Bioavailability of bioactive compounds from marine *Chlorella vulgaris* in humans

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INTRODUCTION

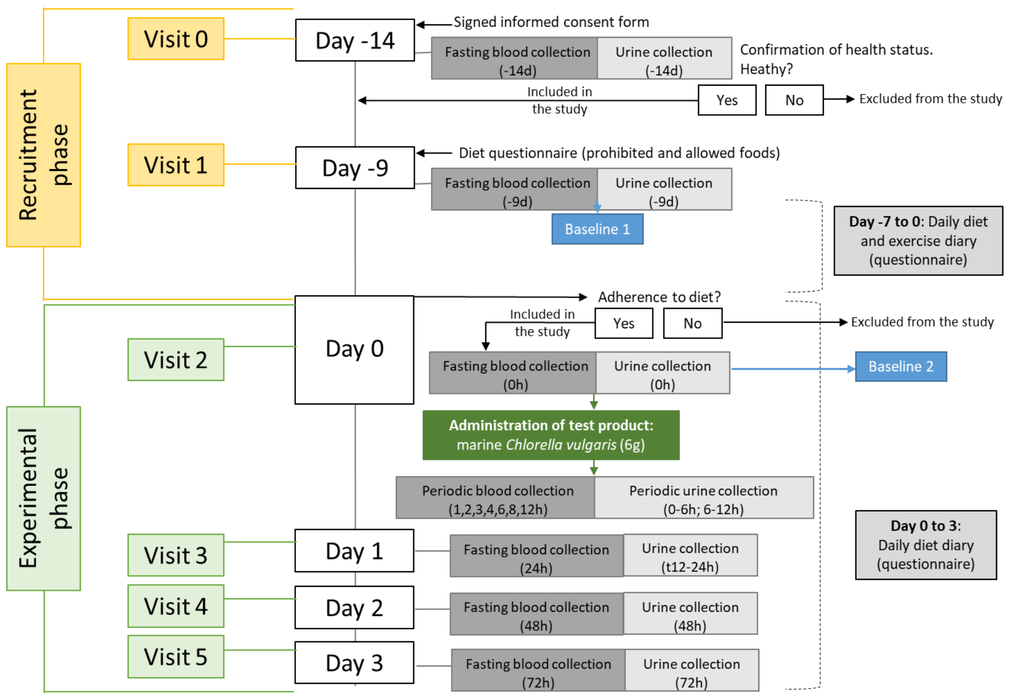
The health beneficial effects of *Chlorella vulgaris* have been associated with the presence and synergism between multiple nutrients and antioxidant compounds, including carotenoids[1]. The main carotenoids identified in Chlorella species include lutein (the most abundant), β-carotene and zeaxanthin[2]. However, their bioavailability, which is dependent on the type of food matrix[3], is still poorly evaluated. *Chlorella vulgaris* is also a good source of dietary fiber[1], this may also have a hampering effect on carotenoid absorption[4].

AIM

Evaluation of the bioavailability of carotenoids after a single intake of marine *Chlorella vulgaris*

STUDY DESIGN

Study diagram:



This study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of Cintramédica (protocol number F6H-CT1/2018- BioavailabilityCHSP; approval date: 18.07.2019).

Study population:

Healthy male subjects (N=11)
Age- 30.5±4.2
BMI- 24.6 ± 2.6 kg/m²

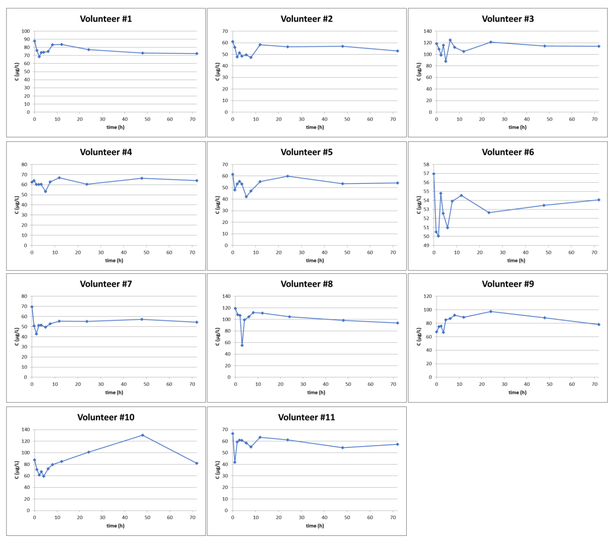
Test product:

