



HOME ECONOMICS

Virginia Cooperative Extension Service

VIRGINIA TECH AND VIRGINIA STATE • VIRGINIA'S LAND GRANT UNIVERSITIES

Publication 348-909

Reprinted January 1987

Cholesterol in the Diet

Ann A. Hertzler

Extension Specialist, Nutrition and Foods

Cholesterol was detected in the early 1800's by scientists studying gallstones. It was called biliary fat because it was found in gallstones and because like fat, cholesterol is not soluble in water.

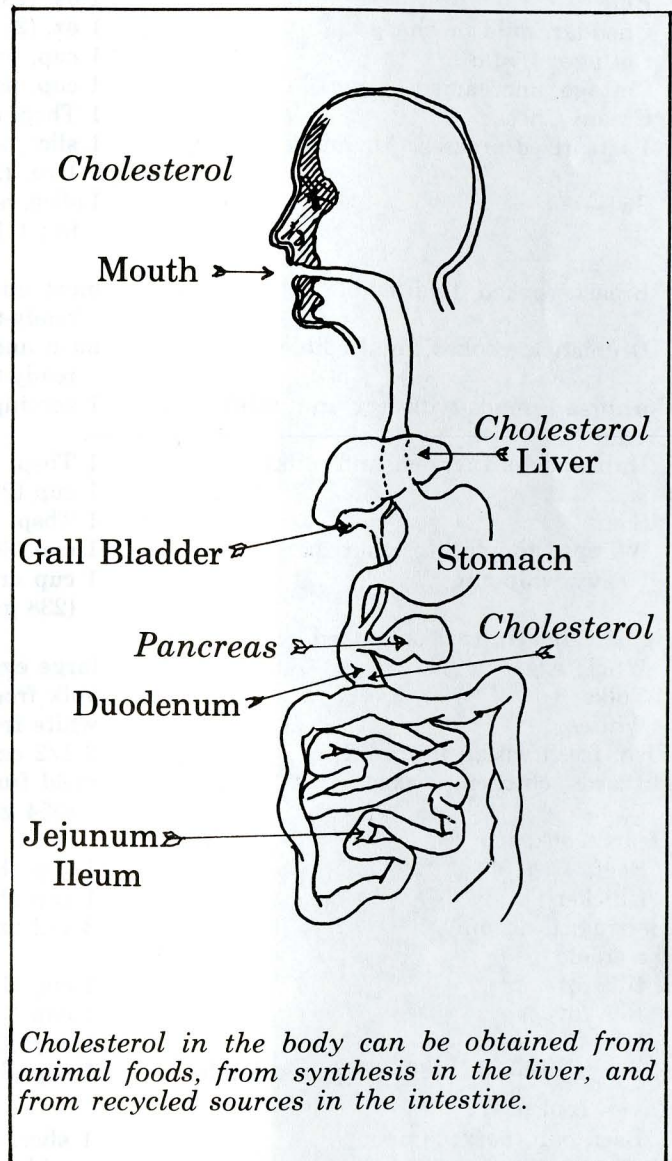
Eventually cholesterol was also reported to be part of the brain and other organs and to be present in egg yolk and milk. By the middle and late 1800's compounds (sterols) similar to but different from cholesterol were discovered in plants. Some time passed before the question of the nutritional role of cholesterol was studied.

Absorption and Utilization

Cholesterol in the intestinal tract accumulates from food that one eats, from gallbladder bile, and from old cells worn off from the intestinal lining. Since cholesterol is insoluble in water, it must be mixed with bile in order to pass into the body circulation. Compounds in plants that are in the same family as cholesterol are not readily taken up by the intestinal cells.

From the intestinal cells most of the cholesterol travels to the liver. When dietary cholesterol is low, the liver synthesizes or makes a greater amount of cholesterol. The body makes between 1000 and 2000 milligrams (1 to 2 grams) of cholesterol each day. The liver can also break down cholesterol.

The level of dietary calories can influence serum cholesterol levels because the body can convert extra protein, fat, and carbohydrate into cholesterol. Therefore, keeping food calories balanced to meet energy needs and for maintenance of normal body weight will help to maintain normal cholesterol levels in the body. Other factors which can reduce serum cholesterol levels for some people are lowered cholesterol intakes and increased consumption of polyunsaturated fatty acids.



