SKELETAL MUSCLE OXYGEN SATURATION KINETICS DURING GRADED EXERCISE TESTING IN FEMALE D-I COLLEGIATE ROWERS

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Purpose

- Skeletal muscle oxygen saturation (SmO2) kinetics have previously been used to assess oxygen supply and demand at the microcapillary level during graded exercise tests (GXT's) in competitive male rowers, with very few data available on females. Therefore, we aimed to descriptively analyze changes in SmO2 kinetics during 7x4 minute GXT's in female rowing athletes.

Methods

- n = 20; female D-I collegiate rowers
- 7x4min discontinuous GXT consisted of 6 submaximal work steps that gradually increased in wattage, interspersed with 1-minute of passive rest, with the 7th and final step at maximal effort. Target watts for each step were derived from each athlete's personal best 2,000m indoor rowing ergometer time trial, in agreement with Australian Institute of Sport (AIS) guidelines.
- Near-infrared spectroscopy sensor (NIRS) was affixed distally on the right vastus lateralis (VL) at 1/3 the distance between the anterior superior iliac spine and the lateral most patellar tip.
- A subset of 5 of the top athletes performed this GXT twice, at the start and end of the Fall semester, wearing NIRS. Their data will be exploratorily analyzed for longitudinal changes.

Results

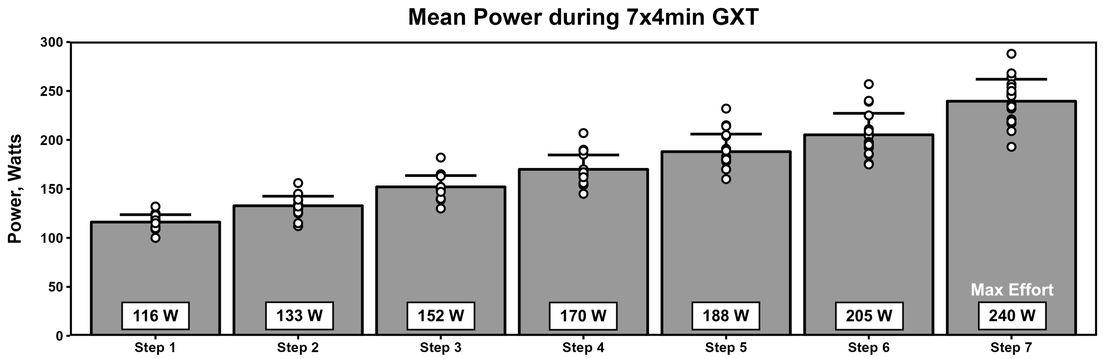

Figure 1. Mean rowing ergometer power during all 7 steps of the GXT, displayed as Mean ± SD.

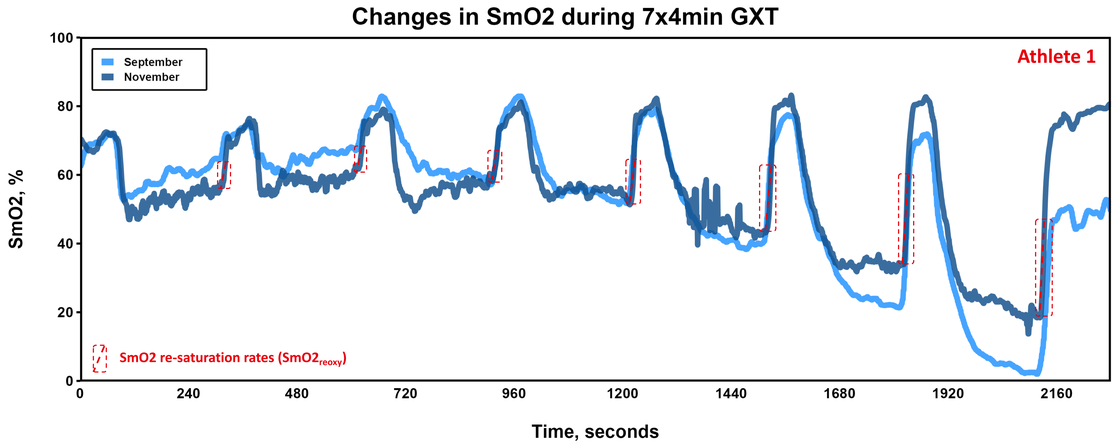

Figure 2. Representative single athlete data showing SmO2 kinetics across the entire GXT protocol.

