

Sarcopenia causes, definition and prevalence

[Health & Medicine](#), [Disease](#)



Sarcopenia is the age associated degenerative loss of muscle tissue.

Sarcopenia is estimated to affect 30% of people over the age of 60, and over 50% of people over the age of 80. Narici and Maffulli (2010) state that whilst sarcopenia is associated with loss of muscle function, the two are not proportional. Therefore, it is important to recognize that sarcopenia may not directly lead to impaired muscle function. The European Society for Clinical Nutrition and Metabolism Special Interest Groups define sarcopenia as the presence of low skeletal muscle mass and low muscle strength. Similarly, Evans (2010) states that sarcopenia is most prevalent in older adults who have an appendicular lean/fat mass 2 SD less than that of young adult. This is consistent with older adults whom are bedridden, unable to stand up from a chair, or have a gait speed less than 1 meter per second. Evans' definition of sarcopenia outlines clear criteria, which can be the subject of future intervention, such as aiming to increase gait speed or increase lean mass.

Causes

An array of environmental and genetic factors are thought to cause sarcopenia. A review conducted by Walston (2012) presents a conceptual framework which outlines the multifactorial cause of sarcopenia. Endocrinal changes, namely the age-related decline in anabolic hormones, such as testosterone, likely cause sarcopenia. Testosterone increases muscle protein synthesis. In adult males, testosterone decreases by 1% every year, whilst females experience a sharp decline between the ages of 20-45. It is suggested that decreased testosterone leading to decreased muscle protein synthesis causes muscle tissue loss.

In addition, a loss in number of neuromuscular junctions leads to reduced type II muscle fibre recruitment, imperative for dynamic movement such as arising from a chair. Research suggests accumulation of mitochondrial DNA in older adults causes damage to neurons and muscle fibres at neuromuscular junctions. It is suggested that mitochondria may promote maladaptive changes at neuromuscular junctions, via oxidative stress. Such changes can result in a decrease in the number of neurotransmitter-containing synaptic vesicles, potentially impairing the overall function of the muscle as less muscle fibres may be recruited. Many investigations have suggested that decreased physical activity in older adults leads to increased sarcopenia. Chronic disease and concomitant pain have been found to be barriers toward activity engagement in older adults.

Another environmental cause of sarcopenia is malnutrition. A low protein intake is associated with sarcopenia, whilst an optimal protein intake of 1.0-1.2g per kg of bodyweight has been proposed to minimize muscle tissue loss. However, optimal protein guidelines must take into account energy expenditure. As muscle tissue is lost via sarcopenia, an individual's basal metabolic rate shall decrease, due to less respiratory demand. As total energy expenditure is likely to decrease, and diet remains consistent, fat mass increase is likely, potentially leading to sarcopenic obesity.

Interventions and diet plans for sarcopenic individuals should aim to formulate realistic diets which suggest adequate protein, without exceeding energy expenditure where necessary in overweight and obese older adults. Furthermore, interventions should aim to integrate both adequate protein

intake and physical activity in order to minimize sarcopenia, as these are the main anabolic stimuli for muscle protein synthesis.

Sarcopenia is a risk factor for falls, as skeletal muscle is responsible for maintaining balance and posture, as well as controlling movement. Loss of muscle tissue may restrict skeletal muscle to perform these roles, resulting in impaired balance. Whilst research has identified sarcopenia as a risk factor for falls, future research may investigate whether sarcopenia in certain limbs is more likely to increase risk of falling. There is limited investigation into this area, although one study suggests that sarcopenia in the legs is a greater risk factor for falling in comparison to reduced hand grip strength. The multifactorial causes of sarcopenia increase the difficulty of delivering intervention. The combination of causes may vary between older adults. This may increase the difficulty of designing group interventions, as they may not adequately consider an individual's specific needs.