

**Age related changes in skeletal muscle strength and modifications through exercise:  
A literature review**

**CHAPTER 1**

**INTRODUCTION**

**INTRODUCTION**

In American society, relaxation is a prototypical benefit one strives for, expects and supposedly deserves as a result of retirement and advancing age. This relaxation often comes to mean adopting a more sedentary lifestyle than is typical of our predominately sedentary society. It is often thought that this relaxation is needed because of what is seen as the expected but undesirable sequela of aging, reduced muscular speed and strength.[1] Numerous investigators have shown that there is a decrease in muscular strength associated with aging[2-15] and that this decreased strength has a direct and deleterious effect on the ability of the elderly to perform activities of daily living[2, 4, 8-10, 16-18]. This review looks at the research that has investigated this decrease and reversing the decrease in skeletal muscle strength associated with aging.

**BIBLIOGRAPHY**

1. Linenger J, West L. Epidemiology of Soft-Tissue/Musculoskeletal Injury Among US Marine Recruits Undergoing Basic Training. Mil Med 1992;157[9]:491-3.

2. Fiatarone MA, Marks EC, Ryan ND, Meredith CN, Lipsitz LA, Evans WJ. High intensity strength training in nonagenarians: effects on skeletal muscle. *JAMA* 1990;263[22]:3029-34.
3. Frontera W, Hughes V, Lutz K, Evans W. A cross-sectional study of muscle strength and mass in 45- to 78-year-old men and women. *J Appl Physiol* 1991;71:301-16.
4. Bassey EJ, Fiatarone MA, O'Neill EF, Kelly M, Evans WJ, Lipsitz LA. Leg extensor power and functional performance in very old men and women. *Clin Sci* 1992;82:321-7.
5. Klitgaard H, Mannoni M, Schiaffino S, et al. Function, morphology and protein expression of ageing skeletal muscle - a cross-sectional study of elderly men with different training backgrounds. *Acta Physiol Scand* 1990;140:41-54.
6. Aniansson A, Sperling L, Rundgren A, Lehnberg E. Muscle function in 75 year old men and women: a longitudinal study. *Scand J Rehab Med* 1983;9:92-102.
7. Davies C, Thomac D, White M. Mechanical properties of young and elderly human muscle. *Acta Med Scand Suppl* 1985;711:219-26.
8. Fiatarone S, Kehayias J, Lipsitz L, Evans W. Exercise training and nutritional supplementation for physical frailty in very elderly people. *NEJM* 1994;330[25]:1769-75.

9. MacLennan W, Hall M, Timothy J, Robinson M. Is weakness in old age due to muscle wasting? *Age Ageing* 1980;9:188-92.
10. Wickham C, Cooper C, Martetts B, Barker D. Muscle strength, activity, housing and the risk of falls in elderly people. *Age Ageing* 1989;18:47-51.
11. Young A, Stokes M, Crowe M. The size and strength of the quadriceps muscles of old and young men. *Clin Physiol* 1985;5:145-54.
12. Judge J, Whipple R, Wolfson L. Effects of resistive and balance exercises on isokinetic strength in older persons. *J Am Ger Soc* 1994;42[9]:937-46.
13. Bruce S, Newton D, Woledge R. Effect of age on voluntary force and cross-sectional area of human adductor pollicis muscle. *Q J Exp Physiol* 1989;74:359-62.
14. Grimby G, Danneskiold-Samsoe B, Hvid K, Saltin B. Morphology and enzymatic capacity in arm and leg muscles in 78-81 year old men and women. *Acta Physiol Scand* 1982;115:125-34.
15. Coggan A, Spina R, Rogers M. Histochemical and biochemical characteristics of skeletal muscle in master athletes. *J Appl Physiol* 1990;68:1896-901.
16. Evans WJ. Exercise, nutrition and aging. *J Nutri* 1992;122:796-801.

17. Frontera W, Meredith C, O'Reilly K, Knuttgen H, Evans W. Strength conditioning in older men: skeletal muscle hypertrophy and improved function. *J Appl Physiol* 1988;64:1038-44.

18. Whipple R, Wolfson L, Amerman P. The relationship of knee and ankle weakness to falls in nursing home residents: an isokinetic study. *J Am Geriatr Soc* 1987;35:13-20.