7th International Congress
MOUNTAIN, SPORT & HEALTH
updating study and research from laboratory to field
9-10 November 2017 Rovereto (TN) Italy

"BEet On Alps"
ergogenic effects of dietary nitrate supplementation at high altitude

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O_2 availability

L-arginine

NO_3^-

NOS enzymes

NO_2^-

NO

Vasodilation

Angiogenesis

Mitochondrial respiration

Mitochondrial biogenesis

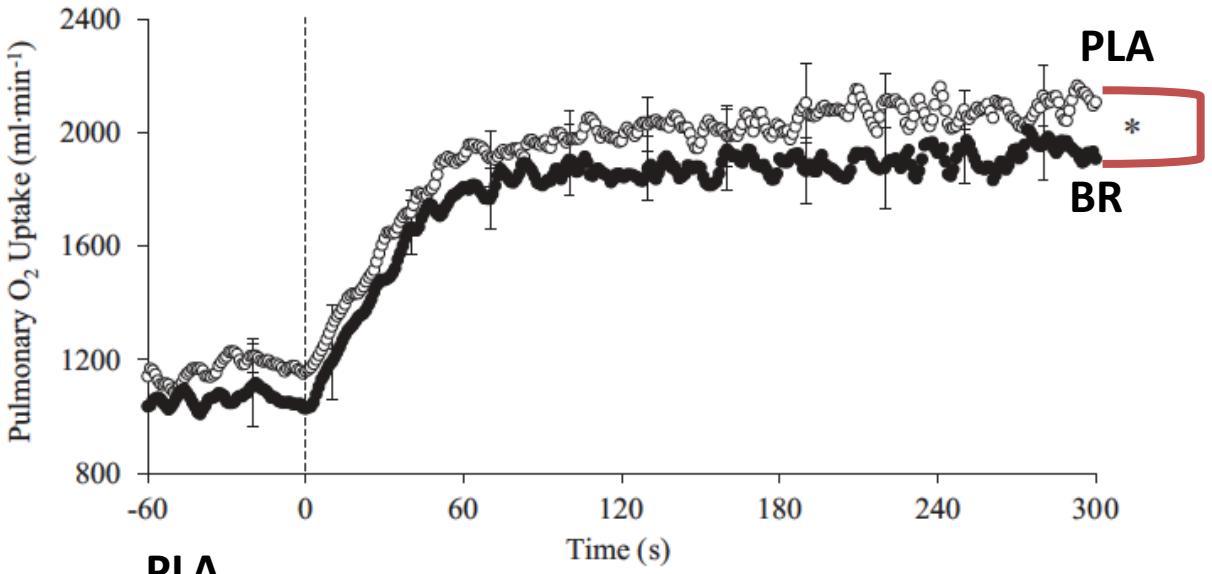
Glucose uptake

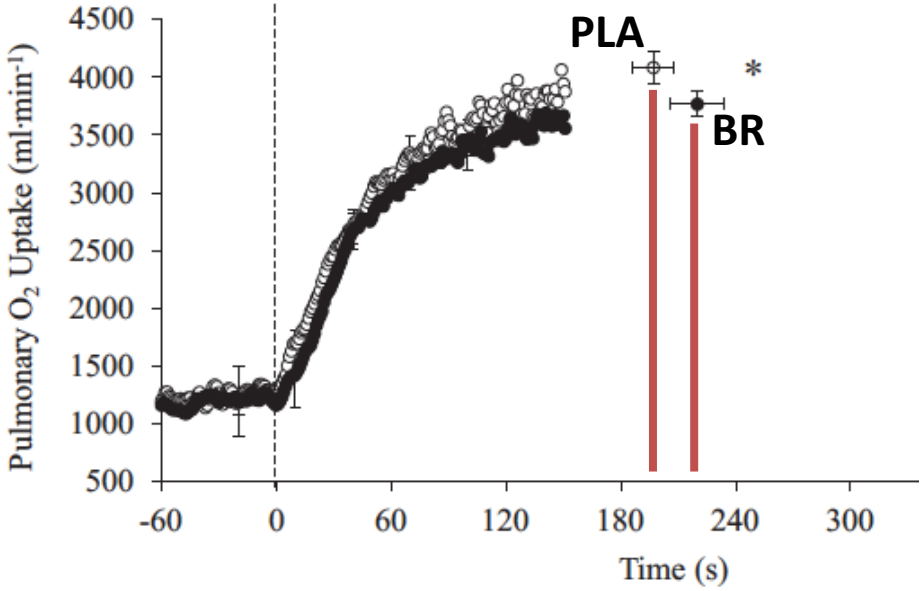
SR Ca^{2+} handling

Fatigue resistance	Exercise efficiency	Exercise performance

Jones, *Sports Med*, 2014

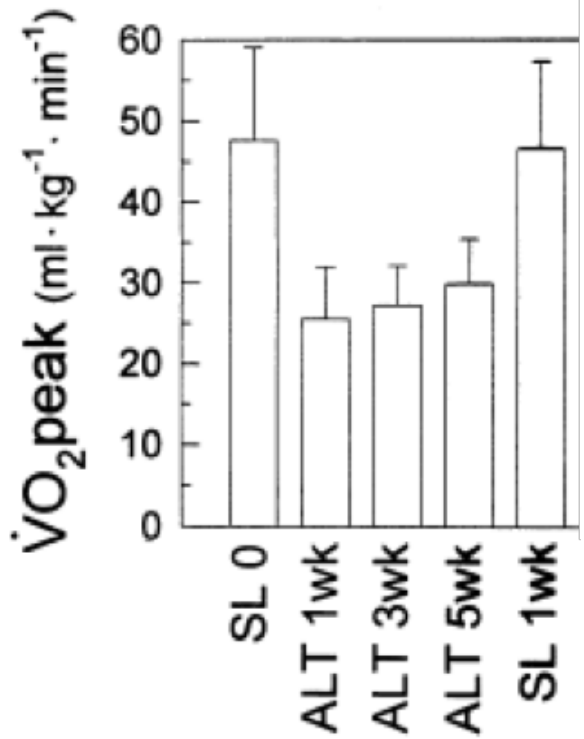
NO_3^- SUPPLEMENTATION IN NORMOBARIC HYPOXIA

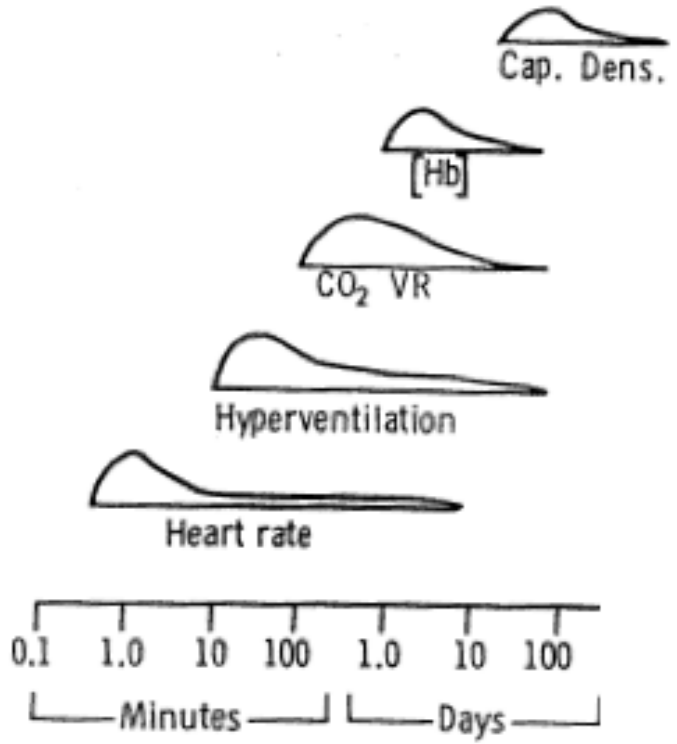




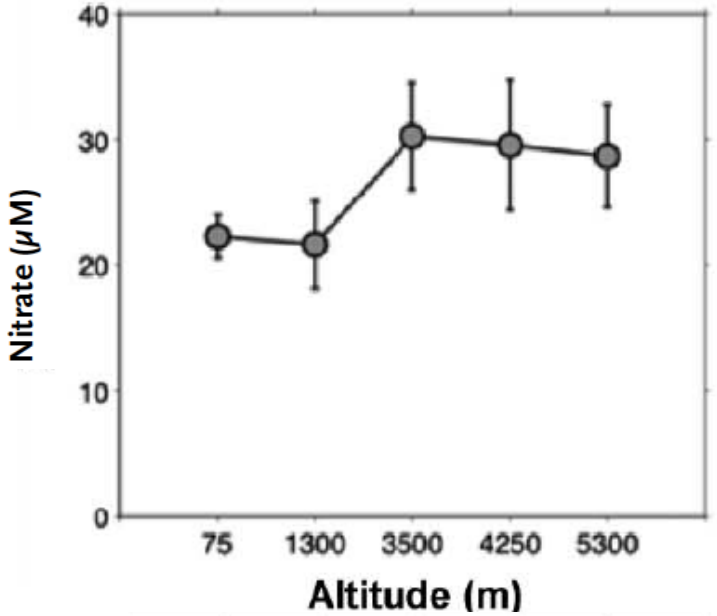
Kelly et al, *Am J Physiol Regul Integr Comp Physiol*, 2014

