Differential Responses in the Growth Hormone-Insulin-Like Growth Factor-1 Axis Following Simulated Military Operational Stress

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PURPOSE: The growth hormone-insulin-like growth factor-1 axis plays a critical role in physical performance and recovery. Circulating concentrations of these hormones have been found to increase following physical exertion and decrease following sleep and food restriction such as that common in military operations. It is unknown if the magnitude of change (i.e., pre- to post-exercise difference) varies over time. We aimed to determine the effects of simulated military operational stress (SMOS) on GH and IGF-1 patterns. **METHODS:** Thirty-four males (176.7±1.3cm, 83.4±2.5kg, 20.0±1.2%BF) and ten female (166.0±3.7cm, 64.0±2.2kg, 24.8±2.0%BF) service members (26.1±0.80yrs) completed a 5-day/night SMOS protocol. During days 3 (D3) and 4 (D4), subjects were given 50% of caloric demands. On nights 1, 2, and 5 subjects slept from 2300-0700. During nights 3 and 4, subjects slept from 0100-0300 and 0500-0700. Participants underwent a Tactical Mobility Test (TMT) on D2-5: 2-minute water can carry (20-kg each hand), fire and movement course, 20-meter casualty drag (91-kg), 300-meter unloaded and loaded (16-kg) shuttle runs, and 2-mile paced then 2-mile best effort timed ruck march (15-kg). One-way repeated measures ANOVAs were used to assess the "magnitude" of hormone response following the TMT (change scores from pre- to post-TMT), as well as pre- and post-TMT concentrations on D2, D4, and D5. Paired-sample t-tests were used to compare absolute changes in pre- to post-concentrations. **RESULTS:** There was no difference in magnitude of change at any time point for GH (p=0.814) or IGF-1 (p=0.723). However, there was a significant increase in both GH and IGF-1 following physical exertion each day. Pre-TMT IGF-1 concentrations (D2: 40.22±12.47, D4: 37.45±12.56, D5: 34.75±11.82 ng/mL, p<0.001) but not GH (p=0.784) declined significantly. Post-TMT IGF-1 was significantly (p=0.001) lower at D4 (37.96±11.67) vs. D2 (41.96±12.26) and did not recover by D5 (36.91±12.11), and GH was not different (p=0.582). **CONCLUSION:** Circulating concentrations of IGF-1 but not GH declined following SMOS. While GH and IGF-1 increased significantly following TMT, the magnitude of response was not different over time. Future studies should investigate the relevance of declining levels with no change in the magnitude following physical exertion.