

OFFERING AN INTEGRATED SOLUTION FOR THE GRAYING POPULATION: COLLAGEN PEPTIDES FOR HEALTHY AGING

With populations aging in virtually every nation across the globe, consumer demand for solutions that can tackle age-related conditions and keep people active for longer is growing at an incredible rate.¹

A healthy, active lifestyle is the goal of many modern consumers. Essential to achieving this is mobility. As the global population gets older, musculoskeletal health concerns, particularly osteoarthritis, osteoporosis and sarcopenia, are becoming increasingly common. The global proportion of people aged 60 or above has increased from 9.2% in 1990 to 11.7% in 2013 and is expected to reach 21.1% by 2050.²

Taking osteoporosis as an example, according to the International Osteoporosis Foundation, age is a significant contributor to the condition: it affects approximately one tenth of women aged 60, one fifth of women aged 70, two fifths of women aged 80 and two thirds of women aged 90. Worldwide, one in three women over the age of 50 will experience an osteoporotic fracture, as will one in five men in the same age group.

What's more, the prevalence of osteoarthritis is increasing. By 2050, a conservative estimate suggests that 15% of people over 60 will have symptomatic OA and one third of them will be severely disabled. This means that 130 million people will suffer from OA worldwide, of whom 40 million will be severely



disabled by the disease. Staying healthy and maintaining an active lifestyle is crucial for many of these consumers.

MARKET OPPORTUNITIES

Across the globe, people are taking an increasingly proactive role to counteract the negative effects of aging by adopting healthier diets and more active lifestyles. Maintaining healthy bones joints and muscles allows them to continue being active well into their later years. Indeed, the significant interest in staying fit and active as we age has been confirmed by the author of "10 Key Trends in Food, Nutrition and Health," Julian Mellentin, who declared senior nutrition to be the biggest trend in the market, after the increasing demand for natural or naturally derived products.³



Collagen Peptides for a Healthy Lifestyle

PRODUCED & MARKETING BY ROUSSELOT

Peptan[®]

DARLING
INGREDIENTS

With health claims related to bone and joint health among the top product positionings that resonate best with consumer goals of maintaining their health, according to Euromonitor, preventive nutrition is gaining popularity as a way to optimize overall quality of life, personal health and wellbeing.⁴

Consumers want proven solutions that enable them to stay active and limit the physical impact of aging (Figure 1).

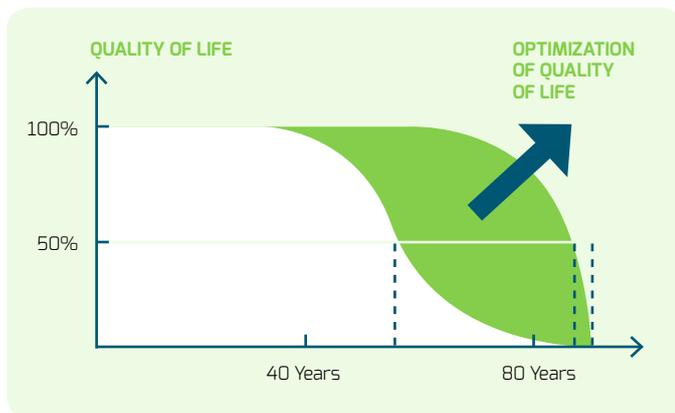


Figure 1: With advancing years, joint stiffness, brittle bones and loss of muscle strength can restrict or even prevent movement and reduce overall quality of life. Source: modified from WHO/HP5 (Geneva, Switzerland, 2000).

Another health issue that comes with aging is nutritional deficiency. Aging consumers are among the high-risk groups that are likely to suffer from malnutrition as a result of loss of appetite, difficulty to swallow, lifestyle and social factors.⁵ Thus, owing to rising healthcare costs, government health insurance schemes are under pressure to encourage senior consumers to eat healthily to prevent age-related conditions and maintain their musculoskeletal health. Active agers typically look for solutions that taste great, are scientifically endorsed and, above all, are convenient and easy to use.

