

# Carotenoids, inflammation, and oxidative stress—implications of cellular signaling pathways and relation to chronic disease prevention - ScienceDirect



Volume 34, Issue 11, November 2014, Pages 907-929



## Carotenoids, inflammation, and oxidative stress—implications of cellular signaling pathways and relation to chronic disease prevention

Anouk Kaulmann ... Torsten Bohn  

<https://doi.org/10.1016/j.nutres.2014.07.010>

[Get rights and content](#)

### Abstract

Several epidemiologic studies have shown that diets rich in fruits and vegetables reduce the risk of developing several chronic diseases, such as type 2 diabetes, atherosclerosis, and cancer. These diseases are linked with systemic, low-grade chronic inflammation. Although controversy persists on the bioactive ingredients, several secondary plant metabolites have been associated with these beneficial health effects. Carotenoids represent the most abundant lipid-soluble phytochemicals, and *in vitro* and *in vivo* studies have suggested that they have antioxidant, antiapoptotic, and anti-inflammatory properties. Recently, many of these properties have been linked to the effect of carotenoids on intracellular signaling cascades, thereby influencing gene expression and protein translation. By blocking the translocation of nuclear factor  $\kappa$ B to the nucleus, carotenoids are able to interact with the nuclear factor  $\kappa$ B pathway and thus inhibit the downstream production of inflammatory cytokines, such as interleukin-8 or prostaglandin E<sub>2</sub>. Carotenoids can also block oxidative stress by interacting with the nuclear factor erythroid 2-related factor 2 pathway, enhancing its translocation into the nucleus,