

## **Mini-review.**

### **THE EFFECTS OF HYPERTROPHIC HEAVY STRENGTH TRAINING ON BODY COMPOSITION**

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#### **Introduction and methods**

It is very well known that heavy strength training can induce substantial skeletal muscle growth (hypertrophy). Not always but often it also accompanies a body fat decrease.

It is difficult to compare studies because of tons of different training regimens used, variations in subjects initial fitness status etc. Nevertheless, in this mini-review I reviewed 9 studies using women and 12 using men as subjects. Inclusion criteria were: a) training was “hypertrophic” big muscle group training using ~5-20 repetitions in multiple of sets per body and b) normal dynamic constant external resistance training of 7-24 weeks in duration without using extra pharmacological or nutritional supplements (e.g. creatine) and c) 2-4 workouts per week. Studies using professional body builders as subjects are excluded. To decrease the effect of the variation in the duration of the studies reviewed I averaged results as kilograms or percents to 4 week duration (~month training).

Lean body mass (LBM) equals total body mass (TBM) without fat and furthermore, total body mass equals lean body mass plus fat weight. Not all of the lean body mass is skeletal muscle, but nevertheless it can be used as a robust measure of skeletal muscle mass change during strength training.

## **Results and discussion**

In the studies reviewed the average duration was 11.9 weeks (in men 10.9 and in women 12.6), frequency = 2.6 times a week (in men 2,7 and in women 2,6), repetitions per set = ~10, exercises per workout = 6.5 (in men 6.6 and in women 6.4). In men the average four-week training increase in TBM was  $0.40 \pm 0.33$  (SD) kg. At the same time the LBM  $0.56 \pm 0.46$  kg and percent of body fat (%fat) decreased 0.65 %. In women the increase in TBM was  $0.11 \pm 0.32$  kg and the increase in LBM  $0.51 \pm 0.40$  kg. Furthermore, in women the %fat decreased 0.61 %. The lean body mass increase was also higher than whole body mass increase indicating that in addition to the percent body fat decrease the absolute body fat decreased also a little. Thus, muscle mass increase is possible with concurrent decrease in body fat unlike the urban legend says!

The results are depicted in figure 1.

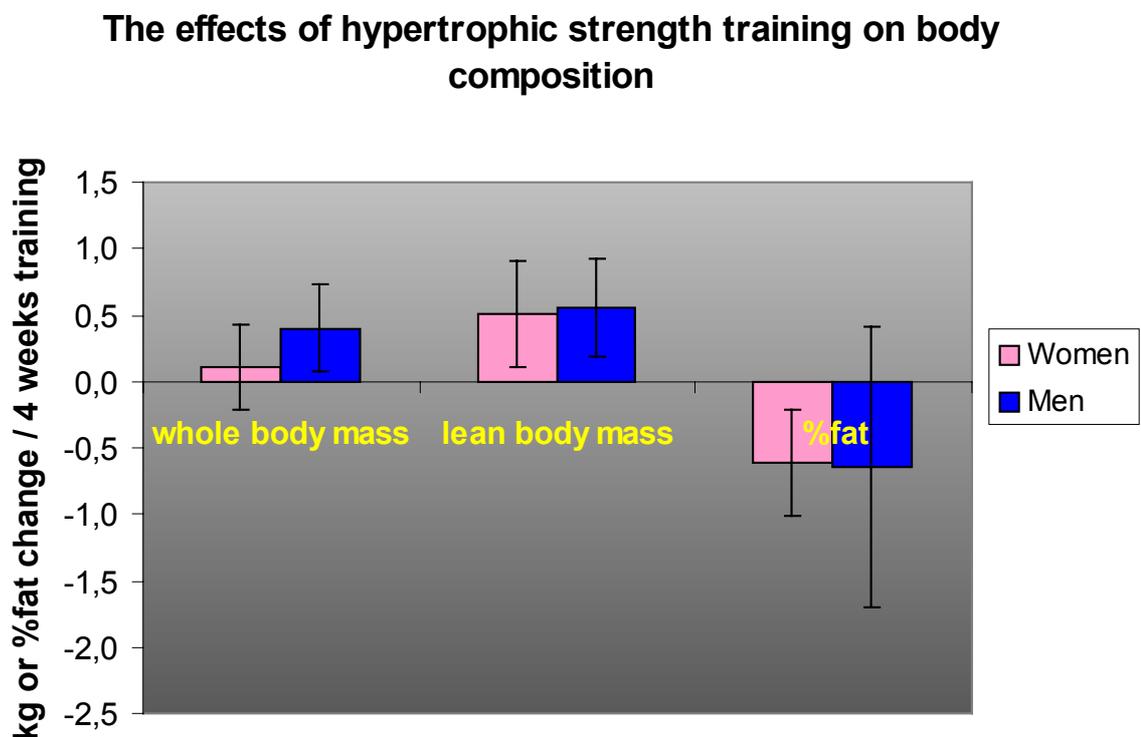


Figure 1. The effects of hypertrophic strength training on whole body mass, lean body mass and %fat.

***In conclusion:*** heavy hypertrophic strength training regimens reviewed in this study **increased lean body mass averagely ~0.5 kg and decreased percent fat ~0.6% per one month training.** In practice, the changes in lean body mass and percent fat were same in men and in women. The research clearly shows that significant increase in muscle mass is possible in both women and men without simultaneous increase in body fat even without a help of pharmacological substances!

## **References**

### **Women:**

Withers 1970  
Brown & Wilmore 1974  
Mayhew & Gross 1974  
Wilmore et al. 1978  
Hunter 1985  
Staron et al. 1989  
Staron et al. 1991  
Staron et al. 1994  
Häkkinen et al. 2001

### **Men:**

Withers 1970  
Fahey & Brown 1973  
Misner et al. 1974  
Coleman 1977  
Wilmore et al. 1978  
Gettman et al. 1979  
Hunter 1985  
Pierce et al. 1993  
Staron et al. 1994  
Häkkinen et al. 2002  
Esmarck et al. 2001  
Campos et al. 2002

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