

Title Refinements of the attending equations for several spectral methods that provide improved quantification of β -carotene and/or lycopene in selected foods

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Abstract

Developing and maintaining maximal levels of carotenoids in fruits and vegetables that contain them is a concern of the produce industry. Toward this end, reliable methods for quantifying lycopene and β -carotene, two of the major health-enhancing carotenoids, are necessary. The goal of this research was to rigorously refine the attending equations for existing spectral methodologies in order to more accurately quantify lycopene and β -carotene in selected fruits and vegetables. Equations taking into account two absorbing species with overlapping spectra were derived for three spectral methodologies. Carotenoid values determined by absorbance measurements in hexane with its attending equations provided one-to-one correspondence with values determined by reversed phase high performance liquid chromatography for lycopene and/or β -carotene in a broad spectrum of fruits and vegetables. Estimates for lycopene in hexane extracts averaged $\pm 7.8\%$ deviation from those by HPLC while estimates for β -carotene averaged $\pm 5.0\%$ deviation. Simple empirical relationships developed from correlating large numbers of xenon flash spectrophotometry data appeared to be nearly as reliable as the derived equation to treat the experimental data. Estimates for lycopene in watermelon flesh purees by the derived equation deviated $\pm 6.8\%$ from those estimated by HPLC while deviations by a currently employed empirical equation were $\pm 10.8\%$. Absorbance measurements of chromoplasts suspended in aqueous sodium dodecyl sulfate generally required correction for light scattering by the chromoplasts, and equations derived for two absorbing species provided for quantification of lycopene and β -carotene by this method. Estimates for lycopene in watermelon flesh by the derived equations averaged $\pm 9.3\%$ deviation from those by HPLC while estimates for β -carotene in cantaloupe averaged $\pm 12.0\%$ deviation from HPLC values.