule FA values and lower delayed memory and psychomotor test scores were found for the mTBI subjects compared to HCs.

CONCLUSION

Results indicate that DTI is sensitive to group differences in blast-related mTBI, even in the post-acute phase. This suggests presence of a long-term impact of blast injury on the brain. Paradoxically, higher FA values and lower neuropsychological scores were found among veterans with mTBI.

CLINICAL RELEVANCE/APPLICATION

DTI shows promise in enhanced sensitivity for detecting mTBI compared to MRI/CT. Identification of changes in specific brain regions may help in diagnosis and treatment of mTBI among veterans.