VO2MAX: WHAT’S WORTH MONITORING?

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**INTRODUCTION**
In team as well as endurance sports, recent research data suggests that VO2max is a moderate discriminator of performance capacity. VO2max importance in sports performance may therefore be overstated.

**VO2MAX DOES NOT DISCRIMINATE ELITE AND SUB-ELITE TEAM SPORTS PLAYERS**
In repeated-sprints sports (team and several so-called "endurance" sports), the relationship between VO2max and performance has been reported to be low to moderate by sport scientists. For example, recent studies involving Australian rule football and rugby players point out that elite and sub-elite players have about the same VO2max scores (Keogh, 1999) but that elite players perform better on muscular strength and power tests (Baker, 2001).

**SPORTS PERFORMANCE DEPENDS ON POWER OUTPUT CAPACITY, NOT PHYSIOLOGICAL INDICATORS**
In most sports, performance depends on the athlete's capacity to generate and tolerate the repetition of maximal power outputs. For example, if a speed skater can't accelerate after a curve, if a cyclist is unable to tolerate the repeated accelerations that often occur at the top of the hill or after a technical difficulty, if a rugby player is unable to sprint back to his position after a scrum or a maul during the whole game, he will not have any chance to keep up with the bests, even if he/she can run/bike/skate relatively fast during the whole event.

**POWER TESTS PREDICT ENDURANCE PERFORMANCE BETTER THAN VO2MAX**
In elite cyclists, kayak paddlers, swimmers and runners, an inverse relationship between VO2 max scores and time to exhaustion at the lowest velocity that elicits VO2max has been observed (Billat et al. 1996). In world-class cyclists, an inverse relationship between VO2max and economy/efficiency has
also been observed and those who have a relatively low VO2max seem to compensate by a high cycling economy / gross mechanical efficiency (Lucia et al., 2002).

Recent research show that 1 and 6km uphill cycling performances are better predicted by absolute (W) or relative power (W/kg) values obtained during sprint tests (Wingate 30s sprint test) rather than by VO2max score (Davison et al., 2000). In addition, performance of elite endurance athletes can also be significantly improved by maximal and explosive strength training without significant improvements in VO2max (Bastiaans, 2001, Osteras et al. 2002).

CONCLUSION
VO2max is a poor to moderate predictor of real-life performance and its importance in sports performance is often overemphasized. Therefore, once a minimum level of aerobic fitness is achieved, tests that measure repetitive power output capacity and fatigue tolerance in sports-specific situation (neuromuscular components and anaerobic metabolisms) are more useful than VO2max tests. For elite endurance athletes, a single laboratory testing session at the beginning of the season might be sufficient to adequately prescribe training loads (Lucia et al., 2000).

REFERENCES AND SUGGESTED READING