Cholesterol and Food

FOOD	HOUSEHOLD MEASURE	CHOLESTEROL (mgs)
Brownies with nuts, baked from home recipe	1 serving, 1 3/4 x 1 3/4 x 7/8 in. (20 gm.)	17
Butter, regular (4 sticks/lb.)	1 Tbsp. or 1/8 stick (14 gm.)	35
Butter, whipped (6 sticks or 2.8 oz. containers/lb.)	1 Tbsp. or 1/8 stick (9 gm.)	22
Buttermilk, fluid, cultured, made from nonfat fluid milk	1 cup (245 gm.)	5
Cakes:		
Chocolate (devil's food) or yellow 2 layer, with chocolate frosting	1/16 of 9 in. diam. cake (75 gm)	32
Sponge	1/12 of 10 in. diam. cake (66 gm.)	162
Angel Food	1/12 of 10 in. diam. cake (53 gm.)	0
White, 2 layer, made with egg whites, water, and chocolate frosting	1/16 of 9 in. diam. cake (71 gm.)	1
Cheese:		
Blue	1 oz. (28 gm.)	24
Cheddar, mild or sharp	1 oz. (28 gm.)	28
Cottage, 4% fat	1 cup, packed (245 gm.)	48
Cottage, uncreamed	1 cup, packed (200 gm.)	13
Cream Cheese	1 Tbsp. (14 gm.)	16
Pasteurized process, American	1 slice, approx. 3 1/2 x 3 3/8 x 1/8 in.; 1 oz. (28 gm.)	25
Swiss	1 slice, rectangular, approx. 7 1/2 x 4 x 1/16 in.; 1 1/4 oz. (35 gm.)	35
Chicken:		
Breast, cooked, total edible	meat and skin from 1/2 breast (from 3 lb. ready-to-cook chicken, raw) (92 gm.)	74
Drumstick, cooked, total edible	meat and skin from 1 drumstick (from 3 lb. ready-to-cook chicken, raw) (52 gm.)	47
Cornbread (made with egg and milk)	1 serving, 2 3/8 in. in diam. (40 gm.)	28
Cream:		
Half and half (cream and milk)	1 Tbsp. (15 gm.)	6
	1 cup (242 gm.)	105
Sour	1 Tbsp. (12 gm.)	8
Whipped topping (pressurized)	1 cup (60 gm.)	51
Heavy whipping	1 cup unwhipped, or 2 cups whipped (238 gm.)	316
Eggs, Chicken, raw or cooked		
Whole egg	large egg (50 gm.)	252
Yolks	yolk from large egg (17 gm.)	252
Whites	white from large egg	0
Fish, fresh water, flesh only	3 1/2 oz. serving (100 mg.)	60
Gizzards, chicken, cooked	yield from 1 lb. raw, approx. 12 1/2 oz. (354 gm.)	690
Heart: cooked		
Beef	1 cup chopped or diced pieces (145 gm.)	398
Chicken	1 cup chopped or diced pieces (145 gm)	335
Herring, flesh only	3 1/2 oz. serving (100 gm.)	85
Ice cream,		
10% fat	1 cup (133 gm.)	53
16% fat	1 cup (148 gm.)	85
Ice Milk	1 cup (131 gm.)	26
Kidneys, cooked (beef, calf, pork, lamb)	1 cup sliced pieces (140 gm.)	1,125
Liver: cooked		
Beef, calf, pork, lamb	1 slice, approx. 6 1/2 in. long, 2 3/8 in. wide, 3/8 in. thick; wt. 3 Oz. (85 gm.)	372
Chicken	approx. 2 in. long, 2 in. wide, 5/8 in. thick (25 gm.)	187
Mackerel, flesh only	3 1/2 oz. serving (100 gm.)	95
Margarine:		
All vegetable fat	any size	0
2/3 animal fat, 1/3 vegetable fat	1 Tbsp. or 1/8 stick (14 gm.)	7