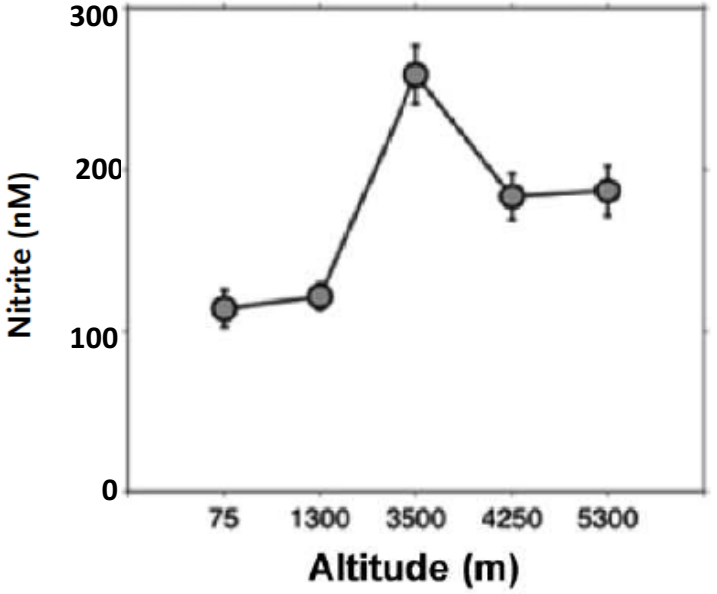
PHYSIOLOGICAL RESPONSES TO CHRONIC HYPOXIA





NO_3^- & NO_2^- IN ALTITUDE





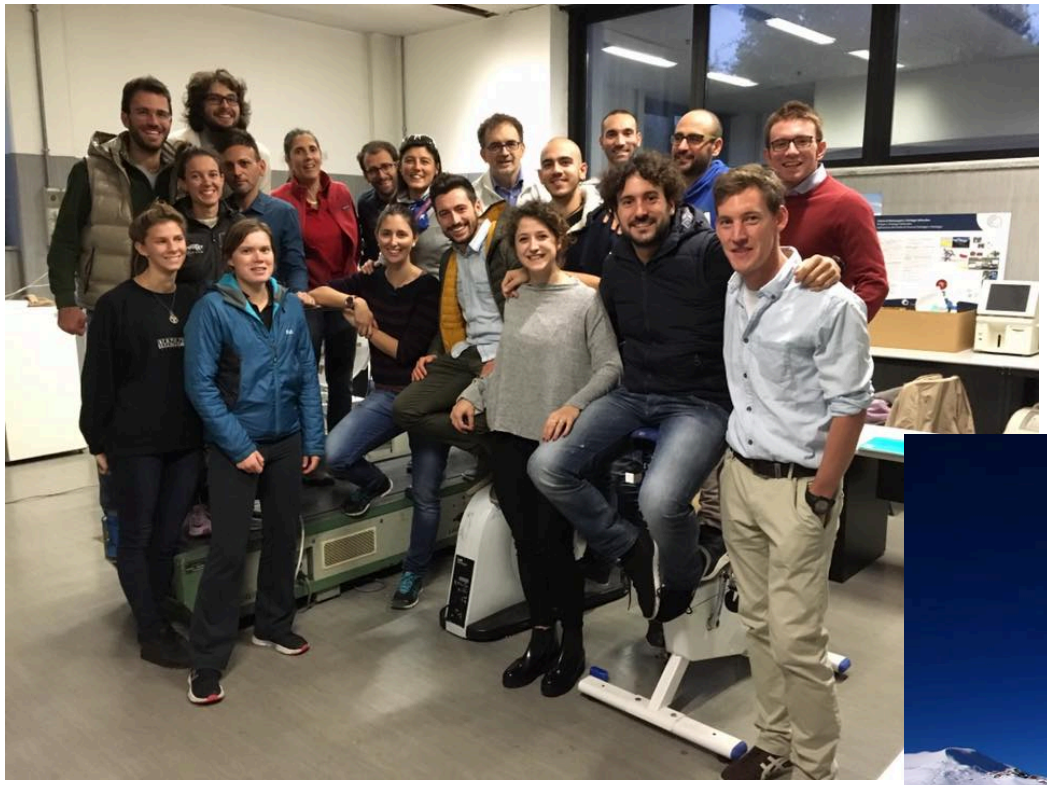
Levett et al, *Sci Rep*, 2011

AIM

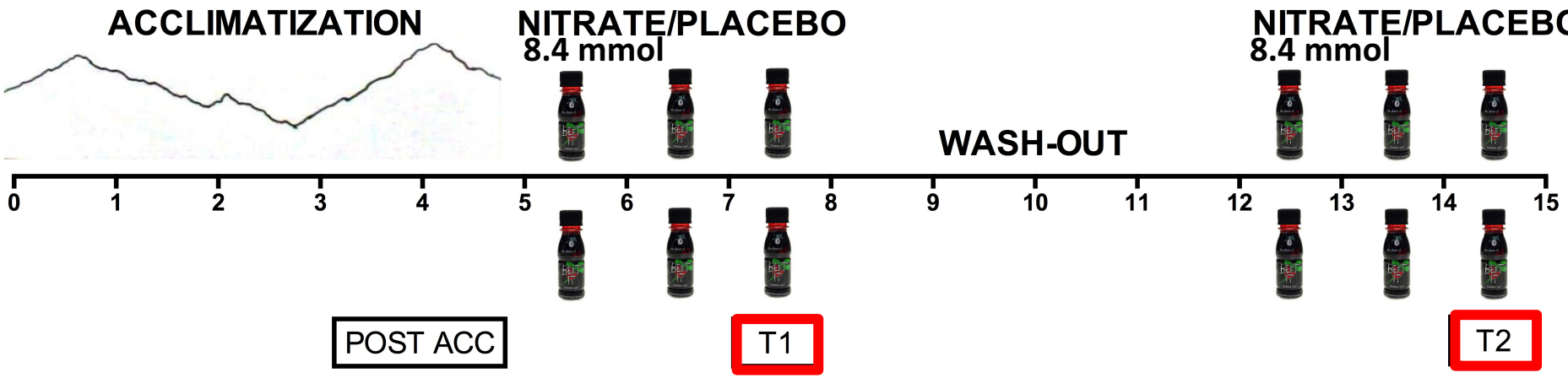
Investigate the effects of
dietary nitrate supplementation
on physiological responses to exercise
during a prolonged sojourn at altitude

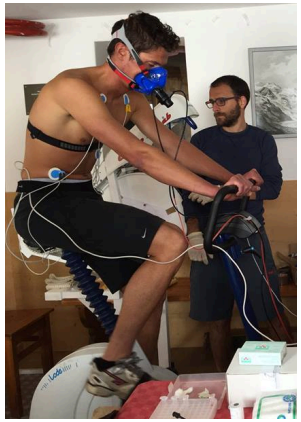
METHODS

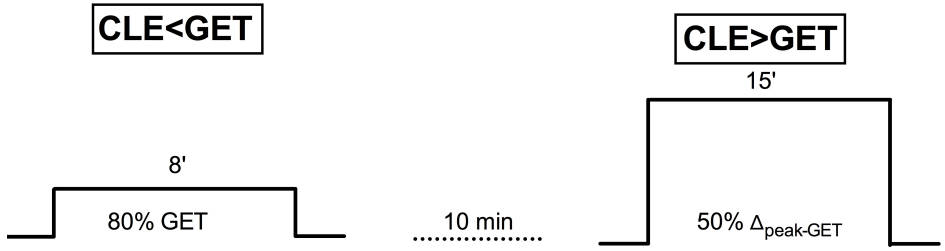
Age (Years)	Mass (Kg)	Height (m)	BMI ($Kg*m^{-2}$)	$\dot{V}O_2peak$ ($mL*\ kg^{-1}*min^{-1}$)	$HRpeak$ ($b*min^{-1}$)
28 ±6	70.8 ±11.8	1.76 ±0.09	22.7 ±2.4	45.5 ± 9.0	187 ±12

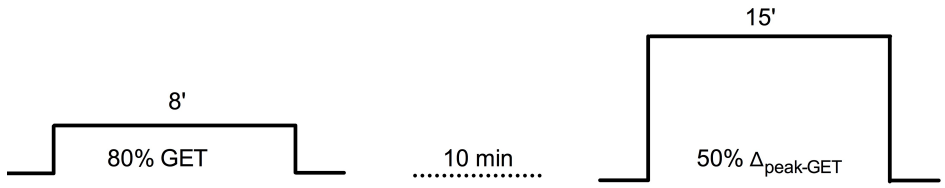


METHODS


ACCLIMATIZATION
NITRATE/PLACEBO
8.4 mmol
WASH-OUT
NITRATE/PLACEBO
8.4 mmol
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
POST ACC
T1
T2

