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Title: Group and individual endogenous hormonal responses to acute resistance exercise and load carriage workouts

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Purpose: To evaluate and compare the acute group and individual endogenous hormone responses to three resistance exercise workouts and two load carriage workouts. Understanding hormone responses specific to military settings may enhance training optimisation in the future.

Methods: Eighteen resistance exercise-trained male civilians (age: 19 to 38 y, mean 24.9 y) completed five experimental workouts and a control condition in a randomised order; three resistance exercise workouts (cluster, hypertrophy, endurance), two load carriage (90-min constant pace [CO-LC] or 6 × 8-min intervals [IT-LC], both carrying a rucksack with 25% body mass) workouts, and a control condition (60-minutes of rest). Venous blood was drawn before, immediately post workout, and 30-min and 24-h post workout. Testosterone (T), free testosterone (fT), growth hormone (GH), dehydroepiandrosterone sulphate (DHEAS), androstenedione (ANST), and insulin-like growth factor 1 (IGF-1) concentrations were subsequently analysed via liquid chromatography-mass spectrometry. Group responses were evaluated using two-way ANOVA's with Tukey's post-hoc analysis. The standardised standard deviations of the pre-post change scores (SDIR) were calculated to identify the presence of individual responses (Hopkins, 2015). **Results:** Group responses were observed despite large individual variations. T concentrations increased in response to hypertrophy ($p < 0.001$) and CO-LC ($p = 0.02$) workouts; fT concentrations increased in response to CO-LC ($p < 0.001$) and decreased following the hypertrophy ($p = 0.035$) workout; ANST concentrations increased in response to CO-LC ($p = 0.007$); GH increased following hypertrophy ($p = 0.004$), endurance ($p = 0.04$), IT-LC ($p < 0.001$), and CO-LC ($p < 0.001$) workouts; IGF-1 increased in response to the endurance ($p = 0.018$) workout. The SDIR effect size thresholds of extremely large (T, GH, DHEAS) and very large (T, GH, DHEAS, ANST, IGF-1) were achieved, representing an individualised pattern of hormone production in response to the different

resistance exercise and load carriage workouts. **Conclusions:** The presence of within-workout variations in the hormonal responses to all workout types suggests that the mean group responses may not reflect the response experienced by all participants, and that the hormonal anabolic response differs between individuals. The group responses and within-workout variation suggest that a wide panel of endogenous hormones should be measured to provide clarity on the anabolic response to different types of training stimuli at the individual level. **Military Impact:** The anabolic response to training type differs between individuals. This research provides support to further investigate whether training interventions based upon an individualised anabolic hormone response to acute exercise lead to improved physical outcomes.

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References: Hopkins W. J Appl Physiol, 118:1444–1446,2015;
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Themes: Physical Training;Physical Performance;

Commented [OTD(PHAH1)]: I would temper the conclusions slightly as the anabolic response to exercise was not measured