High Intensity Interval Exercise Does Not Influence Overnight GH Secretion in Overweight Sedentary Young Women

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ABSTRACT

Exercise and sleep are the two major factors that influence growth hormone (GH) secretion and it has been well established that there is a strong positive relationship between exercise intensity and GH release. This dose-dependent response may also be correlated with the lactate response to exercise, with steady-state exercise intensities above the lactate threshold eliciting a greater GH pulse. It has yet to be determined, however, if high-intensity interval exercise (HIE) can influence overnight pulsatile GH secretion, which accounts for the majority of daily GH release. **PURPOSE**: To determine if HIE significantly increased overnight GH secretion compared to continuous moderate-intensity exercise (MOD), or no exercise (CON) in young women. **METHODS**: Five young, sedentary women (mean ± SD age: 22.6 ± 1.3 y; BMI: 27.4 ± 3.1 kg/m^2; body fat: 39.2 ± 1.7 %; VO_{2max}: 29.4 ± 5.7 mL/kg/min) were studied on three different occasions during the follicular phase of their menstrual cycle (CON: no exercise; MOD: 30-min of continuous cycling at 50% of peak power determined from the VO_{2max} test; and HIE: 4 30-s "all-out" sprints at a resistance equal to 6.5% body mass with 4.5-min recovery. Each trial was randomly assigned and separated by a minimum of one month. For each visit, participants reported to the lab at 1700h, exercised from 1730h – 1800h, and remained in the lab until 0700h the following morning. The overnight GH secretory profile of each trial was determined from 10-min sampling of venous blood from 1730h – 0600h (12.5 h) using deconvolution analysis. **RESULTS**: Mean power output during MOD was 80.6 ± 6.3 W (68.2 ± 9.7 %VO_{2max}). Estimated exercising energy expenditure for MOD (145.1 ± 11.2 kcal) was significantly lower than HIE (204.5 ± 15.5 kcal, P = 0.002). Peak lactate was significantly higher during MOD (4.7 ± 0.9 mmol/L) compared to CON (0.9 ± 0.2 mmol/L, P = 0.002) and was highest during HIE (11.2 ± 2.1 mmol/L) compared to MOD (P < 0.001) and CON (P < 0.001). Calculated GH AUC (0 – 120 min) was significantly greater in HIE (1018.2 ± 576.1 ng · min/mL) than CON (181.7 ± 138.9 ng · min/mL, P = 0.009), but not MOD (544.7 ± 160.7 ng · min/mL). Overnight GH production rate (ng/mL/min) determined by deconvolution analysis was not significantly different between CON (1040.3 ± 242.0), MOD (1429.2 ± 206.0), and HIE (1831.2 ± 873.8, P = 0.107). Other GH secretory variables: basal GH concentration (ng/mL), number of GH peaks, GH pulse amplitude and mass, and interpulse interval were not different between the three trials. **CONCLUSION**: For these untrained, overweight sedentary young women, a single bout of exercise was insufficient to significantly affect overnight pulsatile GH secretion. Adiposity is a negative determinant of GH secretion, and the GH response to exercise in these women was extremely variable. Aerobic fitness, prior training, as well as several metabolic factors associated with obesity (e.g., increased

insulin and circulating free fatty acids) can also influence GH secretion and should be taken into account as potential mediators of the GH response to exercise.