

Joint health: when prevention is better than cure



What about thinking in « well-ageing » all our lives long?

While at first only developed countries were concerned, the WHO estimates that by 2050, two-thirds of the world's population aged 60+ will come from low- and middle-income countries: so, yes, we are ALL concerned!



So, why is it so essential to “well-ageing”?

Simply because ageing is characterised by an alteration in various neurobiological and physiological processes and behavioural changes over time. This process, which is completely normal and natural, is accompanied by a series of changes that appear progressively throughout our body: the (feared) arrival of the first wrinkles, and almost worse, the first signs of cognitive performance decline (memory, concentration, thinking) appear as early as the age of 45, although we are not all equal!¹

And of course we can't forget the knee pain, neck pain and loss of joint mobility from the age of 40 upwards... Yes, still so young, you might think, but it's a cold shower!²

Factors that accelerate ageing...

And today's society isn't helping. In this age of ultra-processed food, the number of obese people worldwide has

not yet reached its peak, although in 2022, **16% of the world's adults were declared obese. In addition, the recommended weekly duration of moderate or sustained physical activity (150 minutes, for your information) is not being reached by almost a third of the adult population**, i.e. 1.4 billion people³. These factors only serve to exacerbate premature ageing at a time when we are living longer and longer. But what about getting old in good health and in full possession of our faculties?

Growing old in full possession of our abilities includes motor skills and mobility

Without our joints, there's no mobility: we would be nothing more than a pile of bones, which wouldn't be very practical. Unfortunately, for all of us, with age comes **reduced mobility and joint pain, which can become a major impediment** to some, if not all, of our daily activities. «Osteoarthritis is not a preventable cause of ageing», according to the WHO. **So what are the solutions for preserving them and slowing down the process?**

1- Singh-Manoux, A., Kivimaki, M., Glymour, M. M., Elbaz, A., Berr, C., Ebmeier, K. P., Ferrie, J. E., & Dugravot, A. (2012). Timing of onset of cognitive decline : results from Whitehall II prospective cohort study. *BMJ (Clinical research ed.)*, 344, d7622. <https://doi.org/10.1136/bmj.d7622>

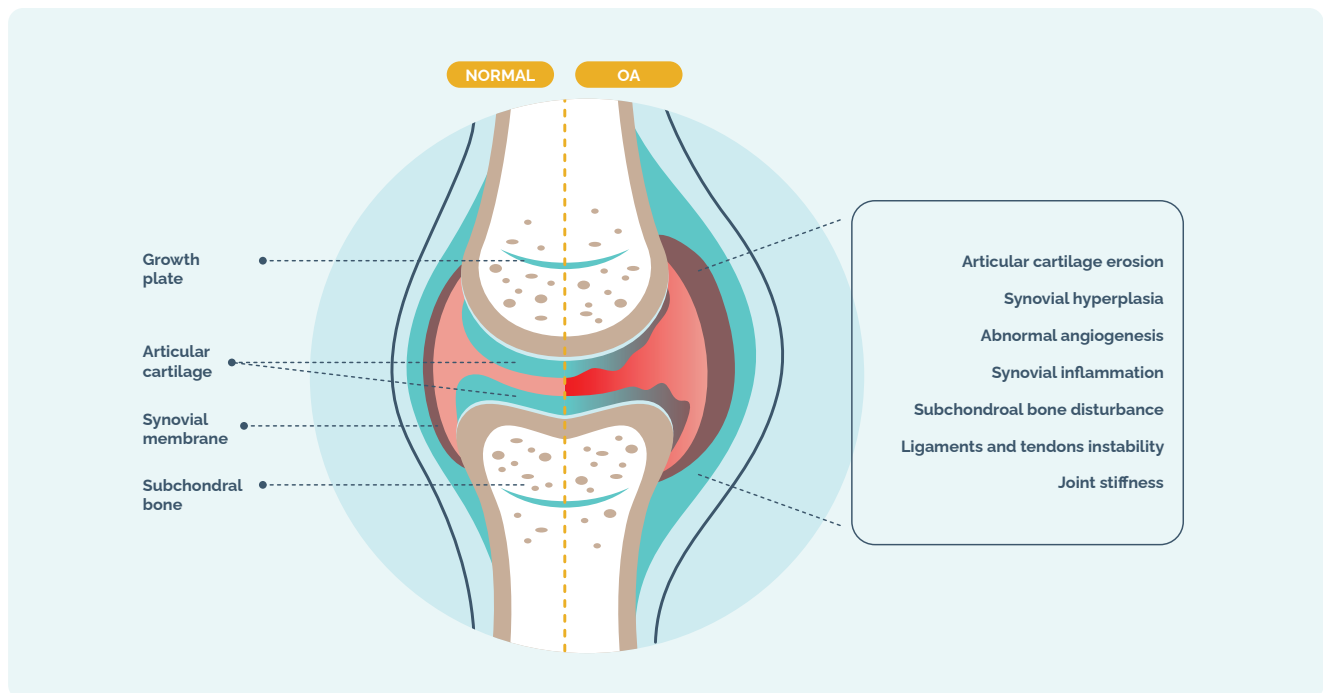
2- Yao, Q., Wu, X., Tao, C. et al. Osteoarthritis : pathogenic signaling pathways and therapeutic targets. *Sig Transduct Target Ther* 8, 56 (2023). <https://doi.org/10.1038/s41392-023-01330-w>

