RECOVERY OF HEART RATE VARIABILITY FOLLOWING LOW- AND HIGH-INTENSITY EXERCISE

Askew Chris¹, Stefanovic Brad¹, Schneider Stefan², Kamen Peter¹
(University of the Sunshine Coast¹, Australia, German Sport University², Germany)

Introduction
Understanding the effects of acute exercise on HRV will aid the standardisation of HRV measurement. Previous studies have examined the effects of exercise intensity on HRV at short (60min) or long (24hr) recovery intervals, often without a control group or condition. The present study aimed to assess the effects of high and low intensity cycling over a 6hr period relative to a non-exercise control condition.

Methods
Eighteen subjects, 10 male 8 female, (age: 28 +/- 6y, VO2peak: 43.90 +/- 5.46 ml.kg-1.min-1) participated. After an incremental cycle test for the determination of maximum exercise capacity, each subject completed three experimental trials in a random order that were separated by 6 days: 1) 25min of high intensity cycling at a power output equivalent to 70% VO2peak (HIGH); 2) 50min of low intensity cycling at 50% of the HIGH intensity workload (LOW); and 3) a 50min non-exercise control period (CON). For each subject, each trial was performed at the same time of day following a 2hr fasting period. Immediately prior to (baseline) and following (0-, 60-, 180-, and 360min) each trial, subjects rested in a supine position for 20min while ECG data were collected at 1000 Hz, from which a 5min epoch was used for the determination of HRV components. Frequency domain measures of HRV were determined by power spectral analysis using FFT (Chart software v5, ADInstruments, Australia). The frequency components examined were low (LF 0.04-0.15 Hz), high (HF 0.15-0.40 Hz) and total power (TP 0.04-0.40 Hz).

Results
Baseline measures of HRV across each of the trials were not different between the genders; hence pooled data were used for subsequent analyses. There was no difference between HIGH, LOW and CON at baseline for any of the HRV measures. A trend was noted whereby the HRV measures in the CON trial tended to increase from baseline to the 0min measurement and remain relatively high until the final measurement at 360min. Immediately after exercise, TP was reduced in HIGH (425 +/- 475 ms²) and LOW (2263 +/- 1227 ms²) compared with CON (5020 +/- 3663 ms²), and recovered to be not different to CON by 60min in LOW and by 180min in HIGH. HF was lower immediately after exercise in HIGH (36 +/- 95 ms²) compared with LOW (517 +/- 323 ms²) and CON (1489 +/- 1346 ms²), and recovered to be not different to CON by 180min. Similarly, LF was lower immediately after exercise in HIGH (36 +/- 95 ms²) compared with LOW (517 +/- 323 ms²) and CON (1489 +/- 1346 ms²), and recovered to be not different to CON by 180min. Similarly, LF was lower immediately after exercise in HIGH (166 +/- 243 ms²) and LOW (789 +/- 722 ms²) compared with CON (1616 +/- 1463 ms²), but recovered by 60 min to be not different between the trials.

Conclusion
These findings support the notion that higher intensity exercise causes a greater perturbation in HRV measures and that a longer recovery is required to return to control values compared with that following low intensity exercise. The changes seen in HRV with the control condition highlight the importance of including a control group or condition in such studies to account for the numerous factors that influence HRV.

Keywords: Recovery, Heart Rate Variability, Intensity

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