

Sarcopenia

What every dietitian needs to know



Rebecca McManamon MNutr RD,
Specialist Dietitian

The phenomenon of sarcopenia has recently received a lot of attention in many areas of health. Despite this, there is still not an international agreed definition.¹ The loss of lean muscle and strength are elements which commonly feature in definitions and, whilst the process of ageing is often attributed to these losses, it is clear that ageing is not the only factor which puts one at risk of developing sarcopenia. Through this article, the relevance of sarcopenia to dietitians, whether they work in the community or acute setting, with young or older adults, with acutely unwell patients such as in ICU or surgery, or with long-term conditions, such as diabetes or obesity, will be discussed. The options currently available for identifying patients at risk and the treatment of sarcopenia will also be explored.

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Definition and diagnosis

The European Working Group on Sarcopenia in Older People (EWGSOP)² recommended, in 2010, using the presence of both low muscle mass + low muscle function (characterised by strength or performance) to define sarcopenia. Sarcopenia is a progressive condition and linked to adverse health outcomes, such as physical disability, poor quality of life and, ultimately, death.²

The use of body imaging techniques, such as computed tomography (CT) scans, magnetic resonance imaging (MRI) scans or dual energy X-ray absorptiometry (DEXA) scans, are very accurate means of evaluating lean muscle mass to diagnose sarcopenia. In day-to-day clinical practice, these measures are expensive and, since they involve radiographic exposure, need a clear and justifiable clinical reason to be carried out, so will therefore not be readily available for clinicians in diagnosis. There will, however, be some groups of patients who regularly require CT or MRI scan, such as patients with cancer who have staging imagery, and regular repeated images to measure response to treatment or incidence of recurrence. Dietitians working in oncology settings may be fortunate to work alongside radiologists who can help guide the use of CT or MRI imagery to diagnose sarcopenia and measure the effectiveness of dietetic treatment for sarcopenia through follow-up scans. Patients with osteopenia or osteoporosis or with clinical conditions at risk of developing osteopenia or osteoporosis, such as coeliac disease or Addison's disease will have regular DEXA scans, which may be a further tool in assessing lean muscle mass. For patients in whom radiological body imagery is not appropriate, anthropometry to measure muscle mass, such as mid upper arm circumference or skinfold thickness, can be used but are not as well validated in older populations.² Bioimpedance analysis may also be used to estimate lean mass,² although can be affected by hydration status.

Reduced muscle strength or performance is the second criterion to diagnose sarcopenia according to the EWGSOP guidance.² Handgrip strength measures are easily carried out in any clinical setting, providing the client is alert to carry out instruction to use the equipment, and can be used to measure muscle strength. Physical performance is frequently assessed by gait length or speed or the 'Get Up and Down in a Chair' test.² For dietitians working in teams closely supported by physiotherapists, they may be able to carry out multidisciplinary

assessments together of the gait length or speed. The 'Get Up and Down in a Chair' test could easily be carried out by dietitians, and data has indicated that each additional second taken to get up and down increases the risk of sarcopenia by 8%.³

As aforementioned, the definition of sarcopenia remains internationally disputed.¹ The EWGSOP is a commonly used definition,² however the different diagnostic tools outlined above which form this definition have also shown that by using these tools, there are inconsistent numbers of patients diagnosed with sarcopenia according to the different tools used.⁴ Dietitians need to be aware of the limitations of different diagnostic tools and weigh up all factors when using these tools as a means of the basis of dietetic treatment or as dietetic outcome measures.

Prevalence and groups at risk of sarcopenia

Whilst conservative estimates suggest at least half of elderly adults may be affected by sarcopenia,⁵ older adults are not the only patients at risk of sarcopenia. Whilst the literature base is still in its infancy, young adults with conditions such as cerebral palsy have early muscle wasting, and are at risk of sarcopenic obesity.⁶ Sarcopenic obesity occurs when a patient may be obese in accordance with body mass index, but there is also reduced muscle mass and muscle strength or performance (sarcopenia). Physical activity is particularly crucial in this patient group in maintaining muscle mass and reducing the risk of sarcopenia.⁶

Patients who have a neurological condition, such as a stroke, especially since this often involves an impact on mobility, are at an increased risk of sarcopenia; a risk which accelerates in adults who have experienced a stroke who are over 70 years of age.⁷

Conditions such as liver cirrhosis⁸ and cancer⁹ may drive towards a catabolic status and therefore increase the risk of sarcopenia in these conditions. The consequences of sarcopenia in these conditions is particularly stark, since sarcopenia is strongly linked to higher mortality in liver cirrhosis,⁸ and in a recent study of patients undergoing neoadjuvant chemotherapy to prepare them for potentially curative oesophago-gastric cancer surgery, sarcopenia has been linked to toxicity of chemotherapy treatment, where patients may have chemotherapy dose lowered, delayed or all together stopped.⁹

Respiratory conditions, both chronic such as chronic obstructive pulmonary disease (COPD)¹⁰ or acute respiratory failure,¹¹ are also

linked with a high prevalence of sarcopenia. Patients with acute respiratory failure may not be identified as having sarcopenia due to the co-existence of obesity.¹¹