3- WHO : <https://www.who.int/fr/news-room/fact-sheets/detail/physical-activity>

Osteoarthritis:

what to do to slow it down?

Yes, we're talking about osteoarthritis - **a chronic degenerative joint disease** which develops slowly and has **no cure**. **Osteoarthritis is widespread and can affect all joints**. It is characterised by cartilage degradation associated with inflammation of the synovial membrane and remodelling of the subchondral bone.



The most frequently affected joints are those of the **hands** (in 35% to 45% of cases), the **spine** (in 45% to 50% of cases), the **knees** («gonarthrosis», in 30% of cases) and the **hips** (in 10% of cases, known as «coxarthrosis»)⁴.

The pain, swelling and joint stiffness caused by osteoarthritis have a major and negative impact on daily life. There's nothing more annoying than being restricted in your movements.

Osteoarthritis is a pathology essentially linked to **ageing**, which is explained in particular by an increase in oxidative stress and inflammation as we age. These changes lead to an increase in the expression of certain enzymes (metalloproteinases and aggrecanases), as well as pro-inflammatory cytokines that help to destroy the extra-cellular matrix of articular cartilage^{5,6}.

Is age the only factor?

Other risk factors have been identified: **being overweight**,

repetitive movements that put too much strain on the joints, metabolic disorders, an auto-immune disease such as rheumatoid arthritis, or certain anatomical features (genu varum or valgum). **Osteoarthritis can also occur as a result of trauma** or repeated injury, particularly in sports-people. **Genetic predisposition**, particularly for osteoarthritis of the hands, **is also implicated**.

