

THE VALUE OF ANTIOXIDANT SUPPLEMENTS VS THEIR NATURAL COUNTERPARTS

To the Editors:

In their article "Update on the biological characteristics of the antioxidant micronutrients: Vitamin C, vitamin E, and the carotenoids," (*J Am Diet Assoc*. 1996;96:693-702) Rock, Jacob, and Bowen erroneously treat antioxidant supplements as interchangeable with their counterparts that are naturally present in food.

The idea that antioxidant supplements are the same as their counterparts that are naturally present in food is a myth (1-3). Antioxidant supplements are *synthetic*—factory processed in one shelf-stable form solely. Therefore, they are by definition biochemically unbalanced and uniformly unsafe (1-6). Safety has been sacrificed for profit.

Missing from synthetic supplements are the shelf-unstable forms naturally present in foods that, with the plethora of other phytochemicals in any plant food, are necessary for biochemical balance. Naturally occurring antioxidants differ from their synthetic counterparts in two important ways:

- When they occur naturally as a part of a food they are present in at least two forms; and

- In nature they are blended not only with more than a dozen other redox phytochemicals but also more than 150 nonredox phytochemicals (1) to ensure growth and health in each natural plant product (ie, fruit, vegetable, or grain).

For instance, vitamin C is naturally present in foods in its reduced and oxidized forms. The sole form available in supplements is the reduced form, ascorbic acid, which drives free radical generation from stored iron and is therefore harmful to the approximately 12% of Americans (approximately 30% of African Americans) who have heterozygous hemochromatosis. Another example is beta carotene, which occurs naturally in the *cis* and *trans* forms. Only the *trans* form is in supplements. Daily supplements of *trans* beta carotene promoted 28% more lung cancer and 17% more heart disease than did a placebo in smokers and asbestos workers (7). Furthermore, supplements of vitamin E (solely α -tocopherol) do not have the beneficial value of natural (food) mixed tocopherols (8). α -Tocopherol inhibits cell adhesion, meaning it inhibits platelet adhesion and is therefore prohemorrhagic, inhibiting heart attacks and promoting excessive menstrual bleeding and

bleeding after cuts, blows, and falls. Even worse, it may promote fatal hemorrhagic strokes (2). α -Tocopherol is also immunity enhancing, thereby inhibiting bacterial infections but promoting autoimmune disorders from rheumatoid arthritis to lupus erythematosus to multiple sclerosis (3,4).

Levine et al (9) reported that a daily oral supplement of 100 mg synthetic vitamin C completely saturates human cells and 200 mg vitamin C saturates human serum. Therefore, a 100-mg synthetic vitamin C supplement taken daily is harmful because saturating normal human macrophages with synthetic vitamin C kills them prematurely by releasing all at once too many free radicals from their ingested heme (6). Obviously, 200 mg vitamin C taken daily is even more harmful.

Levine and colleagues indicate that taken daily, 200 mg synthetic vitamin C could cause excessive menstrual blood loss. However, they exclude from their study the greater than one third of all Americans who can be harmed by 200 mg synthetic vitamin C per day, namely the approximately 30% of African Americans and 12% of non-African Americans with high serum ferritin iron (6); the one sixth of Americans who are stone-formers because they are genetically unable to catabolize ascorbate past oxalate (5); any of the millions of Americans with diabetes mellitus (5); or persons with hereditary hemolytic anemias (ie, sickle cell anemia, G6PD deficiency, or paroxysmal nocturnal hemoglobinuria) (5). Even in non-stone-formers, at 1,000 mg synthetic vitamin C, some persons showed high levels of oxalate and uric acid in their urine, which may lead to kidney stones (9).

Therefore, I believe the implication that synthetic supplements of vitamins A, C, and E are interchangeable with their natural counterparts in promoting good health is dangerous misinformation.

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Authors' reply:

As Herbert points out, the chemical forms of compounds in foods may differ from their supplement forms. For this and several other reasons (particularly the nature of the evidence linking these compounds to disease prevention), the recommended approach to obtaining these, and other healthful dietary factors, is to eat more fruits, vegetables, and other foods from plant sources (1).

However, some of the arguments against antioxidant supplements presented by Herbert are difficult to confirm on the basis of current evidence. The ingestion of vitamin C as supplements of synthetic ascorbic acid (the reduced form) is not qualitatively different from ingestion of vitamin C from foods because the vitamin C in foods is primarily in the reduced form. The dehydroascorbic acid content of 25 foods as eaten (fresh, cooked, or left stand-

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