Currently, despite the growing demographic, there's a gap in the market for products targeting older consumers. For example, sales of functional beverages for the elderly were recently valued at \$1.4 billion in 2014 in Western Europe and North America, indicating that there is plenty of room for expansion. Furthermore, protein, well recognized as an essential nutrient for the elderly, offers a raft of product differentiation opportunities for manufacturers — boosting the high protein trend in categories such as drinks, cookies and cereals — targeting buyers with a strong nutritional requirement and relatively high disposable incomes.⁶

Manufacturers can seize this opportunity to develop proven nutritional products that support good nutrition, target and educate older adults in particular to promote mobility, independence and general wellbeing. With a range of proven

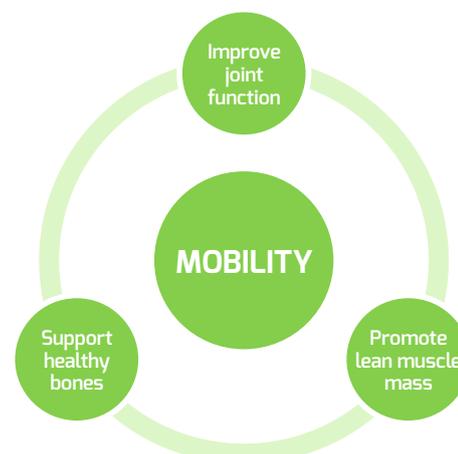


nutritional and functional benefits, collagen peptides such as Peptan, manufactured by Rousselot, are recognized as the ideal solution.

COLLAGEN PEPTIDES: HOLDING UP THE BODY

As the main component of fibrous tissue, collagen is the most abundant protein in the human body, forming up to 70% of the skin and 90% of total organic bone mass. It provides the crucial infrastructure of our musculoskeletal system — enabling us to move. Highly digestible and bioavailable, Peptan collagen peptides are the result of a gentle enzymatic process that converts large, native collagen molecules into small bioactive peptides. Often referred to as hydrolyzed collagen, the peptides are characterized by a unique combination of 18 key amino acids with a particularly high concentration of glycine and proline/hydroxyproline, and offer exceptional nutritional properties not found in other protein sources.

Derived from the native collagen, Peptan is a premium collagen peptide that has been specifically developed to offer multiple health and functional benefits. A wide body of scientific evidence has demonstrated Peptan's efficacy in promoting healthy joints, bones and muscles.



AGE-INDUCED COLLAGEN LOSS

The collagen content of the body gradually decreases with age, a process that is accelerated in women by the hormonal changes caused by the menopause. The onset of menopause also triggers a dynamic decrease in bone mineral density, which can lead to osteoporosis. Castelo-Branco, et al. analyzed the relationship between changes in skin collagen content and bone mass during aging.⁷ A total of 76 female participants were organized into five age groups (from 20 to 60 years). Their bone mineral density was measured and the collagen content in skin biopsies from the lower abdomen was determined.

The results indicated that skin collagen levels decreased significantly with age after the age of 40 and after the menopause.

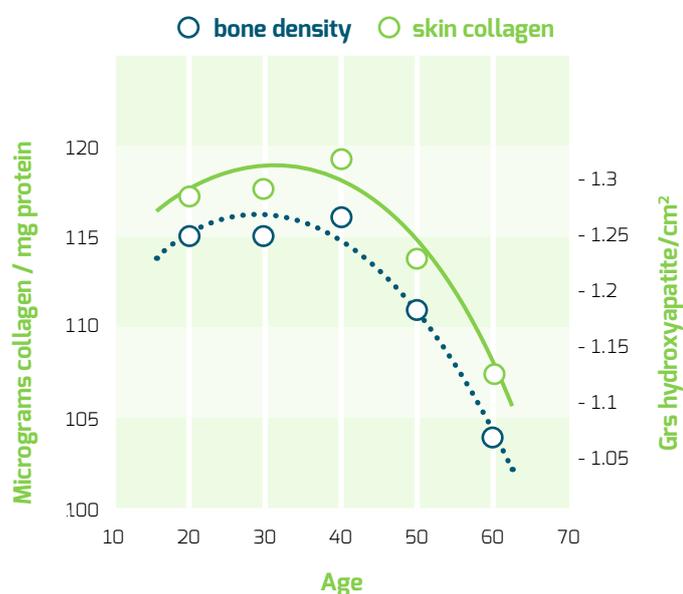


Figure 2: Skin collagen (μ collagen/mg protein) and bone mineral density (g hydroxyapatite/cm²) related to age (adapted from Castelo Branco, et al, 1994).⁷

Changes in bone mass were closely related to those detected in collagen. The data suggest that bone mass and skin collagen decline in parallel with aging and both show an accelerated decline in postmenopausal years. As the mineral content of the bone is deposited on an organic collagen scaffold, one might speculate that the collagen content of bone decreases in the same way as in skin. Nevertheless, the question of whether osteoporosis is an intrinsic collagen disorder remains to be demonstrated, the authors noted.

