

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 $\mu\text{g}/\text{ml}$. 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 $\mu\text{g}/\text{liver}$. 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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