Milk, fluid:		
Whole	1 cup (244 gm.)	34
Nonfat (skim)	1 cup (245 gm.)	5
Dry, nonfat instant	1 1/3 cup (makes 1 qt.) (120 gm.)	20
Meat, cooked, bone removed (beef, lamb, pork, rabbit, veal)	1 serving approx. 4 1/8 in. long, 2 1/4 in. wide, 1/2 in. thick; or patty, approx. 3 in. diam., 5/8 in. thick; wt. 3 oz. (85 gm.)	80
Muffins, plain	1 muffin, approx. 3 in. diam. (40 gm.)	21
Noodles, dry form (whole egg)	package, net wt., 8 oz. (227 gm.)	213
Pie: baked		
Apple or Peach	crust made with vegetable fat	0
Lemon chiffon	1/8 of 9 in. diam. pie (81 gm.)	137
Lemon Meringue	1/8 of 9 in. diam. pie (105 gm.)	98
Salad Dressings		
Mayonnaise, commercial	1 Tbsp. (14 gm.)	10
Cooked, made from home recipe	1 Tbsp. (16 gm.)	12
Salmon: sockeye or red		
Cooked, broiled with vegetable shortening, steak	1 serving approx. 6 3/4 in. long, 2 1/2 in. wide, 1 in. thick; refuse; bone 12% (145 gm.)	59
Canned, solids and liquid	No. 1 tall can, net wt. 16 oz. (454 gm.)	159
Sausage, frankfurter, all meat	1 frank, 8/lb. (56 gm.)	34
Shellfish (clams, lobster, oysters)	1 cup meat only, no refuse	120
Shrimp, canned, drained solids	1 cup (approx. 22 large or 76 small) (128 gm.)	192
Sweetbreads (thymus), cooked	3 oz. (85 gm.)	396
Tapioca cream pudding	1 cup (165 gm.)	159
Tuna:		
Canned in oil, drained solids	Chunk style; drained wt. 5 1/2 oz. (157 gm.)	102
Canned in water, solids and liquid	Chunk style; net wt. 6 1/2 oz. (184 gm.)	116
Turkey, light meat without skin, cooked	2 pieces approx. 4 in. long, 2 in. wide, 1/4 in. thick; wt. 3 oz. (85 gm.)	65
White Sauce (thin, medium, or thick)	1 cup (250 gm.)	36
Yogurt, fluid and nonfat dry milk,		
Plain or vanilla	8 oz. carton (227 gm.)	17
Fruit-flavored (all kinds)	8 oz. carton (277 gm.)	15

FROM CHOLESTEROL CONTENT OF FOOD: J. Am. Dietet. Assn., 61: 135-148, 1972

Body Function

Cholesterol is used by the body in important functions. It is present in practically all tissue cells. Highest concentrations occur in the liver, the adrenal glands, the brain, and the nerves. It is used for the synthesis of sex hormones (estrogens, androgens, and progesterone); it helps transport certain dietary fats that the body needs for good health; it is a part of the skin; it is a part of the covering of nerve fibers; and it is converted by the body with the ultraviolet light of sunshine into Vitamin D.

Normal adult serum cholesterol values range between 150 to 250 milligrams in 100 milliliters. Some investigators feel that it is desirable to keep cholesterol levels below 200 milligrams.

Atherosclerosis

Much emphasis has been placed on cholesterol because it has been used as a measure to reflect fat build up in the blood stream. Atherosclerosis is a common disease of the blood vessels. Plaques or deposits build up on the inside of blood vessels causing them to grow narrower and changing the patterns of blood flow. A clot can close the vessel causing a heart attack or a stroke.

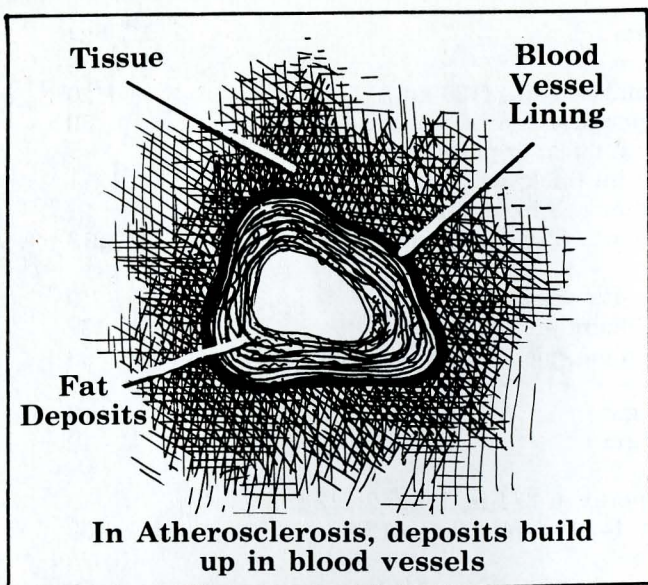
Many investigators feel that obesity, cigarette smoking, inactivity, and diets high in saturated fats (triglycerides) and cholesterol are associated with atherosclerosis. However, some scientists

point out that many people have these characteristics without having a heart attack or a stroke.

