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Neuroendocrine Responses to Cold Pressor Stimuli in Midshipmen Participating in the Naval Special Warfare Screener.

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The Naval Special Warfare (NSW) Screener is an arduous, 24-hour event conducted at the U.S. Naval Academy for midshipmen aspiring to enter the Navy Sea-Air-Land (SEAL) Teams. Acute physical stress, such as military training, has a myriad of effects on the neuroendocrine system, adversely affecting anabolic hormones while increasing levels of adrenal hormones. Cold water immersion of distal limbs has been shown to stimulate neuroendocrine responses. **PURPOSE** To assess the effects of a modified cold pressor test (CPT) on neuroendocrine responses and explore the association between CPT time and successful completion of the screener. **METHODS** 65 midshipmen (body mass: 79.0 ± 6.9 kg, body fat: $10.0 \pm 3.9\%$, height: 178.8 ± 7.1 cm) performed the CPT approximately 4-6 weeks prior to the NSW Screener. The CPT was conducted by submerging both feet to the midpoint of the medial and lateral malleolus in circulating ice-water ($\sim 1^{\circ}\text{C}$) until volitional withdrawal (max: 5-min, undisclosed). Total time for the CPT was recorded. Blood was collected before (PRE) and immediately after (POST) the CPT and analyzed for concentrations of cortisol, adrenocorticotropic hormone (ACTH), human growth hormone (HGH), insulin-like growth factor I, neuropeptide-Y, brain-derived neurotrophic factor, epinephrine (EPI), testosterone, and dehydroepiandrosterone. The analysis was conducted using unpaired t-tests. **RESULTS** 50 midshipmen (39 finishers, 11 non-finishers) participated in the screener, while 15 were excluded from the analysis for non-participation. We observed a significant increase pre- to post-CPT in ACTH (PRE: 55.7 ± 32.4 pg/mL vs POST: 76.8 ± 38.3 pg/mL, $p = 0.0094$), HGH (PRE: 0.88 ± 1.42 ng/mL vs POST: 2.61 ± 3.34 ng/mL, $p = 0.0019$), and EPI (PRE: 51.6 ± 40.8 ng/mL vs POST: 80.5 ± 54.5 ng/mL, $p = 0.047$). However, CPT time was not significantly different between finishers and non-finishers (272.5 ± 63.2 s vs. 253.8 ± 84.4 s, respectively, $p = 0.438$). We also observed no difference in the change from pre- to post-CPT for any analytes between finishers and non-finishers. **CONCLUSION** The CPT was

effective in simulating acute stress in the midshipmen, leading to robust increases in ACTH (+37.8%), HGH (+195.8%), and EPI (+55.9%). However, there were no differences in CPT time or any biomarkers between finishers and non-finishers.

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