

*always
inspiring more ...*



symrise 

dianafood™

Collagen range

*Natural solutions for joint health,
beauty and even more...*



Contact us

This marketing document concerns industry professionals. It only pertains to food ingredients not final food products. It is the responsibility of each manufacturer to verify the compliance of the final product's labeling and communication indicated on the finished foods to be delivered as such to the consumer with respect to the current local legislation.



— Insights

Consumers across all demographics want to age healthily and live longer. They are increasingly seeking a more holistic approach to healthy aging, by proactively supplementing their diet. Collagen is commonly known to support healthy aging functions such as skin beauty, and joint care*.

The United Nations predicts that by 2050 there will be 2.1 billion people globally aged 60 or over. The main target group is obviously older consumers (55+) who will become increasingly susceptible to age-related issues. That said, as collagen degradation begins around 30, a growing number of younger people are becoming aware of the benefits of supplementation. As a result, the market is no longer solely targeted at seniors, brands have now placed renewed focus on delivering joint support to diverse consumer groups, from millennials to boomers, and everything in between.

MILLENNIALS

50%

of US Millennials agree **they are more focused on their health** than they were 10 years ago

SENIORS

55%

of Germans **aged 65+ look to enhancing their health** over the next five years

JOINT HEALTH

64%

of UK Baby Boomers (57-75) are interested in and willing to pay more for **foods and beverages that improve muscle and joint health**

BEAUTY

61%

of surveyed consumers in Thailand associate **“collagen” with beauty functionality**

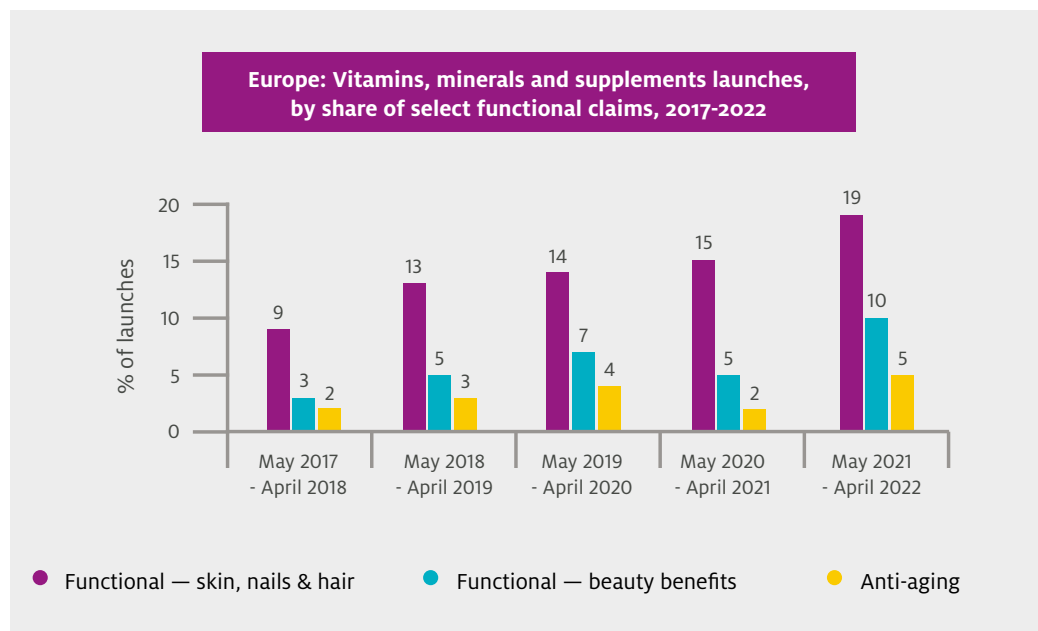
*Source: Mintel, 2023

Consumers across all generations already recognize that diet plays an important role in beauty and skin health. Skin, hair and nail health support from the inside-out can offer consumers a more natural and simplified alternative to traditional makeup and beauty routines. A trend that has been influenced by the Covid-19 pandemic.

This growing consumer appeal for nutricosmetics is reflected in the supplement market innovation activity: **Globally, launches of dietary supplements holding a beauty benefit claim raised by:**



(Source: Mintel)



As nutrition plays a key role in maintaining joint health, joint supporting ingredients are an opportunity for companies formulating functional foods, drinks and supplements targeting all consumer-age groups.

