Fresh, Frozen, or Canned? Raw, Dried, or Cooked?

Selecting and Preparing Foods to Maximize Vitamin Content

Wouldn't it be great if we could all shop daily for fresh fruits and vegetables? When picked at their prime ripeness, fresh fruits and vegetables taste the best and contain peak amounts of different vitamins and phytochemicals. Remember that light, heat, air, acid, and alkali can destroy many vitamins, and cooking liquids can leach them out. Even if you can't buy fresh foods daily, you can still minimize nutrient loss after purchase. Start by choosing clean, undamaged produce on your regular shopping trips. Then store foods with minimal exposure to light and air. Many fruits, most vegetables, and all animal products require refrigeration. Get them cold right away, and keep them cold. Because vitamin content can decrease with time, plan on using fruits and vegetables soon after purchase. The vitamin C of fresh green beans, for example, drops by half after six days at home.

What about frozen and canned foods? Their vitamin content is much better than you might guess. When vegetables are frozen immediately after they are picked, they can be more healthful choices than fresh vegetables that lose nutrients during shipping and storage.[1] Although canning uses destructive heat, the processor typically uses fresh-picked produce, which is higher in vitamins than fresh food transported to faraway markets. When using canned vegetables, incorporate the liquid in soups and stews to get the benefit of any vitamins that may have leached out. Recipes prepared with canned foods and no added salt have similar nutritional values to those prepared with fresh or frozen ingredients.[2]

Carotenoids are stable during the canning process. In fact, research suggests the lycopene in processed tomato products is better absorbed into the body than that from raw tomatoes.[3] Vitamins are lost from fresh produce during transport and storage. Processing fruits minimizes postharvest damage, yet causes nutrient losses due to chemical and temperature processing. One exception to this is vitamin C—there is not a significant difference in the vitamin C content of fresh fruits and vegetables and those that have been frozen, canned, or juiced.[4]

Dried fruits are also a good way to eat your daily fruit. The biggest concern is portion size because when fruits are dried their nutrient, calorie, and sugar content becomes concentrated, and it is easy to eat too much. Dried fruits have a low to moderate glycemic index and a glycemic response that's comparable to that of fresh fruits. They are a good source of nutrients such as potassium and fiber.[5] Data from the National Health and Nutrition Examination Survey (NHANES) showed that dried fruit consumption is associated with lower body mass index (BMI), reduced waist circumference, reduced abdominal obesity, improved nutrient intake (higher vitamin A, vitamin K, potassium, iron, magnesium, and fiber intake), more fruit servings per day, and healthier overall diets for both adults and children.[6,7]

What is the best way to cook vegetables? To maximize vitamin content, think minimal—minimal heat, minimal cooking water, and minimal exposure to air. Try also to minimize handling the food before and during cooking. Dicing a food such as a potato reduces cooking time but also exposes more surface area to vitamin destruction. So, cut if you must, but not too small.

Because steaming, stir-frying, and microwaving minimize cooking time and water use, they are the best cooking methods for preserving vitamin content. If you boil foods, use the cooking water for sauces, stews, or soups to salvage lost water-soluble vitamins. And do not add baking soda to beans or vegetables (some folks do that to intensify color and tenderize). Baking soda destroys some vitamins.

Remember, to retain the most vitamins in your food, choose seasonal freshly picked produce and be gentle with storage, kind with cooking, and "minimize to maximize"!

1 Academy of Nutrition and Dietetics. Are fresh fruits and veggies better than frozen? http://www.eatright.org/Public/content.aspx?id=6442451896&terms=fresh+or+frozen. Accessed May 21, 2014.
2 Fruit and Veggies—More Matters. 5 facts about canned food. http://www.fruitsandveggiesmorematters.org/5-facts-about-canned-foods. Accessed May 21, 2014.
3 Carlsen MH, Halvorsen BL, Holte K, et al. The total antioxidant content of more than 3,100 foods, beverages, spices, herbs, and supplements used worldwide. *Nutr J.* 2010;9:3.
4 Kyureghian G, Flores R. Meta-analysis of studies on vitamin C contents of fresh and processed fruits and vegetables. *J Food Nutr Disor.* 2012;1:2. doi.org/10.4172/2324-9323.1000101.
5 Fruit and Veggies—More Matters. About the buzz: Fresh fruit is much healthier than dried fruit? http://www.fruitsandveggiesmorematters.org/?page_id=18744. Accessed May 21, 2014.
6 Fruit and Veggies—More Matters. About the buzz: fresh fruit is much healthier than dried fruit? Op. cit.
7 Keast D, Jones J. Dried fruit consumption associated with reduced improved overweight or obesity in adults: NHANES, 1999–2004. *Fed Am Soc Exp Bio J.* 2009;23:LB511.

