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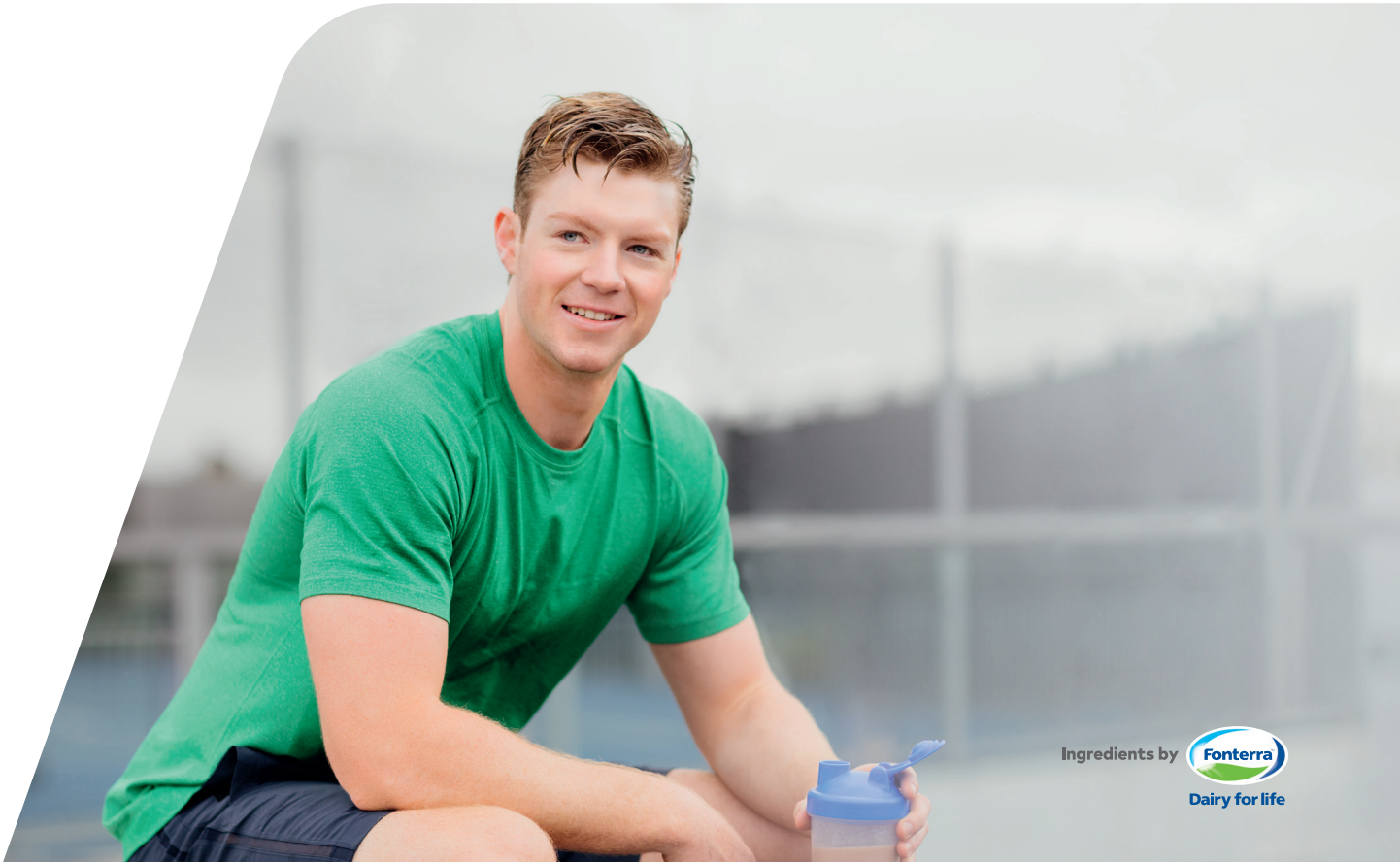
NUTRITION

Boost the benefits of nutrition.

Dairy protein is proven to support the benefits of physical activity and can support mobility as we age.

By Aaron Fanning.



Introduction

The world is undergoing a dramatic transformation. Economies are growing, global population is expanding and governments and individuals are under pressure around health care. One major aspect of this global transition is the population's age.

Globally, the population over the age of 60 is growing at a faster rate than the other age groups within the population. This will result in a larger percentage of the population over 60 (United Nations, 2015), and as such will continue to put increased pressure on the health care system. While the percentages are increasing, the absolute numbers of people over the age of 60 are dramatic. By 2050 over 2 billion people will exceed the age of 60. While the change is largely thought of as a western issue, the vast majority of people exceeding 60 will be in Asia, with over 1.2billion people expected to be above the age of 60, and over 500million will be from China alone.

