



US DEPARTMENT OF DEFENSE  
**BLAST INJURY RESEARCH PROGRAM**  
**COORDINATING OFFICE**

## **Neurocognitive Function and Psychological Health Assessing the Impact of mTBI on Multisensory Integration while Maneuvering on Foot**

Researchers at WRNMMC and the NICOE have completed the first round of data collection in a USAMRMC and Psychological Health/Traumatic Brain Injury Research Program (PH/TBIRP)-funded study designed to examine how well active duty individuals with a history of blast exposure and mTBI can use auditory signals to visually acquire targets while standing and walking. The study was designed around the CAREN, which is an immersive virtual environment located at the NICOE that allows participants to view images on a 180-degree video screen while standing or walking on an articulated treadmill. For the purposes of this study, a 64-speaker array was erected behind the projection screen to allow the presentation of spatialized audio sources originating from the same location as visual targets. All participants in the study (38 mTBI patients and 35 healthy controls) were tested in three conditions: 1) a baseline auditory localization task, which required participants to move a visual cursor to the perceived location of a sound source; 2) a baseline visual discrimination task, which required participants to identify a visual target presented from a known location; and 3) a "visual search" task, which required participants to identify a visual target presented at a random location in a field of 263 visual distractors. This visual search task was presented both as a visual only task with no audio signal, and as an aurally-aided visual search task where a spatialized audio cue was presented at the location of the visual target. Preliminary results show that performance was equivalent in the control and mTBI groups in the auditory localization task and the visual discrimination task, but that the mTBI listeners required significantly more time than the healthy controls to perform the visual-only and aurally-aided visual search tasks. The results also show that both the TBI and control listeners were able to localize sounds faster, with no loss of accuracy, when they were walking on the treadmill than when they were standing. Both groups were also able to perform the aurally-aided visual search task more quickly when they were walking. This result illustrates the importance of evaluating complex multisensory tasks in order to determine the impacts that mTBI may have on sensory processing for blast-exposed individuals.