Cholesterol

Our Health and Temperance topic today is cholesterol and also addressing statins—the modern chemical drug method of reducing high cholesterol.

As my source material I am 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, 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.

Chemists say that cholesterol is a (fuh·nan·threen) phenanthrene ring of carbon with some hydrogen and oxygen atoms. As one young student described it, it is (dī·hī·drŏxē) dihydroxy, dimethyl chicken wire—as we can see from its shape. In its natural state it is a white, crystalline substance that, under magnification, looks like broken panes of glass. But, in the blood plasma, it is a waxy substance and is present in all animal tissue.

When Do We Need Cholesterol?

When we put fat in the mouth, a signal from inside the mouth or stomach tells the liver, "Hey, here comes some greasy, oily stuff. Get ready; make some soap." The liver takes a two carbon atoms complex called "acetate" and makes the entire chemical ring of cholesterol. In fact, as you are reading this your liver is making 50 quintillion molecules of cholesterol per second. That is 50 with 15 zeros behind it. Statin drugs reduce the amount of cholesterol made by the liver even though the digestion process continues to need it. About 70% of this cholesterol is converted into bile salts which are the emulsifying agents. These go down the bile duct into the small bowel.

What use is cholesterol?

The primary bile acids are derived from cholesterol in the liver. The secondary bile acids are further modified by bacteria in the intestine. They play an important role in the digestion and absorption of fat by breaking the globules of fat that we eat into fat droplets that are small

enough to digest. This process is called “emulsification.” It is similar to the role that a detergent plays in disrupting the surface tension of water and oils as we wash dishes after a meal.

Remember that, when cholesterol is in suspension in the liquid blood plasma, it is a sticky substance. This is not a problem if the cholesterol molecules are traveling down the “middle of the stream.” But, when there are more cholesterol molecules, the cholesterol molecules bounce off each other and occasionally stick to the walls of the blood vessels.

As we follow the digestion of the food from the stomach down the digestive tract, we notice that all of the fat has to be emulsified to keep it out of the way so that the enzymes can digest the protein and starch as well as get at the fat itself to digest it. But, when using statins to reduce the cholesterol produced by the liver, this digestion of protein, starch and fat is restricted. As the emulsified fat moves along the intestines, it is normally disassembled into its components of fatty acids and glycerol. These are absorbed by the intestinal wall and reconstructed into little balls of fat called chylomicrons (kai·low·mai·krănz).

These enter the circulation and make their way in the blood to the liver. There the big ones, the chylomicrons (kai·low·mai·krănz), are screened out and made into small balls called low density lipoprotein (li·puh·prow·teen) (LDL) particles. These consist of triglycerides, cholesterol, phospholipids (faa·sfuh·li·puhdz), and protein, designed in such a way that the cells can use them for their protein, fat, and lecithin needs. These float along in the blood stream until the cells of the hard working arteries need them for nutrition.

Every time the pulse wave comes down from the heart, the artery dilates under the pressure. It must then contract down by muscle power and elastic recoil to its original size. The muscle and elastic cells deeper in the artery wall surrounding the artery send signals to the <TAP> endothelial (en·dōh·thee·lee·uh) cells which line the inside of the artery when they need some LDL or VLDL to eat. These endothelial (en·dōh·thee·lee·uh) lining cells open a hole and let some of this LDL food go through the artery wall to the deeper cells.

The muscle cells and elastic cells in the artery wall eat the LDL particles by engulfing them. They use up the protein, the phospholipid (faa·sfuh·li·puhd), and the triglyceride. Guess what is left over! You are right, cholesterol.

Far too many LDL particles may get into the cells if the blood pressure is too high, or if the concentration of LDL particles is too high in the blood, or if tobacco poisons get down to the artery lining and paralyze the endothelial (en·dōh·thee·lee·uh) cells. Cholesterol accumulates in the muscle and elastic cells of the arteries. As it accumulates, it forms little crystals. These little crystals are very irritating to the cells. With each pulse wave, they are bent a little on the inside of the cells. All the evidence indicates that they have piezoelectric properties—like a static voltage shock. This is irritating, and the cells become sick from these sharp little grains–of–sand cholesterol crystals in the cells.

Some of the cells may swell up, sicken, and die. They form a boil–like lesion on the inside of the artery as shown in the picture. Some cells respond by putting up a wall of firm fibrous tissue and even calcium around the irritating little crystals. It has been shown that if animals are fed peanut oil with cholesterol, they develop fibrosis of the artery wall. The artery wall gets thicker and stiffer.

On the other hand, if animals are fed coconut oil with the cholesterol, they developed (ath·er·ō·maz) atheromas, the boil–like lesions on the inside of the arteries.

The good news is that this extra cholesterol can be removed. HDL is a high density lipoprotein (li·puh·prow·teen) particle which goes to the cell, hooks onto the cholesterol, and takes it back to the liver. After the liver releases the cholesterol from the HDL particle, the cholesterol goes out into the bile canals to the small intestines. Exercise is the prime factor to raise HDL levels in the blood.

How does this extra cholesterol that is dumped in the intestines get out of the body? It rides out of the colon on plant fiber and sterols (naturally occurring unsaturated steroid alcohols, typically waxy solids). The cholesterol molecule, the phenanthrene (fuh·nan·threen) ring, cannot be broken down by the body, it has to be eliminated by the gut. If we eat a high fat diet, a low fiber diet, or a low plant sterol diet, far too much of the cholesterol will be reabsorbed by the small intestines into the blood stream.

In conclusion, to prevent or repair damage from the cholesterol molecule, (1) avoid fats—even fats made from plant oils, (2) increase plant foods, and (3) exercise. Our next topic is dietary fats and oils.