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# Anabolic signalling in individual muscle fibres following resistance exercise in combination with amino acid intake

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**Objective** Human muscle consists of a mixture of fibres with different contractile and metabolic properties, type I (slow-twitch) and type II (fast-twitch) fibres. Little is known about the effect of anabolic stimuli, in particular nutrition, on the molecular response in the different fibre types. Here, we examine the effect of resistance exercise and essential amino acid (EAA) supplementation on mTOR signalling in individual type I and type II human muscle fibres.
**Methods** Five strength-trained male subjects performed two sessions of leg press exercise (10 x 10 repetition at 62-85 % of 1RM). During exercise and recovery, the subjects ingested an aqueous solution with EAA (290 mg/kg) or flavoured water (placebo). Muscle biopsies were taken from the vastus lateralis before and 90 min after exercise. The biopsies were freeze-dried and single fibres dissected out and weighed (range 0.9 – 8 ug). The fibres were individually homogenized and analysed for proteins in the mTOR pathway using Western blot. Membranes were repeatedly stripped and fibres were identified as type I or type II following incubation with antibodies against the different myosin isoforms.
**Results** Exercise led to a significant increase in mTOR and p70S6k1 phosphorylation and a fall in eEF2 phosphorylation, similar in both fibre types. There was a large variation between individual fibres; some fibres were highly activated whereas others were not activated at all despite the heavy exercise performed. Intake of EAA caused a 2- to 6-fold higher increase in mTOR and p70S6k1 phosphorylation in both type I and type II fibres as compared to intake of placebo, with no difference between the fibre types. The phosphorylation of eEF2 was not affected by intake of EAA. The total expression of p70S6k1 and eEF2 was 145% and 155% higher in type II than in type I fibres ($P<0.05$), respectively, whereas no difference between the fibre types was observed for mTOR protein.
**Conclusions** The response to heavy resistance exercise regarding mTOR signalling was similar in type I and type II fibres in trained subjects, but with a large variation between single fibres of both types. Furthermore, ingestion of EAA enhanced the effect of resistance exercise on phosphorylation of mTOR and p70S6k1 in both fibre types.