Comparison of Astrand VO\textsubscript{2max} Prediction to a Graded Leg Ergometry VO\textsubscript{2} Max Test in Endurance Athletes

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Numerous methods for estimating aerobic power (VO\textsubscript{2max}) exist. Assessing the predictive accuracy of such estimations can be of value for gauging their generalizability.

**PURPOSE:** To determine whether the Astrand submaximal protocol over/under-estimates the prediction of the VO\textsubscript{2max} in aerobically trained athletes. Participants were 11 (6 male and 5 female) aerobically trained athletes, who trained at least 300+ minutes per week.

**METHODS:** Subjects were tested on two protocols: 1) the Astrand and 2) a VO\textsubscript{2max} test using indirect calorimetry. Both tests were performed on cycle ergometers at a fixed RPM, with the Astrand maintaining a constant workload while the True VO\textsubscript{2max} test employed a graded test protocol. Heart rate and RPE (rate of perceived exertion) were collected throughout both protocols.

**RESULTS:** The Astrand protocol tended to predict a higher aerobic power (57.6 ±8.3 mlkg\textsuperscript{-1}min\textsuperscript{-1}) vs. the actual VO\textsubscript{2max} (50.0 ±8.6 mlkg\textsuperscript{-1}min\textsuperscript{-1}) determination (p=0.054). The Pearson correlation between the predicted VO\textsubscript{2max} and actual VO\textsubscript{2max} was \( r = 0.088 \), with a \( p \)-value of 0.796 between the two variables.

**CONCLUSION:** There was a 15% over-prediction found when comparing the Astrand to the measured aerobic power as determined from graded exercise. Though on the cusp of statistical significance, this is a meaningful difference in measures. It appears that the Astrand protocol over-predicts the actual VO\textsubscript{2max} in aerobically trained individuals and the Astrand test may be more suitable for recreationally active people.