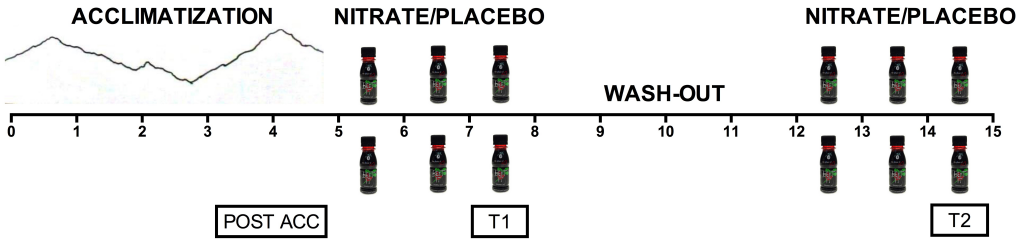


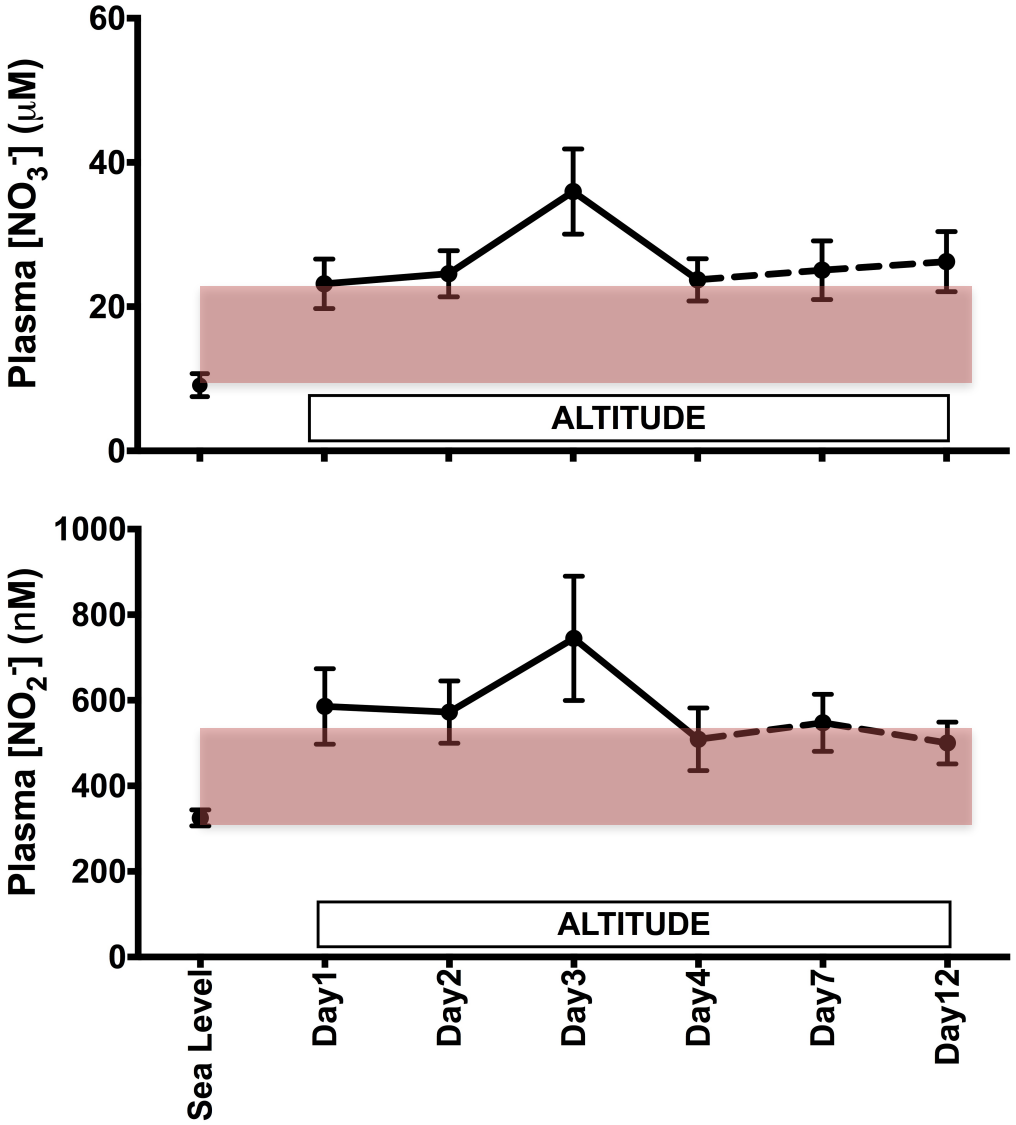

CLE<GET
8'
80% GET
10 min
CLE>GET
15'
50% Δpeak-GET


8'
80% GET
10 min
15'
50% Δpeak-GET

RESULTS

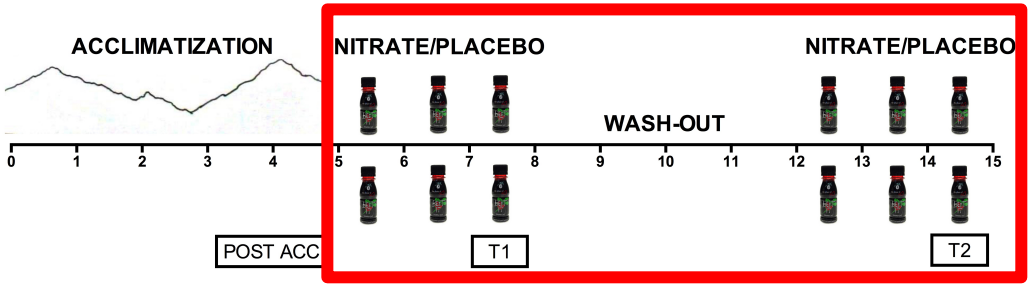
PLASMA [NO_3^-] & [NO_2^-]

