*TACSM Abstract*

# The Effect of Work Rate on Oxygen Uptake Kinetics during Exhaustive Severe Intensity Cycling Exercise

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ABSTRACT

During exhaustive severe intensity exercise, the oxygen uptake ($VO_2$) increases exponentially, with a time constant of ~30 s. After ~1 to 2 min, a slow component emerges and drives the $VO_2$ to its maximum. There are clear differences in the $VO_2$ response profile across exercise intensity domains. These disparities might not be attributable to metabolic demand but, rather, to characteristics of the various intensity domains, such as the consequences of lactic acid production. **PURPOSE:** To investigate the role of exercise intensity on the $VO_2$ response profile at intensities wholly within the severe domain. **METHODS:** Four women (mean ± SD: age 22 ± 2 years, height 167 ± 7 cm, mass 66 ± 5 kg) and eight men (age 23 ± 2 yr, height 179 ± 9 cm, mass 78 ± 10 kg) performed exhaustive constant-power cycle ergometer tests at two different severe intensity work rates (263 ± 78 W and 214 ± 64 W). Smoothed breath-by-breath $VO_2$ data were fitted to a two-component (primary response and slow component) model using iterative regression. **RESULTS:** Times to exhaustion were 217 ± 27 s and 590 ± 82 s, respectively. The $VO_{2max}$ values were the same at the two different work rates (2973 ± 691 ml·min$^{-1}$ and 3011 ± 728 ml·min$^{-1}$). The amplitude of the primary response was greater ($p < 0.05$) at the higher work rate (2095 ± 716 ml·min$^{-1}$) than at the lower work rate (1857 ± 618 ml·min$^{-1}$) and the amplitude of the slow component was smaller (367 ± 177 ml·min$^{-1}$ vs 645 ± 347 ml·min$^{-1}$). In addition, the time delay before the emergence of the slow component was shorter at the higher work rate (92 ± 22 s vs 116 ± 42 s). **CONCLUSION:** The results show that exercise intensity *per se* affects the $VO_2$ response profile within the severe intensity domain and suggest that metabolic demand drives the primary response of $VO_2$ kinetics within this domain.