Carotenoid Bioavailability of Vegetables and Carbohydrate-containing Foods Measured by Retinol Accumulation in Rat Livers

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Abstract

Cassava (Manihot esculenta), water convolvulus (Ipomea reptans) and brassica (Brassica juncea L) leaves, carrot (Daucus carota L), and sweet potato (Ipomea batata) were cooked imitating local household preparation while banana (Musa paradisiaca L) was freeze-dried. The prepared foods, each containing 180 μg β-carotene, were fed to vitamin A-depleted rats in addition to their vitamin A-depleted diet for 14 days. The positive control group received 13 μg retinol daily. After repletion, plasma retinol in treated groups increased slightly ranging from 0.03 to 0.34 μg/ml. The groups received boiled cassava leaves, boiled and simmered cassava leaves, boiled or simmered water convolvulus, boiled or simmered brassica, boiled carrots, boiled or fried sweet potatoes, or freeze-dried banana and accumulated retinol levels of, respectively, 77.98, 163.01, 59.537, 53.10, 151.15, 198.12, 312.25, 347.77, 385.14 and 194.43 μg/liver. The retinol accumulation factors (RAFs) proposed for the test foods are, respectively, 1/35.5, 1/16, 1/9.88, 1/47, 1/18.3, 1/13.5, 1/12, 1/7.4, 1/6.6 and 1/2.7. The RAF of synthetic vitamin A was 1/5.9, which indicates that 5.9 μg vitamin A is needed to accumulate 1 μg retinol in the liver. This study showed that both high-carbohydrate foods, sweet potatoes and banana have RAFs close to that of synthetic vitamin A or higher.

Author Keywords: carotenoids; bioavailability; retinol; green leafy vegetables; high-carbohydrate foods.

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