

PERFORMANCE DCREMENT DUE TO BLAST OVERPRESSURE

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Non-auditory blast overpressure (BOP) injury may occur from an exposure to a single high energy blast or from repeated exposures to lower energy blast waves. BOP induces pulmonary contusion similar to closed chest trauma which may occur in combat or in non-combat situations. Foretelling blast injury and incapacitation for military planning purposes is necessary but is currently an inexact science.

All prediction criteria, to date, stem from Bowen's lethality curves are not based on physiologic correlates. Degrees of expected human incapacitation have been assigned to these lethality curves which are extrapolated from animal data. Recent information has shown this methodology underestimates causalities and therefore is probably not applicable for predicting incapacitation. The need for performance degradation criteria based on a physiological assessment is apparent.

Although performance is multi-factorial and job dependent, the measure of physical work should mirror overall performance. Research was undertaken to delineate decrements of physiological performance due to BOP injury. This paper describes a series of studies which evaluated cardiopulmonary measurements and exercise performance in sheep. Using a 12 inch diameter shock tube and reflector plate, sheep were randomly exposed to an overpressure-time history to produce defined levels of pulmonary contusion. Resting cardiopulmonary parameters were measured at each of four injury levels. Exercise performance was quantified at either one hour or 24 hours post exposure. Changes in maximal or near-maximal exercise capacity were determined. This study determined an important consequence of BOP induced injury - the loss of exercise performance.