NHD
THE DIETITIANS' MAGAZINE

eArticle with CPD
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Vitaflo
Innovation in Nutrition

Volume 5.06 - April 23rd 2015

SARCOPENIA AND DIET IN OLDER PEOPLE

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Sarcopenia is a syndrome characterised by progressive, generalised loss of skeletal muscle mass and strength, which in clinical practice can be determined by the presence of both low muscle mass and low muscle function (1).

Sarcopenia affects 13 to 24 percent of 50 to 70 year olds and 11 to 50 percent of those aged 80 or older (2) and so has similar prevalence to malnutrition. There are currently no estimates of the approximate cost of sarcopenia to the UK health economy, but in 2000, it was estimated to cost the USA $18.5 billion.

Progressive resistance training has been shown to be an effective intervention in older people with sarcopenia. However, what is currently less clear is whether there are additional benefits of protein supplementation on skeletal muscle response to resistance training (3).

SARCOPENIA CAUSATION

Older adults who are less physically active are more likely to have lower skeletal muscle mass and strength and are therefore at increased risk of sarcopenia (1). Low nutrient intake, in particular low protein intake, is also a significant risk factor for sarcopenia (4) and observational evidence links low protein intake to both declining muscle mass (3) and impaired physical function (5).

Decreasing muscle mass is caused by loss of muscle fibres and muscle fibre atrophy (3), together with changes in muscle composition (2, 4). Loss of muscle mass is not limited to old age, however; between the ages of 30 and 60, an average adult will gain approx 0.5kg fat and lose approx 0.25kg muscle per year and loss of skeletal muscle predicts future mortality in the middle aged as well as older adults (3). After age 60, loss of both muscle mass and muscle strength tend to increase (4).

The overall contribution of adequate nutrition to muscle mass and strength has not been studied extensively (5), but consistent evidence points to a treatment/preventative role for both protein and vitamin D (3). Recent studies also suggest that the n-3 polyunsaturated fatty acids (PUFA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) may help stimulate muscle anabolism (5).

Alison works with GPs and other HCPs to improve identification and treatment of malnutrition and appropriate prescribing of sip feeds. Alison is also a committee member of NAGE (BDA Specialist Group of the Year 2014).

Research has suggested that grip strength may improve with increased intake of oily fish and that resistance exercise combined with EPA/ DHA supplementation could double strength and functional ability

MUSCLE MASS AND PROTEIN INTAKE

In frail older people, loss of muscle mass is further compounded by compromised muscle protein metabolism, potentially due to greater systemic inflammation and associated co-morbidities and/or reduction in physical activity. Muscle anabolism is dependent on the level of absorbed essential amino acids (EAA) circulating in the blood (6); however, in older people, the level of EAA required to produce muscle anabolism is increased, a situation known as anabolic resistance (7).

In older age, the body's requirement for total protein may not change, but because of anabolic resistance, achieving muscle anabolism may require ingestion of either more total protein, a greater nutrient density of EAA or higher quality protein. On this basis, the optimal protein intake for older people may be above the current recommended level of 0.8 to 1.0g protein per kg body weight per day (BW/d). In their 2013 Evidence-Based Recommendations for Optimal Dietary Protein Intake in Older People, Bauer et al (8) suggest that:

- to maintain and regain muscle, older people need more dietary protein than do younger people; older people should consume an average daily intake in the range of 1.0 to 1.2 g/kg BW/d;
- the per-meal anabolic threshold of dietary protein/amino acid intake is higher in older individuals (i.e. 25 to 30g protein per meal, containing about 2.5 to 2.8g leucine) in comparison with young adults;
- protein source, timing of intake and amino acid supplementation may be considered when making recommendations for dietary protein intake by older adults.

TIMING AND TYPE OF PROTEIN INTAKE

Some recent papers have suggested that timing of protein intake may be critical to maintaining muscle mass in those with increased EAA requirements for anabolism (4). In the UK, the typical protein ingestion pattern is little protein eaten at breakfast and lunch, with the majority consumed at the evening meal. This means that the evening meal may be the only meal of the day providing a sufficient level of absorbed EAA to stimulate anabolism (9), but, if the amount ingested is more than 30g the suggestion is that this may not be used efficiently.

Instead, researchers suggest that intake of high biological value protein should be distributed equally between three or more meals each day, with 20 to 30g protein (containing 5.0 to 8.0g EAA) consumed at each meal (9).

Leucine is an EAA which helps to determine the anabolic potential of protein (6, 4) and is also known to be anti-atrophic (4). Older people may be less sensitive to the anabolic action of leucine, therefore high leucine content protein, with rapid digestion kinetics, may be needed to increase response (9). Leucine supplementation may be a potential strategy to combat progression of sarcopenia, but more research is needed and, in the meantime, evidence suggests that older adults should be encouraged to consume a diet high in leucine rich food (4).