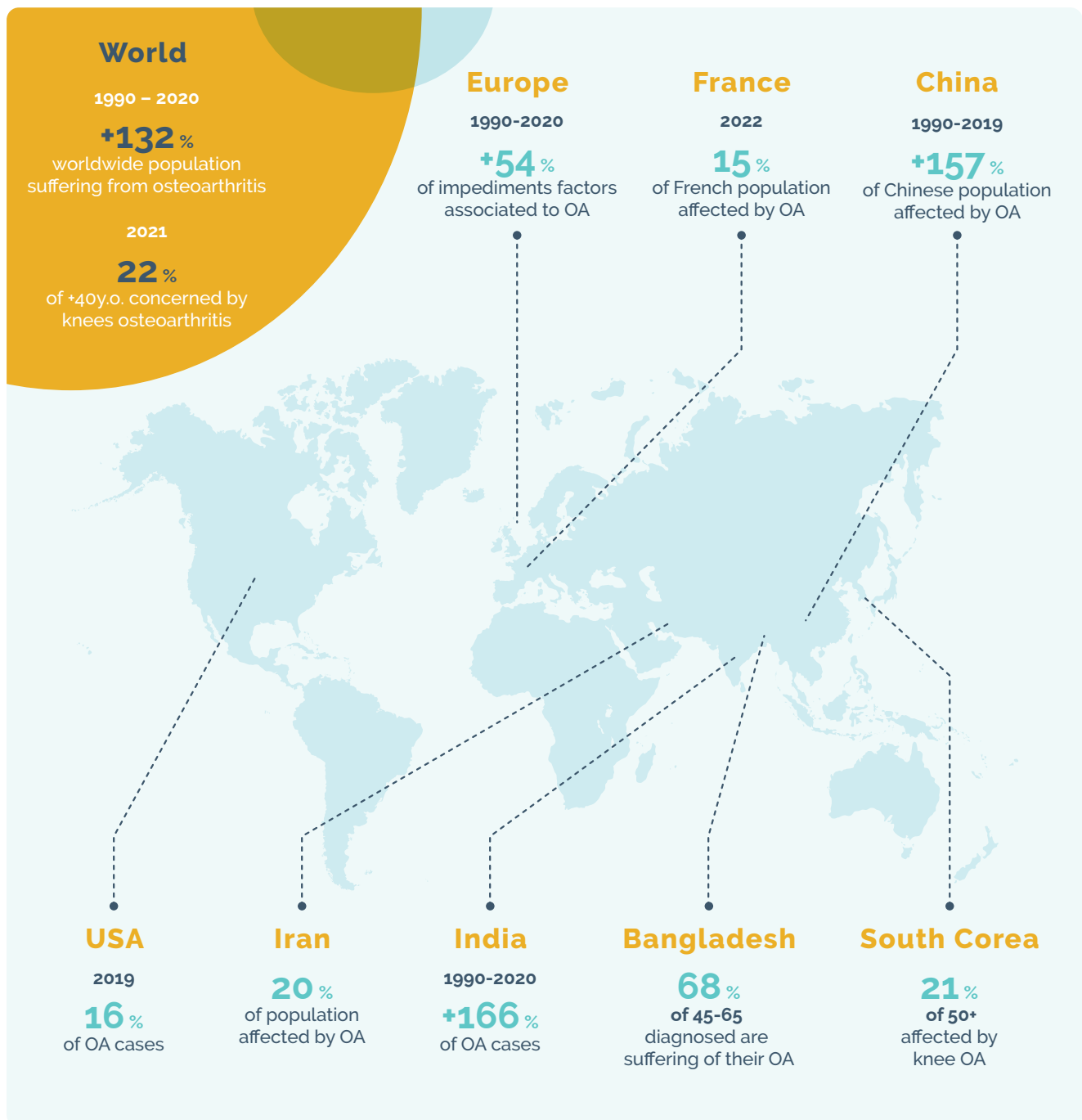
Despite the high prevalence of osteoarthritis and its impact on daily life, **there is currently no cure or treatment to stop it progressing**. Hygienic and dietary measures, such as weight loss, a balanced diet and appropriate physical activity, can limit the progression of the disease. And contrary to what you might think: if you suffer from osteoarthritis, don't stop moving! **Movement is life!** Only symptomatic treatments, usually non-steroidal anti-inflammatory drugs (NSAIDs), can relieve the pain.

4- Arthrose, la maladie articulaire la plus répandue ; dossier Inserm ; 2022

5- Valdes, A. M., & Stocks, J. (2018). Osteoarthritis and ageing. *European Medical Journal Rheumatology*, 3(1)

6- Veronesi F, Contartese D, Borsari V, Pagani S, Fini M, De Mattei M, Tschon M. Ageing and Osteoarthritis Synergically Affect Human Synovioocyte Cells : An In Vitro Study on Sex Differences. *Journal of Clinical Medicine*. 2022; 11(23) :7125. <https://doi.org/10.3390/jcm11237125>

Prevalence



By 2050, it is estimated that over a billion people worldwide will be suffering from osteoarthritis. And like ageing, osteoarthritis spares no-one, although its prevalence is significantly **higher in women than in men**, respectively 314 and 210 million people⁷. But age and gender aren't everything! The massive increase in cases of **overweight and obesity⁸ contributes to an acceleration in the development of osteoarthritis.** In fact, a high body

mass index (BMI) was identified as the sole risk factor in 20.4% of cases in 2020⁹.