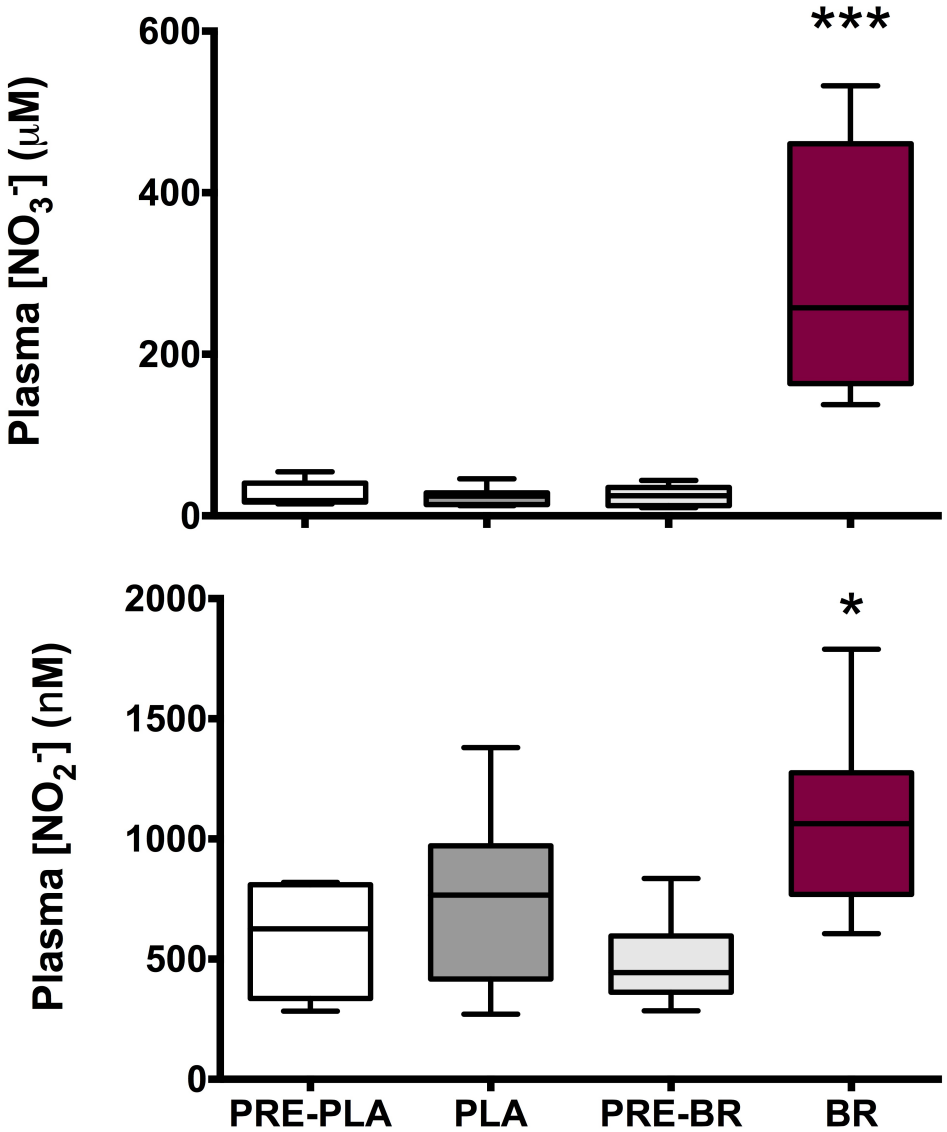




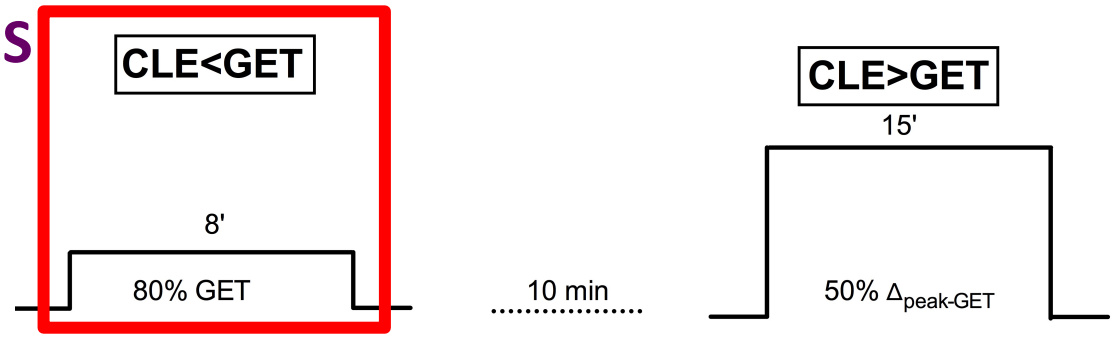
RESULTS

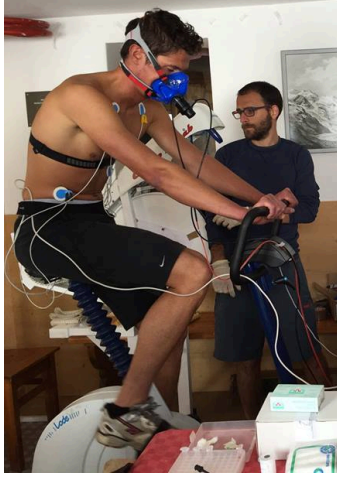
PLASMA [NO_3^-] & [NO_2^-]

