

The advantage of  
supplementary  
nutritional support  
between slow and  
fast proteins



# SUMMARY



## Introduction

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Ageing is inevitable, but the challenge is to age in good health.

## What does healthy ageing mean?

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The objective is to limit life events that might alter the ageing trajectory, in order to have the best possible quality of life with minimum dependence.

## How can the elderly achieve greater mobility?

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Protein intake among the elderly:  
How much? When? How?

## Our ingredients solution

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Pronativ® – Native Micellar Casein  
Pronativ® – Native Whey Protein

# INTRODUCTION

## DEFINITIONS

**Malnutrition:** nutritional imbalance characterised by a negative energy and/or protein balance [4].

**Sarcopenia:** High, progressive loss of muscle mass, strength, and function due to ageing [5].

It is estimated that the share of the elderly population will continue to increase. The number of people aged 60 and over will double increasing from 900 million in 2015, to 2 billion by 2050 [1]. This ageing population concerns all continents. While it started in high-income countries, low- and moderate-income countries are now experiencing the greatest changes.

Alongside the increase in the proportion of elderly people, we also see a steady increase in life expectancy around the world (over 80 in Japan [2], for example). Despite the increase in life expectancy, the handicap-free period is stable. Consequently, the longer the population lives, the greater the number of years marked by disability.

With advanced age, the incidence of illnesses such as hypertension, type 2 diabetes, and heart disease increases. The risk of malnutrition also increases. Among the elderly living within their community, in a family environment, 6% suffer from malnutrition and 32% are at risk. These figures are higher in retirement homes increasing to 14% and 53% respectively. In a hospital environment, the share of elderly people suffering from malnutrition even reaches 39% [3]. Different factors linked to a lack of activity can lead to sarcopenia and consequent lack of autonomy.

Ageing is, therefore, inevitable, but the challenge is to age in good health.





# Focus on the clinical nutrition market

The world clinical nutrition market is estimated a \$19.4 billion, with a projection of \$29.3 billion by 2025 [6]. It includes enteral and parenteral nutrition and oral nutritional supplements. Global distribution is reasonably balanced with 36% of the market in Asia, 34% in North America and 20% in Europe.

This market is driven by growing awareness of nutrition-related issues. Screening policies are increasing everywhere. Increased screening seems logical when we know that hospitalisation costs double or even triple in the case of malnutrition [7].

Clinical nutrition solutions are increasingly innovative. For the ageing population, work on taste is essential. The sector is working on the notion of pleasurable eating to meet patient expectations and improve observance, defined as the ability to follow the dietary treatment.

Eating food that tastes good is important to 67% of dependent elderly people [8]. This specific requirement stimulates product innovation. However, offering good, palatable products with the right texture is a technological challenge.



# What does healthy ageing mean?

From a biological point of view, ageing is caused by the build-up of molecular and cellular damage that appears over our lifetime. This build-up leads to the gradual deterioration of our physical and mental capacity, an increase in the risk of disease, and, ultimately, death. The elderly generally experience loss of sight and hearing and joint pain, but also brain damage that may lead to memory problems. The loss of bone mass, or

osteoporosis, is also a common pathology associated with ageing. Finally, sarcopenia, defined as the loss of muscle mass, is one of the main elements leading to reduced muscle strength and reduced autonomy.



Mobility is indeed a primary requirement: it is necessary to carry out everyday actions and to meet personal needs in an unassisted manner.





# What does healthy ageing mean?

However, declining physical and mental capacity is not as linear and predictable as we might imagine. As shown in the image opposite, every life event can affect the course of ageing: an episode of illness can momentarily lead to a state of dependence, and a chronic illness can accelerate it.

Thus, each person has their own ageing trajectory. While some people still enjoy good health with strong functional abilities when they are 70, others at the same age are frail and dependent.

For each person, the objective is to limit life events that might alter the ageing trajectory, in order to have the best possible quality of life with minimum dependence. This is what is known as healthy ageing, and has been the subject of a World Health Organisation action programme in which maintaining mobility is a crucial issue. Mobility is indeed a primary requirement: it is necessary to carry out everyday actions and to meet personal needs in an unassisted manner.

