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Greater muscle damage induced by fast versus slow velocity eccentric exercise.

Chapman D(1), Newton M, Sacco P, Nosaka K.

Author information:
(1)School of Exercise, Biomedical and Health Sciences, Edith Cowan University, Joondalup, Western Australia.

Debate exists concerning the effect of contraction velocity on muscle damage, and few human studies have yet to address this issue. This study examined whether the velocity of eccentric exercise affected the magnitude of muscle damage. Twelve untrained subjects performed a series of slow velocity isokinetic eccentric elbow flexions (SV: 30 degrees . s (-1)) of one arm and a fast velocity exercise (FV: 210 degrees . s (-1)) of the other arm, separated by 14 days. In order to standardise the time under tension (120 s) for the two conditions, the number of muscle actions for SV was 30 and 210 for FV. Criterion measures consisted of maximal voluntary torque for isometric, concentric (4 velocities) and eccentric contractions (2 velocities), range of motion (ROM) and relaxed elbow joint angle (RANG), upper arm circumference, muscle soreness and plasma creatine kinase (CK) activity. Measures were taken before, immediately after, 0.5 hour and 24 - 168 hours (240 hours for CK) after each eccentric exercise protocol, and changes in the measures over time were compared between FV and SV by two-way repeated measures ANOVA. Both protocols resulted in significant decrements in isometric and dynamic torque ($p < 0.01$), but FV showed significantly ($p < 0.05$) greater reductions over time (approximately 55 %) and a slower recovery compared to SV (approximately 30 %). Significantly ($p < 0.05$) larger decreases in, and delayed recovery of, ROM and RANG were evident after FV compared to SV. FV had significantly ($p < 0.05$) larger increases in upper arm circumference and soreness compared to SV, and peak plasma CK activity was 4.5-fold greater ($p < 0.05$) following FV than SV. These results suggest that, for the same time under tension, fast velocity eccentric exercise causes greater muscle damage than slow velocity exercise in untrained subjects.

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