— Collagen properties & benefits

Collagen is the main protein of connective tissue in animals and the most abundant protein in mammals, making up about 25% of the total protein content (Holwerda, 2022). Collagen is also a structural protein in the extracellular matrix of cutaneous tissue, representing up to 75% of its total weight. In association with other fibers found in the extracellular matrix (hyaluronic acid, elastin...), collagen forms a support network for fibroblasts or keratinocytes (Michalak *et al.*, 2021).

Collagen type II is mainly present in the cartilages, and collagen type I is the most common in skin, bone, tendon or ligaments.

To counteract joint weakening, oral collagen supplementation (especially using collagen type II), has recently gained in popularity supported by well-designed clinical studies. Supplementation was shown to improve joint function (flexibility and mobility) and decrease pain in healthy individuals with joint discomfort (Lugo *et al.* 2013; Schön *et al.* 2022; Shiojima *et al.* 2022) and also in athletes (Dressler *et al.* 2018, Zdzieblik *et al.* 2017). When the supplement source was hydrolyzed collagen or collagen peptides, benefits were observed for daily doses from 1.5g to 10g during 3 to 6 months (Bruyère *et al.* 2012, Kumar *et al.* 2014, Zdzieblik, 2017; Dressler 2018).

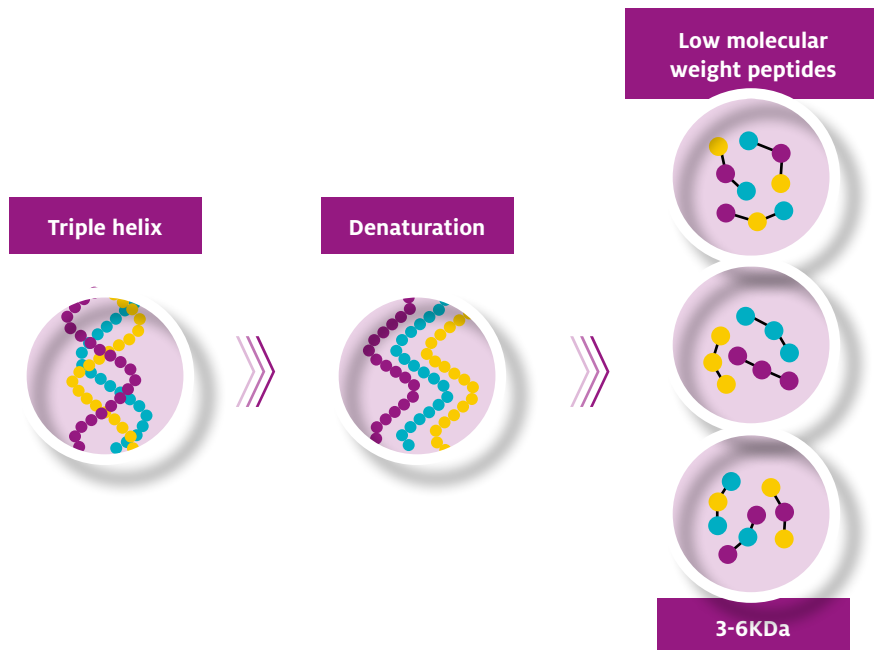
“Supplementation was shown to improve joint function (flexibility and mobility) and decrease pain in healthy individuals with joint discomfort and also in athletes.”

— Hydrolyzed collagen: What are the benefits and how does it work?

Collagen is a structural fibrous protein with a molecular weight of ~300 kDa, the principal constituent in many animal tissues = native protein. Collagen provides almost all the essential amino acids (excluding tryptophan) which play important roles in the building of skin and joint cartilage and may also have anti-inflammatory and antioxidant effects (Mobasheri, 2021).

Denaturation of native collagen, induced by hydrolysis, produces three chains in their random coiled form. Once the chains are separated, the hydrolysis is carried out by the action of proteolytic enzymes. The resulting product is commonly called hydrolyzed collagen. Hydrolyzed collagen contains high concentrations of small bioactive peptides, which are present in blood after consumption and are thought to promote collagen turnover in connective tissue such as joint (Kviatkovsky *et al.* 2022).

