

PAPER

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The development of a novel functional food: bioactive lipids in yogurts enriched with *Aurantiochytrium* sp. biomass

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Western diets are poor in healthy n3 polyunsaturated fatty acids, such as docosahexaenoic acid. Since microalga *Aurantiochytrium* sp. is rich in docosahexaenoic acid, a functional food based on lean yogurt and this microalga was tested. This study entailed characterizing the lipid fraction and determining the fatty acid bioaccessibility. The tested yogurts (control and 2% w/w, *Aurantiochytrium* sp.) had differences. Docosahexaenoic acid was not detected in the control product, but it was the second most important fatty acid in *Aurantiochytrium* sp. and *Aurantiochytrium* yogurt, $29.7 \pm 0.4\%$ and $18.7 \pm 2.0\%$, respectively. Based on the fatty acid profile only, an amount of 158.7 g of *Aurantiochytrium* yogurt in wet weight terms would be required to ensure an appropriate intake of healthy fatty acids. Generally, the fatty acid bioaccessibility was not high, remaining below 60–70% in almost all cases. Considering the docosahexaenoic acid bioaccessibility ($44 \pm 3\%$), an amount of 360.7 g of *Aurantiochytrium* yogurt would be advisable. A reasonable dietary prescription would be a daily consumption of 125 ml of *Aurantiochytrium* yogurt.

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1. Introduction

The last decade was characterized by relevant changes in food consumers' preferences and concerns. This has affected most Western countries and has led to a significant transformation in eating habits and food expectations, with consumers increasingly considering food and health as two intertwined aspects. These changes inevitably have effects on all food types and embody a challenge that can only be met with novel concepts, thereby opening up new opportunities for health-promoting ingredients. Regarding this issue, it should be remarked that the food sector faces an existential challenge arising from the intersection of two contradictory currents. On the one hand, there is a growing tendency to value sensory aspects, being some current foods commonly consumed in the everyday life subjected to a strong drive to renewal/update. On the other hand, the enhanced health awareness of an average consumer often poses a dilemma because it either causes a

loss in the product's sensory quality as a result of less pleasant healthy ingredients or only slightly adds health benefits (or reduces risks) without changing any fundamental in the product. Testing innovative ingredients such as microalgal biomass is part of the response to this challenge.

Precisely, microalgae are an important and not fully exploited aquatic resource.¹ These microorganisms are considered a valuable natural source of bioactive molecules, such as n3 polyunsaturated fatty acids (n3 PUFA). Microalgal biomass can thus be used as a nutraceutical, that is, as an ingredient of functional foods due to its high potential to positively influence human health. Among the most promising microalgae, *Aurantiochytrium* sp. is known for its richness in docosahexaenoic acid (DHA, 22:6 n3).² This microalgal species which belongs to the group of thraustochytrids has been cultured and already used in the feed industry as an alternative source of PUFA.³ For instance, *Aurantiochytrium limacinum* is known as a thraustochytrid producing high quantities of DHA.³

DHA is considered to have a positive impact on human health.⁴ This n3 PUFA is also considered beneficial for the neurocognitive development of children⁵ and prevention of mild cognitive impairment in elderly.⁶ Moreover, DHA has been recognized as a source of anti-inflammatory specialized proresolving mediators, such as protectins, resolvins, and maresins.⁴

Yogurts are a suitable food matrix whenever the successful incorporation and high bioaccessibility—the fraction of a

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