Brain Injury Diagnostics

Screening for Hormonal Deficiencies in Serum from U.S. Marines with Blast-related Mild Traumatic Brain Injury: Preliminary Findings

The estimated prevalence of traumatic brain injury (TBI) within U.S. troops deployed to Iraq and Afghanistan is 20 percent (*Schell and Marshall 2008*). A positive relationship between hypopituitarism and mild traumatic brain injury (mTBI) has been found in the Veteran and active duty military populations (*Wilkinson et al. 2012*). It is not currently standard procedure to screen blast-related mTBI patients for pituitary hormone deficiencies. The Naval Health Research Center (NHRC; San Diego, California) and collaborators from the Department of Veterans Affairs Puget Sound Health Care System (Seattle, Washington) sought to identify if serum hormone deficiencies characteristic of hypogonadism and growth hormone deficiency (GHD) occurred significantly more often among U.S. Marines who sustained a blast-related mTBI while deployed during Operation Enduring Freedom or Operation Iraqi Freedom than among similarly deployed Marines not blast exposed (NBE).

The NHRC's Expeditionary Medical Encounter Database, which contains unique point-of-injury medical data, was used to identify male Marines meeting the study criteria: 75 with blast-related mTBI and 50 who were NBE. The DoD Serum Repository provided pre-deployment and post-deployment samples that were then measured for luteinizing hormone (LH), testosterone, and insulin-like growth factor-1 (IGF-1). Hormone deficiencies were identified based on generally accepted percentile cutoffs of a reference sample's normal distribution. Hypogonadism was defined as a deficiency in testosterone levels and low or moderate LH levels (testosterone levels below the pre-deployment fifth percentile and LH levels below the pre-deployment 95th percentile, respectively). GHD was defined as IGF-1 levels <2 standard deviations below the mean. Preliminary analysis focused on individuals who were determined to be hormone deficient post-deployment and who were not hormone deficient pre-deployment (*Clouser, Shannon, et al. 2017a, Clouser, Shannon, et al. 2017b*). Fisher's exact test was used to examine the post-deployment associations between hormone deficiency and TBI status. Based on the post-deployment serum sample, 13 percent (16/125) were classified as hormone deficient (14.7 percent [11/75] mTBI, 10 percent [5/50] NBE). Of those, 69 percent (11/16) were classified as HG (8 mTBI, 3 NBE) and 31 percent (5/16) were GHD (3 mTBI, 2 NBE). Fisher's exact tests for the relationship between each condition and mTBI were not statistically significant ($p = 0.59$ and $p = 0.64$, respectively).

Further investigation is warranted to determine the prevalence of posttraumatic hypopituitarism in active-duty Service members.

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