In a Caco2 bioavailability test, our hydrolyzed collagen showed a superior permeability compared to native cartilage, meaning a superior bioavailability and thus potential efficacy. Looking at new launches of collagen-based products, hydrolyzed collagen is, by far, the most commonly used in supplements and functional foods and beverages.



— What about hyaluronic acid & chondroitin sulfate?

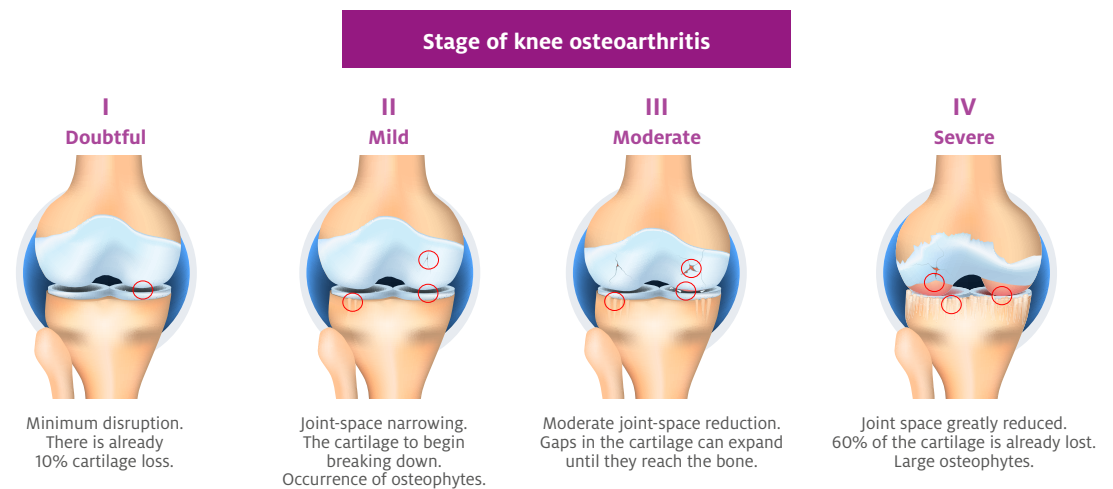
Hyaluronic acid and chondroitin sulfate are glycosaminoglycans naturally found in biological tissues such as skin, bone and cartilage. A meta-analysis showed a significant reduction in pain following supplementation with chondroitin sulfate in knee osteoarthritis (OA) (Simental-Mendía, 2018).

A pilot study has also indicated that **daily oral supplementation with hyaluronic acid from chicken comb natural extract could improve the quality of life for adults with OA** (Kalman *et al.* 2008).

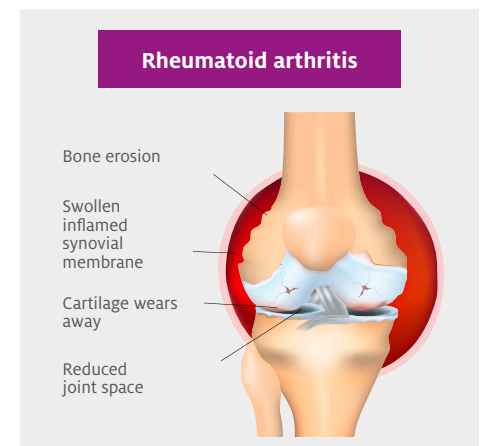


Joint mobility

Different types of disorders can affect joint mobility. These disorders can cause pain, swelling, and loss of motion in the joint. They are usually caused by a progressive cartilage breakdown or local inflammation. It affects preferentially weight bearing joints such as the knees, hips and spine(Simental-Mendía, 2018) and (Kalman *et al.* 2008).



Rheumatoid arthritis is the second largest disorder classified as an autoimmune disease, meaning that certain cells from the immune system no longer recognize the cartilage as an intrinsic part of the body, and tend to eliminate it like any foreign element. This results in severe pain, swelling, stiffness, and loss of function in the joints.





SINGAPORE

24%

of adults between 18 and 50 are reported suffering from chronic joint problems.

USA

31%

of consumers aged 25-34 regularly experienced pain or injury.

— Recommended solutions

✓ Collaful™

Supported by consumer tests⁽¹⁾, run over 3 months on 64 panelists (43 years old as average age) with joint pain declared for at least 6 months.

