Formoterol-induced hypertrophy of slow-twitch skeletal and cardiac muscle is reversible after withdrawal of treatment

J.G. Ryall, J.D. Schertzer and G.S. Lynch, Basic and Clinical Myology Laboratory, Department of Physiology, The University of Melbourne, Victoria 3010, Australia.

β_2-agonists, such as formoterol, have potent muscle anabolic effects and therapeutic potential for pathologies where muscle wasting is indicated, such as cancer cachexia, muscular dystrophy and sarcopenia. For muscle wasting and weakness it is important to determine what effect withdrawal of formoterol treatment will have on muscle mass and force producing capacity. We tested the hypothesis that the hypertrophy of rat skeletal muscle after treatment with a micromolar dose of formoterol, would persist even after withdrawal of treatment. Fischer 344 rats (3 months/age, n = 8/group) were treated with either formoterol (25 μg/kg/day, i.p.) or saline vehicle for four weeks, after which time treatment was withdrawn for a further four weeks. After treatment and withdrawal, rats were anaesthetised with sodium pentobarbitone (60 mg/kg, i.p.) and the fast-twitch EDL and predominantly slow-twitch soleus muscles were surgically excised for determination of contractile properties *in vitro*. At the completion of the experiments the still anaesthetised rats were killed by cardiac excision. After treatment withdrawal, EDL muscle mass and force producing capacity remained above control levels (8% and 12% respectively, $P < 0.05$), but soleus muscle mass and force producing capacity were not different from control. Heart mass after formoterol withdrawal was not different from control. These findings indicate that the cardiac hypertrophy in young rats after formoterol administration is reversible, whereas effects on fast-twitch muscle are more permanent.

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