Beets and Nitrates for Sporting Improvement?

As the use of nitrate drinks increases, most notably with beetroot juice, a quick review and recommendation seems imperative. First, it is necessary to state, it seems no negative health benefits result from the consumption of nitrate drinks. However, it seems nitrate drinks only appear beneficial for untrained athletes. First, let us consider the potential benefits of nitrates.

**Lactate Reduction**

Some hypothesize lactate reduction would occur with nitrate consumption. However, Nezmar (2011) notes no reduction in lactate, but a reduction in 
\[\text{K}^+\] in untrained individuals.

**NO Alterations**

Now this doesn't mean no alterations, but nitric oxide alterations. Totzeck et al., noted baseline NO2\(-\) correlates with lactate threshold and predicts exercise capacity during an incremental cycle test in highly trained athletes, Wiley and his colleagues argue that it is more than likely that the ability to produce more NO quasi 'on demand' is the underlying cause of the performance increases (Dreissigacker. 2010; Totzeck. 2012). However, these baseline levels are higher in trained vs. untrained athletes, suggesting the NO are more likely in untrained populations (Dreissigacker 2010).

**VO2 Max**

Lansley (2011) provided 0.5 L of 6.2 mmol nitrate two and a half hours prior to maximal cycling output. This study noted no alteration in VO2max in untrained cyclists. Conversely, another study notes a lower O2 cost at a sub-maximal task. This suggests improved mitochondrial efficiency (Jones 2013). Once again, this was performed in an untrained population. Lastly, Peacock (2012) noted no alterations in oxygen uptake after consuming a potassium-nitrate drink in elite cross-country skiers.

**Prevents Creatine Phosphate Depletion**

In swimming, specifically short course, the creatine phosphate system or alactic system is commonly used. The physiology of nitrates for preventing creatine phosphate depletion is still being studied, but this hypothesis suggests NO increases skeletal muscle glucose uptake, the correspondingly lower blood glucose levels the researchers observed in the active arm. This indicates readily available glucose will spare the PCr stores.

**Prevent Potassium Leakage**

Lactic Acid and Muscular Fatigue by Dr. Ernest Maglischo is a great read about the myths and facts of lactate and fatigue in swimming. One area not discussed by Dr. Maglischo is the possibility of electrical imbalances contributing to fatigue. As postponed fatigue may result if the the distribution of K and Na ions inside and respectively outside of the muscle cell are maintained.

**Maximal Power**

In this same study, an improvement in maximal power occurred (Lansley 2011). In another study providing 2x250 mL/day of beetroot juice, Kelly (2013) did not note an improvement in maximal power in recreationally trained cyclist.

**Performance**

The same Kelly study notes an improvement in performance (Kelly 2013), unfortunately no alterations in power or watts were noted.

**Conclusion**

It is clear, more research is needed on elite and trained athletes. Moreover, the reason for potential improvement is still muddy even in un- or moderately trained athletes. Personally, for trained populations, I don't see nitrates or beets providing any ergogenic benefit. However, if you wish to try beetroot juice, simply try consuming beetroot juice 3 hours before a workout/performance, there is no harm in that!
References:


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