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High and moderate intensity strength exercises to exhaustion activate different signaling cascades regulating protein metabolism in trained skeletal muscle

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Objective The aim of the study was to evaluate the activation of signaling cascades regulating protein synthesis and degradation after strength exercise sessions of high and moderate intensity in the muscles of athletes adapted to strength training.
Methods Eight strength-trained men were recruited for the experiment. The volunteers performed 4 sets of leg press to volitional fatigue with moderate intensity (65% 1RM) for one leg and 4 sets of leg press to volitional fatigue with high intensity (85% of 1RM) for contralateral leg. The sets for both legs were performed in turn with rest intervals of 2 min. Biopsy from *m. vastus lateralis* was performed before, 1, 5 and 10 hours after cessation of exercise. Content of signaling proteins was evaluated using Western blot.
Results Total work performed by the leg during moderate intensity strength exercise was 32% ($P<0,001$) higher in comparison with contralateral leg performing high intensity exercise. The phosphorylation levels of $p70S6k^{Thr389}$ and $4E\text{-}BP1^{Thr37\,/\,46}$ increased only after the exercise of moderate intensity ($P<0.05$). On the contrary, the phosphorylation level of $ERK1\,/\,2^{Thr202\,/\,Tyr204}$ increased only after the exercise of high intensity ($P<0.05$). The level of phosphorylation of $eEF2^{Thr56}$ significantly decreased after 1 ($P<0.001$), 5 ($P<0.01$) and 10 ($P<0.01$) hours after the exercise of high intensity. The phosphorylation level of ACC^{Ser79}, an AMPK activation marker, was significantly increased 1 hour after the exercise of moderate intensity ($P<0.01$). The phosphorylation level of $FOXO1^{Ser256}$ significantly decreased after the exercises of both intensities (5 hours after the exercise of moderate intensity, $P<0.001$; 1 hour after the exercise of high intensity, $P<0.05$).
Conclusions Strength exercises of high and moderate intensity, performed to volitional fatigue, may cause activation of different signaling cascades. Herewith, activation of mTORC1 after strength exercise is more dependent on the total work, whereas the ERK1 / 2 and eEF2 activation on the exercise intensity.
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