The Wholesomeness of Fruits and Vegetables

The Flavonoid Complex
Water Soluble Super-Antioxidants

Image Awareness International 1271 High Street, Auburn, Ca. 95603
Phone:(916) 823-7092 Order Line: 1-800-359-6091 FAX: (916)823-7086

A Backward Look

As early as 1972, Neo-Life realized the importance of the bioflavanoids when Neo-Plex Concentrate was introduced. This product provided the important flavonoids found in the whole citrus along with vitamin C. At that time many in the medical and nutritional communities ridiculed the inclusion of flavonoids in a supplement as a waste of money and marketing hype. Today we know that these compounds provided Neo-Life customers with substantial protection simply by virtue of their activity as potent antioxidants in the human body.

Today we know that a good many of the flavonoids found in foods are protective of each and every cell in the human body. Citrus bioflavonoids in the form of one citrus fruit daily have been shown to decrease the risk of pancreatic cancer by 50 to 66% as compared to those who consumed less than one citrus a week.[1] Flavonoids generally appear to interfere with the processes whereby cancer and heart disease develop. The Neo-Plex was a great start, but nutritional science has come a long way in the last quarter century.

Recent research indicates that citrus flavonoids are not the only ones which promote health by acting as free radical scavengers. Other foods, especially many berries, greens and teas offer important antioxidant protection.

1. Carper, Jean, "Foods That Fight Cancer," *Reader's Digest*, January 1994.

The Flavonoid Family

The latest product released by Neo-Life scientists is a Flavonoid Complex with ellagic acid and vitamin C. In 1976 the scientific world was familiar with only about 800 flavonoids.[1] Today *four thousand* of these compounds have been identified in fruits and vegetables and more are being added every day. Many of these newly discovered flavonoids give foods blue, purple and emerald green hues.

Flavonoids are the water soluble complement to the fat soluble carotenoids. Being water soluble, flavonoids pass into the tissues much more readily than the carotenoids and are not as difficult to work with. Below the reader will find information on the components of this product, food sources, and the importance of a consistent intake of flavonoids.

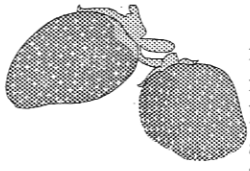
1. Kuhnau, Joachim, "The Flavonoids. A Class of Semi-Essential Food Components: Their Role in Human Nutrition," *Wld Rev. Nutr. Diet.*, vol. 24, p. 120.

Food Sources of Ellagic Acid

Major Sources
- Strawberries
- Raspberries
- Cranberries
- Loganberries
- Cashews
- Pecans
- Walnuts
- Brazil nuts

Minor Sources
- Cherries
- Oranges
- Grapes

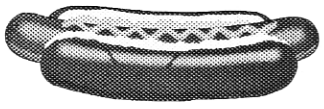
Ellagic Acid



Ellagic acid, while closely related, is not a flavonoid. It is a natural component of nuts and berries. Recent work has shown that this compound is active against substances that cause cancer. These substances include aflatoxin, a mold found in grains and nuts including peanuts which has been a matter of grave concern. Ellagic acid also provides protection against potent carcinogens called nitrosamines found in tobacco smoke, overcooked meat, pickled vegetables and some alcoholic beverages. Nitrosamines can be formed in the body if stomach acid is low. They can also be found or formed when luncheon meats and bacon are consumed because nitrites and nitrates are added to these foods.[1]

Dr. Gary D. Stoner of the Medical College of Ohio has studied ellagic acid extensively. He notes one crucial fact which must be kept in mind by those who would experience the benefits of this important compound. "...ellagic acid must be consumed in advance of any onslaught of carcinogens. It prevents initial damage from carcinogens, but must be present in body tissues — waiting for the carcinogens — in order to have any effect."[1]

A comment is in order here. We are most often exposed to nitrosamines when eating out. For example, a hot dog at the ball park is a likely source of exposure. Researchers have found that when children eat more than twelve hot dogs per month the risk for childhood leukemia is increased almost six times. It is interesting that when the father ate more than twelve hot dogs per month the child's risk of leukemia also increased. In this situation the leukemia risk increased eleven times. It may seem strange that a father's dietary intake could be a greater risk factor than the child's own intake. When nitrosamines were given



to male mice prior to mating, a large number of gene mutations took place which predisposed the offspring to tumors.[2]

It is important to consume a source of ellagic acid prior to consuming the hot dog (nitrosamine) for protection.

