



Nutrition for Family Living

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October, 2005 Topics

- Don't dismiss alpha-carotene for your vitamin A needs!
- Why Don't the Dietary Guidelines Emphasize Glycemic Index?

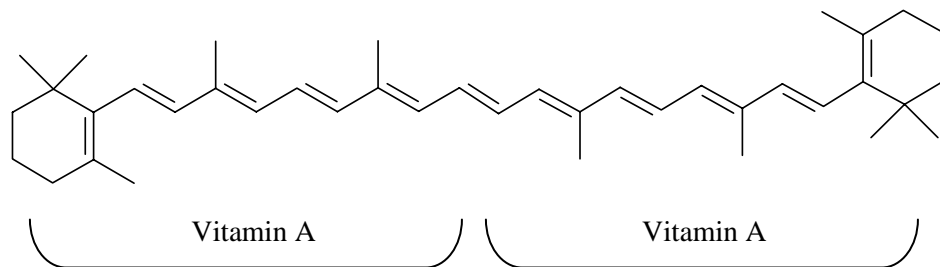
Don't dismiss alpha-carotene for your vitamin A needs!

By Sherry Tanumihardjo and Julie Howe

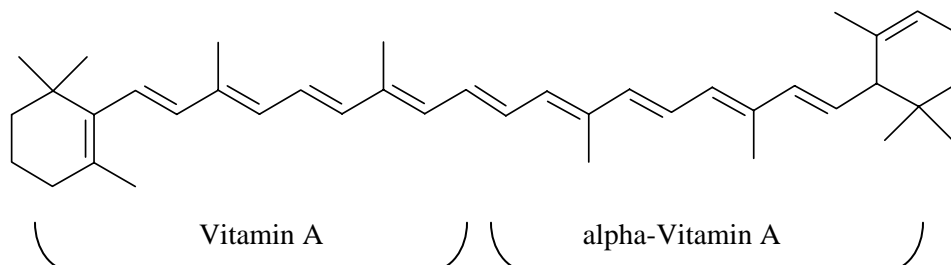
Background: The vitamin A value of carotenoids, such as alpha- and beta-carotene, from fruits and vegetables is affected by many factors. A variety of phytochemicals (compounds contained in fruits and vegetables), including carotenoids, are assumed to be important for optimal health and reduced risk of chronic disease even though they are not considered essential nutrients for humans. In particular, high blood concentrations of alpha- and beta-carotene are associated with a lower risk of atherosclerosis. Although health benefits are recognized, the Institute of Medicine (IOM) was unable to recommend a daily reference intake for any carotenoid in 2000. Of the carotenoids that can give us vitamin A, alpha- and beta-carotene are the most common in the human diet. Vitamin A equivalency factors for these carotenoids from food sources have been set by the IOM at 24 and 12 micrograms, respectively, to 1 microgram vitamin A. For oil-based supplements, the vitamin A values are 4 micrograms of alpha-carotene and 2 micrograms of alpha-carotene to 1 microgram vitamin A. Thus, the vitamin A value of alpha-carotene is assumed to be one-half that of beta-carotene. This assumption is based predominantly on its structure (see figures) and not on scientific data.



Beta-carotene gives 2 molecules of vitamin A:



Alpha-carotene gives 1 molecule of vitamin A and 1 molecule of alpha-vitamin A:





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Current research from the Tanumihardjo lab: Often scientists use animal models to ask scientific questions that are not easy to answer in humans because tissue concentrations cannot be directly measured. Humans are unique from other animals in how they handle and utilize carotenoids. The Mongolian gerbil, a desert animal, not only converts beta-carotene to vitamin A but also absorbs it intact, similarly to humans. A recent study in gerbils in the Tanumihardjo laboratory determined the vitamin A value of alpha-carotene isolated from carrots compared with beta-carotene and vitamin A supplements. All of the supplements were dissolved in oil. Twice the amount of pure alpha-carotene maintained the vitamin A status as well as beta-carotene in the gerbils that were maintained on a vitamin A-free diet. The vitamin A values obtained in this study were ~5.5 micrograms of alpha-carotene and ~2.8 micrograms of beta-carotene to 1 microgram of vitamin A. Therefore, alpha-carotene does result in half the amount of vitamin A but the vitamin A values are higher than those proposed by the IOM's report.

