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Title: Tissue oxygenation profiles during prolonged exercise in hypoxia

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Body: Introduction: Tissue oxygenation is altered during hypoxia (H) at rest and during exercise⁽¹⁾. It remains however debated whether these perturbations are similar between tissues as well as between cerebral areas implicated in motor output. The purpose of our study was to assess the effect of hypoxic exposure on quadriceps, prefrontal (PFC) and motor cortices oxygenation during prolonged submaximal cycling in H. Methods: After a 4-h wash-in period, either in normoxia or H, 12 subjects performed a 80-min cycling exercise at 45% of their maximal aerobic power (N_E $FiO_2=21\%$, H_E $FiO_2=11\%$). A 3rd condition (H_R $FiO_2\sim 9\%$) consisted in a 80-min resting period in which the arterial saturation (SpO_2) reached during H_E was matched by adjusting FiO_2 . Oxy[HbO₂]- deoxy[HHb]- and total[THb]-haemoglobin changes were measured on each site by near-infrared spectroscopy. Results: H_R and H_E resulted in similar SpO_2 reduction ($\sim -20\%$). Quadriceps exercise-induced [HbO₂] reductions were associated with increased and unchanged [THb] in N_E and H_E respectively, while [THb] dropped significantly in H_R . PFC showed a large [THb] increase at exercise with a four-fold [HbO₂] increase in N_E compared to H_E . Motor cortex showed similar [HbO₂] changes than PFC in H_R but not at exercise. Indeed, motor cortex [THb] was stable in H_E and N_E while [HbO₂] decreased and [HHb] increased in N_E , these latter changes being significantly accentuated in H_E . Discussion: This study quantifies for the first time the respective effects of prolonged cycling exercise and SpO_2 drop on muscle and cerebral oxygenation responses in H and demonstrates important specificities between tissues and cortical sites. References: ⁽¹⁾Verges et al. In Press, Am J Physiol.