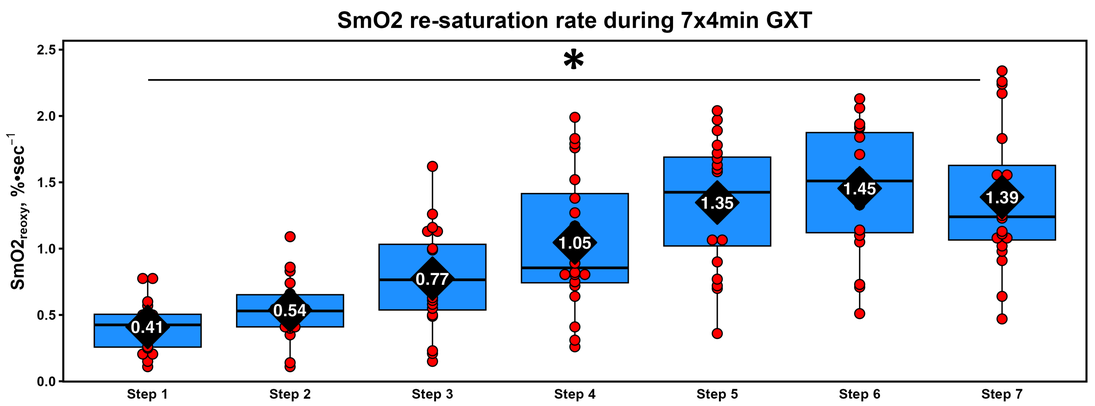

Figure 3. Skeletal muscle oxygen re-saturation rates ($SmO2_{reoxy}$) calculated the first 30-seconds of positive SmO2 slopes during each 1-minute inter-step rest interval. Box plots contain bold crossbars displaying medians, with first and third inter-quartile ranges. Black diamonds display means, with red dots for all individual data. * = main effect for Time (p<.001). GXT = graded exercise test.

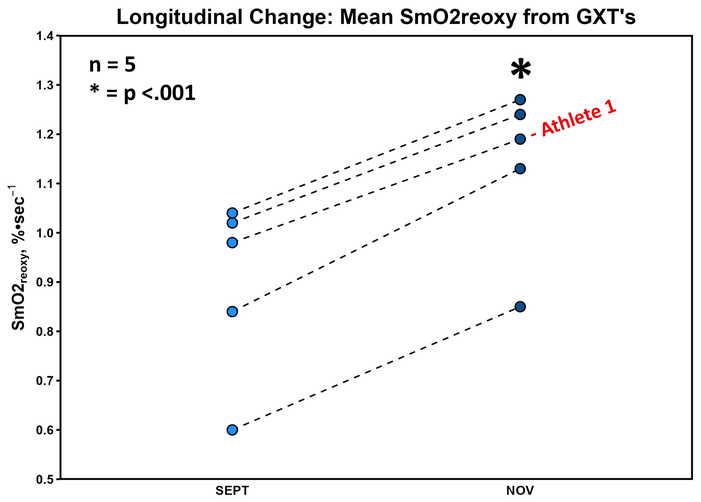

Figure 4. Pre-Post fall semester testing data from five athletes. Mean $SmO2_{reoxy}$ from all 7-steps of the GXT at both time-points.

Conclusions

- $SmO2_{reoxy}$ increased across the GXT, likely in response to increasing watts. Maximal 7th step watts and subsequent $SmO2_{reoxy}$ were not associated, indicating higher performing athletes did not necessarily re-saturate their VL's with oxygen at faster rates. Pre-to-post semester data showed significant improvements in GXT **mean** $SmO2_{reoxy}$ were present, suggesting faster VL oxygen re-saturation rates may be a trainable adaptation.

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