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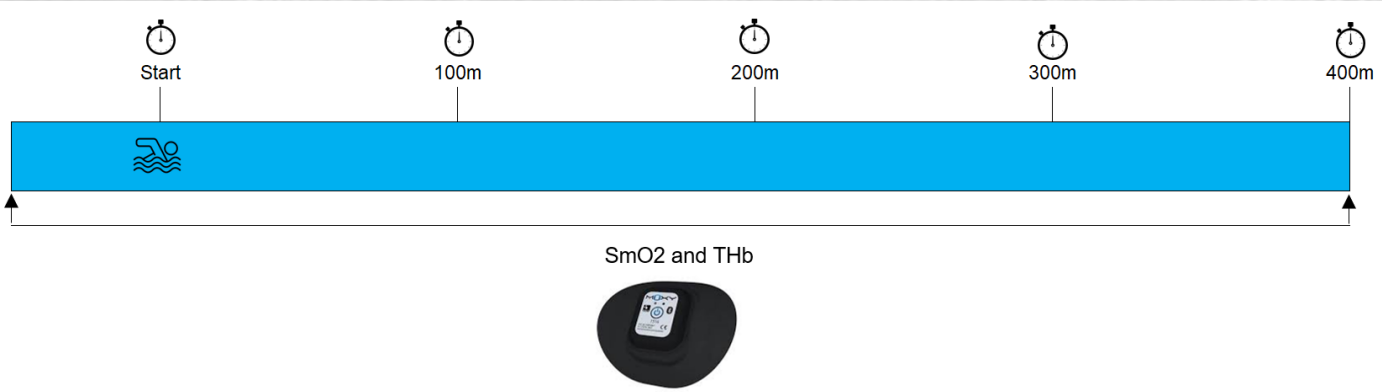
Muscle oxygenation responses during a 400-Meter Open Water Swim Time Trial

BACKGROUND

Near-infrared spectroscopy (NIRS) has been used to monitor peripheral adaptations and acute training responses in pool swimming; however, to our knowledge, no studies have examined its application in open-water swimming.

- ❑ **Assess changes in SmO_2 and THb during a 400m open water swim on the vastus lateralis (VL) and latissimus dorsi (LD).**
- ❑ **Compare SmO_2min and desaturation slopes between VL and LD and relate SmO_2min to performance in the 400 m time trial.**
- ❑ **Evaluate the influence of adipose tissue thickness (ATT) on SmO_2min in both muscles.**



METHODS

11 international swimmers
5 men
6 women
400m time: 04:33 ± 00:14 (mm:ss)

ATT = 6.3 ± 2.7 mm

ATT = 3.6 ± 0.8 mm

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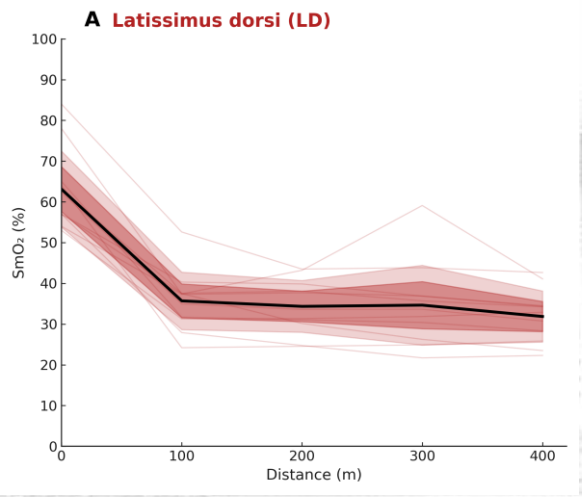
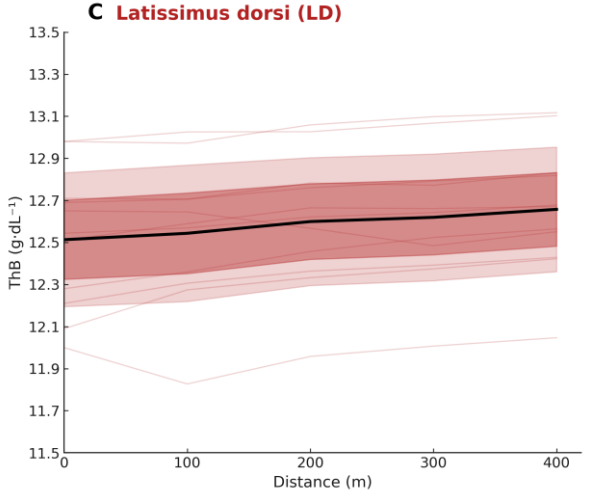
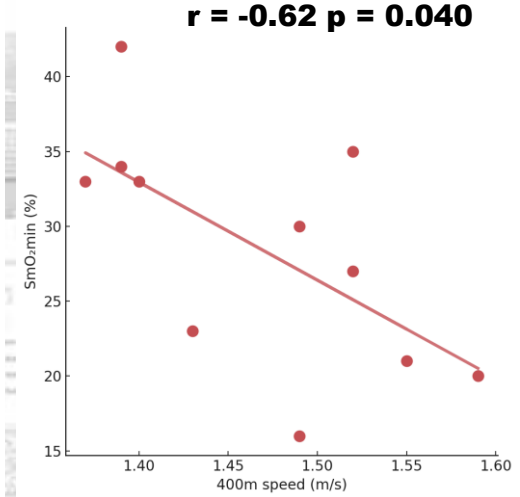
RESULTS

