

# Maintaining muscle mass and preventing sarcopaenia in the elderly: important benefits of dairy protein



**Sarcopenia is defined as the age-related loss of skeletal muscle mass and strength.<sup>1</sup> This condition is associated with disability and lower functional independence, which significantly impact on the ability to perform activities of daily living and quality of life.<sup>1</sup>**

## Aging, exercise and sarcopaenia

**R**esistance exercise has the ability to increase muscle protein mass and strength,<sup>2,3</sup> which over time can result in improved muscle protein synthesis and muscle hypertrophy.<sup>3</sup> By preserving muscle mass, metabolic rate is maintained, which reduces the risk of obesity and its comorbidities.<sup>2</sup> There is a growing body of evidence that has highlighted the potential of milk-based proteins to enhance the benefits of exercise in maintaining and enhancing muscle mass in older adults.

## Milk-based proteins

Dairy products are rich in nutrients and have a high palatability, making them beneficial in the diet of both healthy and frail elderly persons.<sup>4</sup> In addition, milk proteins such as whey and casein have a high biological value and quality<sup>2,5</sup> due to their different absorption rates in the digestive system. Whey proteins, also termed 'fast proteins', remain in a liquid state in the stomach, which increases amino acid availability and absorption. Whey protein is therefore thought to support rapid increases in muscle protein synthesis. In contrast, caseins, or 'slow proteins', clot at the low pH of the stomach, resulting in a slower availability of amino acids<sup>5</sup> and are therefore more likely to support sustained increases in muscle protein synthesis and decreases in muscle protein breakdown.<sup>2,3,5</sup> In addition to the whey and casein proteins, milk and other dairy products are also a good source of leucine,<sup>5,6</sup> which is especially important in stimulating muscle protein synthesis.<sup>6</sup>

## Reviewing the evidence

Hartman *et al.*<sup>7</sup> showed that over a 12-week period, the intake of milk after resistance training sessions resulted in greater increases in muscle mass in healthy young adults than in comparable participants who were supplemented with soy. Another study compared the effects of fat-free milk and soy milk after exercise in young, healthy men and found that although both foods promoted muscle mass maintenance and gains, the consumption of milk however resulted in greater muscle protein synthesis.<sup>8</sup> The researchers concluded that incorporating milk consumption in a resistance training programme supports accrual of lean muscle mass.

Recently, Bjorkman *et al.*<sup>9</sup> undertook a randomised cross-over trial in older persons (mean age = 69.5 years) with polymyalgia rheumatica. These participants consumed regular milk or a whey-enriched dairy product, which had an associated high leucine content, after exercise for eight weeks. The two products resulted in similar improvements in muscle mass and function, but the whey product tended to prevent accumulation of body fat. These results were confirmed in young adults who consumed different sources of milk-based proteins: the consumption of whole milk, skim milk, and skim milk plus carbohydrate all improved muscle synthesis after resistance training.<sup>10</sup>

Cermak *et al.*<sup>11</sup> conducted a meta-analysis to examine whether protein supplementation augments the effects of resistance exercise in younger and older subjects. Data from six randomised clinical trials related to the impact of protein supplementation in untrained older subjects were combined. Five studies included only dairy protein (whey, milk or casein) and one included a combination of egg, meat and dairy. Although the individual studies failed to find a significant benefit of protein supplementation with regard to fat-free mass gain, the combined data from 215 older subjects showed that protein supplementation resulted in 38% more fat-free mass and a 33% increase in strength when compared with a placebo.

One trial involving the intake of milk-based proteins during or after exercise in the elderly has reported conflicting results. A randomised, controlled trial in healthy middle-aged and older men could not demonstrate any added benefits of milk consumption over that of resistance exercise training alone.<sup>12</sup> In this trial, however, milk was not consumed directly after exercise, meaning that the benefit of exercise-induced blood flow and the potential of amino acids to improve muscle protein synthesis after exercise were not utilised.<sup>3</sup> The authors acknowledge that the timing of milk consumption could have been the reason for the lack of impact in that trial.<sup>12</sup>

## Conclusion

Milk-based proteins have biological effects that may improve the beneficial effects of exercise, since these proteins are an effective protein source for stimulating muscle protein synthesis and slowing muscle protein breakdown, so improving muscle mass. The anabolic effect of milk may be an effective, practical and cost-effective way to maintain muscle mass and strength in the healthy elderly and promote fast recovery in the frail and malnourished elderly.

## REFERENCES

- Walston JD. 2012. *Curr Opin Rheumatol*, 24:623–627.
- Phillips SM *et al.* 2009. *J Am Coll Nutr*, 28:343–354.
- Forbes SC *et al.* 2012. *Endocrine*, 42:29–38.
- Van Staveren WA *et al.* 2011. *J Am Coll Nutr*, 30(5 Suppl 1):429S–437S.
- Gryson C *et al.* 2013. *Cll Nutr*, <http://dx.doi.org/10.1016/j.clnu.2013.09.004>.
- Norton C *et al.* 2013. *Int Dairy Tech*, 66(3):317–320.
- Hartman JW *et al.* 2007. *Am J Clin Nutr*, 86:373–381.
- Wilkinson SB *et al.* 2007. *Am J Clin Nutr*, 85:1031–1040.
- Bjorkman MP *et al.* 2011. *J Nutr Health Aging*, 15:462–467.
- Elliot TA *et al.* 2006. *Med Sci Sports Exerc*, 38:667–674.
- Cermak NM *et al.* 2012. *Am J Clin Nutr*, 96:1454–1464.
- Kukuljan S *et al.* 2009. *J Appl Physiol*, 107:1864–1873.

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