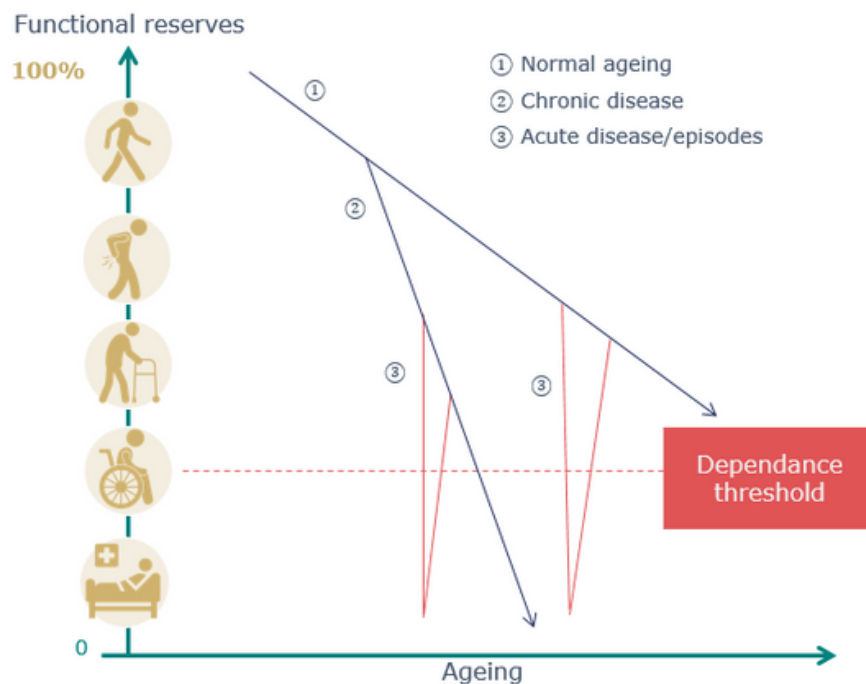


Figure 1: Different trajectories of ageing



# How can the elderly achieve greater mobility?

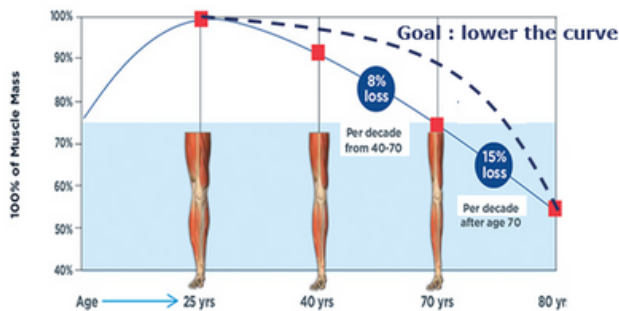
The main goal in achieving and maintaining mobility among the elderly is to fight against muscle loss associated with ageing.

Muscle loss is a physiological process of ageing: An 8% loss of muscle mass is observed at age 40 and this can reach 15% at age 70, as illustrated in the graph opposite (9,10). The idea is to limit the curve as much as possible.

Lifelong physical activity has many benefits, including increased longevity. Both cross-sectional and longitudinal studies suggest that there was a 50% reduction in the relative risk of developing functional limitations in those who reported regular physical activity of at least moderate intensity(11).

In association with suitable physical activity, a good diet with sufficient protein intake is an effective combination to improve mobility among the elderly.

Graph 1: Evolution of muscle mass according to age



a good diet with sufficient protein intake is an effective combination to improve mobility among the elderly.





# How can the elderly achieve greater mobility?

## Protein intake among the elderly: How much? When? How?

To maintain, or even achieve greater mobility, loss of muscle mass associated with age needs to be slowed. To do so, ensuring protein balance is key.