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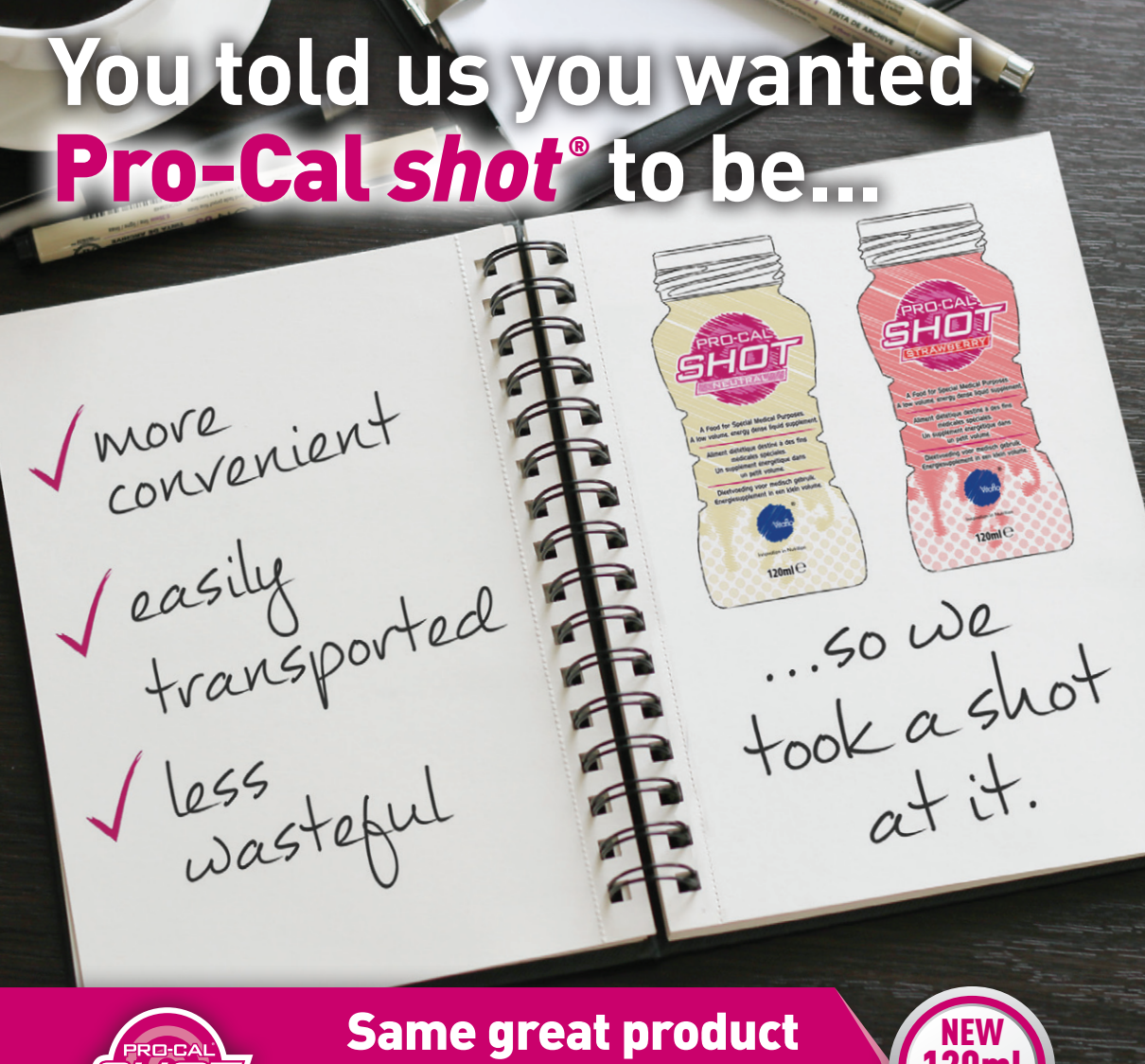

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NHD0415
Date of preparation February 2015

Eggs are a good source of both high biological value protein and leucine: two medium eggs provide 6.4g EAAs (1.086g leucine) and 12.5g protein. The EAA content (as a percentage of protein) in eggs is equal to or greater than that of other animal proteins (6). In addition, the leucine content of eggs is second only to milk protein (7). One study has suggested that a diet including eggs as a protein source provided significantly more EAA and leucine than did an egg-free diet (6).

ROLE OF VITAMIN D AND N-3 PUFA

Interestingly, eggs are also a good dietary source of vitamin D (two medium eggs provide 2mcg vitamin D) and also have an n-3 PUFA content (two medium eggs provide 140mg n-3 PUFA), although, for the latter, this is significantly less than the amount contained in oily fish. Low serum vitamin D is associated with more rapid loss of muscle mass and function (1, 10) and low levels of vitamin D are associated with increased risk of sarcopenia (1). Vitamin D deficiency is common in older adults for several reasons, including reduced exposure to sunlight and reduced intake of vitamin D rich foods (4).

The n-3 PUFA EPA/DHA are thought to be useful in the treatment of conditions with an inflammatory component, which includes sarcopenia. Research has suggested that grip strength may improve with increased intake of oily fish and that resistance exercise combined with EPA/ DHA supplementation could double strength and functional ability (10).

CONCLUSION

Current evidence for prevention and treatment of sarcopenia points to a need for maintenance of good nutrition and physical activity throughout life and, in older age, focus should be on helping people remain nutritionally well and mobile.

In older age, it is likely that increased protein intake with more emphasis on type and timing of intake may be beneficial both for prevention and treatment of sarcopenia and, therefore, dietitians' skills in translating this into simple and practical food-based advice is essential.

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Questions relating to: *Sarcopenia and diet in older people*
Type your answers below and then **print for your records** or print and complete answers by hand.

Q.1	Describe Sarcopenia and its aetiology.
A	
Q.2	Explain why older people are at greater risk of sarcopenia than other adults.
A	
Q.3	What are the effective interventions of Sarcopenia in older people?
A	
Q.4	What are the causes of loss of muscle mass in the elderly?
A	
Q.5	Explain muscle anabolism and how this can be increased by anabolic resistance.
A	
Q.6	Why is dietary intake of protein and amino acid important in treating sarcopenia?
A	
Q.7	Describe the protein intake patterns of the elderly and how this can be maximised.
A	
Q.8	Why would leucine supplementation be considered beneficial in those at risk of sarcopenia?
A	
Q.9	Briefly outline the role of vitamin D and N-3 PUFA in treating sarcopenia.
A	

Please type additional notes here . . .