Body Composition and Aging

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Human Aging

- Several chronic diseases
- Increase in body fatness
- Decrease in skeletal muscle mass
- Decline in metabolic rate
- Decline in muscle strength
- Decline in functional capacity

Age-related changes in body composition

- Novak (1972): body fat increased from 18 to 36% and 33 to 44% in men and women (18 to 85 years).
- Tzankoff (1978): skeletal muscle mass declined 6% per decade
- Sarcopenia: most impor. factor assoc. with changes in BC in elderly.

Age-related changes in muscle fibers

- Decline in type I and type II fibers.
- Early studies (1972, 1978): increase in type I fibers and decrease in type II.
- More recent (1983, 1986): both fibers affected the same.

Energy Metabolism

- Energy expenditure declines throughout adult life.
- Sarcopenia: lower basal metabolic rate.

Physical Activity

- Exercise and the prevention of sarcopenia.
- Resistance training exercises: improved muscle mass, strength, basal metabolic rate and restoration of muscle function.

Resistance Training

- Frontera (1988): 12 men, 12 weeks, quads/hams, 66 yrs: 200 and 100% increase in strength.
- Protein turnover: 38%.
- Muscle hypertrophy.

Resistance Training

- Fiatorone (1994): 100 nursing home residents, 87 yrs, 10 wks.
- Muscle strength: 113%.
- Cross-Sectional area muscle: 2.7%.

Resistance Training

- Increases in muscle mass and function due: improved muscle protein synthesis and/or breakdown.
- Yarasheski (1993): After 2 weeks of training, 63-66yrs, protein synthesis increased, protein breakdown not changed.

Resistance Training

- Increased resting metabolic rate
- Pratley (1994): 8% increase following 16 wks training, 50 and 65 years.
- Campbell (1994): 7% increase following 12 weeks trng, 56 to 80 yrs, energy requirement increased by 15% over the course of training.

Diet

- Dietary modification alone does not seem to affect gains in muscle strength or size.
- Fiatorone (1994): protein energy formula (360 kcal day, 60% cho, 23% fat, 17% soy protein). No effect on muscle strength and size.

Diet

- Meredith (1992): 12 male, 61 to 72 yrs, 12 weeks trng.
- Diet supplement: 560 kcal, 17% protein, 43% cho, 40% fat).
- Group w/ supplement: gained more lean mass, fat tissue but no gains in strength.

Summary Sarcopenia

- decreases resting metabolic rate
- affects body composition
- Others: osteoporosis, obesity
- Resistance training: hypertrophy, muscle strength, mass, RMR.
- Diet alone: does not affect gains in skeletal muscle mass.