# Bioprospecting and nutritional approaches: MARINE bioactive compounds towards human health benefits

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Bioactive compounds are recognized as promoters of health and well-being. The bioprospecting of marine organisms, as led to the biodiscovery of new bioactive compounds, with positive effect on multiple diseases, as diabetes, cancer, thrombosis, hypercholesterolemia, allergy. The microalgae and seaweeds, in particular, have been confirmed as a unique source of some bioactives. It is important to reinforce, that when marine resources or extracts are included in foods, their biological activity, turn these products into functional foods.

A consistent bioprospecting work has been undertaken at IPMA. Among microalgae species, *Skeletonema sp.* and *I. galbana* have shown an important anti-inflammatory activity, while the seaweed, *C. abies-marina* aqueous extracts exhibited high levels of polyphenols and antioxidant activity.

In this context, eicosapentaenoic acid (EPA, 20:5 n-3) and docosahexaenoic acid (DHA, 22:6 n-3) are recognized as fundamental for well-being, due to the numerous physiological functions in which they are involved. The reduction of anti-inflammatory processes, cancer, autoimmune diseases, cardiovascular and neurodegenerative diseases are some of the health benefits attributed to these fatty acids. Particularly, DHA is involved in the development and maintenance of mental health. In fact, reduced levels of DHA have been linked to poorer cognitive development, but also to cognitive decline during aging, leading to the belief that this fatty acid will play an important role in the prevention of neurodegenerative diseases, such as Alzheimer's disease. As a result, strategies that improve DHA intake must privileged, including, for example, the consumption of foods naturally rich in this fatty acid (such as fatty fish). However, the ingestion of functional foods should also be considered. Yogurts produced with *Aurantiochytrium* sp**.** (marine macroalgae known to produce high amounts of DHA), for example, is an interesting approach to increase DHA intake.

Alternative nutritional approaches, that make use of biotechnology have also been shown to be effective. This is the case of structured lipids (SL) production, that consist in chemically or enzymatically modified triacylglycerol (TAG), that change the fatty acid composition and/or positional distribution in the glycerol backbone. The molecular structure of different TAG influences their metabolic fate in the organism, namely, digestion and intestinal absorption, and is enhanced for fatty acids located at the sn-2 position. *In vivo* studies have shown that the incorporation of DHA in hamsters liver, erythrocytes and brain was enhanced with diets containing DHA-SL. These structured sn-2 position DHA containing TAG could find application as an alternative dietary supplement for human diets, taking advantage of increased health benefits resulting from higher DHA bioavailability in the structured lipid form.

Despite of the distinct ways, the bioprospecting together with biotechnology methodologies, proved to be a valuable tool, allowing to optimize the traditional nutritional approach, in order to deliver higher amounts of biologically active marine molecules with higher bioaccessibility.

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