Those Elusive Nutrients: M. C. Badami

Why you may need Vitamin Supplements: A guide to Modern Food.

Extracted from "Real Food, Fake Food And Everything In Between" by Geri Harrington.

Part and parcel of the argument that goes on about whether or not the average person needs vitamin and mineral supplements is the idea of eating " a balanced diet" ---that is, one that supplies all the essential nutrients. Theoretically, anyone eating such a diet would have no need to supplement it.

There are four problems with the balanced-diet notion.

1. Individual nutrient requirements vary, often considerably, from the "average". One individual may be so genetically constituted as to achieve perfect health following the RDA tables as a guide. Another individual may require four or five times that amount for the same health level. A third person may require, for instance, twice as much vitamin C and E but only half as much A.
2. The amount of vitamins one person needs can change, influenced by illness and exposure to pollutants, chemicals or other stresses. Even it were possible to get enough of the essential nutrients from food sources, the individual have to constantly adjust certain items in the diet according to changing needs. It is usually easier and more convenient for a person to effect these temporary changes by taking more or less of the nutrient in supplement form; additionally, supplements will not affect the caloric balance already achieved.
3. We unknowingly ingest, under the misconception that it is real food, an untold amount of fake or denatured (edible but not nutritious) food. Specific recommendations for a so-called balanced diet---such as choosing from the four food groups and other guidelines----do not differentiate between whole fruit and fruit drinks, chicken breast and fast-food chicken nuggets, or canned and fresh vegetables. Instead we are told to eat so much dairy, so much meat, and so much of the other generalized food items. Since thee are more no-or low-nutrition food sold, the odds are against the unguided consumer buying the food that contain the maximum nutrition---yet that is the premise behind the food groups and recommendations.
4. From harvest to food processor to dinner table is a long, arduous journey and many nutrients are lost along the way. Many foods that star out loaded with good nutrition end up pleasing our jaded plates but accomplishing little else.

Presently, many consumers are trying to remedy the deficiencies in nutritional requirements caused by modern life, by taking supplements. They do not take the place of real food. It is still important to get as many nutrients as possible from food itself; only in that way can we also get the as yet unknown but essential elements that nature has built in. The value of supplements is limited by our still limited nutritional knowledge; we are constantly discovering the importance of nutrients of which we are unaware just a few years ago.

Without a tame analytical chemist in the kitchen, it is impossible to know that good still remains in the food that you re putting into your mouth, but it helps to know how to choose wisely, what to avoid and how to handle to handle and prepare food so as to retain whatever good may have survived in it by the time you get it home.

Vitamin C

Vitamin C is the most commonly taken supplement. Thanks to the work and writings of Dr. Linus Pauling, and in spite of studies by the Mayo Clinic and others to the contrary, the public seems to have decided empirically that Vitamin C intake for over the RDA amount helps prevent colds and possibly a number of other ills, such as cancer and high serum cholesterol. Since the worst opponents can say is that taking large quantities is a waste of money and in some individuals there is a slight chance that massive amount may cause kidney stone formation, Vitamin C supplements are probably here to stay.

Vitamin C is adversely affected by heat (cooking, pasteurisation, food processing and exposure to air, oxygen, water, and light. It is not surprising, therefore, that the best sources are raw freshly picked foods; even oranges with a high vitamin C content will lose more & more the further they are from the tree and the more they have been processed. Some foods, such as liver (the only meat that contains appreciable amounts of this Vitamin) are useless as a source because they are never eaten raw. Here are examples of the difficulty the consumer encounters in trying to get the maximum vitamin C from natural sources.

From Oranges

You probably look to orange and orange juice to fill most of your RDA of vitamin C; let us see how satisfactory this is. The RDA for "ascorbic acid" is 60 mg, the amount supposedly provided by one 6 oz (80 ml) glass of 100% pure orange juice. The USDA composition of foods table provides the following information.

Food and description	Ascorbic acid (mg/100g)
Oranges, raw—peeled fruit: All commercial varieties	50

California Navels (winter oranges)	61
Valencia (summer varieties)	49
Florida: All commercial varieties	45

In other words, the amount of vitamin C varies according to season (winter oranges contain more than summer), variety of orange and what state the oranges are grown in. According to the following table, the same vitamin C content is found in the fresh squeezed juice from the raw fruit as in the whole fruit itself, except that in the juice table we have the Florida listing broken down in more details as follows.

Florida juice	Ascorbic acid, mg
Early & mid-season oranges Hamlinm Parson Brown, Pineapple)	51
Late season Valencia	37
Temple	50

Since these nutrient values are given for fresh squeezed juice, let us see what happens to vitamin C with processed juice.

