

Resveratrol in Grapes Fights Cancer

A group of FFH Program scientists led by Dr. John Pezzuto (shown below) in the College of Pharmacy at the UIC campus have recently shown that a substance in grapes may prevent cancer (Jang, M., Cai, L., Udeani, G.O., Slowing, K.V., Thomas, C.F., Beecher, C.W.W., Fong, H.H.S., Farnsworth, N.R., Kinghorn, A.D., Mehta, R.G., Moon, R.C. and Pezzuto, J.M. *Science* volume 10:218-221, 1997).



The substance, known as **resveratrol** (pronounced rez-VER-a-trawl), is one of a group of compounds (called phytoalexins) that are produced in plants during times of environmental stress such as adverse weather or insect, animal or pathogenic attack. Resveratrol has been identified in more than 70 species of plants, including mulberries and peanuts. Grapes, however are particularly good sources. Resveratrol is found in the skin (not flesh) of grapes. Fresh grape skin contains about 50 to 100 micrograms of resveratrol per gram, while red wine concentrations range from 1.5 to 3 milligrams per liter. This compound is also thought to be responsible, in part, for the cholesterol-lowering effects of red wine and may also explain why those consuming a Mediterranean-type diet (of which red wine consumption is characteristic) may have a reduced risk of heart disease.

In the current study, Pezzuto and colleagues were able to show that resveratrol was effective during all three phases of the cancer process: initiation, promotion and progression. Resveratrol was found to have antioxidant and antimutagenic activity and also increased levels of the phase II drug-metabolizing enzyme quinone reductase, an enzyme capable of metabolically detoxifying carcinogens, thereby ridding them from the body. All three of these physiological effects are indicative of resveratrol preventing cancer initiation--the initial, irreversible stage of the cancer process. Resveratrol also demonstrated antiinflammatory effects and inhibited the activity of the cyclooxygenase and hydroperoxidase enzymes (suggestive of antipromotion activity) in addition to causing the differentiation of human promyelocytic leukemia cells, indicating that this compound may also depress the progression phase of cancer. Finally, resveratrol inhibited the development of preneoplastic lesions in mouse mammary glands treated with a carcinogen in culture and inhibited tumor formation in mice. No toxic effects were observed.

The UIC researchers originally isolated resveratrol from a crude extract of the roots of a tree collected in Peru under a grant from the National Cancer Institute which involves screening for cancer-inhibiting compounds from plants. According to Pezzuto, "Of all the plants we've tested for cancer chemopreventive activity and all the compounds we've seen, this one has the greatest promise."

For additional information, the following references are suggested:

- Concentration of the phytoalexin resveratrol in wine. *American Journal of Enology and Viticulture*, vol. 43 p. 49-52 (1992).
- Wine, alcohol, platelets, and the French paradox for coronary heart disease. *The Lancet*, vol. 339, pp. 1523-1526 (1992).
- Beyond alcohol: Beverage consumption and cardiovascular mortality. *Clinica Chimica Acta*, vol.