THE CANCER PROJECT

DIET AND CANCER RESEARCH

The Antioxidant Defenses

Oxygen is essential to life. But, as oxygen is used in the body, some of the oxygen molecules become very unstable. These unstable oxygen molecules, called free radicals, can attack cell membranes and even damage the DNA (genetic code) in the nucleus of the cell. Damage to DNA is the beginning of cancer.

Fortunately, the foods we eat can help protect our bodies. Antioxidants, including vitamin C, vitamin E, beta-carotene, selenium, and others, can neutralize the damaging effects of oxygen. These powerful, natural chemicals come to us in vegetables, fruits, grains, and beans (see table below). People who include fruits and vegetables in their daily diets have lower rates of many forms of cancer.

Smokers have provided dramatic demonstrations of the power of vegetables and fruits. A 55-year-old male smoker whose diet is low in vitamin C has a one-in-four risk of dying of lung cancer in the next 25 years. But if the smoker has a high intake of vitamin C, either through diet or supplements, his risk drops to 7 percent.[7] Effects of antioxidants have even been seen in childhood. When children with brain tumors were studied, it was found that their mothers consumed less vitamin C during pregnancy, compared to other women.[8]

Antioxidants in Foods (in mg)

Source	Vit C	B-carotene	Vit E
Apple (1 medium)	8	0.04	0.44
Broccoli	116	1.30	1.32
Brown rice	0	0.00	4.00
Brussels sprouts	96	0.67	1.33
Carrot (1 medium)	7	12.00	0.28
Cauliflower	54	0.01	0.05
Chick peas	2	0.02	0.57
Corn	10	0.22	0.15
Grapefruit (pink, 1/2)	47	0.19	0.31
Navy beans	2	0.00	4.10
Orange (1 medium)	75	0.16	0.31
Orange juice	124	0.30	0.22
Pineapple	24	0.02	0.16
Soybeans	3	0.01	3.35
Fresh spinach	16	2.30	0.57
Strawberries	84	0.02	0.23
Sweet potato (1 medium with skin)	28	15.00	0.32

Serving sizes are one-cup (8 oz.) except as otherwise noted.

Sources: Pennington JAT. Bowes and Church's Food Values of Portions Commonly Used. New York, Lippincot, 1998. Messina M, Messina V. The Dietitian's Guide to Vegetarian Diets. Gaithersburg (Md.), Aspen, 1996. USDA Nutrient Database for Standard Reference, Release 12, last updated April 7, 1999.

Even with vegetables and fruits in the diet, damage to the cells' DNA will occasionally occur, so the body has built-in repair machinery. Fixing DNA requires a B vitamin called folic acid, which is found in dark green leafy vegetables, fruits, peas, and beans. The Recommended Dietary Allowance (RDA) of folic acid for adult women is 200 micrograms per day and increases to 400 micrograms per day for pregnant women. The RDA for adult men is 180 micrograms per day.[9] As the table below shows, beans and vegetables are rich in folic acid.

Folic Acid in Foods (micrograms per 1-cup cooked servings)			
Asparagus	262	Kidney beans	229
Vegetarian baked beans	61	Lentils	358
Black beans	256	Lima beans	156
Black-eyed peas	254	Navy beans	255
Broccoli	78	Pinto beans	294
Brussels Sprouts	94	Soybeans	93
Chick peas	282	Spinach	262
Great northern beans	181		
Source: Pennington JAT. Bowes and Church's Food Values of Portions Commonly Used. New York, Lippincott, 1998.			

We are all exposed to cancer-causing chemicals, whether we like it or not. Some people are smokers, and, of course, quitting smoking is a vital step for them. But all of us are exposed to chemicals in the air, in water, in food, and in household products, not to mention the carcinogens produced within our bodies as a part of our metabolic processes. While trying to minimize our exposure to carcinogens, we can also shore up our defenses against these assaults by including generous amounts of vegetables and fruits in our diet. A plant-based diet rich in vegetables, fruits, legumes, and unprocessed cereals is associated with a decreased risk of cancer.[10]