The Effects of Chest Wall Loading on Fatigue, Exercise Performance, Respiratory Function, and Muscle Perfusion

Presenters: Anders Gundersen, Sarina Verma, Ethan Pelletier, Brock Bakewell

Advisor: Professor Stephen Ives

## Abstract

Increased work of breathing can be caused by the increased chest wall fat in obese individuals. There is potential for this increased work of breathing to negatively affect exercise performance by altering an individuals respiratory and metabolic functions during exercise. **Purpose:** To determine the effects of increased work of breathing induced by chest wall restrictive loading during rest and intense exercise (5 km time trial) on measurements of central and peripheral fatigue, respiratory and metabolic function, muscle perfusion, and exercise performance. **Methods:** This was a randomized crossover study that utilized a control and vested condition. A weight vest with 10% of the participants' body weight was used to load the chest wall in the vested trial. During both trials the participants completed a 5 km time trial in a stationary cycle ergometer. **Results:** Final 5 km time was increased by 8 seconds in the vested condition. Pre-exercise FVC and FEV1.0 in the vested condition were significantly lower than during control. Vested values were 5.54 and 4.65 L respectively, and control values were 5.64 and 4.81 L, respectively. Tidal volume ($V_T$), oxygen consumption ($VO_2$) (condition effect: $p = 0.07$), and minute ventilation ($V_E$) were decreased during exercise with chest wall loading. Blood lactate concentrations increased at all time points in the vested condition. Total hemoglobin content (THC) tended to be higher in the control condition than the vested. **Conclusion:** Increased work of breathing induced by chest wall loading impaired exercise performance, and the ability of the participants to expand the chest wall during inhalation. This caused decreases in pre-exercise FVC and FEV1.0, as well as a suppression of $V_T$, $VO_2$, and $V_E$ during exercise. The decrease in THC was attributed to the increase in oxygen delivery to the respiratory muscles induced by the increased work of breathing.