Canned	Ascorbic acid (mg)
Unsweetened	40
Concentrate, unsweetened, undiluted	229
Diluted, 5 parts water	47
Frozen, concentrate, unsweetened Undiluted	158
Diluted, 3 parts water	45

As you would expect, juice from the whole orange comes out best, frozen concentrate next and canned last. Let us see what the vitamin C situation is when the consumer buys it at the store.

There are no regulations that stipulate how much vitamin C 100% pure orange juice must contain; seasonal or varietal variations are understood. About 90% of the juice produced in the United States comes from Florida (California produces primarily eating oranges), and more and more of it is sold in the form of concentrate that has been mixed with water, pasteurised, bottled and sold chilled in the refrigerated section of the market. Only a few brands sell whole orange juice that has been pasteurised but has not been made from concentrate.

Unlike riboflavin, vitamin C is retained better if stored in the refrigerator in glass containers rather than cardboard. This is due to the fact that vitamin C can be decreased by exposure to oxygen and the glass containers exclude oxygen more successfully. Some manufacturers contributed this information (the length of time from bottling to code date), revealing a range from 16 to 49 days, with an average of 27 days. The study found “The effective vitamin C contents-----decreased at an average rate of about 2% per day during an average period of 16.5 days when stored unopened at 40° F.” But loss of effective vitamin C in some brands differed greatly from the average; the range was, “from none to 76.5%”. And, of course, there is further loss as the carton is opened and during storage. So in estimating whether you are getting your RDA of vitamin C from that 6-ounce of glass of 100 percent pure orange juice, you have to allow considerable leeway.

Juice Drinks

Generally speaking, juice drinks are not a good sourced of vitamin C: most of them even pretend to be. The categories are self-limiting, since only the 100 percent citrus drinks are high in Vitamin C and juice drinks by definition, are low in their content of pure juice. Unless vitamin C has been added, the amount they contain is bound to be negligible. A juice drink, by law, must contain at least 30 percent juice, ades (except lemon and lime) must contain 15 % juice (lemon and lime at least 12.3% juice), drinks and punches (except lemon and lime) at least 10% (lemon and lime at least 6%), flavoured drinks less than 10 percent, artificially flavoured drinks need not contain any juice.

Drinks in these categories may be sold in the form of water and juice, juice concentrate,, instant mixes or powders . They may contain either artificial or natural flavours. Considering the loss of vitamin C from the 100 percent pure orange juice, the amount of the vitamin still to be found in the highly processed juice drinks does not constitute incentive for purchasing them.

Produce

Fresh raw vegetables, such as cabbage, green leafy vegetables, and potatoes, are a good source of vitamin C when they are fresh. Dousing them with sulphites to make them look fresh, removing wilted outer leaves, wetting them down and other similar marketing practices make it

difficult for the consumer to make an informed choice. This is serious because bruised or old vegetables, subjected to these practices and stored for several days in the store at room temperature, have substantially reduced amounts of vitamins A and C. The USDA reports, for example, that 'fresh' raw green beans may lose up to 50 percent of their vitamin C when left unrefrigerated for 24 hours.

According to USDA composition of Foods table, raw spinach contains 51 milligrams per 100 grams of vitamin C and cooked spinach, boiled and drained, 28 milligrams per 100 grams The USDA tables do not distinguish between the vitamin C remaining after being subjected to commercial marketing conditions.

Perfect Packaging

It is clear that scientists are learning much more about packaging with each study, especially about the vulnerability of nutrients in food and the difficulty in retaining them from the time of harvest to the consumer's kitchen. It is the job of the manufacturer, not the consumer to ensure packaging that will provide maximum nutrient retention. Most of the studies that compare various types of packaging show sharp differences among them in nutrient retention, depending on the packaging material or on the design of the package.

Food packaging has become an extremely complex industry. Not only are the available materials numerous but new ones are being invented faster than the manufacturer can keep up with them. It is not enough for a manufacturer to decide to use a "plastic" container. If the is cellophane, there are over a hundred types of cellophane-containing films and laminates, and each type has its own particular property of moisture or gas permeability, burst strength, stretch ability and flexibility---to name just a few properties that must be considered in protecting a given food product. A symbiotic relationship exists between the food packager and the food scientist, the latter discovering the kind of protection his newly "invented" food requires, the packager trying to provide it.

