



US DEPARTMENT OF DEFENSE

BLAST INJURY RESEARCH PROGRAM COORDINATING OFFICE

Injury Models

Sensitivity Study on the Finite Element Model of the Lower Leg

Over the past decade, the use of IEDs by enemy forces has increased exposure to UBB events among US combat vehicles and Service Members. Partly as a consequence of this, the lower extremities are one of the most commonly injured body regions among mounted Service Members in theater, necessitating the modeling of damage to the lower limbs to understand, prevent, and mitigate such occurrences. However, both human cadaver models and mechanical test devices have notable drawbacks. Numerical models such as FE models provide a potential solution. Researchers at USARL conducted 64 simulations on a lower leg FE model to understand the sensitivity of predicted injury relative to the choice of material parameters, and found that the prediction of injuries depends strongly on soft tissue properties. The results of this study provided critical feedback needed to make improvements to the FE model. An improved understanding of the importance of material characterization on the predicted response of the human body will help in the interpretation of modeling results and the prediction of injuries. These results will be used to develop improved protection technologies for both mounted and dismounted Warfighters.