

Acute breath-holding does not improve 3km cycling time trial performance

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Purpose:

Intense exercise evokes a spleen contraction releasing red blood cells into the blood circulation. This improves oxygen transport capacity which is beneficial for performance. The same mechanism is found following acute apnea, increasing [Hb] by 2 to 5%. Therefore, the aim was to examine whether pre-race apnea can improve performance in a 3km time trial (TT) through apnea-induced spleen contraction before the onset of exercise.

Methods:

11 recreationally active subjects performed 3km cycling TT following a 10 minute warm-up in 3 different conditions: an apnea (one maximal static apnea finishing 3 minutes before TT), control and placebo condition. Power output, maximal heart rate and VO_2 uptake were continuously measured. Lactate and venous [Hb] were sampled at baseline, after warm-up and before TT.

Results:

Interaction effects ($F=3.475$, $p=0.049$) for [Hb] values revealed that including an apnea during the rest period evoked a positive change in [Hb] pattern. With completion times of 264.8 ± 14.1 s for apnea, 263.9 ± 12.9 s control and 264.0 ± 15.8 s placebo, performance did not differ between conditions ($F=0.250$, $p=0.840$). Power output ($F=0.406$, $p=0.584$) and peak physiological parameters did not differ either (VO_2 $p=0.602$; heart rate $p=0.757$; lactate $p=0.185$). HR and VO_2 responses during TT also were not different ($p>0.05$), while power was significantly lower in the last 250m interval in AP compared to CO and PB ($F=5.940$, $p=0.010$).

Conclusion:

Although a small positive impact on the Hb values was seen, implementing a single apnea in the warm-up did not change the physiological parameters during nor improve the TT performance.