Some products require two containers, a primary one that comes in direct contact with the contents and a secondary one that does not touch the contents. The requirements for the two containers are entirely different. In the case of saltines, for example, the inner container protects the product from moisture and help keep it fresh and allow uniform packing so that the individual crackers are less liable to crumble, the outside box displays the labelling information, stores easily on the supermarket shelves, is recognizable for the type of product and is strong enough to stand up under the normal marketing conditions.

Nutrient Stability and Light and Oxygen Exposure

Some nutrients are stable when exposed to light and Oxygen; some are not. This list will help consumer purchase and handle food so as to obtain the greatest amount of a given nutrient

Light-stable Nutrients are: Choline, Inositol, Niacin, Pantothenic acid, Thiamine

Light sensitive Nutrients are: vitamin A, vitamin C (ascorbic acid), carotenes (pro-A), vitamin B12, vitamin D, Essential fatty acids, Folic acid, Vitamin K, Vitamin B6, Riboflavin

Oxygen-stable Nutrients: Biotin, Inositol, Vitamin K, Niacin, Pantothenic acid, Vitamin B6, Riboflavin

Oxygen-sensitive Nutrients: Vitamin A, vitamin C (ascorbic acid), carotene (pro-A), vitamin B12, vitamin D, essential fatty acids, fikic acid, Thiamine, Vitamin E

Nutrient Stability and Heat

Those nutrients that are heat sensitive tend to be decreased by cooking. The consumer can decide which foods to serve raw and which cooked, if the degree of loss is known. This table does not differentiate among the various methods of cooking-----steaming, boiling, broiling or baking------ but rather gives a range. The cook can rather retrieve lost nutrients by, for instance, the water in which the foods have been boiled or skimming the fat off the baked and roasted foods and using the natural gravy that remains.

Nutrient	Stable (S) / Unstable (U)	% Cooking Loss
Vitamin A	U	0-40
Vitamin C	U	0-100
Biotin	U	0-60
Carotenes (pro-A)	U	0-30
Choline	S	0-5
Vitamin B12	S	0-10
Vitamin D	U	0-40
Essential fatty acids	S	0-10
Folic acid	U	0-100
Inositol	U	0-95
Vitamin K	S	0-5

Niacin	S	0-75
Pantothenic acid	U	0-50
Vitamin B6	U	0-40
Riboflavin	U	0-75
Thiamine	U	0-80
Vitamin E	U	0-55

"Edible" Packaging

The consumer may hardly be even aware of some "packaging" such as the waxes uses on fresh produce and the dangers of waxed foods. Before the invention of spray-coating, edible packaging was more less confined to sausage casing, cheese rinds, and similar more-or-less natural "containers". With spray-drying, gelatine, gum Arabic and similar materials can be combined with artificial flavouring, preservatives and similar additives to form a coating that goes completely unnoticed.

Of course, not all coatings are undesirable. Raisins are coated with starch to prevent them from moistening the rest of the commercial cereal, much as a baker dredges them with flour before adding them to the batter so that they will not sink to the bottom of the baked muffin. If labelling were so complete that the consumer knew all the ingredients in the package, spray-dried ingredients would also be revealed, either harmless or undesirable. The problem with them now is that their presence may go undetected or so cannot be avoided.

The consumer is right to feel that the first priority should be given to the preservation of the highest proportion of maximum number of nutrients, but this is unlikely to be the case, since this aim does not take priority in any other aspect of food processing and distribution.

The Consumer's Role in Nutrient Retention

The consumer is the one who suffers if the edibles are eaten under the misapprehension that they are nourishing when they are not. Even when the consumer is well informed about the diet and makes wise choices, creating a diet that is varied and well balanced in theory, the actual result may be nutritionally disappointing.

Many things will have happened to food—even fresh produce—from the time it is harvested to the time we eat it. Additionally, its nutrient content will vary, even at the time of harvest, according to season, soil, degree of maturity, weather during various periods of growth, method of harvesting, and the specific variety that was grown. Washing, trimming, storing, packing, transporting and packaging will all take their toll. The more a food is processed, the greater the possibility of nutrient loss .The industry estimates that no more than 25% of nutrients are lost in processing, but that is an industry estimate and may be somewhat optimistic. Considering the large diversity of processes, it is not a particularly meaningful figure, but even a 25% loss may mean a great deal to the consumer trying to plan a high-density diet.

The more the consumer eats prepared foods, take-out foods, highly processed foods and out of season foods, the less likely it is that the necessary amount of nutrients can be gotten from diet alone. Our entire food manufacturing, processing, and distribution systems may be unwittingly undermining our health.

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