### How much?

Nutritional protein requirements for the elderly depend on age and state of health. For an active person aged 50 to 60, the requirements are similar to those of a healthy adult: 0.8 g/kg/day or roughly 60 g a day for a person weighing 70 kg. Requirements start to change once we reach 65 due to metabolic changes associated with ageing: protein requirements increase to 1-1.2g/kg/day or 80 g a day. Finally, for someone 80 or so, who is fragile, requirements are even higher and may reach 1.2-1.5g/kg/day or 100 g a day (12).

However, despite the increased nutritional needs, dietary protein intake is lower among the elderly. A French study conducted in 2017 shows that among 65–79 year-olds, protein intake is below the recommended intake: 88 g for men and 71 g for women (13). It is therefore even more important to remain vigilant in order to guarantee sufficient protein intake.

### When?

Scientific studies show the importance of spreading protein intake across three daily meals. It would seem that there is a threshold of 0.4 g protein/kg per meal in order to trigger muscle synthesis among the elderly, which is roughly 30 g of protein per meal for a person weighing 70 kg (12, 14). In most cultures, the way protein is distributed across meals is not ideal. A western breakfast for example only provides roughly 10 g of protein, the midday meal roughly 15 g, and the evening meal around 60 g. It would therefore be a good idea to balance the protein intake throughout the day to reach 30 g per meal to stimulate protein synthesis at each meal.



# Protein intake among the elderly: How much? When? How?

## How?

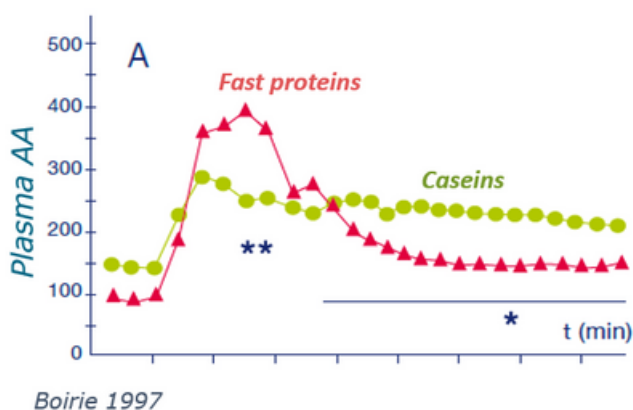
To act on muscle synthesis, the protein quality is also important. Not all proteins are equal.

### Protein

For several years, whey proteins have been recognised for their anabolic effect, in other words, their ability to stimulate muscle synthesis.

Whey proteins are rich in leucine, the amino acid responsible for activating muscle synthesis.

Graph 2: Anabolic properties of whey proteins



Furthermore, thanks to their structure, whey proteins are quickly digested as shown in the graph opposite, from the publication by Boirie et al. (15). Whey protein intake, in red, leads to the rapid appearance of amino acids in the bloodstream. The advantage of rapid digestion is the massive influx of leucine into the bloodstream, which sends a signal to the muscle and triggers muscle synthesis.

On the other hand, caseins, in green, flocculate in the stomach and release amino acids over a longer period.

Whey proteins are therefore said to be digested rapidly, whereas caseins are digested slowly.

Finally, whey proteins are also digested efficiently, since more than 90% of the amino acids present in the protein is absorbed by the body compared to 45–80% for plant proteins.

Thanks to all these characteristics, dietary whey supplements are known to be an efficient strategy for maintaining muscle mass among the elderly (16).



# Protein intake among the elderly: How much? When? How?

## Caseins

Thanks to their slow digestion, caseins are also interesting for maintaining muscle mass.

Casein consumption reduces muscle catabolism, the mechanism that causes muscle protein to deteriorate (15). During a period of fasting, the body draws amino acids from the muscles to deliver them to other organs that need them. Because of its slow digestion, casein delivers amino acids over a longer period, thus reducing catabolism. It is therefore recommended to consume casein before going to bed, which represents a long fasting period.



## Combining casein and whey protein to maintain mobility

Whey protein and casein both have a role to play in maintaining the protein balance. Due to their complementary action on anabolism (muscle synthesis), and catabolism (muscle loss), each protein can be beneficial at a specific time of day.

