



US DEPARTMENT OF DEFENSE

# BLAST INJURY RESEARCH PROGRAM COORDINATING OFFICE

## Injury Models

### Non-uniform Strains in Kolsky Bar Tests on Soft Materials

Researchers at USARL used torsional Kolsky bar tests to perform detailed theoretical and computational studies on the high strain rate properties of soft materials that, similar to brain tissue, have an instantaneous elastic shear modulus on the order of 1–1000 kilopascals and density similar to water. One- and three-dimensional analyses and simulations were conducted to examine the stress and strain states that exist in these materials. These analyses highlighted limitations of previously published results, and demonstrated that correction factors need to be developed to account for inertial effects. This study will help provide better representations of biological soft tissue in computational models, which will improve the ability to predict and prevent blast injuries to the Warfighter.