Dried marine *Chlorella vulgaris* encapsulated in vegetarian hard capsules

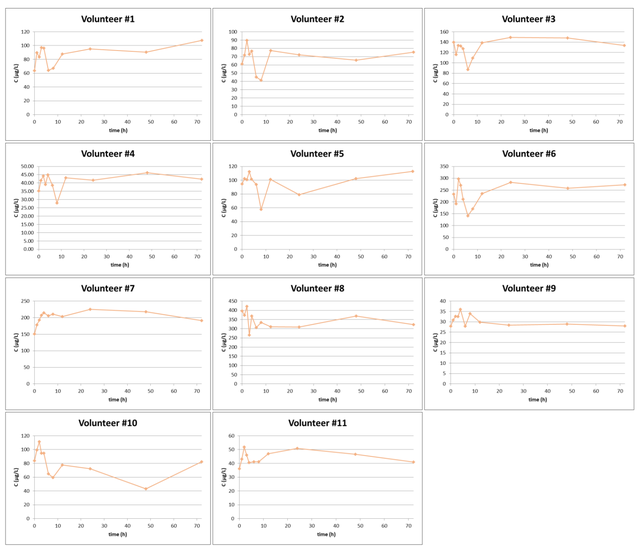
CAROTENOIDS	Per 100 g	Per 6 g
Lutein	118.0 mg	7.08 mg
β-carotene	31.4 mg	1.88 mg
Zeaxanthin	24.1 mg	1.47 mg