In my own experience, it is when I am traveling and away from my normal foods that I am most likely to consume the foods which are known sources of nitrosamines or aflatoxin. Having a supplement handy which contains ellagic acid can be a valuable and convenient protective measure to have available at these times.

One of the best sources of ellagic acid is cranberries. It has been known for quite some time that cranberries inhibited urinary tract infections. Ellagic acid may contribute to this beneficial aspect of cranberries.[3]

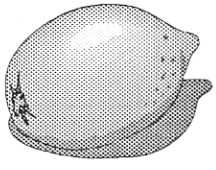
At the present time, there is only one food supplement available which contains ellagic acid, Neo-Life's Flavonoid Complex.

1. American Institute for Cancer Research Newsletter, Spring 1990, Issue 27.

2. Reference: Peters, John M., et al., "Processed meats and risk of childhood leukemia (California, USA)," *Cancer Causes and Control*, 5: 195-202, 1994.

3. Carper, Jean, *The Food Pharmacy*, New York: Bantam, 1988, p. 180.

Flavones



Examples of flavones include *apigenin* and *luteolin*. They are found in citrus fruits, red grapes and green beans. Included in this family are some remarkably active compounds which have been termed methoxylated flavones almost unique to citrus. These have been shown to have a rather strong antibacterial, antifungal, and antiviral activity even at very low concentrations.

These compounds also often reduced the tendency for red blood cells to stick together, a factor involved in a number of diseases including infections and trauma. When red blood cells clump together, blood thickens. This can result in fatigue, bleeding from mucous membranes, enlargement of veins in the eye and hemorrhage there, neurological abnormalities, and failure of the heart.

Flavones and Flavanols

Flavones	Flavanols
Grapefruit	Yellow onion
Oranges	Red onion
Lemons	Kale
Red grapes	Parsley
Green beans	Apples

Methoxylated flavones appear to detoxify polycyclic carcinogens often created by overcooking foods. Some of these compounds have been shown to protect rat liver cells from the carcinogenic effects of aflatoxin.[1]

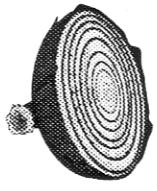
1. Robbins, R.C., "Medical and Nutritional Aspects of Citrus Bioflavonoids," in Nagy, Steven and Attaway, John A. editors, *Citrus Nutrition and Quality*, Washington D.C.: American Chemical Society, 1980, pp. 44-59.

Flavanols

Examples of flavanols include *quercetin, kaempherol, and myricetin*. These are found in foods like kale, spinach, onions, apples and black tea.

Quercetin is one of the most biologically active members of the flavonoid family. It has remarkable anti-inflammatory properties. Quercetin stabilizes membranes of cells that release histamine. It is very similar to an anti-allergic drug that inhibits histamine release called cromolyn.[1]

"Quercetin is one of the most potent anticancer agents ever discovered" according to Dr. Terrance Leighton, professor of biochemistry and molecular biology at the University of California at Berkley. It inactivates several cancer causing agents, prevents damage to DNA, and inhibits enzymes which promote tumor growth. "Quercetin is also anti-inflammatory, antibacterial, antifungal and antiviral." It also helps block the formation of blood clots.[2]



Red and yellow onions are an excellent source of quercetin (as much as 10% of the dry weight). Quercetin is not present in garlic or white onions. Neo-Life's garlic and onion oil supplement would provide another source of this important nutrient.

1. Carper, Jean, *Food Your Miracle Medicine*, New York: HarperCollins Publishers, 1993, p. 348.

2. *Ibid.*, p. 460.

Flavanones

Members of the flavanone family include *hesperidin, neohesperidin and naringen*. In 1936 the flavonone fraction of lemons was shown to exert a therapeutic effect on abnormal capillary permeability and fragility. In 1954 one researcher noted that "There is no disease state in which the capillaries are not detrimentally modified and conversely there are no disease states that will not benefit by assuring proper capillary strength and integrity."[1]

In 1955 Hendrickson and Kesterson listed more than 50 diseases in which bioflavonoids reportedly showed beneficial effects on capillaries or the disease process itself. Ready accep-

Food Sources of Flavanones

Grapefruit	Lemons
Oranges	

tance of citrus flavonoids was inhibited by lack of an understanding of the mode of action and by inability to assess the potency of extracts being used.[2]

1. Martin, G.J. *Exp. Med. Surg.*, 1954, 12, 535.

2. Hendrickson, R.; Kesterson, J.W., *Citrus Sta. Mimeo. Rept.*, Lake Alfred, Fla., 1955, 56, 10.

Anthocyanins

These are deep purple compounds found in black grapes, beets, red onions and berries. The richest sources are red wine and the different berries including blueberries, cranberries, currants, raspberries, hawthorne berries, blackberries and elderberries.

