



Prediction of Running Performances for World Class, Elite, Sub-elite, and Collegiate Athletes based on Maximal Aerobic Speed and Running Energy Reserve Index

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Prediction of performance is an important parameter in exercise, especially in sports. There are several ways to predict performance, however many are fraught with difficulties such as error of prediction being too large or the lack of reliability and validity [1]. The recently published Maximal Aerobic Speed (MAS) validation and the Running Energy Reserve Index (RERI) had lower errors in predicting world class, elite, sub elite and collegiate performances [1,2]. The use of MAS and Maximal Anaerobic Speed to predict performance has been used previously by Bundle et al [3]. However, the errors in acquiring MAS may have caused prediction errors due to the existence of large anaerobic energy. The concept of removing anaerobic energy from an individual to accurately acquire a true MAS is a novel idea to predict performances with lower errors in all sports, especially sports which involve running [1]. RERI is an index which may be

useful for most practitioners. Using an example of a world class runner, Sebastian Coe's 400m and 1609m in 1981, the prediction accuracy was 1.8% and 1.0% for his 800m and 1000m respectively. This was comparable to Bundle's two trials equation (1000m = 1.5% and 800m = 2.0%). However, the Bundle's equation is limited to only predicting performances up to 240 seconds. The results from the MAS and RERI studies suggest that RERI can accurately predict running performances of world class runners when utilizing any two running performances within 5000m distance performance. Kinesiologists can also use the RERI model as an accurate and non-invasive alternative to time consuming methods of determining anaerobic and aerobic running performances [4,5] across various modalities of sports [6]. Training can also be compartmentalized into aerobic and anaerobic energy systems with accuracy, thus optimizing and increasing the potential of individuals with customization specialized training. The concept of talent identification using RERI in terms of identifying superiority in one energy system versus another, may be used in streamlining the potential of an individual to his strengths. For example, RERI can be used to identify a

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striker in soccer who is superior in anaerobic energy system versus a midfielder who may need more aerobic energy system. Moreover, RERI can be used to select a short distance runner versus a long-distance runner. Such identification may help exercise practitioners to select and train accordingly with the energy systems.

Hence, it is essential knowledge and information that Kinesiologists can use to develop training programs to suit athletes of various standards (youth, collegiate, sub-elite, elite, and world class) and predict training performance for them. Such specialized science-based training may improve and enhance overall sporting performances all over the world.

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