After 3-month of 1.5g daily supplementation:

83%

of consumers perceived a significant decrease in joint pain and are satisfied with this dietary supplement.

78%

of participants precised they would recommend this supplementation to people who suffer from joint discomfort.

On top of this test, clinical datas⁽²⁾ confirmed a:

73%

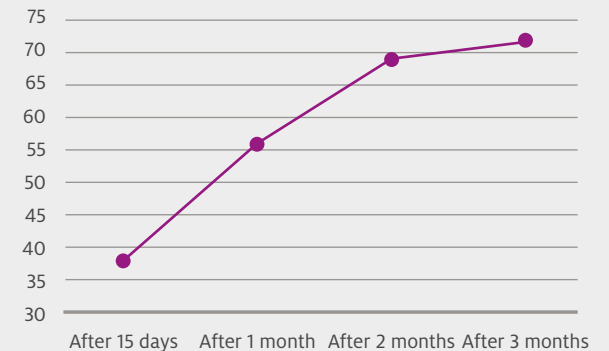
decrease consumption of non-steroidal anti-inflammatory against placebo after a 3-months supplementation period.

✓ Chondractiv™ Plus

Literature review and science demonstrated that **collagen type II significantly improves joint mobility and deceases joint pain**. Benefits were observed for daily doses from 1.5g during 3 to 6 months. (Lugo *et al.* 2013; Schön *et al.* 2022; Shiojima *et al.* 2022)

1 - Biomerieux – 2023 | 2 - Proclaim –Efficacy and tolerance of a product aiming at decreasing articular pain - 2003 unpublished

Evolution of % of consumers perceiving improvement in gestures, movements or activities



+34%
in 2.5 months



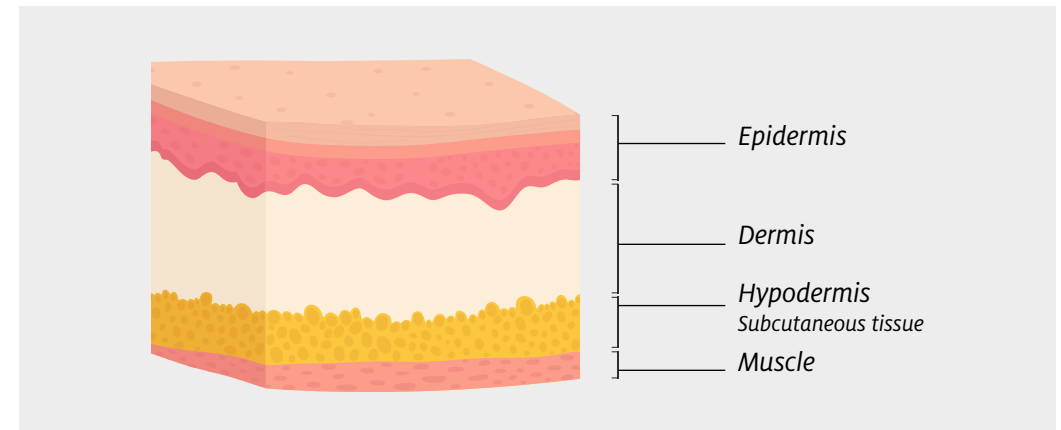
Beauty

— *Skin protection & integrity*

The skin is the largest organ of the human body. Because it interfaces with the environment, skin plays a key role as a barrier protecting the body from pathogens and the external environment. It also plays a role in thermoregulation, water loss, metabolism, synthesis of vitamin D...

Skin is composed of three primary layers (epidermis, dermis and hypodermis). Dermis is particularly rich in collagen type I, a structural protein that gives skin mechanical support, rigidity, and integrity.

Skin aging is influenced by external factors such as environmental conditions (UV radiation, pollution...) and the intrinsic process leading to dermal structural fragmentation (Sibilla *et al.*, 2015).



