

Resting Heart Rate Is a Factor in Acute Blood Pressure Variability Responses to Cycling

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Blood pressure variability (BPV) is an indicator of the ability to maintain blood pressure over time and is an indicator of arterial and autonomic health. What is not known is if steady state heart rate (HR) would affect acute measures of BPV. Resting HR is associated with overall sympathetic and vagal modulation. An individual with a lower resting HR should be able to increase sympathetic modulation to a greater extent which peripherally should increase BPV.

Purpose: To determine if a lower resting steady state HR would result in a greater increase in BPV when cycling at a low workload.

Methods: Forty young healthy subjects had HR, blood pressure and respiration measured during upright rest (5 min), followed by cycling at 20W@60rpm. Participants were instructed to breathe at a pace of 12 breaths·min⁻¹ during both the resting and exercise phases. Groupings were based on Low and High resting HRs of <70 or >70 beats·min⁻¹, respectively. Due to non-compliance with paced breathing only 21 subjects were included.

Results and Conclusions: Data are shown in the table. We expected the similar increase in HR between the groups would equate to an increase in BPV, but there was a divergent change in beat-to-beat deviations of SAP (SAP_{dev}). This indicates that resting HR is important in acute BPV. The light workload cycling may have caused a mild exercise pressor reflex or central command induced sympathoexcitation, but this is unlikely, as shown by no increase in diastolic BP with cycling. The increase in systolic pressure (SAP) is likely due to muscle pump effects increasing venous return.

*group difference; †group x condition interaction; ‡cycling effect

	Low Rest	High Rest	Low W20	High W20
n (female)	10 (1)	11 (7)		
Age	25 ± 1.3	25 ± 1.3		
Height (cm)	177.7 ± 2.02	168.7 ± 2.70*		
Weight (Kg)	77 ± 3.5	67 ± 3.3*		
BMI (Kg·M ⁻²)	24.3 ± 0.82	23.4 ± 0.56		
VO _{2max}	45.1 ± 2.19	33.4 ± 1.62*		
HR (beats·min ⁻¹) ‡	61 ± 2.1	81 ± 2.1*	71 ± 2.7	89 ± 2.6*
SAP (mmHg) ‡	117 ± 4.2	112 ± 3.0	129 ± 4.5	131 ± 2.8
DAP (mmHg)	66 ± 2.9	66 ± 1.6	69 ± 2.5	70 ± 1.8
SAP _{dev} (mmHg) †	5.9 ± 0.51	6.1 ± 0.47	5.0 ± 0.25	6.7 ± 0.37*
DAP _{dev} (mmHg) ‡	2.8 ± 0.22	3.5 ± 0.27	3.3 ± 0.16	4.2 ± 0.21
LF _{SAP} (mmHg ²) ‡	5.7 ± 2.10	3.0 ± 0.91	6.6 ± 1.31	6.2 ± 1.88
VLF _{SAP} (mmHg ²)	10.0 ± 5.91	13.4 ± 4.05	6.3 ± 1.17	11.0 ± 3.30