

ORIGINAL RESEARCH COMMUNICATION

Carotene-rich plant foods ingested with minimal dietary fat enhance the total-body vitamin A pool size in Filipino schoolchildren as assessed by stable-isotope-dilution methodology^{1, 2, 3}

Judy D Ribaya-Mercado, Cherry C Maramag, Lorena W Tengco, Gregory G Dolnikowski, Jeffrey B Blumberg and Florentino S Solon

¹ From the Jean Mayer US Department of Agriculture Human Nutrition Research Center at Tufts University, Boston, MA (JDR-M, GGD, and JBB), and the Nutrition Center of the Philippines, Taguig City, Philippines (CCM, LWT, and FSS)

Background: Strategies for improving the vitamin A status of vulnerable populations are needed.

Objective: We studied the influence of the amounts of dietary fat on the effectiveness of carotene-rich plant foods in improving vitamin A status.

Design: Schoolchildren aged 9–12 y were fed standardized meals 3 times/d, 5 d/wk, for 9 wk. The meals provided 4.2 mg provitamin A carotenoids/d (mainly β -carotene) from yellow and green leafy vegetables [carrots, *pechay* (bok choy), squash, and *kangkong* (swamp cabbage)] and 7, 15, or 29 g fat/d (2.4, 5, or 10 g fat/meal) in groups A, B, and C ($n = 39, 39,$ and $38,$ respectively). Other self-selected foods eaten were recorded daily. Before and after the intervention, total-body vitamin A pool sizes and liver vitamin A concentrations were measured with the deuterated-retinol-dilution method; serum retinol and carotenoid concentrations were measured by HPLC.

Results: Similar increases in mean serum β -carotene (5-fold), α -carotene (19-fold), and β -cryptoxanthin (2-fold) concentrations; total-body vitamin A pool size (2-fold); and liver vitamin A (2-fold) concentrations were observed after 9 wk in the 3 study groups; mean serum retinol concentrations did not change significantly. The total daily β -carotene intake from study meals plus self-selected foods was similar between the 3 groups and was 14 times the usual intake; total fat intake was 0.9, 1.4, or 2.0 times the usual intake in groups A, B, and C, respectively. The overall prevalence of low liver vitamin A ($<0.07 \mu\text{mol/g}$) decreased from 35% to 7%.

Conclusions: Carotene-rich yellow and green leafy vegetables, when ingested with minimal fat, enhance serum carotenoids and the total-body vitamin A pool size and can restore low liver vitamin A concentrations to normal concentrations.

Key Words: Vitamin A • deuterated-retinol dilution • stable-isotope dilution • retinol • plant carotenoids • β -carotene • bioavailability • dietary fat • school-age children • Philippines

This Article

- ▶ [Full Text](#)
- ▶ [Full Text \(PDF\)](#)
- ▶ [Purchase Article](#)
- ▶ [View Shopping Cart](#)
- ▶ [Alert me when this article is cited](#)
- ▶ [Alert me if a correction is posted](#)
- ▶ [Citation Map](#)

Services

- ▶ [Similar articles in this journal](#)
- ▶ [Similar articles in PubMed](#)
- ▶ [Alert me to new issues of the journal](#)
- ▶ [Download to citation manager](#)
- ▶ [Get Permissions](#)

Citing Articles

- ▶ [Citing Articles via Google Scholar](#)

Google Scholar

- ▶ [Articles by Ribaya-Mercado, J. D](#)
- ▶ [Articles by Solon, F. S](#)
- ▶ [Search for Related Content](#)

PubMed

- ▶ [PubMed Citation](#)
- ▶ [Articles by Ribaya-Mercado, J. D](#)
- ▶ [Articles by Solon, F. S](#)

Agricola

- ▶ [Articles by Ribaya-Mercado, J. D](#)
- ▶ [Articles by Solon, F. S](#)