These compounds contribute to what has been called the "French Paradox." In the 1980's and early 1990's it was noted that the French have a very high fat diet, but do not have the expected heart disease to accompany it. The dietary hero proved to be red wine, a French dietary staple.

Catechins

These compounds include catechin, epigallocatechin, epicatechin gallate, epicatechin, and epigallocatechin gallate (the major polyphenol in green tea). The best source of these compounds is green tea although some is found in apples. Green teas will average two or three times the catechin content of black tea.[3] The longer the brewing of a tea, the higher its catechin content will be.

Dr. Hans Stich at the University of British Columbia is intrigued by catechin and feels that it may be just as powerful as beta carotene in helping suppress oral cancers among snuff users. Green tea catechins are used in the Soviet Union to treat capillary failure. Combined with a small amount of vitamin C, catechins were found to increase capillary strength up to five times.[1]

The Japanese have used green tea extensively to combat dysentery. Researcher Mikhail Bokuchava of the former U.S.S.R. wrote, "It was ascertained that consumption of green tea brew had a therapeutic effect on infectious diseases, particularly dysentery." Tea catechins also appeared to decrease blood pressure, alleviate headaches, and help to suppress inflammatory problems.[1]

Food Sources of Anthocyanins

Major	Minor
Red wine	Grape juice
Most berries	Beets
	Red Onions
	Cherries

Food Sources of Catechins

Green Tea	Apples
Black Tea	

It has also been suggested that tea catechins protect from the long term effects of radiation exposure by, among other things, ushering strontium 90 out of the body before it can settle in bone marrow.[2] Beware of drinking extra hot teas, they are believed to contribute to cancer of the esophagus.[3]

A study of 805 men in the Netherlands found that older men at risk of heart attack who consumed the most flavonoids had a 58% reduced risk after five years. The predominant flavonoids in the diets of these men were black tea, apples and onions.[4]

1. Carper, Jean, *The Food Pharmacy*, New York: Bantam, 1988, p. 89.

2. *Ibid.*, p. 292.

3. *Ibid.*, p. 294.

4. Liebman, Bonnie, "Tea for 250 Million?" *Nutrition Action Healthletter*, November 1994, p. 5.

Overview

There is a lot of overlap in the benefits of the 4,000 flavonoids in fruits and vegetables.. There is almost certainly individuality of benefits as well, just as has recently been shown to be the case with the carotenoids, the fat soluble cousins of the flavonoids.

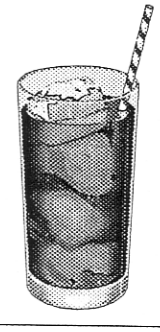
Current research indicates that we can expect benefits from the flavonoids in several key areas.

Free Radicals

More and more scientists are looking to free radicals as the causative factor in degenerative diseases and aging. Flavonoids are among the most powerful water soluble antioxidant groups of compounds yet discovered. They work with vitamin C to provide protection in the water soluble areas of the body, just as vitamin E and carotenoids provide protection of fatty areas. Both groups of compounds should be a part of the regular dietary intake for prolonged health and longevity.

Cancer

Flavonoids appear to have strong anticancer activity at all stages of the development of cancer. They prevent formation of cancer causing compounds in the digestive tract. They interfere with the ability of carcinogens to bind to critical cell sites like the DNA. Finally, they inhibit promotion of cancer processes through their antioxidant activity.



Flavonoids, particularly the highly methoxylated *flavones* in citrus and some other foods, have been shown to activate the enzyme aryl hydrocarbon hydroxylase which makes it possible to detoxify carcinogens produced in

burned foods and environmental pollutants. One writer suggests that "...the cytostatic and anti-carcinogenic activity of food flavonoids which distinguishes these compounds from all other nutrients is a fundamental phenomenon which warrants in itself the conclusion that flavonoids must be looked upon as 'semi-essential' food components."[1]

It should be emphasized that we have a lot to learn about the relationship between these food compounds and cancer. One recent study found that flavonoids which were primarily from tea did not appear to have much inhibitory effect on the development of cancers in the elderly. By contrast, there was a marked association between fruits and vegetables and cancer rates. This was despite the fact that 61% of the flavonoids being consumed were from tea!