These numbers will have a major impact on governments as they struggle with the increases in health care costs associated with the aged population. The increases come from the changes that occur across the lifespan. We know that children gain physical function with age. Their body weight increases, their muscle mass grows, and their bones strengthen, all as they grow and develop. This physical function reaches a peak in early life, and from around the age of 40 starts to decline (Stein & Mortiz et al, 1999).

This becomes an issue if the rate of decline results in somebody not being able to perform their daily tasks, and unable to function or enjoy life the way they wish to. Aspects of this decline are well known, such as the decline in bone mass that leads to increased risk of fracture, called osteoporosis. However, other functional losses are less well known, and this is true for the loss of skeletal muscle size and strength known as sarcopenia.

Muscle can make up to 30-40% of bodyweight in a healthy young person (Janssen et al, 2000) but from around 40 years old, the content of muscle declines by 0.4 – 2.6% per year (Mitchell et al,. 2012), which increases the risk of frailty, disability and being less independent as older adults (Deer and Volpi, 2015). When combined with obesity, low muscle mass can substantially increase risk of cardiovascular disease and other chronic conditions such as diabetes (Kim et al, 2015).

THE ROLE GOOD NUTRITION AND EXERCISE CAN PLAY IN MINIMALISING THE IMPACT OF AGEING

Muscle is a dynamic tissue capable of regenerating and responding to changes in its environment (Goldspink, 1998), and does so by the constant turnover of its proteins. This protein turnover is driven by two dominant forces - muscle protein breakdown, where old tissue is broken down, and muscle protein synthesis (MPS), where new tissue is created. To support this turnover, the diet needs to provide the essential building blocks as substrates for the synthesis of new tissue. Protein acts as an anabolic agent stimulating MPS (Bennet et al, 1989) and by doing so, help protect muscle mass over the course of the lifetime. This effect is complemented by exercise. Regular exercise is an essential element for maintaining a healthy body. Currently guidelines (Department of Health, 2011) highlight the benefit of exercise, including the major non-communicable diseases worldwide, cardiovascular disease, type-2 diabetes, and metabolic syndrome, to help improve quality of life. Exercise can stimulate the production of muscle proteins for up to 48hrs after exercise. But if you don't eat, then the body will break down more muscle protein than it produces (Biolo et al, 1995), so the body does not grow and adapt. By consuming food after exercise, especially protein, muscle protein breakdown is blunted and MPS is stimulated, so we end up with a positive protein balance (Biolo et al, 1997). The effects of dietary protein and exercise are synergistic, activating an anabolic pathway within the muscle. Protein both stimulates this pathway, but also provides the amino acid substrate for the muscle to build the new proteins. By consuming protein after resistance exercise, there is a greater gain in muscle mass, and strength, than when consuming other nutrient sources (Cermak et al, 2012), in both young and old subjects. Most research has focussed on the benefits of protein for resistance exercise; sound reasoning (Moore et al, 2014) exists for the beneficial impact of protein on endurance exercise.

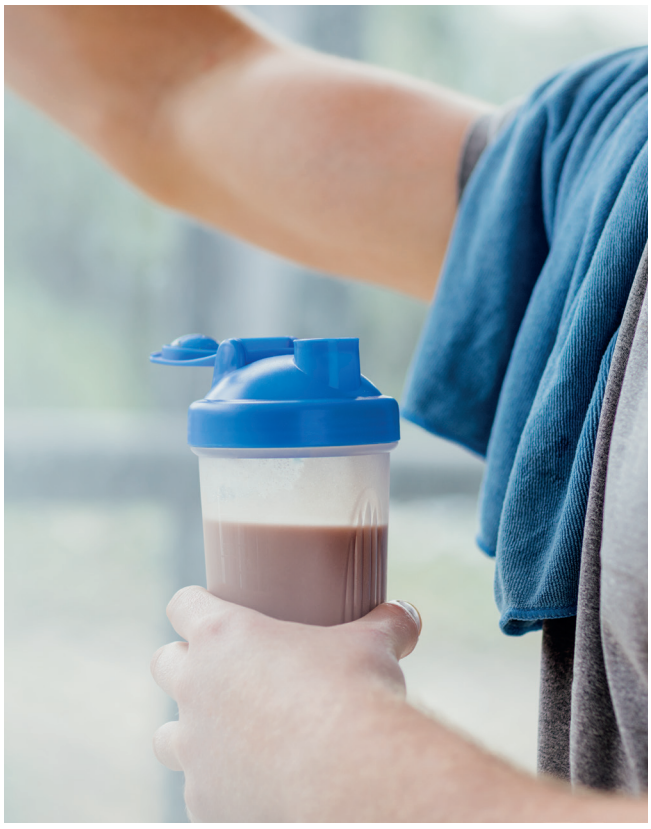
But what about different types of protein. There are many ways to differentiate dietary proteins, but the three simple ways are amino acid composition, the protein quality and the beneficial effects of protein when consumed.