JOINT HEALTH

Affecting almost 10% of men and 18% of women over the age of 60, joint stiffness and discomfort is considered to be one of the most disabling conditions in the developed world.⁸ Cartilage is made up of cellular building blocks (chondrocytes), which produce an extracellular matrix, consisting of collagen and proteoglycans (mainly aggrecan). Collagen fibers make up between 70 and 95% of cartilage and are responsible for its structure and strength; proteoglycans serve as a joint lubricant.



In healthy joints, the cartilage matrix composition is regulated by chondrocytes (joint cells) through a finely balanced process of synthesis and turnover, which ensures joint lubrication and cartilage matrix renovation. When these processes are disrupted, causing an imbalance involving matrix-degrading enzymes, which attack aggrecan and collagen are attacking resulting in the deterioration of cartilage structure and function.

To help maintain joint health, it is essential to ensure that this balance is protected and the necessary building blocks for collagen are available to support cartilage regeneration. Stimulating chondrocytes to produce more aggrecan and type II collagen, Peptan has been proven to improve joint mobility and flexibility, and help to reduce joint discomfort. A recent double-blind placebo-controlled clinical study done in collaboration with the Sixth People's Hospital of Shanghai revealed that an 8 g daily intake of Peptan significantly improved joint comfort and functionality.⁹

During the 6-month study, 94 women with diagnosed knee osteoarthritis were randomly assigned either 8 g of Peptan or a placebo. Their knee joint function was assessed with standardized score systems (WOMAC for general joint discomfort and function and Lysholm for more specific functions when walking, jumping and stair climbing). At the end of the study, the Peptan group revealed noticeably lower discomfort and better joint flexibility than the control group, reinforcing the existing body of scientific evidence on Peptan's joint health benefits. This study confirms that Peptan collagen peptides can improve joint health, which can help to maintain an active lifestyle throughout aging, the researchers concluded.

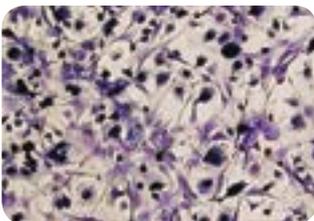
BONE HEALTH

Maintaining healthy and strong bones at each life stage is a key to avoid fractures later in life. Healthy bone is subject to a continuous cycle of bone matrix breakdown and new bone formation. An imbalance between bone resorption and bone formation results in a reduction of bone mineral density (BMD), leading to an increased risk of fractures. Several in vitro and in vivo studies have proven Peptan's effectiveness in improving bone metabolism and biomechanical parameters by stimulating the endogenous production of collagen and improving bone mass density and bone strength.^{10,11}

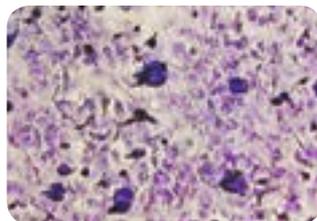
This suggests that Peptan can help support healthy bones. In an animal model mimicking the loss of bone mass during the onset of menopause, Guillerminet, et al. provided evidence that collagen peptides (Peptan) restored bone mineral density and improved bone microarchitecture and solidity.¹⁰

In a follow-up study, the same group showed that collagen peptides (Peptan) had the same benefit on bone health in older animals and, importantly, could exert not only a therapeutic – but also a preventive – effect.¹¹ Peptan acts to trigger osteoblasts (bone forming cells), reduces bone resorption and promotes the regeneration of bone fibres.^{12,13} Peptan's bone health benefits can be further strengthened when combined with calcium and vitamin D.

