CORRESPONDENCE

Comments on Quantification of Major Carotenoids in Raw Fruits and Vegetables by HPLC

Sir: As one who is presently revising an extensive review, accepted for publication (Sri Kantha and Erdman, 1987), on legume carotenoids, I found the information provided in two recently published papers in this journal (Bushway, 1986; Khachik et al., 1986) quite informative. I believe that the following comments are pertinent.

(1) I agree with Khachik et al.'s observation that "current food composition tables lack detailed analytical information in that they only provide data on 'carotene' or vitamin A activity." However, it is my opinion that those reporting original data on the carotene content of "several" or "some" green vegetables should also provide analytical data on the proximate compositions of those vegetables. Absence of these proximate composition values (even the basic information such as moisture content, though the carotenoid composition was expressed in milligrams or micrograms/100 g of edible food) will make it difficult for the compilers of food composition tables to match the reported carotene data with the other essential nutrient values.

(2) For completeness and for assisting researchers from countries other than the United States, I would appreciate if Bushway and Khachik et al. could provide the botanical nomenclature of the vegetables to the species level. While Khachik et al. mentioned in their results and discussion that the majority of green vegetables studied in their report belong to the genus *Brassica*, Bushway's report is lacking in the botanical identification of the fruits and vegetables studied.

(3) Khachik et al. reported the losses of *all-trans*-β-carotene and its 15,15′-cis isomer due to microwave cooking for 6 min in brussels sprouts and kale as 15% and 14%, respectively. Table III of their paper also reveals that the loss of total carotenoids due to microwave cooking in brussels sprouts and kale amounts to 40.1% and 31.2%, respectively. Previously, Sweeny and Marsh (1971) reported a 15–20% decrease in carotene content of green vegetables cooked for 30 min. However, other researchers (Panalaks and Murray, 1970; Gomez, 1981; Bushway and Wilson, 1982) reported 24–88% carotene increase during cooking treatment in the carrots and cooked leaves of cassava, cowpea, kale, and amaranthus. We (Sri Kantha and Erdman, 1985) reported some preliminary data that steam blanching for 30 min at atmospheric pressure in an autoclave resulted in significant apparent increase (87–150%) in the β-carotene content of cooked winged bean leaves, carrot, and lettuce, though water blanching for 30 min resulted in 13.2% decrease in β-carotene content in winged bean leaves. Does this mean that microwave cooking leads to rapid degradation and rearrangement of provitamin A carotenoids?

In conclusion, I agree with the observation of Khachik et al. that the degradation, rearrangement, and stereoisomerization of carotenoids are influenced by the degree, length, and the method of cooking. Since the existing reported data are very much conflicting, carefully designed experiments to control the various parameters of cooking could provide better clues in understanding the effect of heat treatment on the provitamin A carotenoids of edible plant products.

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Received for review August 19, 1986.

Rebuttal on Quantification of Major Carotenoids in Raw Fruits and Vegetables by HPLC

Sir: I have the following response to the comments of Sri Kantha:

(1) I agree with Sri Kantha that it may be beneficial to report moisture content to have some basis of comparison. I am not convinced that all proximate analyses data are needed.

(2) For countries other than the United States it would be helpful to add the scientific names. This may be something the journal editors would want to consider in the future to better serve a wider audience.

(3) I totally agree that there needs to be experiments designed for looking at cooking effects. But first there need

0021-8561/87/1435-0849$01.50/0