Encouragingly, **generations Z and Y seem to be proactive when it comes to their health** and the notion of « healthy ageing »¹⁰ as in 2021, almost half of 18–34-year-olds said they wanted to improve their bone and joint health over the next 12 months¹¹.

7- Yao, Q., Wu, X., Tao, C. et al. Osteoarthritis : pathogenic signaling pathways and therapeutic targets. Sig Transduct Target Ther 8, 56 (2023). <https://doi.org/10.1038/s41392-023-01330-w>

8- Surpoids et obésité de l'adulte : définition, causes et risques, Ameli.fr, 2024

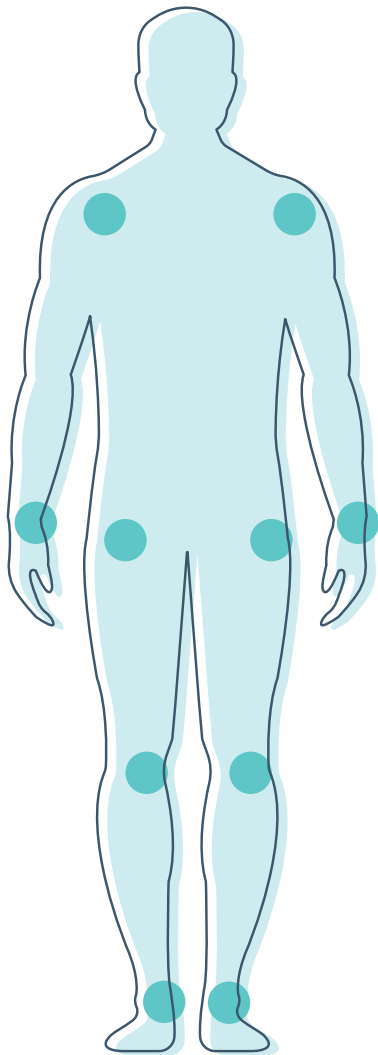
9- Livre Blanc des Etats Généraux de l'arthrose 2015-2016

10- Actifs Mag 85

11- FMCG Gurus, 2021

The role of nutraceuticals in joint health

And these young people are absolutely right! Given that there is currently no miraculous solution for curing osteoarticular diseases, **food supplements can have a part to play in reducing joint discomfort**, as well as preventing it from occurring in the first place.



