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The content and bioaccessibility of carotenoids from selected commercially available health supplements

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The potential health benefits of algae and wheatgrass, due to their vitamins, amino acids, minerals, carotenoids and other bioactive compounds, have been widely reported[1,2]. Chlorella (*Chlorella*) are single-celled green algae and kelp (*Laminaria*) are multi-celled brown algae. Spirulina (*Arthrospira*) are a genus of green–blue cyanobacteria of which the species *Arthrospira platensis* and *Arthrospira maxima* are utilised as a food supplement. Wheatgrass is obtained from the common wheat *Triticum aestivum*. The aims of the present study were to measure the content and bioaccessibility of carotenoids from chlorella, kelp, spirulina and wheatgrass supplements.

The supplements were purchased in a local health food store. Each supplement was weighed (2 g), homogenised and then subjected to *in-vitro* digestion[3] to simulate the human gastric and intestinal digestion system. Subsequently, the micelle fractions of the digested material were isolated via ultracentrifugation. Both the undigested and digested samples were saponified and the carotenoid fraction was extracted using hexane. HPLC was used to quantify the carotenoid content of the supplements.

	Chlorella		Kelp		Spirulina		Wheatgrass	
	Food (ng/g)	Micelle (ng/g)	Food (ng/g)	Micelle (ng/g)	Food (ng/g)	Micelle (ng/g)	Food (ng/g)	Micelle (ng/g)
Fucoxanthin	313	ND	479	ND	731	ND	815	ND
Violaxanthin	1369	ND	ND	ND	32	ND	538	244
Neoxanthin	1434	ND	ND	ND	58	ND	376	89
Antheraxanthin	310	ND	ND	ND	287	ND	541	63
Astaxanthin	441	ND	ND	ND	300	ND	287	67
Lutein	5640	30	37	ND	381	26	17760	2918
Zeaxanthin	596	ND	809	ND	12268	605	ND	ND
Alloxanthin	1323	ND	ND	ND	222	ND	ND	ND
β-Cryptoxanthin	496	ND	50	76	112	21	ND	ND
β-Carotene	454	ND	80	ND	460	40	ND	ND
α-Carotene	379	ND	63	ND	467	94	64	ND

Values are means for four independent experiments. ND, not detected.

The total content of the carotenoids determined in the present study was highest in wheatgrass (20.4 μg/g) followed by spirulina (15.3 μg/g) and chlorella (12.7 μg/g), the lowest carotenoid content was in kelp (1.5 μg/g). Lutein was the predominant carotenoid in chlorella and wheatgrass, while zeaxanthin was predominant in wheatgrass. Bioaccessibility was lowest for chlorella and only 0.23% of the total carotenoid content was transferred to the micelle fraction. Both kelp and spirulina had a carotenoid bioaccessibility of approximately 5%. The highest carotenoid bioaccessibility was in wheatgrass, where 16.6% of the total carotenoid content was transferred to the micelle fraction. Under the conditions of the present experiment, the bioaccessibility of carotenoids from powdered health supplements, with the exception of wheatgrass, is low in comparison with those reported for foods[3].

1. Cornish ML & Garbary DJ (2010) *Algae* **25**, 155–171.
2. Bar-Sela G, Tsalic M, Fried G *et al.* (2007) *Nutr Cancer* **58**, 43–48.
3. Jiwan MA, Duane P, O'Sullivan L *et al.* (2010) *J Food Comp Anal* **23**, 346–352.