Efficacy of Drugs and Exercise in Combating Sarcopenia

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Sarcopenia is the age related loss of muscle mass. This loss of muscle mass is the prime, but not sole, cause of the progressive loss in muscle strength, power and functional ability in later life. These changes are not only important for the ageing individual in terms of quality of life, but are beginning to have important health and social care cost implications throughout Europe as people are living longer. Importantly, sarcopenia is not a solely a disuse phenomenon, as it also occurs even in well trained master athletes. The loss of muscle mass is associated with a number of endocrine changes such as declining levels of testosterone, growth hormone and IGF-I. However, anatomically, sarcopenia is reflected in loss of muscle fibres and an atrophy of the fast contracting type II fibres in later life.

Strategies are being explored which may reverse, or at least ameliorate, this loss of muscle mass. It has been known for many years that strength training increases muscle mass in young individuals. In the last couple of decades there has been accumulating evidence to suggest that older muscles are also highly adaptable to strength training, with roughly comparable increases in muscle strength and size compared to young individuals. This is the case even for very elderly (85+ years) individuals. But what about those individuals who are not able to exercise, but whom would still benefit from a larger muscle mass? This is important both for functional improvements, but also for improving the protein reservoir that may be used in times of critical illness. As mentioned above, circulating levels of GH, IGF-I and testosterone decline in later life, these are factors known to stimulate muscle growth and have thus been among the prime targets for study regarding potential therapeutic interventions to tackle sarcopenia. The GH and IGF-I axis is extremely important during somatic growth and development, thus GH was viewed as a potential target for therapeutic use, particularly as the results of studies treating GH deficient adults with recombinant GH (rhGH) had shown increases in muscle mass. However, the results of rhGH studies in elderly subjects have been disappointing in this regard. Indeed, even when combined with strength training the gains in muscle mass are no greater when compared with strength training alone. Furthermore, administration of testosterone to elderly subjects has been shown to produce only moderate improvements in lean muscle mass and few studies have reported increases in muscle strength. In addition to the somewhat disappointing effects of these two interventions, unwanted side effects have been reported with carpal tunnel syndrome, gynaecomastia and hyperglycaemia being associated with prolonged rhGH use. The risks of testosterone replacement in older men include fluid retention, gynaecomastia, worsening of sleep apnoea, polycythaemia and acceleration of benign or malignant prostatic tumours. In contrast, not only is there good evidence of the efficacy of strength training as regards muscle growth in elderly people, exercise is also associated with many other health benefits. Thus at present resistance training, with appropriate nutrition, remains the most effective means of increasing muscle mass in older people.

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