Taurine supplementation can improve *tibialis anterior* force production and muscle architecture: A comparison between the 28 and 70 day old *mdx* mouse model of Duchenne muscular dystrophy

R.G. Barker,[1] C. van der Poel,[2] R.M. Murphy[1] and D. Horvath,[2] [1]Department of Zoology, La Trobe University, Melbourne, VIC 3086, Australia and [2]Department of Human Biosciences, La Trobe University, Melbourne, VIC 3086, Australia.

Taurine supplementation has been shown to increase force production of skeletal muscle in adult *mdx* mice, however, a limitation is that these affects are only evident in animals that had first been exercised to induce damage. This is because the *mdx* mouse has a natural reduction in the pathology experienced during adulthood compared to humans with DMD. The peak damage period in an *mdx* mouse is 21-28 d, and so we investigated taurine supplementation during this peak damage period.We previously reported that specific and peak twitch forces were decreased in 28 d *mdx* mice compared with wild-type (WT) mice, and that those forces were less attenuated when mice of the same age had been treated with taurine for 28 d (Barker *et al.*, 2012).

In the current study, we extended our previous work to determine whether taurine had a similar effect in 70 d *mdx* mice. Offspring from C57BL/10ScSn (WT), *mdx* and *mdx* taurine (Tau) supplemented mice (n = 4, 9, 7 respectively) were obtained and utilised for experimentation at 70 d (± 1 d). Supplemented *mdx* offspring received taurine (dose 3%) in drinking water for 70 d. At 70 d, mice were anaesthetised with Nembutal (6mg/ml) in accordance with the La Trobe University Animal Ethics Committee. *In situ tibialis anterior* (TA) muscle force characteristics were measured. Mice were euthanized by Nembutal overdose post experimentation.

Taurine increased both specific and peak twitch force in 28 d *mdx* mice but no differences were observed in the complimentary 70 d groups (Figure left). In support of the literature, preliminary whole muscle western blotting appears to indicate an up-regulation in the structural protein utrophin in 70 d *mdx* mice compared to WT controls, which was not apparent in 28 d mice (Figure right). Haematoxylin and eosin (H&E) staining of the contracted TA of 70 d mice (n = 4 per group) identified extensive damage in *mdx* mice, as seen by centralised nuclei and highly variant fibre sizes, that were less prominent in the Tau mice which more closely emulated the WT. This apparent improvement in muscle architecture in 70 d Tau mice was not seemingly as great as 28 d Tau mice (Barker *et al.*, 2012), likely due to less attenuation of muscle taurine content in the older mice (Horvath, 2011).

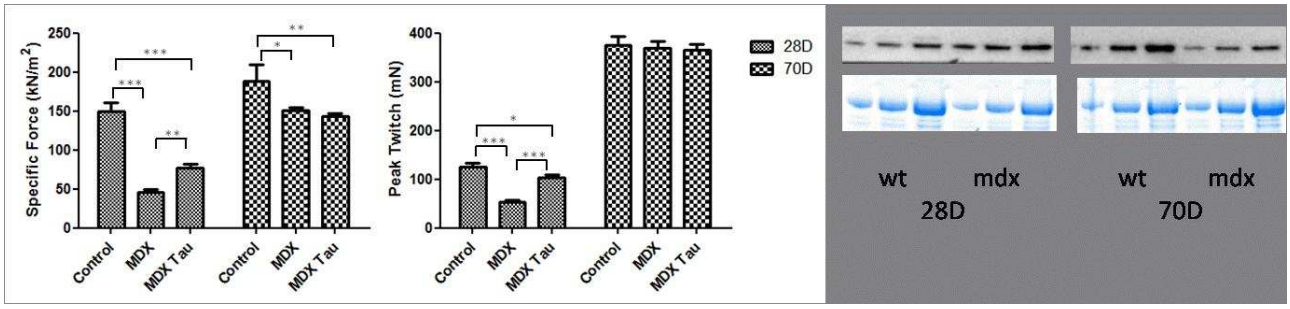

Figure. **Left:** Specific and peak twitch force of the contractile TA of WT, *mdx* and *mdx* Tau treated 28 and 70 d mice. **Right:** Whole muscle western blot comparing 28 and 70 d WT and *mdx* mouse Utrophin expression. Mean ± SD, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, 1-way ANOVA, Newman-Keuls *post-hoc*.

Barker RG, van der Poel C, Murphy RM, Horvath D. (2012) Taurine improves *tibialis anterior* force production and muscle architecture in the 28 day old mdx mouse model of Duchenne muscular dystrophy, *Proceedings of the Australian Physiological Society*, **43**, 47P.

Horvath DM. (2011) The effect of taurine on dystrophic muscle function. PhD thesis, *Faculty of Health, Engineering and Science.* Victoria University.