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ORIGINAL RESEARCH COMMUNICATION

Excentral cleavage of ß-carotene in vivo in a healthy man[1,2,3]

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Background: Excentral cleavage of ß-carotene to retinoids and apocarotenoids occurs in vitro and in animal models. Whether it occurs in humans is unclear.

Objective: We tested the hypothesis of whether humans can cleave ß-carotene excentrally.

Design: A healthy man was given an oral dose of *all-trans* [10,10',11,11'-^{14}C]-ß-carotene (1.01 nmol; 100 nCi). Its fate and that of its metabolites were measured in serial plasma samples. Its fate in feces and urine was also measured over time. Selected plasma samples were spiked with reference standards of retinol, ß-apo-12'-carotenal, ß-apo-8'-carotenal, *13-cis*-retinoic acid, *all-trans*-retinoic acid, ß-carotene-5,6-epoxide, *all-trans*-ß-carotene, and retinyl palmitate and subjected to reverse-phase HPLC fractionation. The plasma, plasma fractions, urine, and feces were measured for ^{14}C with the use of accelerator mass spectrometry.

Results: Sixty-five percent of administered ^{14}C was absorbed, and 15.7% was eliminated in urine during the first 21 d after dosing. ^{14}C-ß-carotene and ^{14}C-retinyl palmitate appeared in plasma 0.25 d after the dose. ^{14}C-ß-carotene and ^{14}C-retinol both appeared at 0.5 d only. On day 3 after the dose, 2 large ^{14}C peaks appeared in plasma: one matched the retention time of ß-apo-8'-carotenal, and the other did not match any of the reference standards used. The delayed appearance of ^{14}C-ß-apo-8'-carotenal in plasma suggests that the excentral cleavage occurred after the ^{14}C-ß-apo-8'-carotene was absorbed into the body.

Conclusion: These data suggest that excentral cleavage of ingested ß-carotene occurs in vivo in humans. Confirmation of that possibility and further study to identify and characterize additional metabolites are needed.

Key Words: ß-carotene • ß-apo-carotenal • humans • vitamin A • ^{14}C