Another interesting finding in this study was that the other half of the alpha-carotene molecule, known as alpha-vitamin A (see figure), was not found circulating in the body but did accumulate in the liver of the gerbils. This confirmed prior studies done in test tubes and has future research implications for the efforts of the Tanumihardjo laboratory.

The bottom line: Often when we think about fruits and vegetables as sources of vitamin A, beta-carotene is the only one that is considered at the international level. However, this research clearly shows that alpha-carotene also provides vitamin A to the body. The main source of alpha-carotene in the diet is carrots and some orange squashes. Remember, the 2005 Dietary Guidelines recommend 2 cups of orange vegetables each week!

References:

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Why Don't the Dietary Guidelines Emphasize Glycemic Index?

Susan Nitzke

The *South Beach Diet* and dietary recommendations from some medical experts have made the *glycemic index* a popular concept. Glycemic index is supposed to show how much impact an individual food has on a person's blood glucose (blood sugar) levels. Each food's glycemic index score is calculated in comparison to white bread or dietary glucose (a very simple and easily digested form of sugar). In theory, the glycemic index shows how fast a food causes blood glucose levels to rise and how long it takes for the blood glucose levels to come back down. Since high levels of blood glucose and insulin are often signs of diabetes and other problems, foods with high glycemic index scores are sometimes called "bad carbs." A table showing the glycemic index of common foods can be found at http://print.nap.edu/pdf/0309085373/pdf_image/211.pdf.

The concept is interesting, but many mainstream nutrition experts have been cautious about the glycemic index. Glycemic index has limited practical value because most foods are consumed in meals or snacks that also contain other foods. It is very hard to predict or calculate the glycemic index of a meal, even if you have the scores for every food in that meal. Furthermore, different forms of the same food (boiled vs. baked potatoes, for example) can have very different glycemic index values. Some experts have tried to overcome these problems by calculating the *glycemic load* of a meal. The glycemic load measurement includes a mathematical adjustment for the percentage of total energy from carbohydrate in a meal. However, applications of the glycemic load have also been disappointing.

New research. Alfenas and Mattes measured the effects of eating meals that were high in glycemic index and glycemic load in comparison to meals that were low in these values. This study was different from many previous studies of glycemic index and glycemic load because the subjects were fed actual meals (with similar amounts of protein, total carbohydrates, and fat) instead of individual foods. They followed 39 subjects who were allowed to eat as much of their assigned meals as they wanted for 8 days. There were no significant differences in plasma glucose or insulin responses, appetite ratings, or food intake between the treatments.

Implications for Extension educators. This new study supports the conclusions of the Dietary Guidelines Advisory Committee that stated "although the use of food with a low-glycemic index may reduce postprandial glucose (levels of blood sugar after eating), there is not sufficient evidence of long-term benefit to recommend general use of diets that have a low-glycemic index." Thus, recommendations in the *Dietary Guidelines for Americans and MyPyramid* do not mention glycemic index. Instead, they emphasize the importance of eating more fruits, vegetables and whole grains and decreasing intakes of foods and beverages that are high in added sugar.

References:

Alfenas, Mattes. Influence of Glycemic Index/Load on Glycemic Response, Appetite, and Food Intake in Healthy Humans. *Diabetes Care* 2005;28:2123-2129.

American Dietetic Association. *Glycemic Index: What Is It?* (Daily Tip, 3/19/2004)
http://www.eatright.org/Public/NutritionInformation/index_19161.cfm