Most elderly people consume insufficient protein at breakfast time to reach the threshold that triggers muscle synthesis. It would therefore be interesting to offer a supplement with either casein or whey protein up to 10–15 g to reach the threshold value of 30 g per meal when combined with food intake.

Physical activity, in association with whey protein intake (15 g) is the perfect combination for stimulating muscle synthesis.

Finally, casein intake just before going to bed may reduce muscle catabolism during the night.

Consuming proteins at all these times of day will contribute to gaining functionality and maintaining mobility among the elderly so they age in good health.

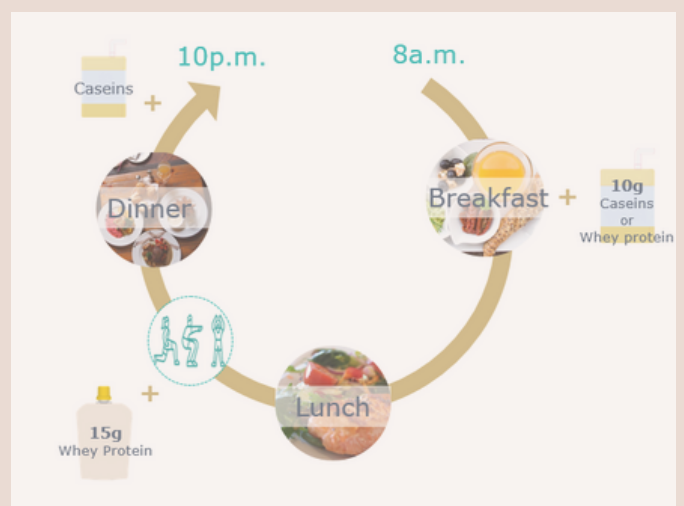


Figure 2: Association of fast and slow proteins in the elderly



## Our ingredients solution

Lactalis Ingredients offers a range of native proteins for clinical nutrition: **Pronativ® Native Whey Protein** and **Pronativ® Native Micellar Casein**.

Based solely on membrane separation technology, Pronativ® is produced directly from milk using a gentle, non-denaturing process. No additives or chemicals are used to extract our native proteins.

The physical process used to extract Pronativ® limits the number of processing steps to keep the proteins and their functional and nutritional benefits intact.



Pronativ® is produced directly from milk using a gentle, non-denaturing process.



# Pronativ® – Native Micellar Casein

Pronativ®–Native Micellar Casein, is a slow protein ideal for reducing muscle catabolism, in other words, muscle protein deterioration.

Pronativ® – Native Micellar Casein is extracted through a gentle membrane filtration process. The protein suffers little denaturing and has excellent biological properties. Thanks to its slow digestion, it ensures prolonged release of amino acids into the bloodstream. It therefore slows down muscle protein deterioration during fasting periods, preventing sarcopenia. It is rich in micellar calcium, known to have a beneficial effect on bone health and thus prevent osteoporosis.

The micellar casein content of more than 90%, compared to 80% in traditional dairy proteins, means this protein has interesting functional qualities for formulating low-viscosity, high-protein-dense, neutral-tasting foods.



# Pronativ® – Native Whey Protein

Pronativ® – Native Whey Protein is a fast protein with a higher nutritional quality than standard whey proteins.

Thanks to a process that does not denature, Pronativ® – Native Whey Protein is close to its original form in milk, maintaining its excellent biological value and its amino acid profile. With a higher level of BCAA\*, the leucine content in particular is 15% higher than standard whey proteins.

Scientific studies have shown that Pronativ® Native Whey Protein guarantees the quantity of leucine necessary to stimulate muscle synthesis (17), and improves muscle function with benefits such as better resistance to fatigue and improved locomotor activity (18).

\*Branched chain amino acids





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Les Placis, 35230 Bougarré, France  
Tel: 00 33 2 99 26 63 33 email: [lactalisingredients@lactalis.fr](mailto:lactalisingredients@lactalis.fr)  
[www.lactalisingredients.com](http://www.lactalisingredients.com)