

Title Stability and bioavailability of lycopene, lutein and zeaxanthin in fruits and vegetables as affected by thermal processing

Author Esther Mayer-Miebach and Diana Behsnilian

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Abstract

Purpose of review: During food production, most fruits and vegetables undergo various mechanical and heat-related processing operations that could potentially influence their carotenoid bioavailability. The aim of the present review is to provide an overview of the effects of thermal processing on the stability of some non-provitamin A carotenoids.

Main findings: The effects of thermal processing on the bioavailability of lycopene depend mainly on the severity of the thermal treatments applied. At lower temperature ranges (60–100°C), which are used for blanching, pasteurisation and drying, plant tissues are disrupted and cell walls and membranes are destroyed, leading to an increase in carotenoid extraction and retention, whereas isomerisation is negligible. Higher temperatures (>100°C), practiced for canning and sterilisation, cause major *cis*-isomerisation favouring carotenoid uptake. Carotenoids found in canned or sterilised products tend to have a high storage stability. In contrast, carotenoids in fresh produce, and frozen and dry products are very susceptible to oxidative deterioration, especially during production and storage of convenience products (eg, pizza). For any bioavailability estimation, only data concerning carotenoid stability and isomerisation derived from real food matrices are valid.

Directions for future research: Canning of food enhances lycopene isomerisation, facilitates its absorption, enhances its bioavailability in humans, and provides high storage stability. This effect should be used to create innovative food products with a special interest in lutein- and zeaxanthin-containing fruit or vegetable matrices. Furthermore, knowledge about the effects of different processing (thermal, mechanical, chemical) and oxygen-excluding storage methods on lycopene, lutein and zeaxanthin stability in specific fruit and vegetable matrices is needed. Special emphasis should be given to production and storage of convenience products.