



Nutrition for Family Living

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September, 2002 Topics

Sherry's late summer functional food – THE TOMATO

Sweet Choices: Sugar Replacements for Foods and Beverages

For Your Use: Sweet Choices: Sugar Replacements for Foods and Beverages

To answer your question... vitamin fortified water vs. sports drinks?

Sherry's late summer functional food – THE TOMATO



Nothing tastes better than a deep red tomato fresh from the garden. It is often one of the only products from the garden that can withstand intruders such as deer, squirrels, rabbits and raccoons. This is good news as tomatoes are currently the richest source of lycopene in the human diet.

Lycopene is a carotenoid responsible for the red pigment seen in tomatoes, pink grapefruit, and watermelon. The primary dietary source of lycopene is the tomato, with 85% of lycopene consumed in the US coming from tomato products. Lycopene, while having no vitamin A activity, is a potent antioxidant with twice the antioxidant activity of β -carotene and 10 times the antioxidant activity of vitamin E. Epidemiological evidence suggests an inverse association between dietary lycopene and the development of certain types of cancer. This means that the more tomato products in the diet, the lower the cancer risk. This association is especially strong for prostate cancer, but epidemiological studies have also found that diets high in lycopene are associated with lower rates of bladder, cervical, and breast cancers as well as cancers of the gastrointestinal tract. The discovery of large concentrations of lycopene in specific tissues in the body suggests that lycopene may play a specific role in such tissues, which include the blood, testes, adrenal glands, liver and kidney. However, before the body can utilize lycopene, it must be absorbed through the intestine, and very little information is known about factors that affect lycopene bioavailability.

Bioavailability is defined as the fraction of lycopene from food that is absorbed by the body through the digestive process and available for use by the body. Absorption rates are influenced by many dietary factors and food properties. Specifically for lycopene, the factors that are important include: the amount of lycopene consumed at the meal, the plant structure, dietary fiber, and dietary fat. Mechanical processing of tomato products such as cooking and pureeing breaks down cell walls and releases lycopene from the food, thus increasing bioavailability of lycopene. Therefore, tomato paste is a better source than fresh tomatoes because not only is it concentrated but it is also heat processed. Lycopene bioavailability is decreased by dietary fiber, and increased by the presence of dietary fat.

Another future source of dietary lycopene is the **red** carrot! Our research group recently finished two human intervention trials to gain information on the bioavailability of lycopene from red carrots. What did we find?

Implication of the Lycopene Red Carrot: Our experiments showed that the lycopene from the lycopene red carrot is bioavailable. Thus the lycopene red carrot could one day provide a viable alternative to tomatoes as a dietary source of lycopene. Furthermore, as the carrot is a familiar



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and highly popular vegetable with a longer shelf life than fresh tomatoes, the red carrot as a functional food could help increase lycopene consumption in general.

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Sweet Choices: Sugar Replacements for Foods and Beverages

If the nation's obesity epidemic boils down to the simple balance of calories in vs. calories out, then a discussion of sugar vs artificial sweeteners seems timely. Added sugar in foods is one of the major contributors of excess calories in many people's diets. A number of artificial sweeteners now exist so that people can enjoy sweet foods with fewer calories.

Several types of sugar occur naturally in foods. Fructose and lactose are found primarily in fruit, honey and dairy products. These sugars, as well as sucrose (the sugar we typically call "sugar") are also added to foods during processing and cooking to improve flavor or as a preservative. Sucrose occurs naturally as a result of photosynthesis and is found as a component of every fruit and vegetable in the plant kingdom. Sugar cane and sugar beets have the greatest concentration of sucrose, which is extracted for use in other products.

High-fructose corn syrup (HFCS) has made a major impact on the food industry. HFCS is less expensive than raw sugar from sugar beets or sugar cane and is used by the beverage and processed foods industries. Between 1970 and 1996, Americans' per capita consumption of added sugars increased 23%. Added sugars are defined as all sugars used as ingredients in processed and prepared foods – such as HFCS - as well as sugars eaten separately or added to foods at the table. Sugar sweetened beverages are the primary source of added sugars in the diets of US children. Obese children and adults consume more sugar sweetened beverages than lean children and adults.

The food industry has responded to the obesity epidemic and consumers' concern about added sugar by promoting products with artificial sweeteners. Artificial sweeteners fall into two categories: calorie free, often referred to as low-calorie or intense sweeteners, and reduced calorie sweeteners or sugar replacers, which are significantly reduced in calories but not calorie-free. These sweeteners permit the use of the terms "low-calorie," "reduced calorie," "light," "sugar-free," and "does not promote tooth decay" on the label.

