



## Analytical Methods

# Determination of carotenoids in *Dunaliella salina* cultivated in Taiwan and antioxidant capacity of the algal carotenoid extract

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### Abstract

A simple HPLC method with good separation efficiency was developed to determine all-*trans* and *cis* forms of carotenoids in *Dunaliella salina* cultivated in Taiwan. The analysis used a C30 column (250 × 4.6 mm, 5 μm) and an isocratic solvent system (flow rate = 1 mL/min) mixing methanol–acetonitrile–water (84/14/2, v/v/v) and methylene chloride, (75/25, v/v). Carotenoids were detected at 450 nm. Moreover, the antioxidant capacities of the algal carotenoid extract were also evaluated with Trolox equivalent antioxidant capacity (TEAC) assay, reducing power and 2,2-diphenyl-2-picrylhydrazyl hydrate (DPPH) radical scavenging assay. Results showed that 7 carotenoids in the algal extract could be separated simultaneously within 30 min and the total amount of them was 290.77 mg/g algae. The contents of all-*trans*-β-carotene and 9- or 9'-*cis*-β-carotene, the major carotenoids in the algae, were 138.25 and 124.65 mg/g algae, respectively. The contents of all-*trans*-lutein, all-*trans*-zeaxanthin, 13- or 13'-*cis*-β-carotene, all-*trans*-α-carotene and 9- or 9'-*cis*-α-carotene were 6.55, 11.27, 4.95, 2.69, and 2.41 mg/g algae, respectively. The algal carotenoid extract had significantly higher antioxidant activity than all-*trans* forms of α-carotene, β-carotene, lutein and zeaxanthin in all antioxidant assays. The *cis* forms of carotenoids, especially 9- or 9'-*cis*-β-carotene, might play crucial roles for the antioxidant capacities of the algal extract.

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