MAIN OUTCOMES

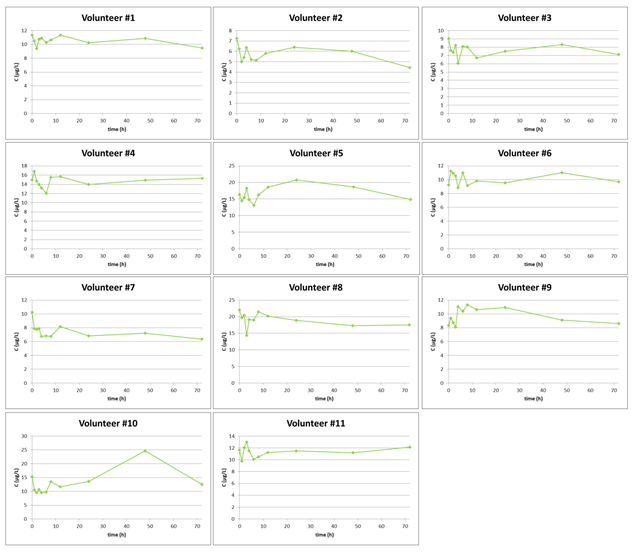
PLASMA CONCENTRATION OF LUTEIN



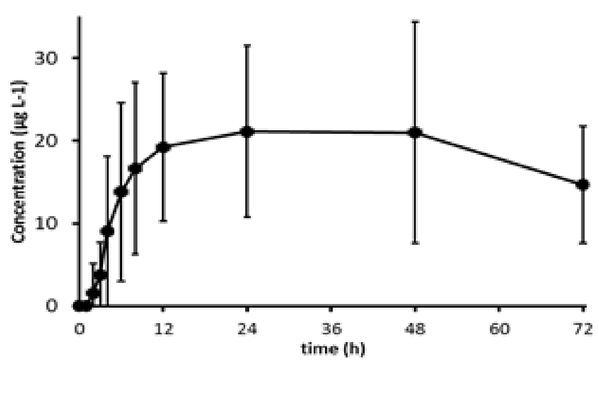
PLASMA CONCENTRATION OF β-CAROTENE

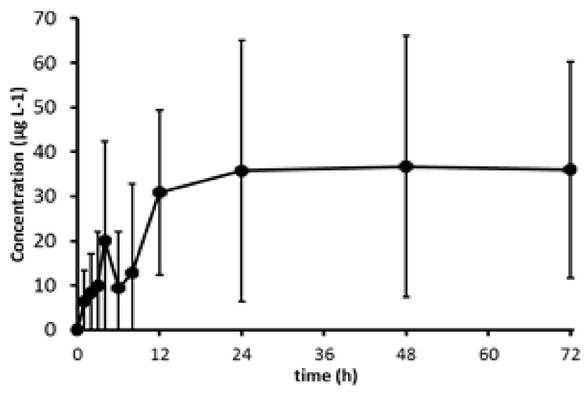


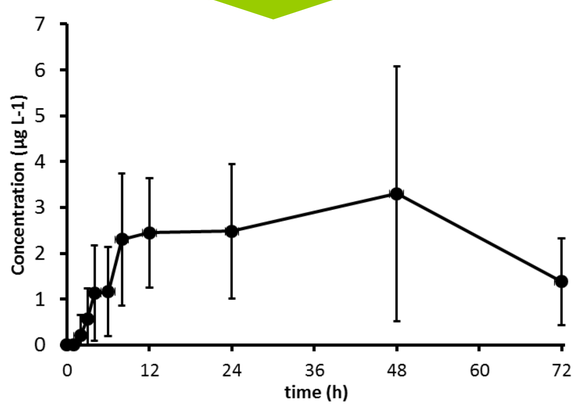
PLASMA CONCENTRATION OF ZEAXANTHIN

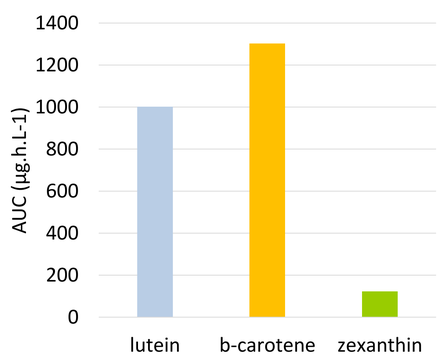


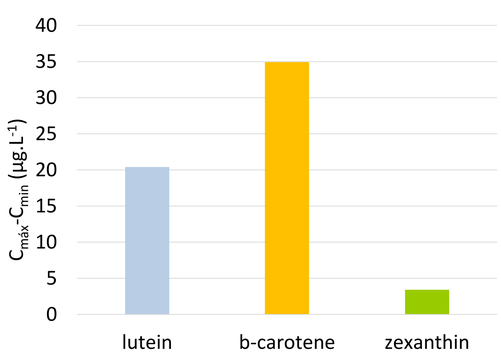
Average profile of plasma concentration of carotenoids of the 11 volunteers . (Shown values represent C_{min}-subtracted concentrations)











A single dose of 6 g of marine *Chlorella vulgaris* increases plasma concentrations of carotenoids during 3 days

- The highest AUC and C_{max} values in plasma carotenoids concentrations were obtained for lutein and β-carotene.
- Increases up to 100% and 140% (relative to baseline) were obtained for plasma β-carotene (volunteer #6) and lutein (volunteer #10) concentration, respectively.

The data generated herein represent a first step towards the design of further intervention studies to evaluate the health promoting effects of marine *Chlorella vulgaris* and to develop formulation strategies to improve the bioavailability of its carotenoids

REFERENCES:
1. Bito, T. et al. Nutrients 2020, 12, 1–21; 2. Hyu, N.H et al. Nutr. J. 2014, 13, 1–8.; 3. Chung, H.Y. et al. J. Nutr. 2004, 134, 1887–1893; 4. Desmarchelier, C. & Borel, P. Trends Food Sci. Technol. 2017, 69, 270–280

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