Enrichment and Fortification

In the 1940s, the U.S. government mandated enrichment of bread and cereal products made from milled grains. Milling or refining grains removes the bran and germ to make white flour, white rice, refined cornmeal, flour for pasta, and most breakfast cereals. Processing grains also removes most B vitamins, vitamin E, and minerals such as iron, magnesium, and zinc. The loss of these nutrients from such staple foods could be devastating. In fact, during the nineteenth and early twentieth centuries, widespread adoption of these milling

cholesterol [ko-LES-te-rol] A waxy lipid (sterol) whose chemical structure contains multiple hydrocarbon rings.

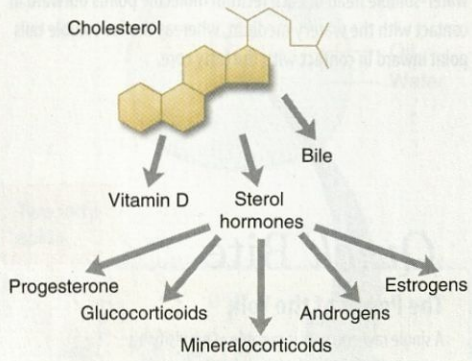


Figure 5.19 **Cholesterol has important roles.** Cholesterol is a precursor of vitamin D and sterol hormones. The liver uses cholesterol to make bile.

Cholesterol Functions

Because of the publicity generated by its role in heart disease, **cholesterol** is the best-known sterol. But cholesterol is a necessary, important substance in your body; it becomes a problem only when excessive amounts accumulate in your blood. Like phospholipids, it is a major structural component of all cell membranes and is especially abundant in nerve and brain tissue. In fact, most cholesterol resides in body tissue, not in the blood serum or plasma that is routinely tested for cholesterol levels.

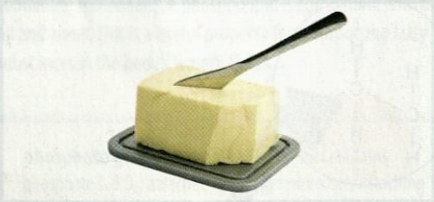
Cholesterol is a precursor of important substances. For example, your body can use cholesterol to make vitamin D. Cholesterol also is the precursor of five major classes of sterol hormones: progesterone, glucocorticoids, mineralocorticoids, androgens, and estrogens. (See **Figure 5.19**.) When making testosterone (an androgen) from cholesterol, our bodies form an intermediate compound called dehydroepiandrosterone (DHEA). DHEA has become a popular nutritional supplement, marketed with the largely unfulfilled promise that it will boost potency and restore youth.

The liver uses cholesterol to manufacture bile salts, which are secreted in bile. The gallbladder stores and concentrates the bile. On demand, the gallbladder releases the bile into the small intestine, where bile salts emulsify dietary fats.

Which Spread for Your Bread?

Okay, it's time to see if you can put some of your new knowledge about lipids to work. You're standing in front of the dairy case ready to pick out the best spread. But, wow! So many choices. Of course, there's butter, which has been around for thousands of years—wholesome, natural, and creamy; sometimes there's just no substitute for the real thing. Margarine, the more recent choice of many, has come to be more familiar than butter to some consumers. Then what's this "vegetable oil spread"? The one that says it "helps promote healthy cholesterol levels."

Butter



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When it comes to spreads, butter is the most traditional choice; however, it has some disadvantages: (1) Butter is high in saturated fat; (2) it contains cholesterol; and (3) like other fats, it's high in calories.

Here are the facts: one tablespoon of butter provides the following:

- 100 kcals
- 11 g fat
- 7 g saturated fat
- 0 g trans fat
- 30 mg cholesterol
- 85 mg sodium
- 8 percent of the Daily Value for vitamin A

The ingredients are usually simple: "cream, salt, annatto (added seasonally)." Annatto is a natural coloring (a carotenoid) that is used to keep the color of butter consistent, despite what dairy cows might have been grazing on.

If you like the taste of butter, but want a bit less saturated fat and cholesterol, you can buy "whipped butter." The ingredients are the same, but the incorporation of air reduces calories, fat, saturated fat, cholesterol, and sodium by 30 to 40 percent.

Margarine

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Margarine was developed to be a substitute for butter. Made from vegetable oils, it appears to be more healthful; as a plant-derived food, it's certainly cholesterol-free, and vegetable oils contain more unsaturated fatty acids than butter. Inconveniently, though, unsaturated oils are liquid, and without extra processing, margarine would run right off any slice of bread. Hydrogenated oils are needed to produce a spreadable consistency. But, as you know, hydrogenation increases the number of saturated and trans fatty acids in a fat, and both of these are associated with higher blood cholesterol levels.