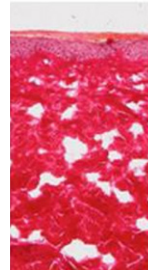


Collagen density

Lines & furrows

Young skin

Histology skin section



Schematic representation

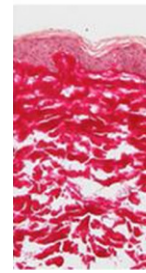


High

None

Skin after intrinsic aging

Histology skin section



Schematic representation

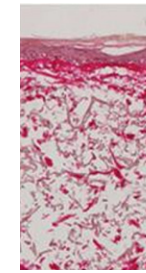


Low

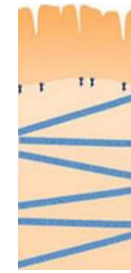
Moderate

Intrinsic aging and photo aging

Histology skin section



Schematic representation



Very Low

Deep

Graph modified from: E.C.Naylor, *Maturitas*, 2011, 69, 249-256

— Nails care

Nails are skin-associated structures or appendages, composed mostly by keratin. The nails consist of a keratinized nail plate, generated by a nail matrix, lying on soft tissues called the nail bed. They play a protecting role regarding fingertips, but also helps to enhance precise movements.

An oral supplementation with specific bioactive collagen peptides increased nail growth and decreased the frequency of broken nails in a clinical trial conducted in 24 participants (Hexsel *et al.*, 2017)

— Recommended solutions

✓ **Collachic™**

The skin barrier structure complexity may limit the delivery of certain skincare nutrients and bioactives to the dermis. Actives delivered from within allow complementary beauty benefits.

Extensive clinical researches with collagen supplementation showed improved skin hydration and elasticity, increased dermal density and reduced markers of skin aging.

Collagen also has synergistic effects with chondroitine sulfate and hyaluronic acid to maintain skin hydration. (Bolke *et al.* 2019; Czajka *et al.* 2018; Evans *et al.* 2021, Nomoto and Iizaka 2020; Miyanaga *et al.* 2021)



dianafood™

Why choosing chicken source?

- ✔ No natural plant-based collagen on the market
- ✔ Collagen obtained from natural raw materials
- ✔ From carefully selected edible chicken parts
- ✔ Chicken raised locally (< 200km around our production plant)
- ✔ Obtained via an **extraction process - standardized high level of collagen combined with chondroitin sulfate and hyaluronic acid**
- ✔ **Healthy image**
- ✔ **Sustainable sourcing** vs bovine
(Chicken is 5 times less impactful in terms of carbon footprint than Beef)*

Our strong export and regulatory expertise is definitely crucial to deliver globally markets with many different restrictions in terms of sanitary & religious requirements.

* Source Agribalyse 3.1

— Our offer

dianafood™

Symrise offers a selection of collagen-rich ingredients that are carefully produced in its French facility dedicated to Chicken.

collaful™ 

- **Well-being and joint comfort for versatile benefits supported by consumer tests**
- Product denomination:
Hydrolyzed chicken bone and cartilage powder
- Specifications:
 - **Collagen (total)** 45 ± 5%
 - Chondroitine sulfate ≥ 10%
 - Hyaluronic acid 1 ± 0.5%
 - Proteins ≥ 75%
- Recommended dosage: 1.5g/day
- Designed for dietary supplement applications (tablets, capsules, ..) & functional foods
- Long shelf life (24 months) and ambient storage
- Halal certification available

chondractiv™ plus 

- **Joint care & mobility, supported by literature review and sensory consumer insights**
- Product denomination:
Hydrolyzed chicken cartilage powder
- Specifications:
 - **Collagen (equivalent type II)** ≥ 25%
 - Chondroitine sulfate ≥ 15%
 - Hyaluronic acid 1.2 ± 0.5%
 - Proteins ≥ 70%
- Recommended dosage: 1.5g/day
- Designed for dietary supplement applications (tablets, capsules, ...) & functional foods
- Long shelf life (24 months) and ambient storage
- Halal certification available

collachic™ 

- **Skin condition & anti-aging and nail beauty from within, supported by literature review and non-proprietary clinical studies**
- Suggested beauty claims: Skin elasticity / beauty, reduction of wrinkles and strong nails
- Product denomination:
Hydrolyzed chicken extract powder
- Specifications:
 - **Collagen (mainly type I)** ≥ 55 %Indicative data:
 - Chondroitine sulfate ≥ 6 %
 - Hyaluronic acid 0.6%
- Recommended dosage: 4.5g/day
- Designed for Beauty from within concepts (capsules, hot drinks, shots...)
- Long shelf life (24 months) and ambient storage
- Halal certification available

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