TACSM Abstract

Acute Partial Sleep Deprivation and High-Intensity Exercise Effects on Cardiovascular Autonomic Regulation and Lipemia Network

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ABSTRACT

Autonomic nervous system imbalance demonstrated by decreased heart rate variability (HRV) is linked to acute partial sleep deprivation (ASPD) and cardiovascular disease (CVD). Cardiometabolic lipemia has been linked to changes in HRV. Habitually active individuals exercising in the morning hours under APSD and consuming afterwards a high-fat breakfast, may disrupt the network coordination of both the cardiovascular autonomic regulation and cardiometabolic lipemic systems jeopardizing their health. The human organism is comprised by an integrated network of interconnected organ systems and functions, therefore, a disruption/failure of one system can trigger a cascade of failures manifested as disease state. **PURPOSE**: To investigate the postprandial network interactions of autonomic regulation assessed by heart rate variability (HRV) and cardiometabolic lipemia assessed by low-density lipoprotein (LDL) cholesterol under APSD and after a high-intensity interval exercise (HIIE). **METHODS**: Fifteen healthy males (age 31 ± 5 years) participated in: (a) reference sleep (RS) (~ 9.5 h) and HIIE (RSX) and (b) APSD and HIIE (SSX). HIIE was performed in 3:2 min intervals at 90% and 40% of VO2reserve. HRV selected time and frequency domain indices were recorded the night before (D1), the morning of the next day (D2), 1 hr post-HIEE (1hrPE), 2 hr (2hrPE)-, 4hr (4hrPE), and 6-hr post-HIIE (6hrPE). Postprandial LDL was assessed at D1, D2, 1hrPE and 4hrPE. Pearson correlation coefficients and correlation matrices were used to investigate the physiologic network during RSX and SSX. Interactions within each network were computed by the number of links (i.e. number of significant Pearson correlations) and presented as positive and negative links. **RESULTS**: The total number of links increased by 90% under SSX compared to RSX due to: (i) manifestation of weak and intermediate negative links between the HRV and the LDL sub-networks and (ii) a 100% increase of positive links within the LDL sub-network. **CONCLUSION**: This study shows a complex network of interactions between autonomic regulation and cardiometabolic lipemia. Our results uncover how this physiological network reorganizes in response to APSD confirming the inverse relationship between HRV and LDL. HRV can be used as an alternative non-invasive marker of CVD.