EXPLAINING AMINO ACID COMPOSITION

Not all proteins are created equal. Proteins are built from a range of smaller molecules called amino acids. Our bodies need a range of amino acids, called indispensable or essential amino acids, to provide the substrate for growth, development in children, to help the performance and recovery in athletes, and to help maintain our muscle mass as we age. These essential amino acids can only be supplied from the dietary protein provided in our diet. Some of the proteins within our diets are complete. This means that the proteins are of high quality and provide all of the essential amino acids at the levels required by the body.

Complete proteins include dairy proteins and common dairy ingredients such as milk protein concentrate, casein and whey protein. However, incomplete proteins such as maize, wheat, rice protein, gelatin and collagen do not contain adequate levels of all the essential amino acids required by the body.

Because the amino acid content of a protein can be chemically analysed, it allows the comparison between types of protein for the essential amino acid composition. What these comparisons show is that dairy protein provides high levels of essential amino acids compared to other common dietary proteins (Rutherfurd et al, 2015; Mathai et al, 2017).



ASSESSING PROTEIN QUALITY TO ENSURE MAXIMUM BENEFIT

The standard method of ranking proteins is more complex than measuring the amino acid content, it is also important to understand how well the protein is digested, and how bioavailable the amino acids are, and how well they meet human requirements. There are many methods to measure the quality, however, the most recent recommendation is the Digestible Indispensable Amino Acid Score (DIAAS) (FAO, 2013). This method replaces the older Protein Digestibility Corrected Amino Acid Score (PDCAAS) method (WHO/FAO, 1991) which was known to have a number of methodological issues (Schaafsma, 2005; Schaafsma, 2012).

DIAAS significantly improves the assessment of a protein's quality and continues to support dairy as the highest quality protein (Wolfe, 2015; Rutherfurd et al, 2015; Mathai et al, 2017). The DIAAS method results in an accurate understanding of how a protein supplies the basal amino acids to the diet and allows us to understand the ability of a protein to provide amino acids to support physiological change, such as protein to support muscle maintenance.

THE BENEFITS OF DAIRY NUTRITION

It's clear that dairy provides a high level of bioavailable essential amino acids. This means consuming dairy is a great way to provide the essential amino acids required from our diets. However, it is also important to understand the benefits of consuming dairy protein compared to other protein types. Fewer comparisons have been performed looking at differences, however, the consumption of dairy protein has been shown to promote MPS to a greater extent than plant proteins, such as soy (Wilkinson et al, 2007; Yang et al, 2012; Tang et al, 2009).

This effect on MPS can result in superior gains in muscle mass over longer term resistance training programs. When this protein source is combined with resistance exercise, dairy leads to greater gains in muscle mass (Hartman et al, 2007; Volek et al, 2013) than soy, and may even improve fat loss (Hartman et al, 2007).

Conclusion

In summary, dairy protein can help support muscle maintenance by providing a high quality source of protein that can stimulate muscle metabolism, and promote the retention and growth of muscle, especially when consumed alongside an exercise program. Dairy protein can easily be incorporated into a balanced diet throughout the day, as well as providing options for post-workout to further optimise muscle growth/maintenance.

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CONTACTS

Fonterra Co-operative Group
109 Fanshawe Street
Auckland 1010, New Zealand
+64 9 374 9000

Fonterra (USA) Inc
9525 West Bryn Mawr Ave
Rosemont 60018, Illinois, USA
+1 847 928 1600

Fonterra (Europe) Coöperatie U.A.
Barbara Strozzilaan
Amsterdam 1083HN, Netherlands
+31 20 707 5300

Fonterra (Japan) Limited
20F 2-16-2 Konan Minato-ku
Tokyo 108-0075
+81 3 6737 1800

Fonterra Commercial Trading (Shanghai)
268 Middle Xizang Road
Shanghai 200001, China
+86 21 6133 5999

Fonterra (SEA) Singapore
1 George Street
Singapore 049145
+65 6879 2977

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