

Dietary Fats and Oils

Our Health and Temperance subject today is “Dietary Fats and Oils”—a continuation of the previous subject on cholesterol.

As my source material I am again using three articles written by Doctor Milton G. Crane including “The Role of Cholesterol and Excess Fat in Disease.” He is a well respected medical doctor with credentials that include emeritus professor of medicine at the Loma Linda University school of medicine, medical director of Weimar Institute from 1982 through 1987, and the director of medical research of Weimar’s NEWSTART Lifestyle Center.

One hundred fifty years ago anesthetics were not used. The nursing profession as we know it, did not exist. One hundred years ago doctors did not use masks or rubber gloves during surgery. Pneumonia, influenza, gastroenteritis (gas’ trō-en’ ta-rī’ tis), tuberculosis, and other infections, caused over half the deaths, and these would be considered preventable deaths with our present medical capabilities. The use of antibiotics, vaccines, and the advent of scientific medicine has reshaped the entire health world. And now we can see what the consequences are of our faulty life style. In our time, we suffer from preventable diseases of a different order. We suffer premature deaths from heart attacks, strokes, high blood pressure, and cancer. In addition to these, many more of our non-fatal medical ailments can be traced to a faulty diet and a sedentary life style. Ailments, such as degenerative arthritis, herniated discs, hemorrhoids, diverticulosis of the colon, may cause discomfort and pain, but they are not serious enough to cause death.

Of the dietary factors that cause these degenerative diseases, we can name two that are the main culprits—animal products and refined foods. Most animal products such as flesh foods, milk, and eggs are high in fat, contain variable quantities of cholesterol, are low in carbohydrate, and have no fiber. This is just the opposite of the contents of plant products. Most nutritionists have no trouble recognizing the deleterious effects of refined sugar and refined cereals on our health. For many of them, though, this concern against empty calories does not seem to extend to the refined fats such as oil, margarine, and shortening. But let us look at the potential role of excess fat in disease states and try to fathom how the harm is done.

Oil that we usually get in the diet comes in different chain lengths. There may be 12, 14, 16, 18, or 20 carbon atoms in the chain hooked together with a single or a double bond between them. Two oxygen atoms are linked on one end. Wherever there is a single bond between the carbons, there are two hydrogens also hooked up directly opposite from each other. These are generally understood and not shown.

Wherever there is a double bond, only one hydrogen is hooked on to the carbon. When there is only one hydrogen present with a double bond between the carbons, the chain takes a 60-degree turn at each of the two carbons. If the hydrogen atoms project in the same direction from the carbons at the double bond, this is called a “cis” arrangement from the Latin “this side of” and it causes a 120 degree “U”-shaped turn in the chain.

If the hydrogen atoms project in the opposite directions, they make a jagged “Z”-shaped offset in the chain called a “TRANS” arrangement from the Latin, “the other side.” These sizes and shapes are important because the cells look for certain shaped fatty acids when they want building blocks for cell membranes or for raw materials to make some very important chemical for the body.

There are four families of chemicals that the body makes from fats: (prow·sta·glan·dinz) prostaglandins, (thrām·bāk·sāns) thromboxanes, (loo·kuh·traī·eenz) leukotrienes and hydroxy-fats. The fatty acids that have no double bonds have straight chains. These are called “saturated fats” because there is no further room for hydrogen to be attached onto the carbon chain.

This chemistry is a bit deep, but it is very important. What the body is looking for is an essential fatty acid which has two or three double bonds in the cis arrangement with the double bonds located at precise locations 3=4 and 6=7, or 3=4, 6=7, and 9=10 carbons from the methyl end. With these fats, the body chemistry can make a set of (prow-sta-glan-dinz) prostaglandins and (thräm-bäk-sāns) thromboxanes that cause the arteries to relax and dilate and produce platelets that have just the right stickiness.

If the first of the three double bonds is located six spaces from the methyl end of the chain, the body chemistry makes a set of chemicals that cause the arteries to constrict and platelets which are too sticky. These cause the blood to clot too easily.

Fats as we eat them come as triglycerides with three fatty acids connected by glycerine. There are some fatty acids that cannot be made by the body. These are called "essential fats." The body doesn't need very much of these good essential fats. It can obtain all that it needs from a diet which has 10% of calories from fat—provided that the fat all comes from natural plant sources. In the natural plants all the fats are of the "cis" shape.

There are two sources of the "trans" shaped fats. These are the refined oils, margarines, shortening and the fat of ruminant animals. Bacteria in the stomach of animals such as the cow converts about 10% of their food fat into the Z-shaped trans fats.

In order to make a solid fat out of liquid oil, manufacturers subject the oils to a process called partial hydrogenation. The oil is extracted under high temperature and pressure, and the remaining fraction of oil is removed with hexane solvents.

Manufacturers then steam clean the oils, a process that removes all the vitamins and all the antioxidants—but, of course, the solvents and the pesticides remain.

These oils are mixed with a nickel catalyst and then, under high temperature and pressure, they are flooded with hydrogen gas. What goes into the reactor is a liquid oil; what comes out of that reactor is a smelly mass resembling grey cottage cheese.

Emulsifiers are mixed in to smooth out the lumps, and the oil is then steam cleaned once more, to get rid of the horrible smell.

The next step is bleaching, to get rid of the grey color. At this point, the product can be called "pure vegetable shortening."

To make margarines and spreads, artificial flavors and synthetic vitamins are added. But the government does not allow the industry to add synthetic color to margarine—they must add a natural color, such as annatto—a comforting thought.

The margarine or spread is then packaged in blocks and tubs and advertised as a health food. It is then labeled "pure oil." How true that is! It is free of protein, starch, fiber, and most vitamins and minerals.

Sizes and shapes are important. In the building of a stone house, the mason selects stones of a certain size and shape. Similarly, when a cell in the body is looking for fat, it is looking for one with of a certain size and shape for a certain function. In the fat molecule, it is the number of double bonds and their location that determines their shape. If there are a lot of bizarre manufactured fats or trans fats in the way, the cells may settle for one that is not its first choice and use it for the job at hand.

If we eat too much of what we call saturated fats, those without double bonds, or too much of the bent-out-of-shape trans fats, then the cell walls will be too stiff. If we have more cholesterol in the cell wall because of a high body cholesterol, that also will make the cell wall stiff. Cells with stiff walls cannot work properly. They are subject to easy attack by viruses and germs. The person is more apt to get cancer and other problems.

Our next Health and Temperance topic is to be "Herbs and Spices."