The effect of taurine and β-alanine supplementation on taurine content and contractile properties of skeletal muscle in the mdx mouse

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The amino acid taurine (Tau) has been suggested as a possible beneficial compound in the treatment of Duchenne muscular dystrophy (DMD) due to its effects on multiple targets associated with DMD pathology. There is evidence that the mdx mouse (a model of DMD) has lower Tau levels compared to controls during degeneration and that increased Tau levels in skeletal muscle correlates with tissue repair and restoration of function (McIntosh *et al.*, 1998). β-alanine competitively inhibits Tau uptake and has been previously reported to decrease Tau in skeletal muscle by up to 50% in rats (Dawson *et al.*, 2002). This decrease was associated with impaired exercise tolerance and an increase in fatigue.

This study examined skeletal muscle taurine levels (*plantaris* and diaphragm) and contractile function (*extensor digitorum longus* (EDL)) of six month old male control (C57BL10) and mdx mice after 4 weeks of 3% taurine or 3% β-alanine supplementation *via* drinking water. Muscles tested were dissected out under anaesthesia (40-50mg/kg of Nembutal i.p.) in accordance with the approval granted from the Victoria University Animal Ethics Experimentation Committee. Contractile function including a fatigue protocol was assessed (30°C, 70Hz, 250ms for 1 min) as previously described (Hamilton *et al.*, 2006). Recovery post-fatigue was then followed for 1 hour and tetanic force measurements recorded at 1, 2, 5, 10, 20, 30, 45 and 60 minutes.

Four weeks of Tau or β-alanine supplementation significantly ($p < 0.05$) increased and decreased skeletal muscle Tau levels, respectively. β-alanine supplementation reduced fatigue ($p < 0.05$) in both control and mdx mice, however Tau showed a similar effect in the mdx muscles only. After 10 minutes of recovery mdx Tau supplemented muscles produced significantly more force ($p < 0.05$) than both the β-alanine and non-supplemented mdx groups. Taurine supplementation had no effect on the recovery of the control group. β-alanine supplementation improved recovery in the control mice up to 10 minutes with no significant difference between supplement groups observed after this time.

The findings suggest that taurine may be able to decrease fatigue and improve recovery in the mdx mouse.

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