

Effects Of Age, Gender, And Myostatin Genotype On The Hypertrophic Response To Heavy Resistance Strength Training.

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OBJECTIVES:

The primary purpose of this study was to compare muscle mass responses of young and older men and women to the same relative strength training (ST) and detraining protocols. A second aim was to assess the possible role of myostatin genotype on muscle mass response to ST. Twenty two young men and women (age 21-29 years), and 23 older men and women (age 65-75 years), had both quadriceps muscle volumes measured using magnetic resonance imaging (MRI) before and after ST and detraining. Training consisted of knee extension exercises of the dominant leg three times per week for 9 weeks. The non-dominant leg was left untrained throughout the ST program. Subjects then underwent 31 weeks of detraining during which no regular exercise was performed. Myostatin genotype was determined in a subgroup of two subjects, of which five female subjects were carriers of a myostatin gene variant.

RESULTS:

Muscle volume increased significantly in the trained leg of all groups. A significantly greater absolute increase in muscle volume was observed in men than in women (204 +/- 20 vs 101 +/- 13 cm³, $p < .01$), but there was no significant difference in muscle volume response to ST between young and older individuals. The gender effect remained after adjusting for baseline muscle volume. In addition, there was a significantly greater loss of absolute muscle volume after 31 weeks of detraining in men than in women (151 +/- 13 vs 88 +/- 7 cm³, $p < .05$), but no significant difference between young and older individuals. Myostatin genotype did not explain the hypertrophic response to ST when all 32 subjects were assessed. However, when only women were analyzed, those with the less common myostatin allele exhibited a 68% larger increase in muscle volume in response to ST.

CONCLUSIONS:

This study shows that aging does not affect the muscle mass response to either ST or detraining when comparing young and older individuals in the same study using the same training protocol, whereas gender does. Men increased their muscle volume about twice as much in response to ST as women did, and experienced larger losses in response to detraining than women. Myostatin genotype may play a role in the hypertrophy response to strength training for women, but future studies are needed with larger subject numbers in each genotype group to confirm this observation. This study makes it clear that aging skeletal muscle retains the capacity to fully adapt to a strength training stimulus.