



# MILK

## Nutritious by nature

The science behind  
the health and nutritional impact  
of milk and dairy foods

## Muscle mass maintenance in older people

There is evidence to suggest a potential role for milk and dairy foods in helping to maintain muscle mass and function in older people. A number of studies point to the benefits of milk protein for increasing muscle protein synthesis in the elderly, and that supplementation, in combination with physical activity, can improve muscle mass and function. There is some evidence too, that older people with higher intakes of milk, cheese and yogurt have greater muscle mass and better functional capacity. In addition to high-quality protein for muscle health, the rich mix of other nutrients in milk and dairy foods make them a valuable part of the diets of older people.



## Sarcopenia

Ageing is accompanied by a progressive loss of skeletal muscle mass and strength – sarcopenia - which leads to the loss of functional capacity and a greater risk of developing metabolic disease such as diabetes<sup>1</sup>. Although some degree of sarcopenia is inevitable, the extent to which it can be minimised, and possibly reversed, has important implications as loss of physical function predicts loss of independence, falls, and even mortality. With an ageing population in Europe, strategies for prevention are increasingly important.

## Muscle protein synthesis

**Both food intake and resistance exercise stimulate protein synthesis in muscles.** Recent studies suggest that older people's muscles are less responsive to the stimulating effects of protein than their younger counterparts<sup>2</sup>. Consequently, research has focused on whether higher intakes of protein can overcome this 'anabolic resistance' and can enhance the effects of exercise. Although there is not yet consensus, it has been argued that to help older people maintain and regain lean body mass and function, higher protein intakes than currently recommended (0.8 g/kg/day) are required: in the range of at least 1.0 to 1.2 g/kg/day and up to 1.5g/kg/day<sup>3-6</sup>. Roughly equal distribution of protein intake at meals across the day is suggested to be the most effective way to achieve this which, assuming three meals a day, equates to 0.4 to 0.5 g/kg per meal<sup>7</sup>. Currently, protein intakes at breakfast time are often low, and increasing protein intake before bed may also represent an opportunity for overnight muscle protein synthesis<sup>8,9</sup>.

**The quality of protein intake is also important.** Protein that has a high concentration of essential amino acids, most importantly leucine, has been shown to best stimulate muscle protein synthesis<sup>9</sup>. This points to milk protein, particularly whey, and a number of studies have confirmed beneficial effects on muscle protein synthesis<sup>10,11</sup>. It is likely

that the effects of whey on muscle gain in older people extend beyond its leucine or essential amino acid content since comparable amino acid 'mixes' do not have the same effect<sup>11</sup>. Factors such as rate of absorption, influenced by the dairy food matrix, may be important<sup>12-14</sup>. In this respect, more research is needed on the effects of milk per se and of other whole dairy foods on muscle protein synthesis in older people.

## Dairy protein supplementation

**A meta-analysis in 2012 of longer term studies examining the effects of diet and exercise in older people found that protein supplementation increased muscle mass and strength gains** during resistance exercise programmes: 38% more fat free mass and a 33% increase in strength<sup>15</sup>. All six studies in the meta-analysis used a dairy-based protein; five exclusively dairy (milk, whey or casein) and the sixth a combination of egg, meat and dairy. A subsequent six-month clinical trial from the Netherlands also found that a milk protein drink combined with a resistance exercise programme significantly increased skeletal muscle mass in frail elderly adults<sup>16</sup>. Another long-term study by the same research group found that although increasing milk protein without exercise did not increase muscle mass, it enhanced physical performance in the frail elderly subjects including improvements in balance, walking speed and ability to 'get up and go' from a chair<sup>17</sup>. The milk drink used in these two studies provided around 30g of protein a day, equivalent to 3 to 4 servings of dairy. In another dairy intervention, adding 210g of ricotta cheese a day to the usual diets of older people (without sarcopenia) for 12 weeks improved skeletal muscle mass and balance-test scores<sup>18</sup>.

## Observational studies

**There is some evidence that older people with higher intakes of dairy have greater muscle mass and better muscle function.** In a prospective cohort study of older Spanish adults (60 years plus), higher consumption of low-

fat milk and yogurt was associated with lower risk of frailty and, specifically, of slow walking speed and weight loss<sup>19</sup>. Similarly, a recent study of almost 4,000 older people in Ireland (over 60 years), found higher daily yogurt intake was associated with better physical function scores<sup>20</sup>. A cross-sectional study in 70 to 85-year-old Australian women also reports that those with the highest milk, cheese and yogurt consumption (2.2 or more servings a day) had significantly

greater lean body and skeletal muscle mass, greater hand-grip strength and better 'up and go' performance than women who consumed the least (less than 1.5 servings)<sup>20</sup>. The authors highlight the bioactive compounds present in dairy such as high-quality proteins and interactions with other components of the dairy matrix such as calcium which may be responsible for the beneficial effects.

**Ensuring adequate protein intake, including with milk protein, alongside physical activity, appears a promising approach to maintaining and improving muscle mass and functional performance in older people. Given the consequences of sarcopenia for health and quality of life, and with an ageing population, such strategies are increasingly important. In addition to protein, milk and dairy foods offer older people other valuable nutrients in a palatable, convenient and affordable way.**



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