

Purple Power

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When I drink a glass of Concord grape juice, I really don't think about the concentration of anthocyanins or the antioxidant capacity in my glass of purple liquid. I just like the taste. However, when I meet new people and promote New York grape juice (as I know you all do) I tell them that Concord juice tastes good and is good for you. Most of the time, my new acquaintance simply smiles and nods and avoids a detailed discussion with an overzealous viticulturist. Other times, I am challenged about my healthful comments promoting Concord juice. I am asked: Why is grape juice healthy? I thought free radicals were party in Washington, DC. What does the color purple in grapes have to do with preventing a heart attack? You may have been asked similar questions at one time so I decided to dust off my plant physiology and biochemistry textbooks to compose some answers.

The Bad Guys: Free Radicals

Although free radicals sound like they are something from out of a sci-fi movie, they are quite common in biological systems – including your own body. Free radicals are atoms or molecules that have at least one unpaired electron, which make them very reactive with other molecules. In some respects free radicals can be good in energy producing reactions and in killing harmful bacteria. In other respects free radicals can be bad because they react with and break down the good molecules in your body; such as, DNA, proteins, enzymes, and lipids. The attack of free radicals is called oxidative stress and can cause cells to lose both structure and function.

So where do free radicals come from? Free radicals are products of normal cellular oxidative metabolism. As you may remember from high school biology and chemistry, oxygen plays a role in receiving or donating electrons in oxidation/reduction reactions. In biological systems, molecules such as peroxy radicals, hydroxyl radicals, and superoxide radicals contain oxygen with an extra electron that is highly reactive with other molecules. Your body naturally tries to repair the tissues damaged by free radicals but if the free radicals go unchecked they may cause more permanent damage leading to health problems: heart disease, cancer, and accelerated aging.

The Good Guys: Antioxidants

The American Heart Association says that a great way to keep free radicals in check is to eat a balanced diet with an emphasis on antioxidant-rich fruits and vegetables and whole grains. An antioxidant is a substance that will react with free radicals at relatively low concentrations before the free radicals have a chance to react with other substrates – such as your cell components. Vitamin E, vitamin C, beta-carotene (a precursor to vitamin A), and other flavonoids usually top the list for antioxidants in the diet.

Why do plants have all the good stuff? Plants absorb energy from the sun and convert it into stored chemical energy by photosynthesis. Then they break down that stored chemical energy through respiration to grow and reproduce. Plants have been called the chemical workbench of biology and with all that energy and chemical reactions going on there are bound to be free radicals that plants need to deal with.

For example, at the start of photosynthesis, chlorophyll absorbs light energy from the sun and enters an 'excited' state. If the excited state of chlorophyll is not transferred to the next step in photosynthesis, a singlet oxygen (or free radical) is formed. This free radical can damage chlorophyll and shut down photosynthesis. Luckily, all photosynthetic organisms, including Concord, contain accessory pigments called carotenoids that act as photoprotectants by accepting the excess energy from chlorophyll and preventing free radicals from forming. The most famous carotenoid is beta-carotene, the pigment that makes up the orange color of carrots.

In addition to carotenoids, Concord grapes produce a set of flavonoid compounds called anthocyanins that are potent antioxidants. Anthocyanins are very popular with you and me because they make up the red, pink, purple, and blue colors of plant parts – including grape berries. Besides making Concord grape juice purple, the more than 30 different types of anthocyanins found in Concord grape juice scavenge free radicals in plant tissue and in our organs before the free radicals can cause damage.

According to a USDA antioxidant analysis called oxygen radical absorbance capacity (ORAC), Concord grape juice ranks very high for antioxidant capacity. As you might expect based on color, blueberry and blackberry fruit had higher ORAC scores than Concord fruit but Concord juice surpassed all other juices, including red wine.

Can Concord grape juice really prevent a heart attack?

Your blood vessels are lined by a thin layer of cells, called the endothelium, which exchanges nutrients in the blood with the rest of the body. If healthy, the endothelium is smooth and facilitates the unobstructed flow of blood through your body. The chronic punishment of the endothelium by free radicals allows plaques to form on arterial walls and in time will restrict blood flow, a condition known as atherosclerosis. As atherosclerosis progresses, arteries become more and more clogged by plaque, and the threat of heart attack and stroke becomes much greater. A diet rich in antioxidants, such as one with daily consumption of Concord grape juice, can help slow down the punishment of your endothelial cells by free radicals.

Is Concord the wonder drink? As with everything else in biology, there are no magic bullets. Concord grape juice will not reverse the negative effects of genetics, hypertension, smoking, lack of exercise, or a fatty diet on vascular disease. However, in conjunction with a healthy diet and moderate exercise, Concord grape juice can help safeguard your heart in three ways: It reduces the oxidation of LDL cholesterol, it improves elasticity of the arteries, and it reduces platelet clumping.

In addition to blocking the attack of free radicals on vascular tissue, anthocyanins may help prevent some forms of cancer by keeping free radicals from damaging DNA and may reverse some aspects of aging by protecting brain cells. There is much more to your Concord grapevines than just good tasting juice. So tell the people you meet about the delicious and healthy product that you produce and when they ask you about the health benefits of Concord juice, dazzle them with your knowledge of purple power.