



Bio-SMART Personal Protective Equipment



S&T Campaign: Sciences for Lethality & Protection
Tier 2 Subtopic Humans in Extreme Environments

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Research Objective

Create Soldier protection with no effect on Soldier effectiveness

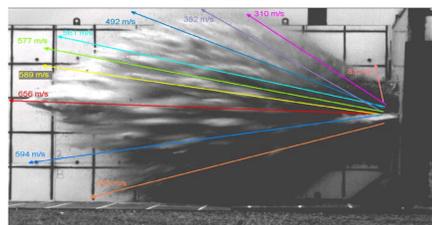
- Research at the forefront of Biomechanics, Computational Mechanics, Robotics, and Terminal Ballistics



Soldiers require protection that doesn't constrain mobility.

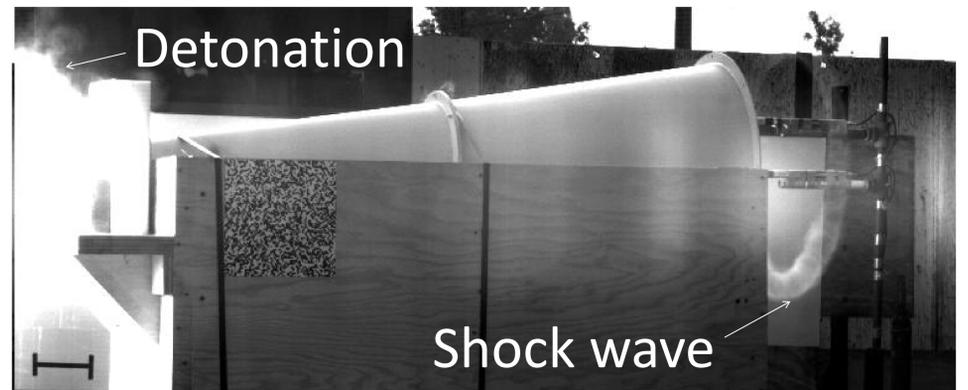
Challenges

- Developing quantifiable relationships between Soldier burdens, protection, and effectiveness.
- Understanding how fundamental biological structure and properties influence response to ballistic loading conditions
- Characterizing the effects of biodiversity on response to ballistic loading conditions



ARL Facilities and Capabilities Available to Support Collaborative Research

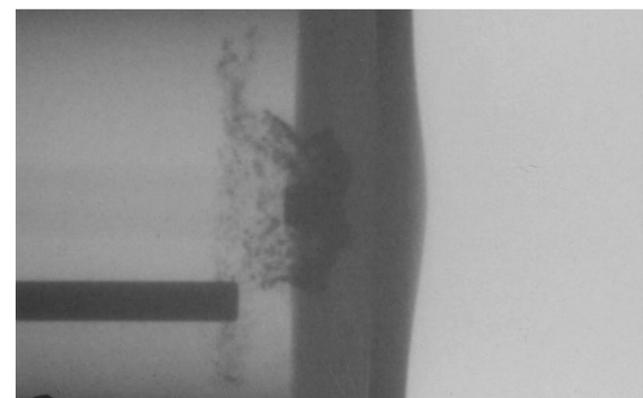
- HRED Soldier Performance and Equipment Advanced Research Facility (SPEAR)
- Small Arms Experimental Facilities
- Humans in Extreme Ballistic Environment Tissue Characterization Facility
 - Capable of characterizing tissue and bone at static through ballistic strain rates
 - Micro CT capability to relate microstructural details to macroscopic response
- Army High Performance Computing Network
- ARL Computational Biomechanics Facilities
- Shock Tubes (Gas and Explosively-Driven Shock Tubes)
- Energetic material characterization facilities



Explosively-driven conical shock tube

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Research in clothing comfort, load distribution
- Research in robotic augmentation, including exoskeletons
- Relationship between material microstructure and performance under extreme conditions (high pressure and rates of loading)
- Computational Biomechanics



Body Armor image when impacted with a threat