

Skeletal muscle monocarboxylate transporter 4 content is associated with endurance performance

YXR Harley¹, A St Clair Gibson¹, TD Noakes¹, M Collins²

UCT/MRC Research Unit for Exercise Science and Sports Medicine of the ¹Department of Human Biology, Faculty of Health Sciences, University of Cape Town and the ²Medical Research Council

Aims: Lactate flux may affect the development of fatigue, and hence performance during endurance exercise, by 1) influencing the rate of glycolysis, 2) altering the supply of lactate as a respiratory fuel and 3) regulating muscle pH. Monocarboxylate transporters (MCTs) play an important role in exercising muscle by facilitating lactate transport across cell and mitochondrial membranes. Training studies suggest that a greater skeletal muscle MCT content may be related to superior athletic capability, however the relationship between MCTs and endurance performance is not yet well understood. The content of the two major MCT isoforms expressed in skeletal muscle (MCT1 and MCT4), was therefore examined in relation to endurance performance. **Methods:** Muscle biopsies were taken from the vastus lateralis of 19 male sub-elite distance runners. The total MCT1 and MCT4 content of the muscle samples were determined using Western Blotting.

Results: Muscle MCT4 content correlated significantly with the runners reported personal best 10 km race time ($r=-0.5655$, $p<0.05$). MCT1 content was not significantly correlated with 10 km time.

Conclusions: A greater MCT4 content in the muscle of sub-elite runners was associated with a faster 10 km race performance. A greater muscle MCT4 content may therefore be beneficial during endurance exercise. This is suggested to be due to: 1) enhanced MCT4-mediated efflux of lactate from the muscle cell, allowing the continuation of glycolysis during exercise, and 2) the associated efficient efflux of H^+ ions, which would delay fatigue by preventing high levels of acidity in the cell.