

## **The Effects of Acute Exercise on Plasma Volume Expansion - Variations of the Intensity /Duration Relationship: 957: 9:00 AM - 9:15 AM**

### **E-19 Free Communication/Slide - Hematology and Renal Physiology: FRIDAY, JUNE 2, 2006 8:00 AM - 9:30 AM ROOM: 401]**

Gregory, Christopher M.; Cheatham, Christopher C.; Michael, Timothy J.

Western Michigan University, Kalamazoo, MI.

Studies have shown that both endurance training and acute exercise sessions result in an expansion of plasma volume (PV) which may be dependent upon how frequency, intensity, and duration are manipulated. A variety of exercise protocols have been utilized to induce PV expansion, however no known studies have explored the intensity / duration relationship on PV expansion.

**PURPOSE:** The purpose of this study was to examine the exercise variables of intensity and duration in relation to PV expansion during an acute bout of exercise, when the total amount of work performed was kept constant.

**METHODS:** Six male subjects (mean age  $24.6 \pm 4.8$  yrs.) completed a maximal graded exercise test and three two-day experimental trials. During the experimental trials, each subject performed one of three exercise protocols on a cycle ergometer: 50%  $VO_{2peak}$  (60 minutes), 65%  $VO_{2peak}$  (45 minutes), and 80%  $VO_{2peak}$  (30 minutes). Measurements of hematocrit, hemoglobin, serum albumin concentration, and serum total protein concentration were obtained before exercise (BASE), immediately post-exercise (Post-EX), 2-hour post-exercise (2-hr REC), and 24 hours post-exercise (24-hr REC).

**RESULTS:** Relative to BASE, no PV expansion was observed at 24-hr REC in any of the three exercise protocols (50%:  $-7.8 \pm 7.7\%$ ; 65%:  $-4.9 \pm 5.2\%$ ; 80%:  $-1.2 \pm 7.3\%$ ;  $P > 0.05$ ). However, the recovery in PV from Post-EX to 24-hr REC was greatest for the 80%  $VO_{2peak}$  protocol (50%:  $-1.6 \pm 7.1\%$ ; 65%:  $3.2 \pm 3.0\%$ ; 80%:  $11.8 \pm 4.7\%$ ;  $P < 0.05$ ). There was no difference in serum albumin concentration between BASE and 24-hr REC for any of the three protocols (50%:  $3.7 \pm 0.2$  and  $3.2 \pm 0.3$ ; 65%:  $3.7 \pm 0.1$  and  $3.5 \pm 0.3$ ; 80%:  $3.8 \pm 0.2$  and  $3.7 \pm 0.4$  g.dL<sup>-1</sup>;  $P > 0.05$ ). However, there was a significant increase in serum albumin concentration from Post-EX to 24-hr REC for only the 65% and 80%  $VO_{2peak}$  protocols (50%:  $3.0 \pm 9.9\%$ ; 65%:  $9.4 \pm 4.9\%$ ; 80%:  $23.3 \pm 8.7\%$ ;  $P < 0.05$ ).

**CONCLUSIONS:** Although none of the protocols resulted in PV expansion 24-hr post-exercise, the highest intensity / shortest duration protocol (80%  $VO_{2peak}$ ) resulted in the greatest recovery in PV after the post-exercise decline and the 65% and 80%  $VO_{2peak}$  protocols resulted in the greatest increase in serum albumin concentration from immediately post-exercise to 24-hr post-exercise. Therefore, this data suggests that higher intensity exercise may result in a more beneficial PV response compared to lower intensity exercise even when the total amount of work is kept constant.