



US DEPARTMENT OF DEFENSE

BLAST INJURY RESEARCH PROGRAM COORDINATING OFFICE

Protective Equipment

Understanding Blast-Mitigation Behavior of Materials

Researchers at USARL tested how different materials and the coupling of materials affects blast mitigation. Forty different materials were assessed, including fabric, rigid materials, and biological surrogates. A 1.5-pound pentolite sphere was used to ensure a repeatable blast environment, and a synthetic gelatin witness block captured the blast loading transferred through each material type. Preliminary results suggest that, in addition to traditional approaches for mitigating adverse shock waves with variations in mass, there might be other material designs and mechanisms that could be balanced with ballistic requirements to give more robust protection capability. Future work will focus on the directional response of material combinations exposed to blast and the feasibility of exploiting classical material impedance in the context of mass- and volume-efficient armor solutions. These results have the potential to enable more informed and explicit material design considerations for protective equipment as it relates to both ballistic and blast events.