

Microalgal derivatives as nutraceutical supplements for chemoprevention

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Project Summary

Microalgae are a relevant source of natural functional compounds, such as polypeptides, polyunsaturated fatty acids, carotenoids, sterols, vitamins, etc. to be integrated in food complements. All these families of compounds have great interest for human wellbeing and health (e.g., chemoprevention), due to their antioxidant and/or immunomodulatory activities.

This PhD project will focus on bioactive compounds synthesized in microalgae with the following specific aims: a) select the best microalgal strains for their potential chemoprevention interest; b) to develop innovative processes for maximization of the production of these compounds by the selected strains; c) to evaluate new ways of extraction and fractionation of bioactive compounds from microalgal biomass; d) to develop new mixtures of functional ingredients from microalgae for foods with disease prevention effects.

During the project, we will also focus on strains of marine microalgae that are rich in starch needed for fermentation, together with antioxidant or immunomodulatory compounds, to evaluate the potential production of functional fermented beverages/foods with relevant health protection bioactivity. Until now, most fermented foods are made from terrestrial materials as rice, soybean, barley, vegetables, and milk.

Among the outputs of this project, one of the most important will be the development of new standard operative procedures (SOP) that will be patented for the production of new functional foods from marine microalgae.

The activities and related expected results of the project will include: 1) the selection, comparison and production of interesting microalgal strains for the production of bioactive compounds with beneficial health effects; 2) the development of bioactivity tests for antioxidative power, chemopreventive and immunomodulating effects; 3) the comparative evaluation of bioactivities from different microalgae, and different extraction procedures; 4) the exploitation and development of innovative strategies to improve upstream and downstream processes for the preparation of formulations rich in bioactive compounds including primary products (e.g. lipids, glycolipids, pigments and polysaccharides) and secondary metabolites (e.g. terpenes, polyketides and polyphenols). The final goal of the project is the creation of new functional ingredients, potentially attracting consumers that are demanding more natural-based products with health-promoting and health-protective effects. Finally, the bioactive fractionated microalgal biomass properties, such as aromatic profile, chemical composition and storage stability will be evaluated, aiming to contribute to the potential production and interest of the market for new functional ingredients