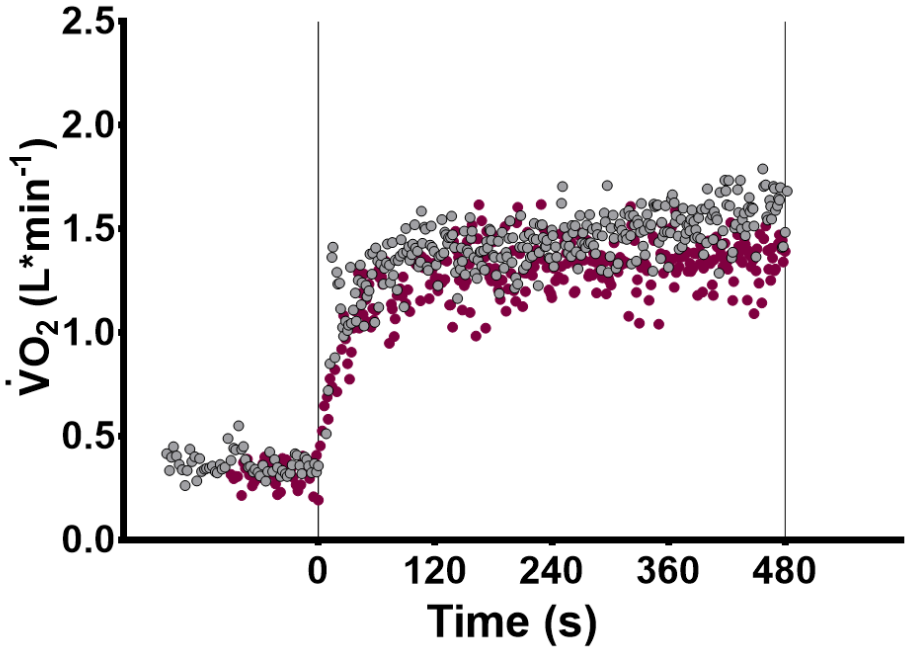


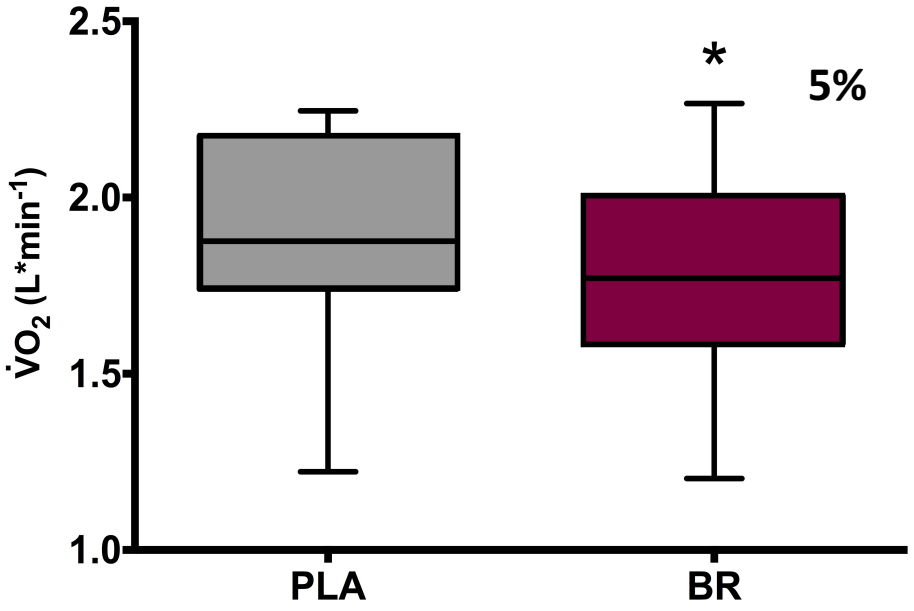


CYCLE-ERGOMETER EXERCISES









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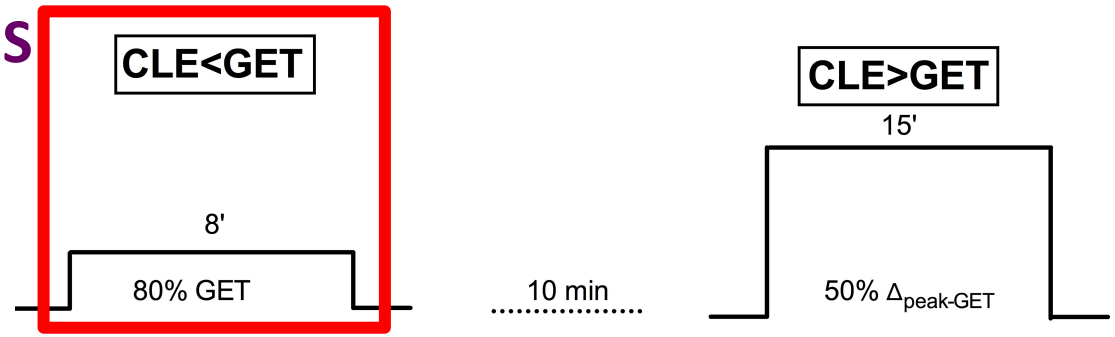
