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Contribution of aerobic and anaerobic capacity to 2000 m rowing performance

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Background

Previous studies strongly have supported importance of aerobic capacity for 2000m rowing performance [1-3] and there are few studies that demonstrated anaerobic capacity had critical role in rowing performance [4-6]. The purpose of the present study is to investigate the relationship between 2000m rowing performance and anaerobic capacity, which were estimated by critical power (CP) model [7,8] and by all-out tests of short duration as well. We also examined aerobic capacity.

Subjects and methods

Nine male collegiate rowers (age:20.0 ± 1.0 yrs, height:174.5 ± 4.5 cm , weight:70.1 ± 7.5 kg) performed 1) incremental exercise tests to determine VO_{2max}, 2) CP test (400m, 600m, 800m and 1000m), and 3) 2000m test. For each subjects, the amount of work (power×time) was plotted against exercise time. The CP was determined as the slope of the linear regression between the work and time. The anaerobic work capacity (AWC) was determined as the y-intercept of the linear regression. AWC was evaluated with standard error of estimation (SEE) [8] for the sake of accurate observation. If SEE of regression line was greater than 10 % of AWC, it was recalculated except one trial that had largest error.

Results

CP (302.7 ± 35.2 watt) was correlated with VO_{2max} (4.1±0.4 L · min^{-1}, r = 0.70, p<0.05, Figure 1) and power output during 2000 m test (P2000, 326.9 ± 29.3 watt, r = 0.86, p<0.01, Figure 2). AWC (11.4 ± 3.8 kJ) was not correlated with P2000 (r = 0.33). Our data demonstrated that there was significant correlation between AWC and residual error between CP and P2000 (r = 0.79, p < 0.01, Figure 3).

Discussion

These results are in accordance with the established interpretation by which contribution of aerobic capacity to rowing performance are well recognized [1-6]. However, our data suggest that anaerobic capacity estimated by AWC also have a pivotal role for rowing performance. Since CP and AWC are affected by familiarity of

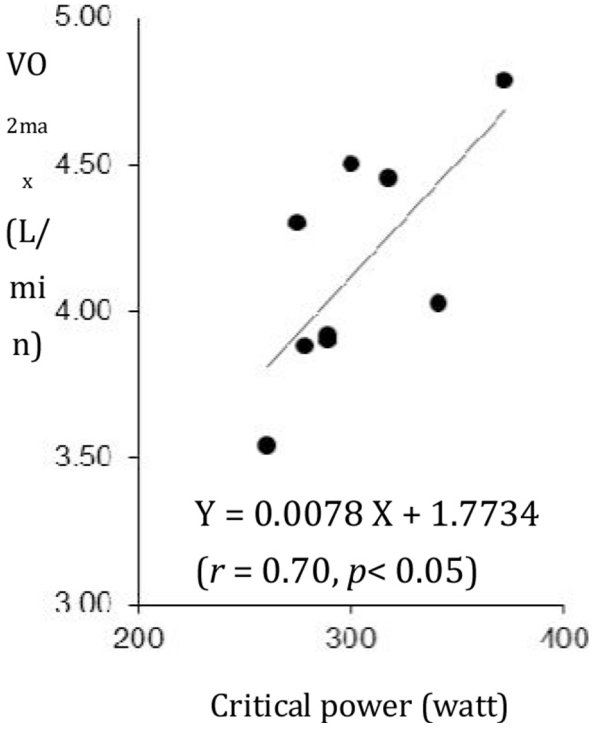

Figure 1 Relationship between maximal oxygen uptake and critical power.

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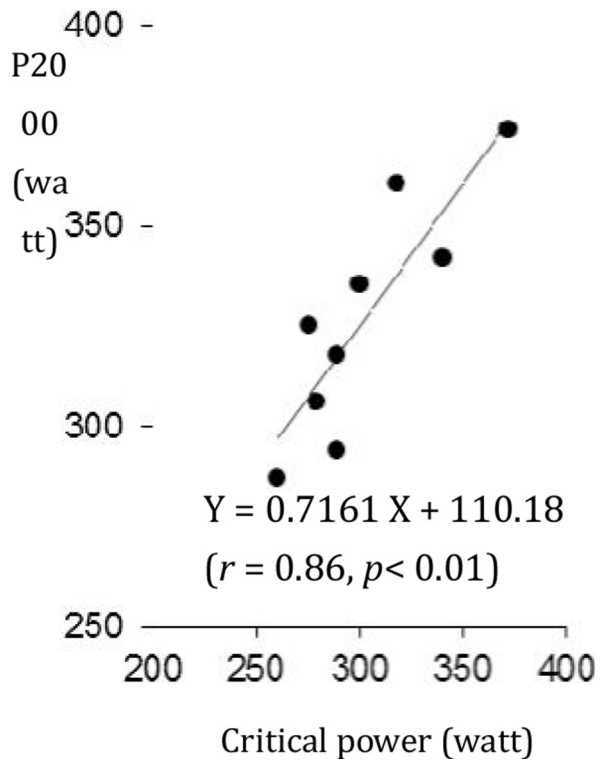

Figure 2 Relationship between critical power and P2000.

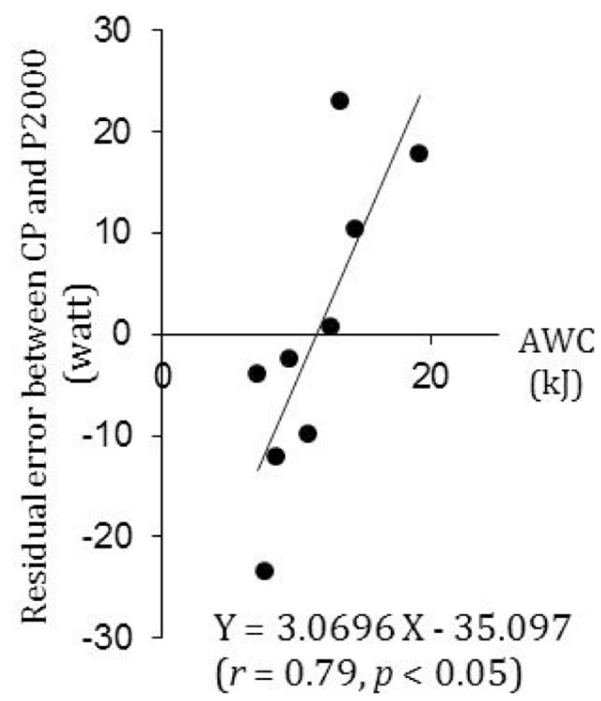

Figure 3 Relationship between AWC and residual error between CP and P2000.

subject to intensive exercise [8] and physiological condition such as fatigue caused by consecutive training sessions, examination of anaerobic capacity might predict rowing performance more precisely in practical competitive situation.

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