WORLDWIDE NUTRACEUTICAL MARKET FOR JOINT HEALTH

2021 Value
3,7 Mds
USD

2022 to 2028
+7,26%
Compound annual growth rate

2022 to 2028

+9,7%
Compound annual growth rate for Asia pacific

COLLAGEN MARKET



Market for collagen dilutable powder sachets

From now until 2030

+9,11%
growth



Worldwide collagen market

2020 Value
3,6 Mds
USD

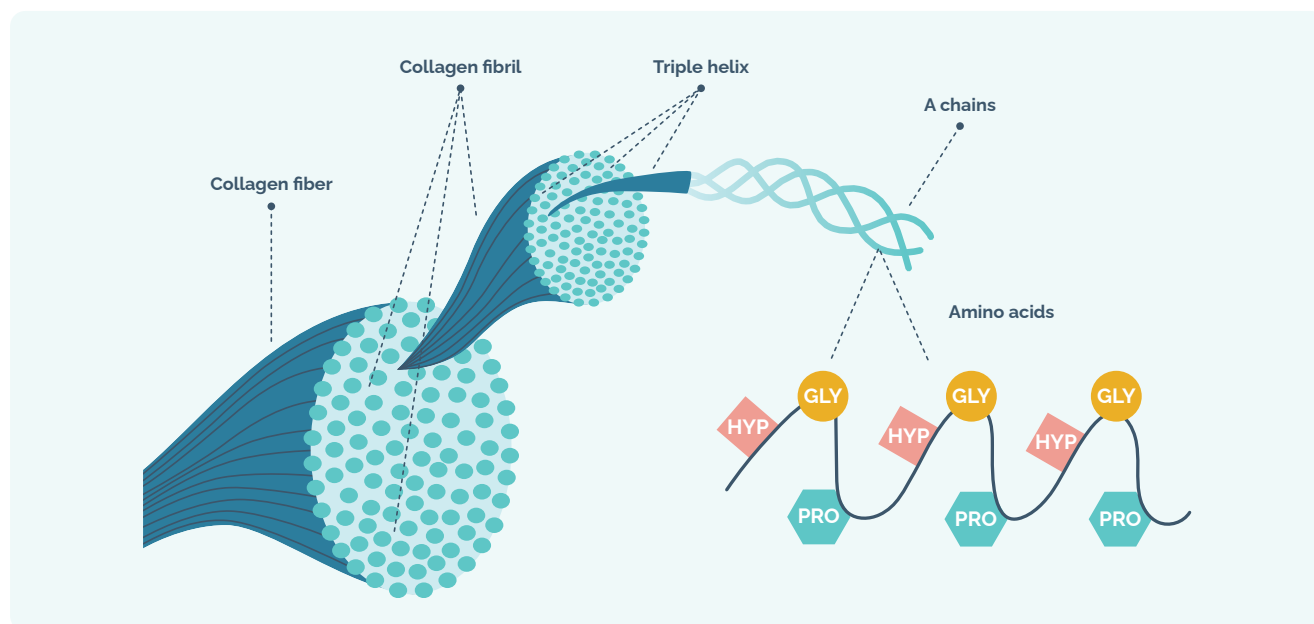
2021 to 2027
+8,3%
Estimated annual growth



The market leading ingredient: collagen

Used for thousands of years in traditional Chinese medicine, **collagen is now widely described and recognised for its benefits**, particularly for joint health.

Naturally produced by the body up to a certain age, collagen is **one of the most abundant proteins in the human body**, accounting for over 70% of the “net” weight of the skin.¹² As its name might suggest (from the Greek «kola» meaning «glue»), **it plays a vital role in the structure and cohesion of our tissues**, ensuring their resistance and elasticity.



Unfortunately, between the ages of 20 and 30, the body begins to lose around 1% of its collagen capital each year. This is a natural process, related to the ageing of cells, but it can be exacerbated by certain external factors: UV rays, pollution, smoking, etc.

But don't panic: **it is possible to limit or slow down this phenomenon by enriching our diet** with foods rich in certain essential amino acids for collagen synthesis (glycine and proline, for example), or directly via collagen (long live bone broth, stew or fish soup!). For those who aren't fond of traditional dishes, there is still the option of **supplementing with carefully selected food supplements**. Be sure to opt for collagen with a low molecular weight (<6000Da), to ensure optimum assimilation!

There are various possible sources of collagen: bovine, ovine, porcine and marine. However, plant collagen does not exist - at least, not in a natural state. Studies carried out on collagen do not seem to show any difference in effectiveness. The choice of source may be based on other criteria: **quality, origin, environmental impact, traceability of the raw material, etc. The choice is up to each individual!**

Well, all right, but **native or hydrolysed?** Here again, it's a question that can be frequently asked.

Studies have demonstrated the **health benefits of these two forms of collagen**, although they do not act in the same way on joint cartilage. On the one hand, **hydrolysed collagen, composed of amino acids and mainly di- and tripeptides**, which are highly bioavailable and absorbed by the intestinal mucosa, acts directly by stimulating the synthesis of the extracellular matrix and the growth of chondrocytes (cartilage cells). On the other hand, **undenatured (or native) collagen, which has kept its triple helix structure and is resistant to digestion**, will act via an indirect mechanism by modulating the immune response; the immune cells will 'tolerate' the native collagen protein, which will ultimately act as an inhibitor of the inflammatory cascade.¹³

Native or hydrolysed, or both, the choice is yours!