Optimal cancer prevention may well be associated with the effective co-working of the fat soluble carotenoids and the total family of primarily water soluble flavonoids present in fruits and vegetables.[2] This is one more warning that isolated nutrients may only provide isolated protection from the degenerative plagues which are strangling the health and vitality of our technologically advanced civilization.

1. Kuhnau, Joachim, "The Flavonoids. A Class of Semi-Essential Food Components: Their Role in Human Nutrition," *Wld Rev. Nutr. Diet.*, vol. 24, p. 180.

2. Hertog, Michael, et al, "Dietary Flavonoids and Cancer Risk in the Zutphen Elderly Study," Nutr Cancer 22, 175-184, 1994, p. 182.

Heart Disease

Flavonoids may reduce the risk of heart disease significantly. They appear to inhibit oxidation of bad cholesterol (LDL). They also decrease the stickiness of blood platelets. Both of these processes lead to blocked arteries and heart disease. The ability of flavonoids to strengthen blood vessels and capillaries should tend to decrease incidence of strokes and related problems.

1. Kuhnau, p. 172.

Antibiotic Properties

Highly methylated *flavones* found among other places in the peel of citrus have been shown to have pronounced anti-viral, anti-bacterial and anti-fungus activity. Among the organisms affected include some influenza viruses and cold viruses.

1. Kuhnau, p. 177-178.

Inflammation

Inflammation can promote a number of degenerative disease processes. Many of the flavonoids have profound anti-inflammatory activity. Flavonoids stabilize adrenal hormones by virtue of similarity to them. The enzymes which destroy the adrenal hormones destroy flavonoids instead. These hormones have antihistaminic and anti-inflammatory effects. This activity takes place at even a relatively low intake of flavonoids.[1]

1. Kuhnau, p. 175.

Flavonoids and Vitamin C

It has been known for quite some time that flavonoids are potent vitamin C synergists. Flavonoids increase storage of vitamin C in vital organs in the guinea pig. It has been suggested that flavonoids make it possible to store vitamin C in an oxidation-resistant form in the body. Others have suggested that vitamin C penetrates the cell membrane only as a complex bound to a polyphenol (flavonoid).[1]

Some researchers believe in the future we may find ourselves "reconsidering the daily vitamin C requirement from the viewpoint of the flavonoid content of the diet."[1] Not all flavonoids have this capability. The most active vitamin C synergists are the *flavonols*, *anthocyanins* and *catechins*.[2]

1. Kuhnau, p. 176-177.

2. *Ibid.*, p. 175.

Issues Raised by This Product

Flavonoids and Pycnogenol

Pycnogenol is a water soluble flavonoid extracted from the bark of the Maritime Pine which has been widely promoted as an antioxidant. Remember that pycnogenol is only one category of flavonoids (the anthocyanin category discussed above). The compounds in pine bark are not a normal part of the human food chain. We do not know what the long term effects of consuming extracts of pine bark are despite attestations of safety by the manufacturer and the apparent benign nature or pycnogenol.

We know that the flavonoids found in fruits, vegetables and berries have a long history of human consumption. We also know that they are as potent as the pycnogenols, probably much more so, due to the large number of compounds involved and the varied ways in which they work in the human body. Now that a well balanced natural flavonoid complex is available, it would seem advisable to use the more natural and complete product.

Flavonoids and Carotenoids

Remember that flavonoids work primarily in the water soluble areas of the cells. Carotenoids work in the fatty areas. Both are important. Assimilation of fat soluble antioxidants is much more difficult than is that of water soluble compounds. This is the reason why Neo-Life has suggested three Carotenoids Complex a day and only two Flavonoid Complex. Absorption of carotenoids is a real challenge. Neo-Life's blood testing on the carotenoids is the only testing conducted so far on a carotenoid product which demonstrates the absorption of a broad spectrum of carotenoids into the bloodstream. Until this takes place no benefits can be expected. Water soluble flavonoids do not pose this problem.