Dietary treatment

Protein

Protein, as the dietary source of amino acids, has naturally been the source of much attention in to the treatment of sarcopenia since it is directly linked to muscle synthesis. The total amount of protein required could be debated, with some arguing when renal function is adequate, protein intake should be increased to greater than 1g per kilogram of body weight,¹² yet an approach to focus on the amount of protein to be ingested at a meal, rather than a total protein intake features much more in the literature.^{13, 14} Paddon-Jones and Rasmussen¹³ reviewed the literature to date in 2010 and found that 25-30g protein per meal is recommended to overcome anabolic resistance to stimulate muscle mass, in particular within elderly patients. This is important to consider in patients who may eat a carbohydrate based breakfast without the addition of protein such as bread and jam or marmalade or breakfast biscuits, and they may require changes in habitual intake, such as considering more traditional breakfast choices: such as cooked breakfast items like eggs, considering cereal with milk or adding protein enrichment to their choices, for example, by adding a glass of milk or a yogurt. A very practical double-blind randomised controlled trial carried out in Mexico demonstrated after 12 weeks an attenuation in the loss of muscle mass and muscle strength, when a daily addition of 210 g ricotta cheese was added to the habitual diet of older adults (over 60) who had not yet been diagnosed with sarcopenia.¹⁵ This suggests the addition of a dairy protein to regular diet may help slow the development of sarcopenia.

The amino acid leucine has also received much attention for its role in sarcopenia, since leucine has a role in stimulating muscle synthesis.¹³ It has been suggested that as we age, we become less sensitive to the effects of leucine and, therefore, leucine supplementation may increase muscle mass, especially in the elderly.¹³ Since whey protein contains leucine, intensivists may now suggest that whey-based enteral feed is preferable in the intensive care setting, where patients are frequently not mobile, and sarcopenic obesity may be pre-existing.¹⁶ It should, however, be noted that the majority of studies which show the benefits of leucine on sarcopenia use specific leucine supplementation, frequently in a powder form, which may therefore be difficult to translate to day-to-day clinical

practice when patients are able to eat and drink orally.

Omega 3 fatty acids

A review carried out last year suggested a promising concept of omega 3 fatty acid supplementation may improve protein metabolism and reduce anabolic resistance.¹⁷ There are however limited *in vitro* studies and, whilst a recent study suggested some benefit in older patients with sarcopenia,¹⁸ a limited study size of 10 older adults suggests that research in this area still needs to develop. However, encouraging consumption of oily fish rich in omega 3 is likely to feature in general dietary advice, since many have an inadequate intake, in line with Government recommendations of at least one portion of oily fish per week.¹⁹

Vitamin D

Vitamin D has a role, independent of other factors which affect sarcopenia, in maintaining muscle mass and strength.²⁰ A meta analysis of randomised controlled studies which considered the impact that vitamin D supplementation had upon muscle function eluded that the supplementation of vitamin D has a moderately positive effect on ameliorating muscle function.²¹ This included studies with and without co-prescription of calcium and as such it is not clear at present the optimal treatment for vitamin D deficiency associated with sarcopenia.²¹ In the interim of awaiting further trials it would be prudent to arrange blood tests for serum 25-hydroxyvitamin D in the at risk groups already discussed, and initiate vitamin D supplementation as local policy dictates.

Role of activity

Nutritional intervention for sarcopenia has been demonstrated to be inadequate on its own to treat sarcopenia.¹² It is clear for the optimal benefit on muscle mass, strength and performance that an increase in physical activity must be also embarked upon.

It is of note that a randomised controlled trial carried out in a small group (29) of elderly patients admitted to hospital demonstrated no benefit in protein supplementation and resistance training,²² although the sample size indicates a common barrier to such research in elderly populations. The researchers did comment that the resistance training three times a week was difficult for the patients to comply with, and reminds clinicians of the importance of client centered goals in activity as well as dietary change. The length of duration of aerobic activity has been shown in a collection of studies published last year, which recruited adults 50 and above, to be particularly important in older clients (over 60) in maintaining muscle quality.²³

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However, the length of time spent on weight resistance activity maintained muscle quality in all adults involved in the study.

Encouraging both aerobic activity and muscle resistance exercises are important in managing sarcopenia, and need to be incorporated in dietetic treatment plans. Where appropriate, patients may need to be referred to physiotherapy to ensure an activity tailored to their ability and any pre-existing injuries or co-morbidities may be required.

Summary

Our understanding of sarcopenia remains in its infancy and debate ensues regarding a definitive diagnostic criteria. What is clear is that many patients, not just those who are

older or with disease-related malnutrition, are at risk of sarcopenia and the serious health consequences related with this condition. Dietitians have a role in identifying patients with sarcopenia and developing treatment plans which must include a concurrent increase in physical activity. Ensuring adequate protein intake and recognising and initiating treatment of vitamin D deficiency are core aspects of dietetic evaluation for most health conditions, but are particularly important for older adults. In paying attention to these dietary factors, the emerging research in to the role of omega 3 fatty acids and optimal protein type and way of consuming protein is exciting and should be monitored for the potential future role of these nutrients in managing sarcopenia.

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