12- Kim, D. U., Chung, H. C., Choi, J., Sakai, Y., & Lee, B. Y. (2018). Oral Intake of Low-Molecular-Weight Collagen Peptide Improves Hydration, Elasticity, and Wrinkling in Human Skin : A Randomized, Double-Blind, Placebo-Controlled Study. *Nutrients*, 10(7), 826. <https://doi.org/10.3390/nu10070826>

13- Martínez-Puig D, Costa-Larrión E, Rubio-Rodríguez N, Gálvez-Martín P. Collagen Supplementation for Joint Health : The Link between Composition and Scientific Knowledge. *Nutrients*. 2023 Mar 8;15(6) :1332.

Cartidyss[®], Type II marine collagen for joint health



So, what is Cartidyss[®]? Quite simply, **much more than collagen peptides!**

Cartidyss[®] is unique in its composition. **It naturally contains collagen peptides, but also glycosaminoglycans (GAGs) including chondroitin, glucosamine and hyaluronic acid.** Ah yes, that sounds familiar, and it's normal! These active ingredients are very often used in food supplements dedicated to joint health.¹⁴

Cartidyss[®] and its unique composition are **naturally obtained from local fishing by-products (from Brittany and Normandy)**, and more specifically from skate cartilage (Raja SPP). Skate biomass is in 'good condition' according to the 2023 report 'How the fish are doing' by IFREMER (the French research institute dedicated to studying the oceans). To source its raw materials, **Abyss Ingredients works with local fishmongers.** We're not only chauvinistic, but this proximity ensures greater transparency and traceability of our products, while promoting local economic development. Working with local suppliers also helps to reduce our carbon footprint.

Cartidyss[®] is obtained through an enzymatic hydrolysis process - and therefore solvent-free - which makes it highly assimilable by the body. Clinical results demonstrate the benefits of Cartidyss[®] on people suffering from joint pain and knee discomfort. There was a significant improvement in mobility and a significant reduction in pain as early as 1 month of supplementation, which continued to improve for up to 3 months. Naturally, **these results had a significant positive impact on the quality of life of the participants in the study.**¹⁵

An innovative mechanistic study conducted in 2022 completes and validates these results. The first important result from this study is confirmation of

the **high bioavailability** of Cartidyss[®]'s molecules of interest: hydroxyproline, a collagen marker, and chondroitin.

Another interesting finding: Cartidyss[®] prevents cartilage matrix degradation - thereby preserving mobility - and limits the production of pro-inflammatory molecules, thereby reducing joint pain.¹⁵

The icing on the cake is its **low dosage** - which we assume is due to the synergy between collagen peptides and GAGs: **only 1g/day** was needed to observe (and feel) its effects on joint mobility and pain. This dosage is perfectly suitable for the capsule and/or tablet format, which is still very popular, but also for 'functional' formulations which respond to the trend for combining several types of collagen!

14- Yves, H., Herman, J., Uebelhoer, M. et al. Oral supplementation with fish cartilage hydrolysate in an adult population suffering from knee pain and function discomfort : results from an innovative approach combining an exploratory clinical study and an ex vivo clinical investigation. BMC Musculoskeletal Disord 24, 748 (2023). <https://doi.org/10.1186/s12891-023-06800-4>

15- Wauquier F, Boutin-Wittrant L, Bouvret E, Le Faouder J, Roux V, Macian N, Pickering G, Wittrant Y. Benefits of Circulating Human Metabolites from Fish Cartilage Hydrolysate on Primary Human Dermal Fibroblasts, an Ex Vivo Clinical Investigation for Skin Health Applications. Nutrients. 2022; 14(23) :5027. <https://doi.org/10.3390/nu14235027>





Abyss Ingredients

Abyss Ingredients is a French company with a human size, whose mission is to develop and market innovative natural marine ingredients. We combine local upcycling economy, sustainability and science to address health issues through nutrition.

Since 2019, we have been heavily investing in Research & Development in order to demonstrate the efficacy of our ingredients and better understand their mechanisms of action. We are also developing innovative new ingredients to meet consumer expectations.

Because ageing well is beautiful!



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