



US DEPARTMENT OF DEFENSE

BLAST INJURY RESEARCH PROGRAM COORDINATING OFFICE

Models of Blast Injury: Warrior Injury Assessment Manikin Program

Human Injury Probability and Corresponding Injury Assessment Reference Curves

The Warrior Injury Assessment Manikin (WIAMan) program is conducting a major biomechanics test program to gather required information to create injury probability curves for blast-related injuries. In FY17, the WIAMan program successfully created two Human Injury Probability Curve (HIPC), and the corresponding manikin-specific injury assessment reference curves (IARC), demonstrating the new advanced injury analysis methods developed by the WIAMan biomechanics team in partnership with Johns Hopkins Applied Physics Lab (Laurel, Maryland), Medical College of Wisconsin (Milwaukee, Wisconsin), Duke University (Durham, North Carolina), University of Virginia (Charlottesville, Virginia), University of Michigan Transportation Research Institute (Ann Arbor, Michigan), Wayne State University (Detroit, Michigan), Virginia Tech (Blacksburg, Virginia), and Ohio State (Columbus, Ohio). The probability curves are critical analysis tools used in conjunction with the WIAMan anthropomorphic test device (ATD) to specify injury mechanisms and the probability of occurrence of the injury during underbody blast (UBB) events. The injury curves focused on two common UBB injuries: 1) lumbar spine fractures and 2) calcaneus (heel) bone fractures. The creation of these curves meets critical schedule goals for the WIAMan program, and marks the first acceptance of novel injury assessment tools for the WIAMan Generation 1 ATD. The WIAMan program will continue executing biomechanical testing with partner academic universities to develop a robust and comprehensive library of HIPC and IARC curves associated with major injuries in UBB and vertical loading environments, which significantly improves ARL's injury assessment capability for U.S. Army test and evaluation requirements.

WIAMan is the world's first ATD purpose-built for military use in UBB testing of ground vehicles in Live Fire Test and Evaluation. These two WIAMan IARCs will greatly enhance the injury assessment accuracy of our live-fire evaluators; driving improved protection of ground vehicle systems; evaluating the effects of UBBs on mission-critical tasks; and quantifying risk to the Service member.

The WIAMan program is funded with Research, Development, Test, and Evaluation funding from Defense Health Affairs.

