

Vinson, J.A., 1991.

## BETA-CAROTENE BIOAVAILABILITY STUDY

30 male weanling Sprague-Dawley rats were received and put on an AIN-74A. Vitamin A deficient diet with cottonseed oil for 2 months. Deficiency was manifested by a loss in weight. The animals were allowed to eat 20 g of food/day. Then the rats were divided into 3 groups. Group 1 was continued on the vitamin A deficient diet for 6 weeks and given 20 g of food/day for each rat. Group 2 was given 20 g of food/day of 0.02% USP Beta-Carotene. Group 3 was given 30 g of food/day of 0.02% Re-natured Beta-Carotene.

The animals were weighed periodically during the supplementation period. The animals were then sacrificed and the liver and the blood removed. The blood was converted to plasma and the liver and plasma frozen at -20°C until assay. The liver and plasma were assayed for retinyl palmitate (Vitamin A) and Beta-carotene by HPLC after organic solvent extraction.

HPLC analysis of the plasma revealed only the presence of Vitamin E. No Vitamin A or Beta-Carotene was found in any sample. The low dose of Beta-Carotene fed groups 2 and 3 may account for this finding.

### Results and Discussion

Groups	<u>Average Weight (g) ± S.D.</u>			
	0 weeks	2 weeks	4 weeks	6 weeks
1. Vitamin A Deficient	310 ± 23	361 ± 28	359 ± 38	358 ± 33
2. USP Beta-carotene	313 ± 17	387 ± 18	454 ± 30	459 ± 34
3. Re-natured Beta-carotene	321 ± 14	395 ± 14	453 ± 19	454 ± 16

The vitamin A deficient group gained weight after 2 weeks and then maintained a constant weight. Groups 2 and 3 gained weight for 4 weeks, then maintained a constant weight as they reached their maximum adult weight. Groups 2 and 3 had significantly greater weights than the deficient group after 2, 4 and 6 weeks, respectively ( $p < 0.01$ ). This indicates that these groups have been repleted with Vitamin A by the Beta-carotene supplementation. These rats are converting the Beta-carotene into Vitamin A.

The results for the liver are shown below:

Group	Vitamin A in Liver (µg/g liver)
1. Vitamin A Deficient	0.79 ± 1.14
2. USP Beta-carotene	28.5 ± 17.4
3. Re-natured Beta-carotene	51.5 ± 15.4

None of the liver samples contained Beta-carotene. This is not surprising since the rat efficiently converts Beta-carotene to Vitamin A in the liver. The vitamin A deficient group had 6/10 samples with no Vitamin A. The Re-natured group had 1.8 times more Vitamin A in the liver than the USP group and the difference was significant,  $P < 0.01$ . This indicates that Re-natured Beta-carotene is more bioavailable than USP Beta-carotene. It also appears that Re-natured Beta-carotene is more metabolised by the liver to Vitamin A than USP Beta-carotene.