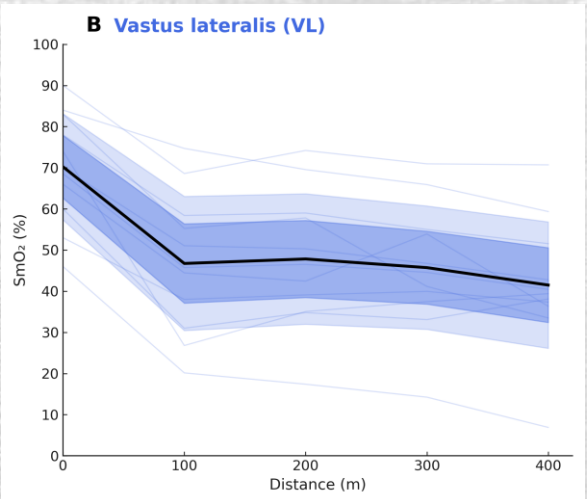
LD

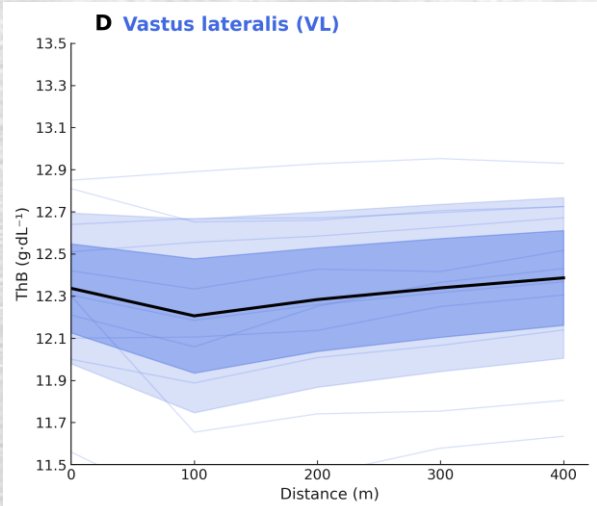


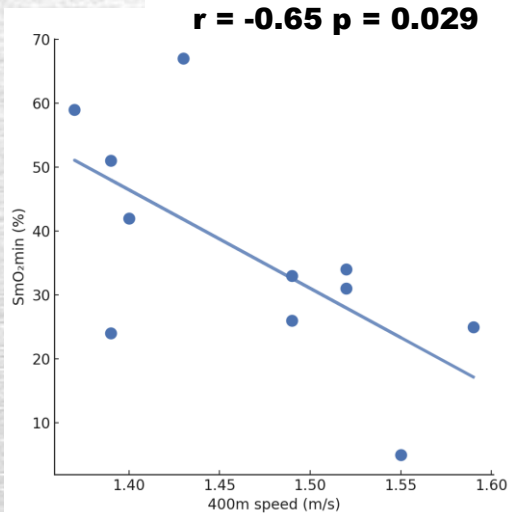


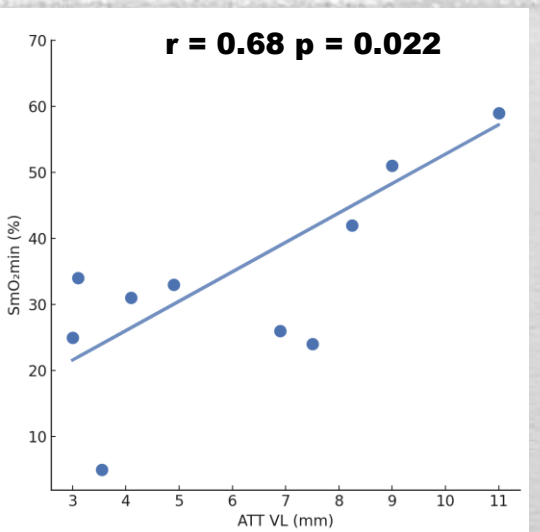


VL









CONCLUSIONS

- No significant differences between LD and VL in a group of international swimmers.
- SmO_2min related to performance in both muscles and ATT to SmO_2min in the VL.
- NIRS shows strong potential for internal load monitoring in open-water swimming; however, ergonomic limitations—particularly sensor design/attachment must be addressed for effective real-world application.

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