CENC
Chronic Effects of Neurotrauma Consortium

Increased small-world network topology following deployment-acquired traumatic brain injury associated with the development of post-traumatic stress disorder

Purpose
To study differences in resting state brain networks between Veterans who developed PTSD and those who did not after deployment-related TBI.

Participants
Veterans (N=16) who were post-deployment with deployment-related TBI were recruited. Veterans with and without PTSD were included.

How was the study conducted?
Structured interviews determined presence of psychiatric disorders as well as presence of PTSD. Self-reports measured post-concussive symptoms, severity of combat, and severity of PTSD. Brain data was acquired using a MEG neuromagnetometer. Differences in network metrics were examined using ANCOVA, adjusting for age and premorbid IQ.

Findings
Results demonstrated that participants with current PTSD displayed higher levels of small-worldness, than participants without current PTSD. There were no between-group differences in modularity or the number of modules present. These findings are consistent with a hyperconnectivity hypothesis of the effect of TBI history on functional networks rather than a disconnection hypothesis, demonstrating increased levels of clustering coefficient rather than a decrease as might be expected; however, these results do not account for potential changes in brain structure.

Military Impact
In this sample of Veterans with deployment-related TBI, the authors found differences in functional brain networks, which may be related to PTSD. These findings suggest that brain changes after TBI may be related to development of PTSD.

Rowland, J., Stapleton-Kotloski, J., Dobbins, D., Rogers, E., Godwin, D., & Taber, K. (2018). Increased small-world network topology following deployment-acquired traumatic brain injury associated with the development of post-traumatic stress disorder. Brain Connectivity, 205-211.