

## SARCOPENIA and RED MEAT - REVISED

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## Introduction

The term “sarcopenia” has been defined as the age-associated loss of skeletal muscle mass and function, sometimes seen in combination with an increase in fat mass. This loss of muscle mass with aging is the result of decreased protein synthesis, increased protein breakdown or the combination of both. The causes are complex and can include physical inactivity, changes in hormones, chronic disease, inflammation, insulin resistance and nutritional deficiencies such as inadequate energy and protein intake.

The consequences of sarcopenia such as a decrease in metabolic rate, strength and maximum oxygen consumption contribute to weakness and a loss of independence.

Sarcopenia has a high prevalence in the elderly, and is a precursor of frailty, decreased mobility (mobility disability) and premature death. Although the prevalence of sarcopenia differs between studies, population groups and due to different screening methods practiced to measure skeletal muscle mass and size, it is estimated by the World Health Organization (WHO) that at least 600 million people over the age of 60 are sarcopenic and that it is expected to increase to 2 billion by 2050

Sarcopenia is also not an isolated disease. It is associated with various other diseases. Sarcopenia increases your risk of falling, and there are various other parallels observed between osteoporosis and sarcopenia, i.e. commonly occurring bone fractures.

In the past decade, associations between mortality and sarcopenia have also been investigated. In a cohort study performed in Mexico, subjects who were diagnosed with sarcopenia had a 1.39 greater risk of dying, independent of other risk factors [17]. Similar conclusions were drawn in Brazil where it was found that sarcopenic patients had a 50% increased risk of dying than other patients.

The decline in muscle mass associated with sarcopenia can begin as early as age 40 and is even more common after age 55, when muscles begin to degenerate. Rolland et al. (2008) published a review estimating that the average rate of muscle loss in humans is between 1 and 2% each year after the age of 50. Decline in strength is also observed at a rate of 1.5% per year beginning at 50 years and accelerating to 3% per year after the age of 60.

In our current era of a rapidly aging population, sarcopenia has become an important challenge [20]. It is important to not only combat sarcopenia at an older age, but to ensure that optimal muscle mass is obtained throughout the life cycle. Protein consumption, including an adequate intake of essential amino acids and other nutrients, remain an important factor in maintaining both muscle mass and functional capacity throughout the life-cycle.

The literature review provides a review of the current evidence relating to the classification and diagnoses of sarcopenia and the role which healthy lifestyles, nutrition and specifically red meat plays.

## Conclusion

Although a consensus definition of sarcopenia has not been reached, it is regarded as an age-related syndrome that affects muscle mass and strength resulting in muscle loss, and in some cases fat gain. Sarcopenia is a major contributor to physical frailty in older adults, with a prevalence of between 5% and 50% in adults older than 60 years, depending upon age and the methodology used to define sarcopenia.

Primary sarcopenia is mainly caused by lower protein intake and an alteration of protein metabolism in the muscle tissue (due to the gradual loss of muscle cell sensitivity to the anabolic stimulus induced by leucine, called “anabolic resistance”).

Meat contains all the essential amino acids, without limitations required for optimal protein metabolism and muscle synthesis in the human body. Beef also contains large quantities of the amino acid leucine that furthermore stimulates protein synthesis through mTOR signalling. Although no reliable source specifying the exact leucine (and other amino acids) quantities found in South African lamb or mutton is available, a current study funded by RMRDSA is underway which will fill some of these gaps in scientific knowledge.

Red meat is also considered to be good sources of the other additional nutrients and bioactive compounds more recently associated with protective effects against the onset and development of sarcopenia. These compounds include iron, vitamin B12, creatine, L-carnitine and CLA. Limited research on L-carnitine in South African red meat has been done.

In conclusion, a moderate intake of lean meat can increase protein synthesis in young and elderly patients of both sexes. Studies have also demonstrated that a synergistic action between adequate meat intake and resistance exercises increases muscle mass. A serving of lean beef containing 30g of protein can increase muscle synthesis by approximately 50%.

Recommendations for future research include a review on the link between L-carnitine and human health (including its positive association with sarcopenia prevention, but also the potential link to increased risk of heart disease), as well as determining the L-carnitine content of South African red meat products. Extrapolation of the findings as reported in this literature review could also be beneficial in the form of consumer and health professional education activities to justify the need for adequate red meat intake to protect against sarcopenia.