

## DUAL-STUDY EXPLORATION: IMPACT OF EXTRACTION METHODS ON BIOAVAILABILITY, HEALTH-RELATED PROPERTIES, AND MATRIX VARIATIONS

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### Objective:

This study aimed to evaluate how digestion affects bioactive compounds (BC) in algae matrix and derived extracts, focusing on *Osmundea pinnatifida* and *Codium* spp. It also examined the impact of non-absorbed fractions on gut microbiota growth (GMG) and metabolic activity.

### Methods:

The study investigated the influence of hexane extraction on the bioavailability of bioactive compounds (BC) in algae using the INFOGEST *in vitro* model. Carotenoids, assessed via HPLC, were studied, alongside health-related activities like antioxidant (ABTS and ORAC), anti-hypertensive, and anti-inflammatory methods, and gut microbiota analysis (GMG using human faecal samples analysed by PCR in real-time).

### Results:

In the algae study, the extraction method significantly influenced bioaccessibility. Gastrointestinal digestion simulation revealed varied carotenoids along the gastrointestinal tract (GIT), with only 2.49% beta-carotene absorption. Carotenoids, specially, lycopene, beta-carotene, beta-cryptoxanthin and lutein, in both extracts experienced significant decreases during GIT, particularly under stomach conditions. *O. pinnatifida* showed no detectable carotenoids, indicating compromised bioaccessibility in complex algae matrices without prior lysis treatment. Carotenoid extracts exhibited noteworthy antioxidant and antidiabetic activities, with lutein demonstrating superiority in the absorbed fraction. Both extracts exhibited high anti-inflammatory and moderately anti-hypertensive activities compared to algae matrices. Relatively to gut microbiota modulation, impact of digested algae highlighted the relative abundance of *Bacteroides* genus, while for the extracts it was the *Bifidobacterium*.

**Conclusions:**

These results emphasize the crucial role of extraction methods and digestion conditions in shaping the bioavailability and health-related attributes of bioactive compounds in algae, offering valuable insights for further research and application in the realm of functional foods and nutraceuticals.

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