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# Research Week 2024

## Buffalo Concussion Treadmill Test: Is it relevant in an adult, non-sports population?

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### Keywords

Adolescent; Adult; Brain Concussion; Bicycling; Body Mass Index; Exercise Test; Exercise Tolerance; Heart Rate; Physical Exertion; Demography

### Abstract

**Purpose:** The Buffalo Concussion Treadmill Test (BCTT) was developed to determine exercise tolerance in mild traumatic brain injury (mTBI). Research has been primarily focused on sports related (72%), adolescent (60%) and acute (56%) mTBI, which does not align with the diverse population seen in clinic. The goal of this study was to explore exercise intolerance with the BCTT in a non-sports related, adult, subacute mTBI population.

**Subjects:** Sixty-eight subjects with mTBI (mean age 36.0±11.9; BMI 25.4±5.7; 54F; days since injury 75.6±33.0) participated. Subjects were symptomatic based on the Neurobehavioral Symptom Inventory (NSI; mean 35.6±15.1). Mechanism of injuries included: MVA (46%), fall (24%), bike (7%), and other (24%). Sports-related concussions were excluded in this analysis.

**Materials & Methods:** Exercise tolerance was assessed with the BCTT and modified by reducing speed based on tolerance. Participants were classified as exercise tolerant if they achieved 85% of their age predicted heart rate (HR)max or Borg Rate of Perceived Exertion (RPE) (≥17/20) without an increase in symptoms. Exercise intolerance was defined as an increase in symptoms (≥3/10) and inability to achieve 85% HRmax or RPE ≥17/20. Student t-tests determined group differences ( $\alpha=0.05$ ).

**Results:** Fifty-three % of subjects were exercise intolerant. There was no difference in demographics between exercise intolerant vs tolerant groups, except exercise intolerant had higher symptoms (NSI 40.0±15.7 vs 30.6±12.8;  $p<0.01$ ). The test speed (mph) was lower for the exercise intolerant group (3.0±0.5 vs 3.4±0.4;  $p<0.01$ ). Exercise intolerant subjects achieved a 67±9% HRmax and a RPE of 13.0±2.2.

**Conclusion:** Over half of the subjects demonstrated exercise intolerance, which was unrelated to baseline demographics aside from global mTBI symptoms. All subjects were able to complete the BCTT indicating the test is feasible in a more diverse population, although nearly half of them were unable to perform the test at the recommended 3.3-3.6 mph.

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