



US DEPARTMENT OF DEFENSE
BLAST INJURY RESEARCH PROGRAM
COORDINATING OFFICE

Blast Exposure Research

Blast Exposure from Shoulder-Mounted Rocket Launchers

Blast overpressure may cause deformations of the brain that could lead to TBI. Though much research has been devoted to understanding how explosive devices may engender unique kinds of brain damage, less work has been devoted to the overpressure created in the standard firing of military munitions. Artillery, rocket launchers, and other heavy-grade military weaponry can yield blast overpressures that affect operators and surrounding personnel. Shoulder-fired munitions can produce a blast overpressure greater than 36 psi. However, the blast events experience by operators of these weapons systems has not been systematically evaluated. In this study, investigators at the Defense and Veterans Brain Injury Center (DVBIC); NMCS; Applied Research Associates; Black Box Biometrics; the Naval Hospital, Camp Pendleton; the Naval Surface Warfare Center (NSWC); and the USUHS examined the effect of shoulder-fired rocket and grenade launchers on military personnel. The researchers collected data from blast sensors positioned on the head, chest, and backs of 64 Service Members and instructors who participated in a combat training course. The Service Members fired five weapons systems in two-hour training blocks: the Carl Gustav 84 millimeter recoilless rifle, the Light Anti-Tank Weapon, the Rocket Propelled Grenade, the Mark-19 Automatic 40 millimeter Grenade Launcher, and fragmentation grenades. Each weapon was fired approximately the same number of times. Overpressure events above 2.5 psi were recorded. The sensors recorded 396 unique blast events, a median of five events per individual. On average blasts were 10 minutes apart. The average blast magnitude was 4.58 psi with 87 percent of the blasts having a psi above 4, the recommended safety threshold for blast exposure. The majority of blast events that exceeded the 2.5 psi threshold occurred with the Carl Gustav 84 millimeter recoilless rifle (56.1 percent), followed by the Light Anti-Tank Weapon (22.0 percent), then the Rocket Propelled Grenade (20.0 percent). The findings suggest that some shoulder-mounted weapon systems (like those above) consistently expose Service Members to blast overpressure above 4 psi. These events are above recommended safety threshold for blast exposure.