Bioactivity and protective effects of natural carotenoids.

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Abstract
Carotenoids comprise a class of natural fat-soluble pigments which are found in numerous fruits and vegetables. The consumption of a diet rich in carotenoids has been epidemiologically correlated with a lower risk for several diseases. The antioxidant activity of carotenoids and biochemical properties influencing signaling pathways have been discussed as basic mechanisms of prevention. Conflicting data from intervention studies with beta-carotene to prevent cancers and cardiovascular disorders have challenged the concept. However, there is convincing evidence that carotenoids are important components of the antioxidant network. Photooxidative damage is suggested to be involved in the pathobiochemistry of several diseases affecting the skin and the eye, and carotenoids may protect light-exposed tissues. Lutein and zeaxanthin are the predominant carotenoids of the retina and are considered to act as photoprotectants preventing retinal degeneration. The unique distribution, localization and high levels of both carotenoids within the macula lutea as well as their physicochemical properties make them suitable candidates for photoprotection. beta-Carotene is used as an oral sun protectant for the prevention of sunburn and has been shown to be effective either alone or in combination with other carotenoids or antioxidant vitamins. Protective effects are also achieved with a diet rich in lycopene.

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