TACSM Abstract

Cerebrovascular Hemodynamics during Concentric and Eccentric Phases of Heavy Resistance Exercise

GILBERT MORALEZ[1], STEVEN A. ROMERO[2], CAROLINE A. RICKARDS[1], PETER B. RAVEN[1] , and WILLIAM H. COOKE[3]

[1] University of North Texas Health Science Center, Fort Worth, TX
[2] University of Oregon, Eugene, OR
[3] University of Texas at San Antonio, San Antonio, TX

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ABSTRACT

Rapid and drastic fluctuations in arterial blood pressures, such as those occurring during heavy resistance exercise pose a unique challenge to the maintenance of cerebral perfusion. During high-intensity leg cycling, regulation of cerebral perfusion is reduced by rapid decreases in beat-to-beat fluctuations in blood pressure (diastolic phase) rather than rapid increases (systolic phase). The purpose of this study was to test the hypothesis that rhythmic heavy resistance exercise will similarly impair the regulation of cerebral blood flow during the diastolic phase of beat-to-beat fluctuations in pressure. We studied seven healthy male subjects. Beat-to-beat finger arterial pressures, and middle cerebral artery blood velocity (MCAv) were measured during 10 repetitions (REP) of rhythmic high intensity leg press exercise. Velocities and arterial pressures were evaluated during both the isotonic concentric and eccentric phases of each REP. The Gosling pulsatility index (PI) of MCAv of each REP was calculated as MCAv systolic-MCAv diastolic/MCAv mean. During the concentric phase, systolic arterial pressures progressively increased from REP 1 through REP 10 ($P < 0.001$), while systolic MCAv was not different across all REPs ($P > 0.2$). Diastolic arterial pressures during the eccentric phase also increased from REP 1 through REP 10 ($P = 0.03$) however diastolic MCAv decreased during REPs 7-10 compared with REP 2 ($P \leq 0.02$). MCAv PI also increased during REP 7-10 compared to REP 2 ($P \leq 0.02$). Similar to high-intensity leg cycling, our data suggest that during rhythmic high-intensity leg press exercise, cerebral perfusion is well controlled during periods of rapid increases in blood pressure, but regulation of cerebral perfusion is impaired during the diastolic phase of beat-to-beat fluctuations in pressure.