



US DEPARTMENT OF DEFENSE

# BLAST INJURY RESEARCH PROGRAM COORDINATING OFFICE

## Injury Risk Assessment and Criteria Development

### The Role of Reflexive Middle-ear Muscle Contractions in Damage-risk Criteria for Impulsive Noise

Researchers at the U.S. Army Aeromedical Research Laboratory (USAARL; Fort Rucker, AL) conducted a study to identify the impact of acoustic forces (impulses) on middle-ear muscle contractions (MEMC) in response to anticipated and unanticipated acoustic impulses to inform efforts to develop and revise damage risk criteria for exposure to loud noises such as those experienced by users of military and civilian weapon systems. Data analyses focused on (1) determination of reflexive MEMC resulting from acoustic and non-acoustic tasks; (2) development of models that identify correlations between acoustic signals and reflex MEMC; and (3) identification and evaluation of concomitant muscle activities that could interfere with detection of reflexive and conditioned MEMC. Results indicate that non-acoustic tasks are most likely to produce reflexive MEMC and that brief acoustic tasks are not common enough to include as a protective factor in damage-risk criteria for impulsive noise.

Improvements in accuracy of damage risk criteria will benefit warfighters and other personnel exposed to impulsive sound. In addition, these criteria could inform the evaluation of damage caused by impulsive noise (e.g., impacts, impulses) for firearm users and other high-level industrial noises.

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