



US DEPARTMENT OF DEFENSE

# BLAST INJURY RESEARCH PROGRAM COORDINATING OFFICE

## Diagnostics

### Olfactory Dysfunction as a Marker for TBI in US Troops

The objective of this study is to determine whether a structured and quantitative assessment of differential olfactory performance—recognized between a blast-injured TBI group and a demographically comparable blast-injured control group—can serve as a reliable antecedent marker for preclinical detection of intracranial neurotrauma. A collaborative research team from the WRNMMC, USUHS, and the NIH prospectively and consecutively enrolled 231 polytrauma inpatients, acutely injured from explosions during combat operations in either Afghanistan or Iraq and requiring immediate stateside evacuation and sequential admission to the tertiary care medical center over a two-and-a-half-year period. This study correlates olfactometric scores with both contemporaneous neuroimaging findings, as well as the clinical diagnosis of TBI, tabulates population-specific incidence data, and investigates return of olfactory function. Olfactometric score predicted abnormal neuroimaging significantly better than chance alone (area under the curve = 0.78, 95 percent confidence interval 0.70–0.87). Normosmia was present in all troops with mTBI (i.e., concussion) and all control subjects. Troops with radiographic evidence of frontal lobe injuries were three times more likely to have olfactory impairment than troops with injuries to other brain regions (relative risk 3.0, 95 percent confidence interval 0.98–9.14). Normalization of scores occurred in all anosmic troops available for follow-up testing. These results indicate quantitative identification olfactometry has limited sensitivity but high specificity as a marker for detecting acute structural neuropathology from trauma. When considering whether to order advanced neuroimaging, a functional disturbance with central olfactory impairment should be regarded as an important tool to inform the decision process. The Study was funded by the US Department of Defense Combat Casualty Care Medical Research and Development Program (ID-D10-I-AR-J6-626).