Blends of artificial sweeteners are often used to combine properties of several sweeteners in a particular product. Producers consider many things in choosing a sweetener: labeling; taste, texture and bulk of the finished product; shelf life; temperature during processing (some sweeteners break down at cooking temperatures); and other ingredients in the product that may interact. Developing low-calorie products usually requires completely reformulating a recipe because one sweetener cannot simply be substituted for another. Various sweeteners interact differently with ingredients and cooking methods, and artificial sweeteners do not provide bulk like sugar.

Five low-calorie sweeteners are currently approved by the FDA for use in the US:

- Acesulfame potassium (acesulfame K) is approved for desserts, puddings, baked goods, candies, soft drinks, and as a tabletop sweetener.
- Aspartame is approved for general use, which means it can be used in any product where a standard of identity does not prevent its use. If a product standard called for a "nutritive carbohydrate sweetener" then aspartame could not be used; if a product standard called for a "nutritive sweetener" then aspartame could be used. No adverse health effects have been found for aspartame, despite many urban legends. The FDA has stated that aspartame is one of the most thoroughly tested food additives ever submitted to their agency.
- Saccharin has been available for more than 100 years. Controversial high-dose rat studies in the 1970's caused the government to place a warning label on products containing saccharin,



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but further research led the government to remove the warning label and consider the product safe in 2000.

- Sucralose is a general purpose sweetener that is 600 times sweeter than sugar. It is used anywhere sugar is used, including cooking and baking, and is available as a liquid concentrate for industrial use.
- Neotame is the most recently-approved general purpose sweetener, and is not yet found in consumer products. It is 7,000 to 13,000 times sweeter than sugar.

Alitame and cyclamate are low-calorie sweeteners awaiting FDA approval. Polyols are reduced-calorie sweeteners that are often used along with low-calorie sweeteners to provide bulk to the product. Examples of polyols include sorbitol, mannitol, maltitol, and xylitol. Products sweetened with polyols may be able to use the label “sugar-free” but not “reduced calorie” if they do not have at least 25% fewer calories than the full-calorie product.

Nutrition and Health Considerations

Sugar intake itself does not lead to diabetes, but it can contribute to weight gain and being overweight clearly increases the risk of diabetes and heart disease. The Dietary Guidelines for Americans recommends that people choose beverages and foods to provide a moderate intake of added sugar. Foods with artificial sweeteners can provide alternatives so people can enjoy sweet foods with fewer calories. They can also play a role in maintaining a healthy weight and reducing the risk of chronic disease.

For more information:

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Nabors, Lyn O'Brien. Sweet Choices: Sugar Replacements for Foods and Beverages. *Food Technology.* July, 2002; 56(7): 28-34, 45.



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To answer your question... vitamin fortified water vs. sports drinks?

Q: What's the difference between vitamin-fortified water and sports drinks such as Gatorade?

A: Beverage manufacturers are introducing products that take bottled water one step further by adding vitamins, herbal extracts, flavorings and sweeteners. These products are often labeled "fitness water" or "vitamin water." They are usually fairly expensive – as much as \$1.50 for a 24-ounce bottle – and may include only small amounts of vitamins. The amount of Vitamin C in Propel is the same amount found in two strawberries. The amount of vitamin B12 in Propel is the same as in a few sips of milk. In order to get a day's supply of folate from Reebok's Fitness Water, you'd have to drink 12 cups at a cost of roughly \$6. The other vitamins added are readily available in the food supply and deficiencies are rare in healthy people.

On the other hand, sports drinks usually contain some sodium, and carbohydrate in the form of sugar, but no added vitamins or herbs. Sodium losses during intense exercise can usually be replaced by eating a typical American diet. A little sugar may help people recover more quickly after intense exercise. The main benefit of sports drinks is the fluid they contain. If people prefer the taste of sports drinks to plain water, they may be more likely to drink enough fluid to replace losses during exercise.

The bottom line: If people prefer the taste of sports drinks or vitamin water, and are willing to spend their money for these products, they don't appear to be harmful. The primary benefit will come from the fluid they contain rather than the added vitamins, minerals, electrolytes or sugar.

For more information, see the American Dietetic Assn webpage:

<http://www.eatright.com/erm/erm071802.html>

Clark, Nancy. Fluids, Dehydration & Thirst Quenchers. Companion handout to *Sports Nutrition Guidebook, 2nd Edition*.

Tufts University Health and Nutrition Letter, July 2002 "Now, Bottled Water with Vitamins and Herbs."