

July 16th, 2008

Since the average intake of 3 servings or less of fruits and vegetables fails to provide minimum levels of even basic vitamins, intakes of the numerous other antioxidants provided by a typical modern diet are sure to be well under optimal and beneficial levels. It has been established that a good multivitamin can fill in gaps in missing vitamins, but availability of broad-spectrum antioxidant supplements has lagged behind.

ANTIOXIDANTS TUTORIAL, PART 3: SOURCES AND DIETARY INTAKES

Antioxidants can be vitamins, minerals, enzymes, or plant-derived nutrients called phytonutrients.

The major vitamin antioxidants are vitamin C, vitamin E and beta-carotene, while selenium is the major mineral antioxidant. Unfortunately, many researchers and nutritionists discuss and report on these as if they are the only sources of antioxidants. However, a thorough examination of antioxidants and their importance to human health must include a much larger list of compounds potentially present in a healthy, varied diet. The following list is an example of the wide variety of phytonutrient antioxidants present in a healthy diet:

| Phytochemical | Food source |
|---|---|
| Allyl Sulfides | Onions, garlic, leeks, chives |
| Carotenoids (e.g. lycopene, lutein, zeaxanthin) | Tomatoes, carrots, watermelon, kale, spinach |
| Curcumin | Turmeric |
| Flavonoids (e.g. anthocyanadins, resveratrol, quercitin, catechins) | Grapes, blueberries, strawberries, cherries, apples, grapefruit, cranberries, raspberries, blackberries |
| Glutathione | Green leafy vegetables |
| Indoles | Broccoli, cauliflower, cabbage, Brussels sprouts, bok choy |
| Isoflavones | Legumes (peas, soybeans) |
| Isothiocyanates (e.g. sulforaphane) | Broccoli, cauliflower, cabbage, Brussels sprouts, bok choy |
| Lignans | Seeds (flax seeds, sunflower seeds) |
| Monoterpenes | Citrus fruit peels, cherries, nuts |
| Phytic Acid | Whole grains, legumes |

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| Phenols, polyphenols, phenolic compounds (e.g. ellagic acid, ferrulic acid, tannins) | Grapes, blueberries, strawberries, cherries, grapefruit, cranberries, raspberries, blackberries, tea |
| Saponins | Beans, legumes |

The recommendation from the National Cancer Institute, the U.S.D.A., and nutrition experts is to eat a minimum of 5-13 servings of fruits and vegetables per day depending on your individual caloric needs. Based on these recommendations, a typical varied diet would provide approximately 200-600 mg of vitamin C and 10-20 mg (16,000-32,000 IU) of carotenoids. Additionally, polyphenols – the most abundant antioxidant in the diet – could have a daily dietary intake as high as 1 gram/day in a mixed, varied diet of fruits, vegetables, grains, and beverages.

Possible intakes of other phytonutrient antioxidants could include:

- **Anthocyanidins:** 1,500 mg in two oz. of black grapes
- **Proanthocyanidins:** 100-300 mg/day from red wine
- **Catechins:** 50 mg/day from tea (one cup brewed green tea – 240-320 mg catechins), chocolate, apples, pears, grapes, red wine
- **Isoflavones:** 50 mg/day from soy foods
- **Chlorogenic acid:** as high as 800 mg/day in coffee drinkers.

Although it may seem reasonable that a consistently healthy and varied diet could provide high doses of antioxidants, the average American gets a total of just three servings of fruits and vegetables each day. As previously mentioned, dietary guidelines call for five to thirteen servings. For a person who needs 2,000 calories a day, this translates into a recommendation of nine servings, or 4½ cups of fruits and vegetables each day.

The 2001-2002 NHANES survey of dietary intakes shows that 93% of Americans fail to get even the Estimated Average Requirement (EAR) for vitamin E, let alone the RDA. More than half of adults fail to get even the average requirement for vitamin A. About one-third of non-smokers and two-thirds of smokers fall short on minimum vitamin C requirements. Obviously, since the average intake of 3 servings or less of fruits and vegetables fails to provide minimum levels of even basic vitamins, intakes of numerous other antioxidants are sure to be well under optimal and beneficial levels.

It is well-established that a good multivitamin can fill gaps in vitamin and mineral requirements unmet by a poor diet, but broad-spectrum supplemental availability of antioxidants has lagged. Although there is much to be learned about the individual characteristics of the hundreds of potential dietary antioxidants, it seems reasonable that providing supplements of various antioxidant classes may also fill nutritional gaps and provide health benefits potentially missing from the typical western diet.

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