

## ANTIOXIDANTS POSITIVELY AFFECT CHOLESTEROL LEVELS

### BLUEBERRIES AFFECTS CHOLESTEROL

Packed with antioxidant phyto-nutrients called anthocyanins, blueberries neutralize free radical damage done to the collagen matrix of cells and tissues—unchecked, this damage can lead to cataracts, glaucoma, varicose veins, hemorrhoids, peptic ulcers, heart disease and cancer. Anthocyanins, the blue-red pigment found in blueberries, improve the integrity of support structures in the veins and the entire vascular system. Anthocyanins have been shown to enhance the effects of vitamin C, improve capillary integrity, and stabilize the collagen matrix (the ground substance of all body tissues). They work their protective magic by preventing free-radical damage, inhibiting enzymes from clinging to the collagen matrix, and directly cross-linking with collagen fibers to form a stable collagen matrix.

While wine, particularly red wine, is touted as a cardio-protective substance (a good source of antioxidant anthocyanins), a recent study found that blueberries deliver 38% more of these free radical fighters than red wine. In this study, published in the August 2003 issue of the *Journal of Agriculture and Food Chemistry*, researchers found that a moderate drink (about 4 ounces) of white wine contained .47 mmol of free radical absorbing antioxidants. Red wine provided 2.04 mmol, and a wine made from high-bush blueberries delivered 2.42 mmol of these protective plant compounds. (October 1, 2003)



Pterostilbene, (pronounced TARE-oh-STILL-bean), a powerful antioxidant compound found in blueberries—already known to fight cancer—may also help lower cholesterol.

In a study using rat liver cells, scientists at the USDA Agricultural Research Service compared the cholesterol-lowering effects of pterostilbene to those of ciprofibrate (a lipid-lowering drug) and to those of resveratrol. Resveratrol is an antioxidant found in grapes that has a chemical structure similar to pterostilbene, and has been shown to help fight cancer and heart disease.

The USDA based their comparison on each compound's capacity to activate PPAR-alpha (short for peroxisome proliferator-activated receptor alpha). The PPARs are a family of receptors on cells all throughout the body that are involved in the absorption of compounds into cells for use in energy production. PPAR-alpha is crucial for the metabolism of lipids, including cholesterol. Pterostilbene was as effective as ciprofibrate and outperformed resveratrol in activating PPAR-alpha (January 14, 2005). The take-away message: Turn up your cholesterol burning machinery by eating more blueberries, grapes and cranberries.

## DARK CHOCOLATE AFFECTS CHOLESTEROL

In addition to powerful anthocyanins, blueberries contain another antioxidant compound called ellagic acid. Ellagic acid blocks metabolic pathways that can lead to cancer. In a study of 1,271 elderly people in New Jersey, subjects who ate the most strawberries (another berry that contains ellagic acid) were three times less likely to develop cancer than those who ate few or no strawberries. In addition to containing ellagic acid, blueberries are high in the soluble fiber pectin, which has been shown to lower cholesterol and to prevent bile acid from being transformed into a potentially cancer-causing form.

Believe it or not, dark chocolate can be one of the healthiest foods you will ever eat. The key is that it must be processed correctly to be beneficial.

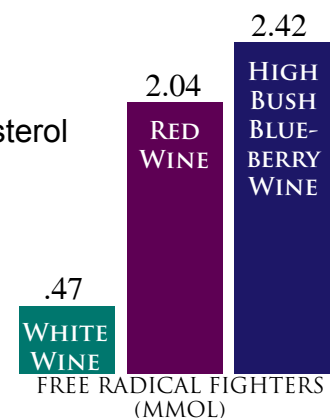
Even though we are taught that saturated fats are harmful to the cardiovascular system, the saturated stearic acid fat from the cocoa bean does not elevate blood cholesterol like other saturated fatty acids. Fat from cocoa butter is not absorbed well by the intestinal tract, and is considered “neutral” in terms of its effect on weight gain and impact on cholesterol. Research shows that these cacao fatty acids may modify LDL-C, making it more resistant to oxidation.

The cocoa bean also contains some insoluble and soluble fiber, which contributed to lower cholesterol levels. Fiber is extremely beneficial in lowering colon cancer rates, improving sugar metabolism and preventing constipation.

Cocoa can stop the oxidation of the LDL-C cholesterol as discussed previously, resulting in reduced cardiovascular damage. Cocoa flavonoids can also increase the production of good cholesterol (HDL), which mops up the harmful fats from the blood vessels. Cocoa flavonoids discourage platelets from forming harmful clots and damaging heart muscle blood vessels. The flavonoids in cocoa help the blood vessels dilate more easily, allowing more blood flow to the heart (nitric oxide (NO) activation). This same principle is applicable to insulin-stimulated blood sugar uptake, resulting in improved diabetic control. Cocoa has been found to have anti-inflammatory properties, stopping the inflammatory process (cytokines) from damaging the body.

Cocoa flavanols also protect the blood vessels by reducing the damage done by oxidized LDL (bad) cholesterol. Basically, flavanols prevent LDL cholesterol from becoming oxidized.

A group from Johns Hopkins found that after two weeks of taking highly flavanol-enriched cocoa, subjects experienced LDL level decreases of 6%, while HDL (good) cholesterol rose by 9%.



## DARK CHOCOLATE AFFECTS LDL AND HDL

## JOHN HOPKINS STUDY

Another cholesterol factor important to examine is the production of Apo A-1 protein. Apo A-1 protein, a good cholesterol marker, helps clear cholesterol from arteries.

The University of Utah study found that unprocessed cocoa powder significantly increased the amount of Apo A-1 in the body. They also found that the cocoa flavanols increased the good cholesterol antioxidant (PON-paraoxanase), which is an HDL-associated enzyme that confers antioxidant activity on HDL-C, and also helps protect against atherosclerosis.

Interestingly, the University of Utah also discovered that cocoa flavanols increased lean body mass, which helps the body burn more calories and increases the function of muscles, bones, brain, liver and kidneys. The university researchers also found that flavanols increased adiponectin—a protein hormone that regulates blood sugar, breaks down fat, and suppresses the development of diabetes, obesity, atherosclerosis, and non-alcoholic fatty liver disease.

### Atherosclerosis

