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Viscoelastic Materials Study for the Mitigation of Blast-Related Brain Injury SUSAN BARTYCZAK, WILLIS MOCK, JR., Naval Surface Warfare Center, Dahlgren Division — Recent preliminary research into the causes of blast-related brain injury indicates that exposure to blast pressures, such as from IED detonation or multiple firings of a weapon, causes damage to brain tissue resulting in Traumatic Brain Injury (TBI) and Post Traumatic Stress Disorder (PTSD). Current combat helmets are not sufficient to protect the warfighter from this danger and the effects are debilitating, costly, and long-lasting. Commercially available viscoelastic materials, designed to dampen vibration caused by shock waves, might be useful as helmet liners to dampen blast waves. The objective of this research is to develop an experimental technique to test these commercially available materials when subject to blast waves and evaluate their blast mitigating behavior. A 40-mm-bore gas gun is being used as a shock tube to generate blast waves (ranging from 1 to 500 psi) in a test fixture at the gun muzzle. A fast opening valve is used to release nitrogen gas from the breech to impact instrumented targets. The targets consist of aluminum/ viscoelastic polymer/ aluminum materials. Blast attenuation is determined through the measurement of pressure and accelerometer data in front of and behind the target. The experimental technique, calibration and checkout procedures, and results will be presented.

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