FORCE-VELOCITY-ENDURANCE PROFILING APPLIED TO ROWING PERFORMANCE

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INTRODUCTION:
The power output achieved in rowing, is contingent upon the ability to product and sustain elevated levels of power [1]. The two mains' power capacities determining performance are the maximal (Pmax) and the critical (Pc) power, the latter is defined as the asymptote of the power-duration relationship and represents the intensity threshold above which fatigue develops drastically, i.e. severe domain.
It is widely accepted that Pmax and Pc are both determinants of performance in 2000m rowing [2], although the precise extent of their contributions has yet to be fully established. Force-Velocity-Power (FVP) relationships define Pmax and Pc as the combination of maximal force (F0max and F0c) and velocity (V0max and V0c) qualities. During the 2000m rowing, the same level of power can be achieved with different FV combinations. Although the role of F0max and V0max in explosive performance has been thoroughly studied, their contributions, to performance in power endurance sports as well as the role of F0c and V0c remain unexplored. The purpose of this study was to establish the interaction between rowing performance and Force-Velocity-Endurance (FVE) profile by determining the contribution of i) initial (Pmax) and critical (Pc) power, and ii) their respective force and velocity components, on rowing 2000-m ergometer performance.
METHODS:
11 high level-to-elite rowers performed a 3min All-out ergometer test, preceded and followed by 6 maximal strokes to establish initial and critical FVP profiles. Pmax and Pc are the apex of the PV relationship. FVE parameters (F0max, V0max, F0c and V0c) are the associated extremum parameters of FVP before and after the all-out exercise. Stepwise regression analyses were performed to quantify the contribution of theses variables on the mean power during the 2000-m ergometer test (P2000). Relative Weight Analyses is performed to gain a better understanding of the respective role played by each predictor in the linear regression [3].
RESULTS:
The first model showed that 75% of the P2000 variance was explained by both Pmax and Pc (relative weight respectively 44.2% and 55.8%). The second model including FVE parameters showed that 72% of P2000 variance was explained by F0max and F0c (relative weight respectively 48.3% and 51.7%), without any significant contribution of V0max and V0c.
CONCLUSION:
The results of this study showed as expected the important and balance contribution of Pmax and Pc in rowing performance during a 2000m test. Within the power, it appears that force qualities seem more predictive of the variance in P2000 than velocity ones. The best rowers presented here force oriented FVE profiles, meaning that it can be of great of interest to orient training to preferentially improve force and force endurance to maximise power production capacities.

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