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Effects of Acute Nitrate Intake on Exhaled Nitric Oxide and Vascular Endothelial Function in Hypoxia

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Nitric oxide (NO) can be produced within the body via NO synthases (NOS) or from dietary nitrate and utilized to regulate blood flow and oxygen delivery through dilation of the vascular endothelium. In chronic hypoxia, highlanders exhibit adaptive increases in NO production to maintain adequate oxygen delivery. Non-adapted individuals, however, exhibit reductions in NO levels which is predicts susceptibility to pulmonary edema and acute mountain sickness. Nitrate supplementation in normoxia increases exhaled NO suggesting an increase in NO levels, and increases brachial artery flow-mediated dilation (FMD). **PURPOSE:** Investigate the effects of acute nitrate supplementation on FMD and exhaled NO in hypoxia. **METHODS:** In a double-blind and randomized study, 8 men (mean age 24±4 years; BMI 24±3 kg/m^2) consumed 70 mL of either 0.45 g of nitrate (NT) or an inert placebo (PL). Brachial artery flow mediated dilation (FMD) and exhaled and salivary nitrate levels were measured before and after 120 minutes of hypoxia (11.5±0.2% O_2) exposure. Brachial artery FMD was assessed with Doppler ultrasound during reactive hyperemia following a standard 5-min ischemia protocol. To determine exhaled nitric oxide levels, participants were asked to exhale at a target force into a hand-held electrochemical device. Salivary nitrate was determined using salivary test strips. **RESULTS:** NT increased salivary nitrate levels (0.1±0.2 to 2.8±1.0 aU, $p<0.05$) while PL had no effect (0.1±0.3 to 0.3±0.4 aU, $p>0.05$). A condition effect was detected for brachial FMD ($p<0.05$). FMD was reduced similarly with hypoxia for the both the NT (8.7±2.7 to 5.9±3.4%) and PL (7.9±2.1 to 5.5±2.8%) conditions. A condition-by-time interaction was detected for exhaled NO ($p<0.001$). Exhaled NO increased during hypoxia with NT (18±5 to 28±10 nmHg) but remained unchanged with PL (19±5 to 20±5 nmHg). **CONCLUSION:** Nitrate supplementation increased exhaled NO during acute hypoxia but had no effect on reductions in brachial FMD. These findings suggest that acute nitrate may increase NO availability in the pulmonary vasculature without having an impact on the peripheral vasculature.