



US DEPARTMENT OF DEFENSE

BLAST INJURY RESEARCH PROGRAM COORDINATING OFFICE

Protective Equipment

Effects of Blast Injury on Hearing in a Screened Military Population

Exposure to hazardous intensity levels of combat noise, such as blast, may compromise a person's ability to detect and recognize sounds and communicate effectively. Previous studies have not examined the onset of hearing health outcomes following exposure to blast in a representative sample of deployed military personnel. In addition, definitive audiometric patterns of Service Members with blast-related injuries (BRIs) have not been adequately described in the literature. Researchers from the Naval Health Research Center (NHRC) analyzed data from the Blast-Related Auditory Injury Database. Subjects included only those with a qualified hearing test within a period of 12 months prior to and following injury ($n = 1,574$). After adjustment for relevant covariates and potential confounders, those who sustained a blast injury had significantly higher odds of post-injury hearing loss, low frequency hearing loss, high frequency hearing loss, and significant threshold shift compared with a non-blast-injury (NBRI) group. An estimated 63 percent of risk for low frequency and high frequency hearing loss in these blast-injured, deployed military members could be attributed to the BRI event. Researchers also calculated median audiometric thresholds for the left and right ear at the test frequencies 500, 1000, 2000, 3000, 4000, and 6000 Hertz for audiograms prior to and following injury, and compared groups according to injury (BRI versus NBRI). Overall, median-threshold audiograms revealed hearing within normal limits (responses greater than 25 decibels Hearing Level) at all test frequencies for both ears. New-onset hearing loss primarily affected the frequency range of 4000–6000 Hertz, and hearing shifts were greater in the left ear. Post-injury low frequency pure-tone averages and high frequency pure-tone averages were significantly higher in those with a blast injury compared with the NBRI group for both ears ($p < 0.001$ for all comparisons). On average, new-onset high frequency hearing loss was also accompanied by low frequency hearing loss. Additionally, when isolating infantry personnel, the blast-injured group had significantly higher pure-tone averages in both ears than the NBRI group.

Auditory health and readiness are critical components of situational awareness and quality of life (QOL) for the Military and our combat Veterans. The results of NHRC's investigation about the hearing health status of deployed Service Members could provide decisive insight about operational readiness, injury prevention, and related medical problems. Continued surveillance of this BRI group may result in the emergence of a signature audiometric pattern for blast exposure in the theatre of war. Preliminary findings suggest there are greater hearing shifts in those with a blast injury than those with no blast injury, and further scrutiny may reveal unique patterns in subgroups of the population. It is imperative to continue to monitor the effects of blast injury on hearing outcomes, identify at-risk populations for early intervention and prevention, develop supportive policies and best practice guidelines, and allocate appropriate funds and resources.