Another explanation is that stress seems to be the greatest influence on elevating serum cholesterol values and the likelihood of a heart attack. Brief stress that occasionally arises can temporarily raise serum cholesterol. Such common stresses might be interviewing for a job, taking a test, or going to the doctor or dentist. However, long periods of stress developed over years seem to be associated with heart disease. The stress can be from competition for advancement and recognition in a highly mechanized environment. This behavioral stress is often associated with particular personality traits such as aggressiveness, haste, impatience, restlessness, and the inability to relax. Atherosclerosis is a problem found far more in the United States than in countries with a slower pace of living.

Cholesterol in Food

Cholesterol is found only in animal foods. Consequently, foods such as chocolate, olive oil, coconut oil, and peanut butter do not contain cholesterol. (Of these, peanut butter is the only one that contains much polyunsaturated fatty acids). Although fruits, vegetables, and grains do not contain cholesterol, they are frequently prepared with animal products such as animal fat (butter, bacon, lard) or other animal products



The normal artery has room for blood to flow normally. In atherosclerosis the deposits on the vessel walls narrow the passage.

such as milk.

The muscle portion (i.e. the lean) of meat contains cholesterol. Current research does not support the view that there is more cholesterol in fat or marbling of meat than in the muscle. Organ and glandular meats such as liver, heart, brains, kidneys, and sweetbreads contain more cholesterol than regular cuts of meat.

In chicken, both dark and light meat seem to have about the same amount of cholesterol.

Shell fish have moderate levels of cholesterol.

Egg yolk contains a large amount of cholesterol. Therefore, any product made with egg yolk (chiffon desserts, egg noodles, and custards) will have similar amounts of cholesterol. On the other hand, egg white does not contain cholesterol. Recipes using only egg whites (angel food cake, white cake, macaroons) will contain only the cholesterol provided by animal shortenings.

Dairy products such as whole milk, cream, butter, cheese and ice cream contain lesser amounts of cholesterol than organ meats. Removing the fat from milk reduces its cholesterol content. Much research is needed the cholesterol content of new dairy products appearing on the market.

Commercial scrambled egg substitutes use egg whites as the base. Batters for fried foods (fried oysters, french toast) could be made with just egg white and no yolk. Test your cake and cookie recipes by using egg substitutes or egg whites in place of the egg yolk. Methods and techniques will influence your success. (A four egg cake

would have 1000 mg cholesterol from the egg yolks. If cut into 12 pieces, each piece would have about 85 milligrams of cholesterol.)

In Cakes, Cookies, Pies, substitute margarine or vegetable shortening for butter or animal shortening.

Substituting Vegetable Fats for Animal Fats in Batters and Baked Goods

mg cholesterol

1 Tbsp. butter	= 35
1 Tbsp. margarine	= 0
1 Tbsp. vegetable oil	= 0
1 cup vegetable oil	= 1-1/4 cup margarine
1 Tbsp. vegetable oil	= 1-1/4 Tbsp. margarine
1 cup margarine	= 3/4 cup oil
1 Tbsp. margarine or butter	= 3/4 Tbsp. oil

A serving of liver, heart, brains, kidney or sweet breads has about 300 milligrams or more of cholesterol while a serving of meat has 80 to 100 milligrams. Because of the rich supply of nutrients in liver, do not eliminate it completely. Luncheon meats may include organ meats. Check the list of ingredients on the package or write to companies to ask the cholesterol content per serving of their product. Legumes, dried peas, beans and nuts are excellent choices because they are vegetables and thus do not contain cholesterol. However, check recipes for other ingredients.

Eating Out

Usually, the patron does not know what is in the food mixtures. The restaurant people may not know because many items are prepared elsewhere.

Avoid:

1. Fried Foods: eggs may be used in batters and animal fat may be used for frying such as deep fried fish and meat, deep fried vegetables, doughnuts and croquettes.
2. Quick Breads such as waffles which may have a high egg content.
3. Omelettes and Egg Base Casseroles
4. Custards, Cakes, Pies with Egg Base
5. Fast Foods: Figure your cholesterol restrictions and make choices. Ask the fast food restaurant for a copy of their nutritive value of foods or use food tables to estimate.

Virginia Cooperative Extension Service programs, activities, and employment opportunities are available to all people regardless of race, color, religion, sex, age, national origin, handicap, or political affiliation. An equal opportunity/affirmative action employer.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, and September 30, 1977, in cooperation with the U.S. Department of Agriculture. Mitchell R. Geasler, Director, Virginia Cooperative Extension Service, and Vice Provost for Extension, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061; Clinton V. Turner, Administrator, 1890 Extension Program, Virginia State University, Petersburg, Virginia 23803.