ABSTRACT

THESIS: Cardiopulmonary Exercise Test Responses to the BSU/Bruce Ramp Protocol

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Purpose: The purpose of this study was to evaluate known correlates of VO$_{2\text{max}}$ including subject characteristics and exercise test data to develop an equation to estimate VO$_{2\text{max}}$ for the BSU/Bruce Ramp protocol. Methods: 1913 cardiopulmonary exercise tests (CPX) were performed by adults aged 48 ± 13 years (range 18-82 years, 54% male). Linear regression analysis was performed to predict VO$_{2\text{max}}$ using 946 CPX with the remaining 967 used for cross-validation. Exclusion criteria applied were RER <1.0, < 18 years old, abnormal test termination, and CPX from the same subject repeated within one month. Results: Total test time had the strongest correlation (r=0.82) with VO$_{2\text{max}}$. Two separate equations were developed to predict VO$_{2\text{max}}$. Total test time alone predicted VO$_{2\text{max}}$ with a standard error of 5.5 ml·kg$^{-1}·$min$^{-1}$. Addition of age, gender, physical activity status, and body weight improved the prediction to account for 77% of the variance in VO$_{2\text{max}}$ with a standard error of 4.6 ml·kg$^{-1}·$min$^{-1}$. Conclusion: Of the exercise testing variables examined, the same predictors as previous analysis of test time, age, gender, body weight, and activity status provided the strongest prediction of VO$_{2\text{max}}$. Additional variables of fat free mass and 1-minute heart rate recovery did not improve upon the prediction. Researchers and clinicians need to determine if the accuracy limits of ± 1 MET for predicted VO$_{2\text{max}}$ are acceptable in clinical practice. When greater accuracy is required, measured VO$_{2\text{max}}$ should be obtained.