

## **Effect of Wearing a Gas Collection Mask on Time to Exhaustion during the Bruce Protocol**

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### ABSTRACT

Oxygen consumption ( $\text{VO}_2$ ) and carbon dioxide production ( $\text{VCO}_2$ ) are important to measure and analyze in exercise physiology and fitness testing. A respiratory gas collection mask (RGC) is required for measurement of  $\text{VO}_2$  and  $\text{VCO}_2$ , but has been reported to cause respiratory symptoms and inhibit maximal performance in subjects. This study compared the performance of a graded maximal exercise test (GXT) while wearing a mask (MASK) and without wearing a mask (NO-MASK). Twelve adults performed the Bruce GXT under the two different conditions on two separate occasions in random order. Performance variables used in data analysis were time to exhaustion (TTE), peak heart rate ( $\text{HR}_{\text{peak}}$ ), and rating of perceived exertion (RPE). Between MASK and NO-MASK, paired sample t-tests revealed significant differences in TTE ( $11.46 \pm 1.45$  v.  $11.70 \pm 1.62$  min;  $p=0.017$ ), but no differences in  $\text{HR}_{\text{peak}}$  ( $184.67 \pm 12.88$  v.  $186.33 \pm 11.59$  beats  $\text{min}^{-1}$ ;  $p=0.226$ ) and RPE ( $8.25 \pm 1.55$  v.  $8.42 \pm 0.90$ ;  $p=0.723$ ). Because peak  $\text{VO}_2$  could not be measured during NO-MASK, predicted  $\text{VO}_2$ , based on TTE, was calculated for both conditions. Post-hoc analysis revealed no significance between predicted  $\text{VO}_2$  for MASK versus NO-MASK ( $40.18 \pm 6.06$  v.  $41.19 \pm 6.74$  ml  $\text{kg}^{-1}$   $\text{min}^{-1}$ ;  $p=0.017$ ). Thus, while TTE was slightly longer while performing the GXT without a mask compared to with a mask, the impact this .24-min (14-s) difference had on predicted  $\text{VO}_2\text{max}$  was not significant. From a practical standpoint, wearing a mask during a GXT does not hinder performance.