Looking at the label of a standard stick of margarine, you'll find the following per tablespoon:

- 100 kcals
- 11 g fat
- 2 g saturated fat
- 2 g trans fat
- 3.5 g polyunsaturated fat
- 3.5 g monounsaturated fat

- 0 mg cholesterol
- 115 mg sodium
- 10 percent of the Daily Value for vitamin A

Compared with butter, margarine has the same amount of calories and fat (a fact unknown to many consumers), less saturated fat and cholesterol, and a bit more sodium and vitamin A. The PUFA and MUFA content of butter are not listed because these are not required elements of the Nutrition Facts label.

Turning to the list of ingredients, we find "liquid soybean oil, partially hydrogenated soybean oil, water, whey, salt, soy lecithin, vegetable mono- and diglycerides (emulsifiers), sodium benzoate (a preservative), vitamin A palmitate, beta carotene (color)." Nothing terribly unusual, especially now that you know what lecithin and mono- and diglycerides are.

Spreads and Other Butter Imitators

Beyond the traditional stick margarine, there

are a growing number of "light," "soft," "whipped," "squeeze," "spray," and "spread" products. These items do not fit the legal definition of "margarine," and so the term *vegetable oil spread* is generally used. In terms of ingredients, these products have more liquid oil and water and less partially hydrogenated oil. More emulsifiers may be needed, along with flavors (including salt) and colors. The result typically is fewer calories, less saturated fat, and still no cholesterol.

Some products tout the inclusion of canola or olive oil for more healthful MUFA. Others indicate "no trans fatty acids" and have no hydrogenated oils on the list. Several spreads contain plant sterols or stanols that reduce intestinal absorption of cholesterol.[1]

Cholesterol-Lowering Margarines

Stanols are plant sterols similar in structure to cholesterol. Ingested plant sterols compete with and inhibit cholesterol absorption. Studies show that consumption of stanols produces favorable lipoprotein lipid changes in men and women with hypercholesterolemia.[2] The "cholesterol-lowering" margarines Benecol and Take Control contain plant stanol esters and plant sterols. Research on the extent of the ability for products such as Benecol and Take Control to improve cholesterol levels is split. Although some studies show a benefit secondary to their use, others have found that the agents have a modest ability to lower LDL cholesterol and are not effective in all conditions, nor do they have an effect on HDL cholesterol or triglyceride levels.[3] People who choose to use stanol- or sterol-ester-containing margarines in an effort to improve cholesterol levels should use caution and talk about their choice with their physician.

Making Choices

The spread you choose may depend on your purpose. There are times, and foods, where nothing but real butter will do. If you've ever tried baking cookies with a soft, reduced-fat spread, you know the outcome ... and probably will use butter, margarine, or vegetable shortening next time.

Remember, your overall goal is to limit total fats as well as saturated and trans fatty acids. Using less butter or margarine on the whole will do that. Choosing a margarine or spread with liquid vegetable oil as the first ingredient (meaning that the amount of hydrogenated oil is less) will reduce not only saturated fat, but also trans fat. The latest scientific research on the topic found no evidence of dangers from saturated fat, but it did confirm the link between trans fats and heart disease; however these findings should not be used as a green light to eat more butter and other foods rich in saturated fat.[4] Most importantly, you should not lose sight of the bigger picture, which is the part all fats play in your total diet. Moderation is the key—making choices that consider your whole diet will help you stay in line with heart-healthy recommendations.

1 Clifton P. Lowering cholesterol—a review on the role of plant sterols. *Aust Fam Physician*. 2009;38(4):218–221.

2 Maki KC, Lawless AL, Reeves MS, Dicklin MR, Jenks BH, Shneyvas E, Brooks JR. Lipid-altering effects of a dietary supplement tablet containing free plant sterols and stanols in men and women with primary hypercholesterolaemia: A randomized, placebo-controlled crossover trial. *Int J Food Sci Nutr*. 2012 Jun; 63(4):476-82.

3 Doggrell SA. Lowering LDL cholesterol with margarine containing plant stanol/sterol esters: Is it still relevant in 2011? *Complement Ther Med*. 2011;19(1):37–46.

4 Chowdhury R, Warnakula S, Kunutsor S, et al. Association of dietary, circulating, and supplement fatty acids with coronary risk: A systematic review and meta-analysis. *Ann Intern Med*. 2014;160(6):398–406. doi: 10.7326/M13-1788.

Cholesterol Synthesis

Because your body can make cholesterol, you do not need cholesterol in your diet. Although researchers believe that all cells synthesize at least some cholesterol, the liver is the primary cholesterol-manufacturing site, and the intestines contribute appreciable amounts. In fact, your body produces approximately 1,000 milligrams of cholesterol per day, far more than is found in the average diet. This production level attests to cholesterol's biological importance. In the lens of the eye, which has a high concentration of cholesterol, on-site cholesterol synthesis may be essential for preventing cataracts.[11] Animal studies suggest that the brain makes almost all the cholesterol incorporated into it during development.[12]