

J Physiol. 2005 Jul 15;566(Pt 2):481-9.

**Metabolic alkalosis reduces exercise-induced acidosis and potassium accumulation in human skeletal muscle interstitium.**

Street D, Nielsen JJ, Bangsbo J, Juel C.

Skeletal muscle releases potassium during activity. Interstitial potassium accumulation is important for muscle function and the development of fatigue resulting from exercise. In the present study we used sodium citrate ingestion as a tool to investigate the relationship between interstitial H<sup>+</sup> concentration and K<sup>+</sup> accumulation during exercise. Seven healthy subjects performed one-legged knee-extensor exercise on two separate days with and without sodium citrate ingestion. Interstitial H<sup>+</sup> and K<sup>+</sup> concentrations were measured with the microdialysis technique. Citrate ingestion reduced the plasma H<sup>+</sup> concentration and increased the plasma HCO<sub>3</sub><sup>-</sup> concentration. Citrate had no effect on interstitial H<sup>+</sup> at rest. The increase in interstitial H<sup>+</sup> concentration during intense exercise was significantly lower ( $P < 0.05$ ) with citrate ingestion compared to control (peak interstitial H<sup>+</sup> concentration 79 versus 131 nM). After 3 min of exercise interstitial K<sup>+</sup> concentration was reduced ( $P < 0.05$ ) in the citrate (alkalosis) compared to the control experiment (8.0 +/- 0.9 versus 11.0 +/- 2 mM) and interstitial K<sup>+</sup> concentration remained lower during the rest of the exercise period. The present study demonstrated a link between interstitial H<sup>+</sup> and K<sup>+</sup> accumulation, which may be through the ATP-sensitive K<sup>+</sup> channels (KATP channels), which are sensitive to changes in H<sup>+</sup>.