Globally, there is a trend to ageing populations. Led by the demographic changes in Germany and Japan, the number of people over 60 years of age will surpass two billion by 2050 (United Nations, 2015) with over half of these being found in Asia. Enjoying a long active life is a goal of many people globally. Unfortunately, with increasing age comes increasing health issues due to the declining capacity of the body, which tends to occur from the fifth decade, including declining heart, lung, bone and muscle function (Stein & Moritz, 1999). The rate of decline, however, is largely determined by lifestyle such as smoking, alcohol consumption, physical activity and diet. If the gradient of decline is too quick due to poor lifestyle, it can result in reduced mobility. Early intervention, or prevention, enables maximal functional capacity, and greater chance of avoiding impacts on health.

The loss of bone, known as osteoporosis, is a well-known issue associated with ageing, where the declining bone density increases the risk of fracture, significantly impacting health and overall quality of life. But alongside bone, muscle is also declining, a less known issue known as sarcopenia (Cruz-Jentoft et al, 2010).

Losing muscle decreases the ability to keep active, slows down our metabolism, impacts quality of life (Deer and Volpi, 2015) and increases risk of diseases and reduces longevity (Srivanthan & Karlamangla, 2014). However, there is hope. Increasing the protein content in the diet can help mitigate some of these losses (Houston et al, 2008), especially when this higher protein is consumed in conjunction with an exercise program.

**Consuming protein to minimise the effects of ageing**

Dietary protein achieves this by stimulating the production of new protein. When we eat protein, it gets broken down into its amino acid subunits, and the amino acids are digested and distributed around the body in the blood. The amino acids act as anabolic agents stimulating muscle to synthesise new muscle proteins (Bennet et al, 1989); by adequately stimulating muscle protein synthesis (MPS) it will help protect muscle mass over the course of the lifetime. This is complemented by the known benefit of exercise, which when performed in conjunction with higher protein intake, there is a combined benefit of improved muscle mass and strength in both young and old (Cermak et al, 2012).

**Evenly distributing protein intake throughout the day**

Recent recommendations indicate that it’s not just the amount of protein that can impact muscle maintenance, but also how we consume protein across the day (Paddon-Jones & Rasmussen, 2009). This is because MPS response occurs through a dose dependant pathway, so a small dose doesn’t stimulate MPS (Mitchell et al, 2016), but taking a suitably large dose of protein (20-40g) will maximise the rate of MPS.

There is not a lot of information around the pattern of protein consumption across the day, but what data exist indicate that a lot of people have a skewed intake (Layman, 2009; Gillen et al, 2016; Ruiz Valenzuela et al, 2013; de Castro et al, 1997; Tieland et al, 2013), with little protein consumed at breakfast, while most is consumed at dinner. This is a situation commonly seen in the modern western world where breakfast might be a quick bite before heading to work, while dinner has a large serving of meat. This pattern of consumption may not be optimal, as the low doses at breakfast and maybe even at lunch do not result in an increase in MPS, and as such the body will breakdown more tissue than it builds with the end result being less muscle.

The new recommendation is to provide protein more evenly across the day (Paddon-Jones & Rasmussen, 2009), so each of the main meals provides enough protein to optimise the MPS response, and make the most of the protein we are eating. By eating protein more evenly across the day it improves the MPS response after breakfast, as well as the overall daily MPS response (Mamerow et al, 2014). The more frequent the consumption of suitably high protein intakes per meal the greater the association with lean mass and strength (Loenneke et al, 2016).

However, the benefits for eating protein evenly across the day is not just muscle maintenance, but there is mounting evidence that balancing protein across the day will improve measures of satiety (Mamerow et al, 2012), potentially reducing food intake and helping with body weight control (Rains et al, 2013). The risk of being overweight or obese increases with age (Ng et al, 2014), and the combined benefit of maintaining muscle and decreasing fat means that people can look leaner, and fitter.

**Dairy protein as a natural solution**

Due to its ability to provide a high quality dose of protein, dairy protein is a natural fit to fortify foods to help balance protein intake across the day.

Dairy is an excellent option for this due to its ability to deliver;

1) **High nutritional quality**

Dairy is an excellent nutritional bundle, and the protein from dairy is amongst the highest quality protein available (Rutherfurd et al, 2015). Dairy protein contains all of the essential amino acids required to be provided in the diet. Not only that, but the amino acids from dairy are highly digestible, meaning per gram of protein more essential amino acids from dairy are available than other protein ingredients such as soy.

2) **Stimulation of muscle protein synthesis**

Since dairy is an excellent source of essential amino acids, it is also a great source of the key amino acids that stimulate the MPS response. Leucine, one of the branched chain amino acids (valine and isoleucine are the other two) is the key nutritional anabolic signal to the muscle, stimulating MPS (Dodd & Tee, 2012).

Dairy provides high levels of bioavailable leucine, and whey protein concentrated or isolated from dairy is amongst the highest dietary sources of leucine. This allows dairy to efficiently stimulate MPS (Mitchell et al,
2016; Mitchell et al, 2015), and does so to a greater extent than soy protein (Yang et al, 2012; Wilkinson et al, 2007).

3) A functional protein suitable for inclusion in a wide range of great tasting consumer products

A food is only useful for health if it is consumed, and foods that do not have good taste or texture are not as popular with consumers. Experience with medical food, or oral nutritional supplements (ONS), show that even when people know they are needed to help with their treatment, they are not consumed as recommended (Grass et al, 2015). But fortifying common foods, while maintaining palatability (Kremer et al, 2014) with higher levels of protein can improve protein intake in those who are already consuming ONS, helping meet their protein needs and balance protein across the day (Stelton et al, 2014; van Til et al, 2015).

In summary, dairy protein is a high quality protein that can help stimulate muscle protein synthesis and support muscle mass and strength maintenance, helping to maintain health across the lifespan as we age.

References