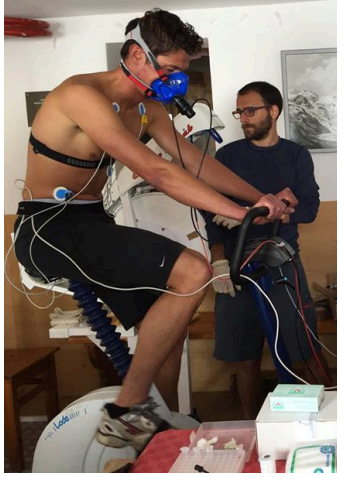
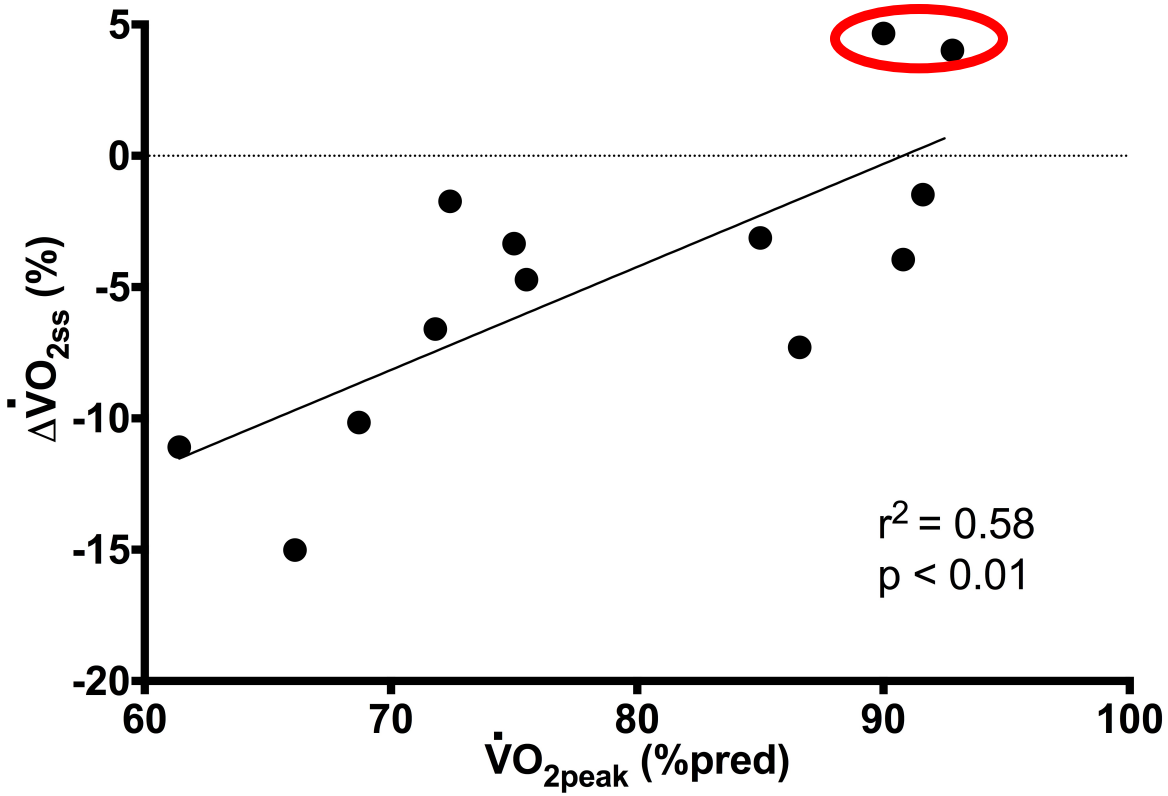
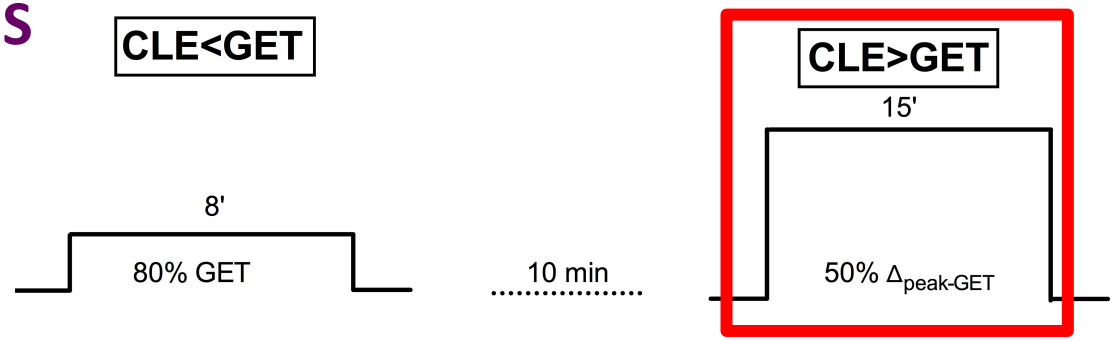
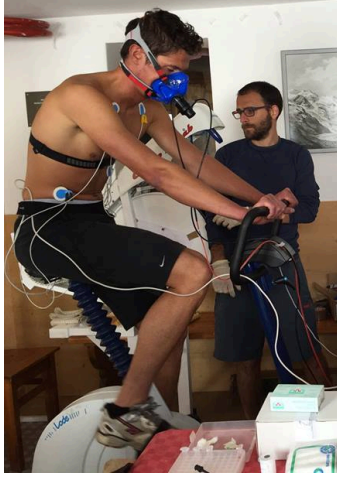


