

## Astaxanthin and its Derivatives as Anticancer Agents

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### ABSTRACT

Astaxanthin, a member of the carotenoid family, is a dark-red pigment which is the main carotenoid found in the marine world of algae and aquatic animals. It is the xanthophyll carotenoid, which is founded in *Haematococcus pluvialis*, *Chlorella zofingiensis*, *Chlorococum*, and *Phaffia rhodozyma*. It accumulates up to 3.8% on the dry weight basis in *Haematococcus pluvialis*. Astaxanthin is also present in many types of seafood, including salmon, trout, red sea bream, shrimp and lobster, as well as in birds such as flamingo and quail. Astaxanthin had higher antioxidant activity when compared to various carotenoids such as lutein, lycopene,  $\alpha$ -carotene and  $\beta$ -carotene. Numerous studies in animals and in human cell lines have demonstrated the benefits of astaxanthin in various types of cancer. Astaxanthin showed significant antitumor activity when compared to other carotenoids like canthaxanthin and  $\beta$ -carotene. Its derivatives enhanced gap junctional communication between mouse embryo fibroblasts. It also inhibited the growth of fibrosarcoma, breast, and prostate cancer cells and embryonic fibroblasts. Nitroastaxanthin and 15-nitroastaxanthin are the products of astaxanthin with peroxy nitrite; 15-nitroastaxanthin anticancer properties were evaluated in a mouse model. Thus, in this review role of astaxanthin and its derivatives against different cancer has been demonstrated.