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Disrupted brain pathway, altered stress hormones key to TBI impact differences in men, women

Bethesda, Md. – The brains of men and women are wired differently, and when it comes to traumatic brain injuries (TBI), women are more likely to develop subsequent neuropsychiatric disorders, like anxiety, depression and post-traumatic stress disorder. Until now, it's been unclear why that is, but a new study by researchers at the Uniformed Services University of the Health Sciences (USU) provides that missing link – a potentially disrupted pathway in the brain.

The study, "Sex-dependent effects of mild brain blast injury on neuroendocrine stress response," was funded by the Center for Neuroscience and Regenerative Medicine at USU. The findings were presented April 3 at the Endocrine Society's annual meeting by lead author Ashley Russell, a Neuroscience PhD candidate in the F. Edward Hebert School of Medicine at USU, and USU research assistant Elizabeth Shupe.

Almost every tissue in the body is affected by the interaction between the nervous and endocrine systems. They produce the hormones that regulate sleep, mood and metabolism. USU researchers, in collaboration with colleagues at Colorado State University, sought to better understand why it is that blast brain injuries have a different impact on women and men, specifically in the neuroendocrine system. They conducted hormonal, behavioral and anatomical studies measuring the integrity of the body's major neuroendocrine system, the hypothalamic-pituitary-adrenal (HPA) axis. They found that a mild TBI can disrupt that system, and that alteration of stress hormones correlated with an increase in anxiety-like behavior in a sex-dependent manner. The researchers believe that uncovering the basic underlying neuroendocrine dysregulation will ultimately allow for better treatments.

Every year, about 1.5 million individuals are diagnosed with TBI, and in the military, blast brain injury is the most prevalent as a result of explosive devices used in modern warfare.

"Currently, there are no therapeutic measures to mitigate the effects of subsequent neuropsychiatric disorders after a TBI. However, these findings allow us to see how a mild TBI injury can disrupt the neuroendocrine system, which hopefully will lead to better treatment modalities and better support for our warfighters," Russell said.

She added that these findings could also translate to other forms of TBI that may occur from a car accident or sports injury.

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About the Uniformed Services University of the Health Sciences

The Uniformed Services University of the Health Sciences, founded by an act of Congress in 1972, is the nation's federal health sciences university and 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 health, and acute trauma care. A large percentage of the university's more than 5,200 physician and 1,000 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 other topics important to both the military and public health. For more information about USU and its programs, visit www.usuhs.edu.