



## **Volumetric and shape analyses of subcortical structures in United States service members with mild traumatic brain injury**

### **Purpose**

Volumetric magnetic resonance imaging (MRI) has been successfully utilized to examine TBI. One promising improvement over standard volumetric approaches is to analyze high-dimensional shape characteristics of brain structures.

### **Participants**

76 servicemembers with mTBI, 59 service members with orthopedic injury (OI) and 17 with PTSD only.

### **How was the study conducted?**

Quantification using FreeSurfer T1-weighted 3T MRI data. Radial distance (RD) and Jacobian determinant (JD) were defined vertex-wise on parametric mesh-representations of subcortical structures. Linear regression was used to model associations between morphometry (volume and shape), TBI status, and time since injury (TSI) correcting for age, sex, intracranial volume, and level of education

### **Findings**

Volumetric data was not significantly different between the groups. JD was significantly increased in the accumbens and caudate and significantly reduced in the thalamus of mTBI participants. Additional significant associations were noted between RD of the amygdala and TSI. Positive trend-level associations between TSI and the amygdala and accumbens were observed, while a negative association was observed for third ventricle.

### **Military Impact**

Findings may aid in the initial diagnosis of mTBI, provide biological targets for functional examination, and elucidate regions that may continue remodeling after injury.

*Tate DF, Wade BS, Velez CS, Drennon AM, Bolzenius J, Gutman BA, Thompson PM, Lewis JD, Wilde EA, Bigler ED, Shenton ME. Volumetric and shape analyses of subcortical structures in United States service members with mild traumatic brain injury. Journal of neurology. 2016 Oct 1;263(10):2065-79.*