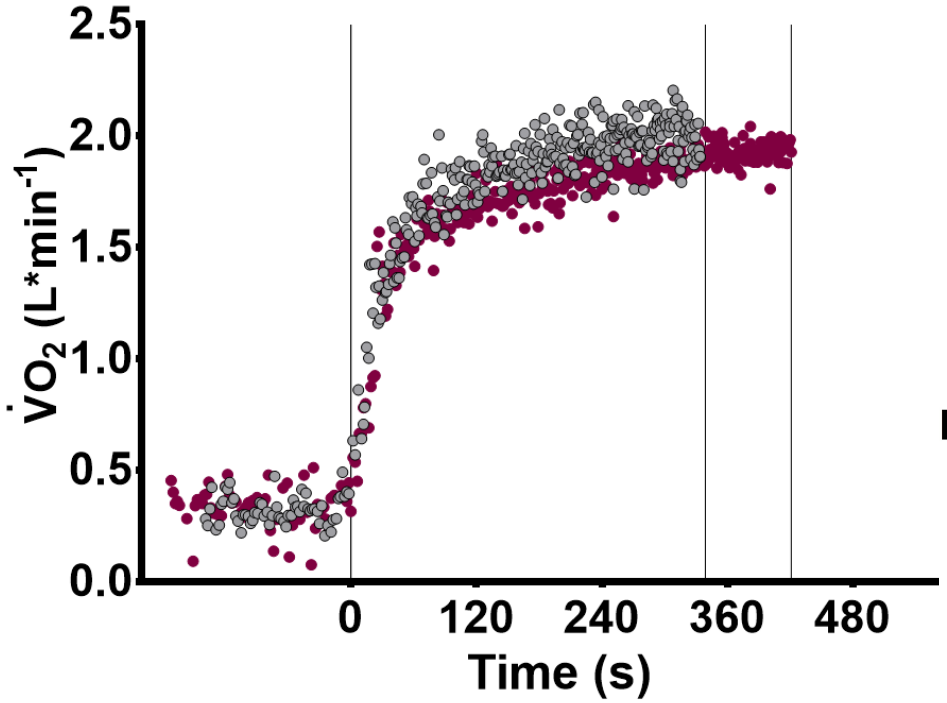


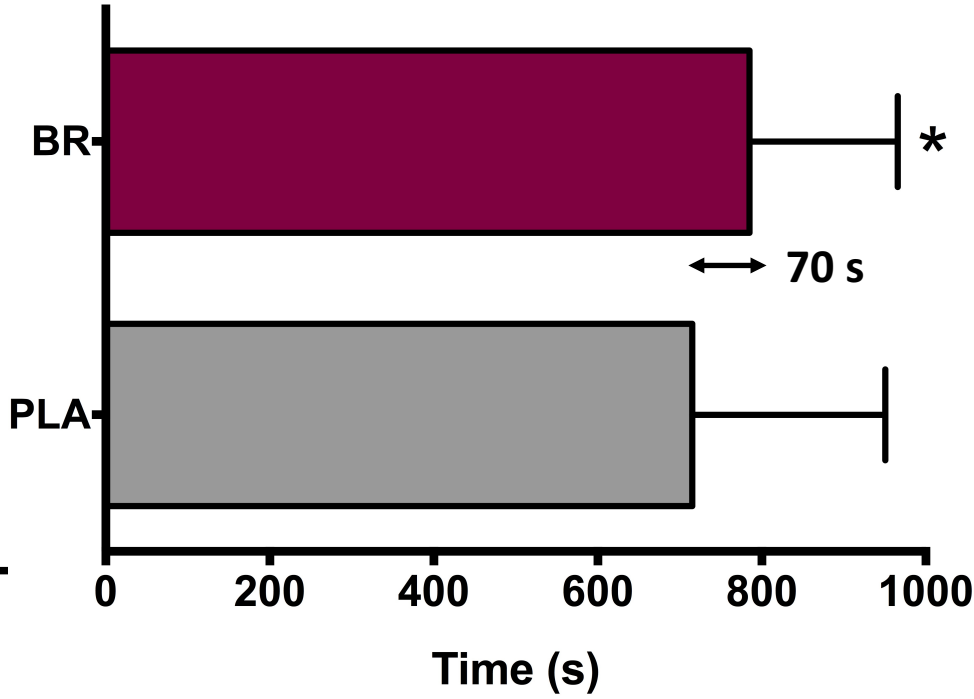


CYCLE-ERGOMETER EXERCISES

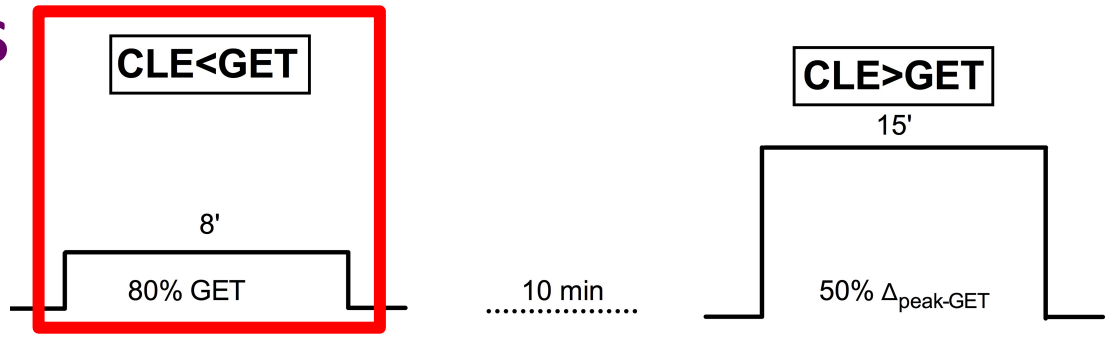


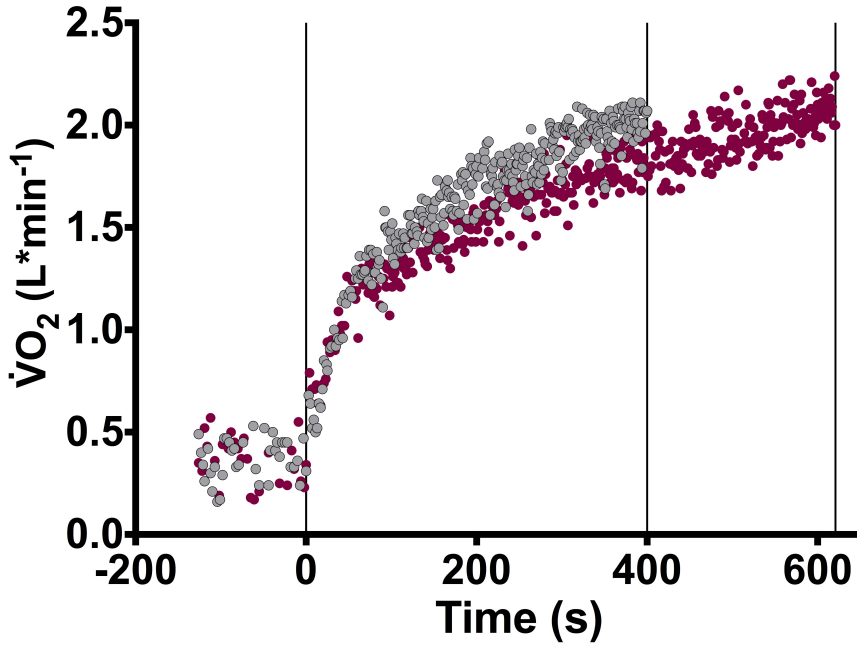


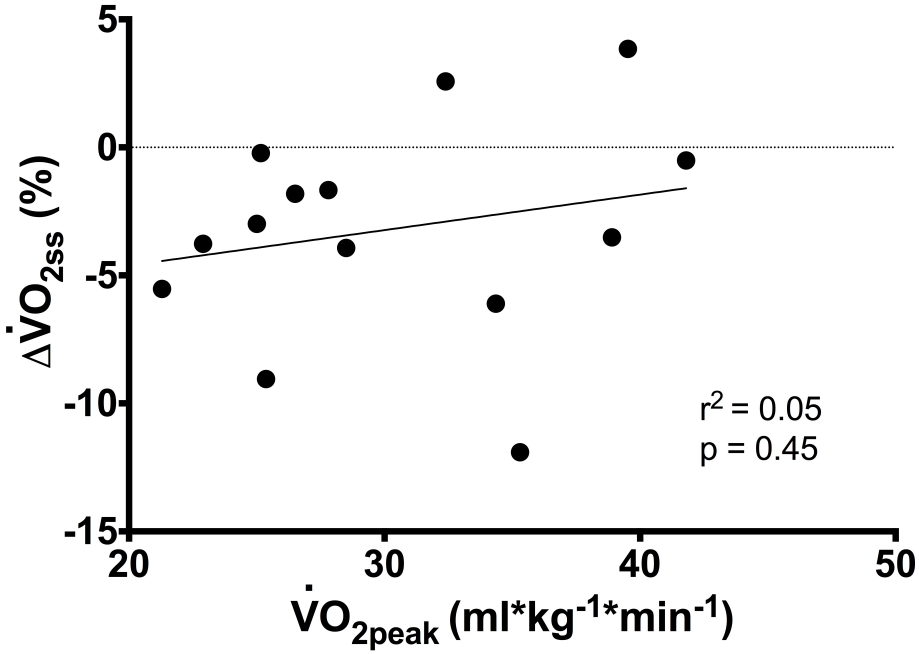




ARM-ERGOMETER EXERCISES







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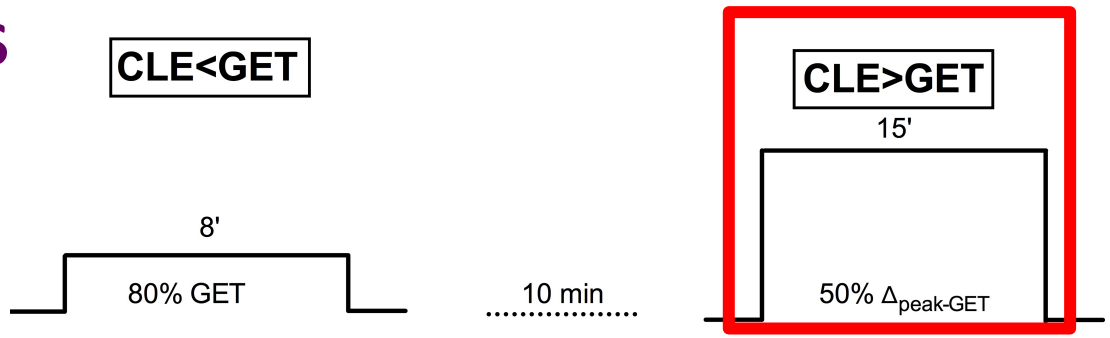
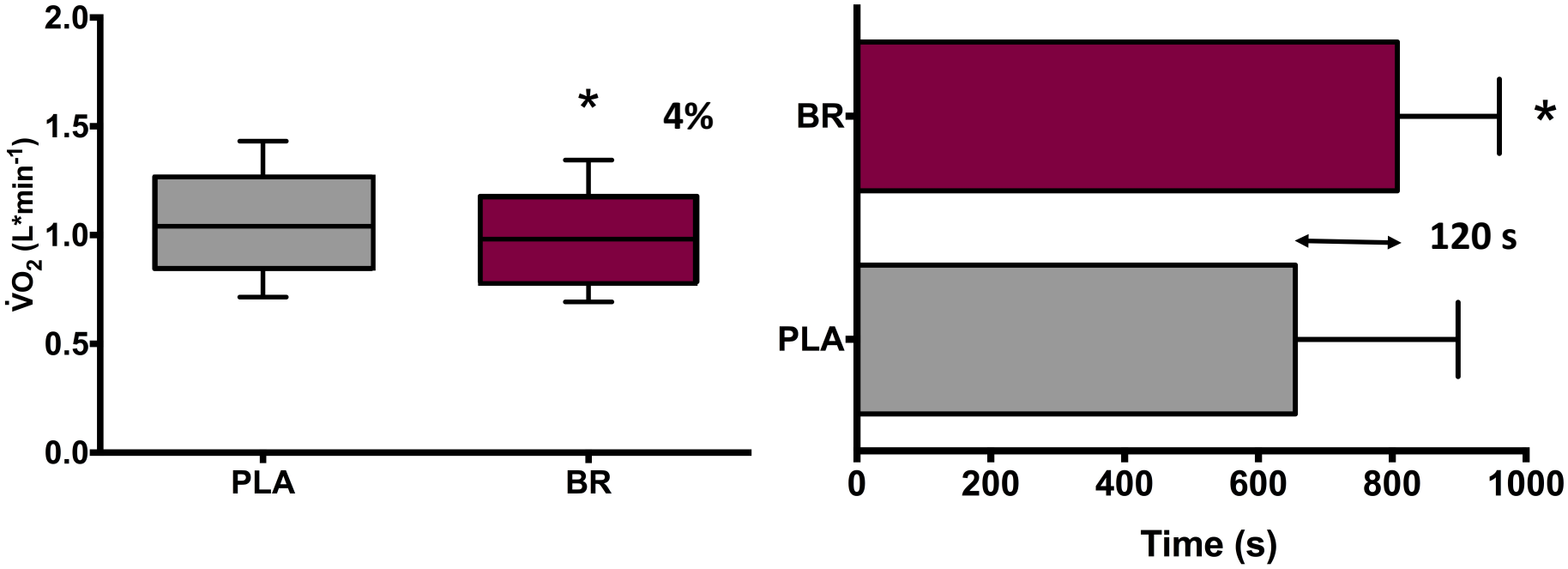
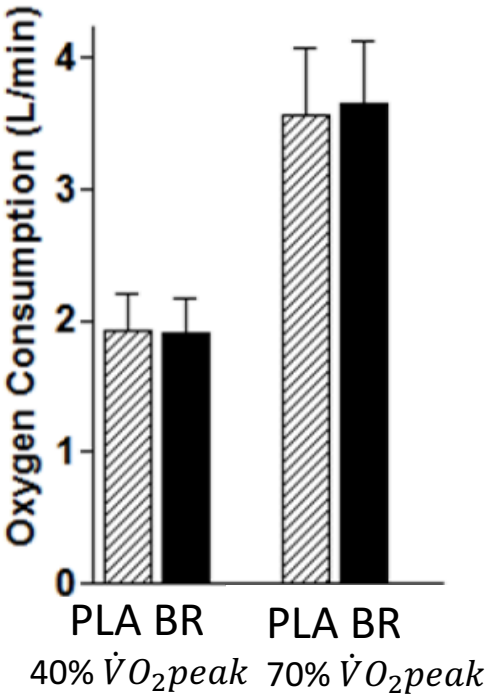




CONCLUSION

Exposure to altitude influences **nitric oxide metabolites**

Dietary nitrate supplementation affects moderate and severe intensity exercises reducing **oxygen consumption** and increasing **time to exhaustion** both in leg and in arm exercises



Carriker et al, *Int J Sport Nutr Exerc Metab*, 2016

In cycle ergometer exercise dietary nitrate supplementation was less effective in subjects with high **fitness level**

TAKE HOME MESSAGE

Dietary nitrate supplementation seems to be a valid aid to enhance exercise efficiency and improve **exercise tolerance** at **high altitude**

THANK YOU FOR YOUR ATTENTION