A Osteoblasts Star-shaped cells



B Osteoclasts Round black cells



The image on the left shows bone cells that are cultured in the presence of a control protein (A) or Peptan (B). Peptan stimulates the development of bone forming cells- osteoblasts visible as star shaped cells much more than the control protein. Bone resorbing cells- osteoclasts are not affected by Peptan or the control protein.¹⁰



MAINTAINING MUSCLE MASS

Sarcopenia is the age-related loss of muscle mass and function. The condition is linked to a decreased metabolic rate and reduced strength and functional status. Exercise and the adequate intake of easily digestible protein are vital to counteract the effects of the condition. These actions help to maintain lean body mass and to provide adequate amino acids for protein synthesis in all tissues. The recommended protein intake for healthy adults, according to the World Health Organization, is 0.8 g/kg body weight per day.

However, expert panels have postulated an increased need for protein for older adults and recommend to consume 1–1.2 g of protein per kg body weight per day to counteract the loss of muscle mass.¹⁴ To meet this recommendation, elderly people can benefit from supplementing their diet with protein: collagen peptides are particularly useful as an easily absorbed protein source.

A recent study in elderly women found that collagen peptides are more effective in maintaining a positive nitrogen balance and preserving lean body mass than equivalent doses of whey protein during the consumption of a controlled diet. Hays, et al. compared varying types of the two supplements with the same

protein content in a crossover study and assessed their ability to enhance nitrogen retention and increase the availability of essential amino acids in elderly people.¹⁵

The study consisted of two 15-day diet trials separated by a weeklong washout period. Nine healthy elderly women (age 71±1 years) were given a eucaloric diet containing approximately 0.8 g/kg body weight/day of protein. Although body weight decreased after consumption of the whey supplement, no significant changes in body weight or composition resulted from the consumption of the collagen supplement. Nitrogen excretion was higher during the whey supplement trial than during the collagen trial. Therefore, a concentrated, fortified, hydrolyzed collagen protein supplement maintained nitrogen balance and preserved lean body mass during the 15 days of consuming a normal-level protein diet of 0.8 g/kg/bodyweight/day.

Furthermore, a new placebo controlled clinical study on healthy, senior men, average age 72 years, demonstrated the positive effect of a daily collagen peptides supplementation (15 g/daily) in combination with resistance training in improving body composition. The 12 week study included 3 training sessions per week and assessments of the Fat-free mass (FFM), fat mass (FM), Isokinetic quadriceps strength (IQS) of the right leg and sensory motor control (SMC). The results showed an increase in Fat free mass (FFM), loss in fat mass (FM) and increased muscle mass and strength as well as motor control in the collagen peptides group compared to the placebo group.¹⁶ Maintaining optimal muscle mass and strength during aging is essential and to reach the recommended protein intake, many seniors reach these recommendations for protein intake, many seniors could benefit from protein enriched foods or supplements to enrich their diets.

FUNCTIONAL PROPERTIES

Multifunctional products are key for older consumers who prefer more palatable foods with a softer, easier-to-chew texture; ingredients should be easy to use and incorporated into a variety of delivery forms that are both convenient and tasty. Being a highly digestible and bioactive protein, Peptan offers a range of unique functional and practical benefits that make it ideal for manufacturers aiming to develop products that appeal to healthy agers. With exceptional organoleptic properties, Peptan can be easily incorporated into a wide variety of functional foods, dietary supplements and nutraceuticals, such as protein drinks, dairy products, soups and gummy style sweets, with little or no impact on taste and texture.

Manufactured to meet the highest international food and quality standards, Peptan has no side-effects, is completely natural and safe, and is free from preservatives and additives.

CONCLUSION

As consumers take an increasingly active approach to counteracting the physical effects of aging, opportunities are growing to meet the demand for functional products that target joint and bone health. However, success in such a market requires manufacturers to work with ingredients that deliver proven benefits in a wide variety of appealing applications. Easy to incorporate and supported by science, Peptan collagen peptides are the ideal solution for manufacturers aiming to succeed in the exciting active aging market.



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About Rousselot® and Peptan®:

Rousselot® and Peptan® are both brands of Darling Ingredients Inc. Rousselot is the leading manufacturer* of gelatin and collagen peptides to the food, nutrition and pharmaceutical industries. Rousselot's wide range of collagen peptides are marketed under Peptan, globally recognized as the leading brand in its category. Rousselot benefits from a global sales and production network of 13 plants and 10 sales offices located in Europe, North America, South America and Asia.

*Source: Grand View Research, Gelatin Market Analysis and Segments Forecasts to 2024, 2014

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