

**A PROGRAM TO DETERMINE EXPOSURE STANDARDS FOR
REPEATED BLAST EXPOSURES: HOW MUCH REPEATED
BLAST EXPOSURE IS TOO MUCH?**

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Exposure standards for repeated exposure to blast events do not exist. As the military considers deploying blast dosimeters operationally there is a gap in knowledge to assess the risk of neurological effects associated with repeated “low-intensity” blast exposure(s). The concern regarding cumulative effects of repeated blast has a parallel in contemporary concerns for cumulative head impacts in contact sports. Occupational standards for acute exposure that guides safe distances and blast intensity are based upon overt pathological outcomes and may not fully account for subtle neurological outcomes that are cumulative. This programmed effort supported by investigators with extensive experience in the assessment of acute and chronic effects of blast exposure in military personnel and animal models. There are three program goals. The first major goal is to assess blast exposure effects in military operators by determining self-reported blast experience and symptoms, characterizing the biological response to blast exposure in the field and assessing cumulative effects of repetitive blast exposures over a career. The initial phase of this effort focused on Breacher populations. Initial analyses demonstrate alterations in structural neuroimaging in career Breachers compared with controls and functional neuroimaging as correlated with self-reported blast exposure. Data analysis from field assessments of the acute effects after blast exposures have suggested that blast exposure shows distinct differences in the physiological response in comparison with exposure to head impacts. Particularly striking are decreases in serum amyloid beta levels shortly after exposure to multiple higher magnitude blast events. A second major goal is to determine repeated blast exposure limits in an established rodent model by exposing rats to blast of varying frequency and intensity in an advanced blast simulator. The third major goal is to develop algorithm(s) that form the basis of exposure standards of repeated blast. The accumulation of data from human studies with operational populations together with preclinical data begins to form an exposure algorithm to inform exposure standards.