**Predicting VO\textsubscript{2max} in Collegiate American-Style Football Athletes**

KALEN A. JOHNSON, KELSEY L. MCLAUGHLIN, STEVEN E. MARTIN, JOHN S. GREEN, and STEPHEN F. CROUSE

Applied Exercise Science Laboratory; Department of Health and Kinesiology; Texas A&M University; College Station, TX

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**Advisor / Mentor: Crouse, Stephen (s-crouse@tamu.edu)**

**ABSTRACT**

**INTRODUCTION:** Maximal oxygen uptake (VO\textsubscript{2max}) is an important measurement for athletic performance. A common method of VO\textsubscript{2max} prediction is the Foster equation (MSSE, 1996). This equation produces accurate predictions in a normal population, however, significant difference has been noted between predicted and measured VO\textsubscript{2max} values when testing athletes. While other studies have produced new equations for athletes in general or even for soccer players, to our knowledge none have made one specifically for American-style football players.

**PURPOSE:** The aim of this study is to develop an accurate VO\textsubscript{2max} prediction equation for collegiate American-style football athletes for testing on the treadmill with the standard Bruce protocol.

**METHODS:** Over 13 years, a total of 413 collegiate American football players (age: 18.5±1.15 yrs, height: 186.8±7.0 cm, weight 102.1±20.8 kg) were assessed for VO\textsubscript{2max} using the standard Bruce treadmill protocol. Linear regression analysis (JMP v. 12) determined which factor out of height, weight, or time spent on the test had a greater impact on VO\textsubscript{2max}. The linear regression analysis of the most significant factor against VO\textsubscript{2max} produced a prediction equation. Predicted VO\textsubscript{2max} was calculated using these data in both the Foster equation and this novel equation. Predicted values were compared to actual measured values with a t-test. \( \alpha = 0.05 \) for all statistical tests.

**RESULTS:** Of all the factors, time had the strongest relationship \( (p<0.0001; r^2=0.6464) \). The linear regression between VO\textsubscript{2max} and time produced a prediction equation: \( \text{VO2max} = -3.546 + 3.904 \times \text{time} \) (time in minutes). Both the Foster equation and this new equation were significantly and positively correlated with the actual VO\textsubscript{2max} values (Foster=0.805, New =0.894). However, t-tests indicate that the Foster equation results were significantly different from the measured values \( (p=0.0007) \), and the new model’s results were not significantly different \( (p=1.0) \).

**CONCLUSION:** The Foster equation is not a reliable predictor of VO\textsubscript{2max} as assessed on a treadmill in collegiate American-style football athletes. This new equation is more accurate to predict VO\textsubscript{2max} in this population.