



US DEPARTMENT OF DEFENSE

BLAST INJURY RESEARCH PROGRAM COORDINATING OFFICE

Risk Assessment and Surveillance Sensors to Detect Injurious Head Exposures

Researchers at the USAARL, sponsored by the USAMRMC, are evaluating currently available environmental sensors for feasibility of use in military training environments. These sensors are designed to characterize potentially injurious head exposures, and were first tested in a controlled laboratory environment to (1) evaluate sensor performance in controlled laboratory exposures to blunt impact and indirect loading, and (2) quantify changes to impact protection, dynamic retention, or mass properties of the worn Advanced Combat Helmet (ACH). Laboratory testing is critical to understanding sensor capabilities and limitations prior to fielding. Environmental sensors were tested on a guided, free fall drop tower for blunt impacts and a custom mini-sled for inertial loading. None of the environmental sensors degraded the blunt impact performance of the ACH. Only one sensor, which was mounted in the side of the helmet, provided usable data in the inertial loading tests, and the data correlated well with the reference acceleration data ($\rho > 0.86$). This sensor was also one of only two sensors to provide time trace data during the blunt impact tests; again the side-mounted sensor data correlated well ($\rho > 0.92$) with reference acceleration data. Five sensors were selected for further testing in military training environments.