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Troops Who Don't Pass the Smell Test Likely Have Traumatic Brain Injury

Bethesda, MD – Decreased ability to identify specific odors can predict abnormal neuroimaging results in blast-injured troops, according to a new study by Federal researchers released online in the journal *Neurology*, March 18, 2015.

The DoD-funded study, “Olfactory impairment and traumatic brain injury in blast-injured combat troops: a cohort study,” led by Air Force Colonel (Dr.) Michael Xydakis, associate professor of Surgery in the F. Edward Hebert School of Medicine at the Uniformed Services University of the Health Sciences (USU), and his colleagues from USU, Walter Reed National Military Medical Center, and the National Institutes of Health, found that testing the sense of smell can be used to assess memory impairment following trauma. The team, which included Navy Captain (Dr.) Lisa P. Mulligan, Walter Reed National Military Medical Center Department of Neurosurgery; Lt Col (Dr.) Alice B. Smith, Cara H. Olsen, DrPH, and Dina M. Lyon, RN, from the Uniformed Services University of the Health Sciences, and Leonardo Belluscio, Ph.D., National Institute of Neurological Disorders and Stroke, NIH, studied more than 231 acutely injured polytrauma inpatients at Walter Reed National Military Medical Center who had been air-evacuated from the combat zone in Afghanistan or Iraq. Each soldier was evaluated for traumatic brain injury and then administered a test of their sense of smell using the University of Pennsylvania Smell Identification Test. The olfactory system processes thousands of different odors, sending signals to the brain which interprets the smell by linking it to a past memory. If memory is impaired, as is the case with Alzheimer’s disease, sleep deprivation, and acute traumatic brain injury, the task is not entirely possible. When the smell test was abnormal in a subject, those soldiers were all found to have abnormalities on their brain scans.

“Although it may seem far-fetched that the sense of smell can be used to identify a concealed brain injury, olfactory impairment was commonly used by neurosurgeons in attempts to localize certain brain tumors prior to the use of advanced neuroimaging in the 1980s,” said Xydakis.

The investigators then concluded that this kind of methodology could be used in the combat theater to assist deployed physicians in determining which injured troops would require immediate neuroimaging, thus significantly enhancing frontline neurologic combat casualty care.

“Getting a CT scan in a combat zone is often the equivalent distance of placing a soldier on a helicopter in Washington, D.C., and sending them to Boston. It requires a significant investment in personnel and aviation resources; not to mention flying troops over hostile terrain. Using abnormalities with the sensory systems has opened up an entirely new avenue of investigation for diagnosing brain injuries,” Xydakis said. The study was funded by the Department of Defense Combat Casualty Care Medical Research and Development Program.

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The Uniformed Services University of the Health Sciences (USU), founded by an act of Congress in 1972, is the academic heart of the Military Health System. USU students are primarily active duty uniformed officers in the Army, Navy, Air Force and Public Health Service who receive specialized education in tropical and infectious diseases, TBI and PTSD, disaster response and humanitarian assistance, global

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health, and acute trauma care. A large percentage of the university's more than 5,200 physician and 790 advanced practice nursing alumni are supporting operations around the world, offering their leadership and expertise. USU also has graduate programs in biomedical sciences and public health committed to excellence in research, and in oral biology. The University's research program covers a wide range of clinical and basic science important to both the military and public health. For more information, visit www.usuhs.edu.