

Abstract

Health Beneficial Effects of Carotenoids Related to Their Interactions with Gut Microbiota [†]

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Abstract: Background: Carotenoid intake and plasma concentrations have been associated with several health benefits, including a reduced risk for diabetes, obesity, cardiovascular diseases, and some types of cancer. However, their absorption is low, and the main fraction is passed on to the colon. Very little is known about the potential interactions of carotenoids and the gut microbiota, though carotenoids and their potential metabolites, such as apocarotenoids, may be potent and have beneficial effects on the gut and at the systemic level. Methods: In this review, we strive to highlight the state-of-the-art knowledge on carotenoids and gut microbiota interactions, based on research on the literature (PubMed, Scopus). Results and discussion: Several studies, ranging from in vitro to in vivo including humans, have suggested health beneficial effects related to altered gut microbiota diversity and abundance of different phyla. The potential mechanisms are yet somewhat elusive, but include apo-carotenoid formation and such compounds, which may have a higher electrophilicity compared to their native compounds, acting as better targets for transcription factors such as NF- κ B and Nrf2 and nuclear receptors, i.e., PPAR γ , and RAR/RXRs. A number of bactericidal effects have also been reported, and altered gut redox potential may also play a role. Furthermore, pre-biotic effects causing bacterial shifts to those related to health beneficial properties have likewise been mentioned. Finally, stimulation of IgA and immune-related responses could also play a role, related to contributing to mucosal health and gut barrier integrity. An interesting novel strategy to fostering gut health may be the supplementation of probiotic strains such as *Bacillus indicus*, producing carotenoids in the colon. In summary, though our understanding of the interactions of carotenoids with the gut microbiota is rather limited, these colorful pigments may constitute a promising route to improving gut health and functionality and contributing to systemic health benefits.

Keywords: carotenoids; large intestine; gut microbiota; bioavailability; health aspects



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