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### Flavonoid compound kills leukemia cells

A report published online on March 20, 2007 in *The Journal of Biological Chemistry* described the finding of a team at the University of Pittsburgh that an anthocyanidin known as cyanidin-3-rutinoside shows the ability to kill leukemia cells in culture while leaving healthy cells unharmed. Anthocyanins, one of the six subclasses of flavonoids, are polyphenol compounds that naturally occur in red wine and many fruits and vegetables, and which have antioxidant, antimutagenic, and anticarcinogenic benefits.

University of Pittsburgh School of Medicine school associate professor of pathology Xiao-Ming Yin, MD, PhD and colleagues tested cyanidin-3-rutinoside (C-3-R), extracted from black raspberries, in leukemia and lymphoma cell lines. Low doses of C-3-R caused programmed cell death known as apoptosis in half of the cells in one human leukemia cell line within about 18 hours of treatment. When the concentration of the compound was doubled, almost all of the cancerous cells became apoptotic. C-3-R was also demonstrated to be effective in other human leukemia and lymphoma cell lines.

The team found that C-3-R induced the accumulation of a reactive form of oxygen known as peroxides which activated an apoptotic pathway mediated by the cells' mitochondria. However, this phenomenon failed to occur when the researchers treated normal human blood cells with the compound. Since previous research with C-3-R has shown that it has strong antioxidant activities characteristic of other polyphenols such as green tea, the ability to induce oxidative stress in tumor cells suggests selective toxicity.

"Current treatments for leukemia, such as chemotherapy and radiation, often damage healthy cells and tissues and can produce unwanted side effects for many years afterward. So, there is an intensive search for more targeted therapies for leukemia worldwide," Dr Yin stated. "Because this compound is widely available in foods, it is very likely that it is not toxic even in purified form. Therefore, if we can reproduce these anticancer effects in animal studies, this will present a very promising approach for treating a variety of human leukemias and, perhaps, lymphomas as well."

Health Concern

### Leukemia

Leukemia can be classified into four major types based on whether the disease is acute or chronic and according to the type of white blood cell affected:

- Acute myelogenous leukemia (AML)
- Chronic myelogenous leukemia (CML)

- Acute lymphocytic leukemia (ALL)
- Chronic lymphocytic leukemia (CLL)

Myelogenous leukemia involves myeloid cells, granulocytes (neutrophils, basophils, and eosinophils) and monocytes (macrophages). Lymphocytic leukemia involves T and B cells (lymphocytes).

Resveratrol, a plant polyphenol found in grapes and red wine, has been shown in scientific studies to inhibit the growth of leukemia cell lines. Resveratrol reduces the growth of AML cell lines and causes death in HL-60 leukemia cells (Su JL et al 2005). Resveratrol has been shown to block the proliferation of fresh AML cells taken from the bone marrow of five newly diagnosed patients (Asou H et al 2002; Estrov Z et al 2003). Exposure of the leukemia cell line U937 to concentrations of resveratrol similar to those found in red wine blocked cell proliferation but, in this case, did not increase cell death of these abnormal cells (Castello L et al 2005).

[http://www.lef.org/protocols/cancer/leukemia\\_01.htm](http://www.lef.org/protocols/cancer/leukemia_01.htm)

## Featured Products

### Resveratrol Capsules

A standardized resveratrol extract is now available as a dietary supplement. This whole grape extract contains a spectrum of polyphenols that are naturally contained in red wine such as proanthocyanidins, anthocyanins, flavonoids, etc.

Based on studies that higher amounts of resveratrol may be beneficial, Life Extension offers a 100 mg standalone product.

<http://www.lef.org/newshop/items/item00970.html>



### Ultrametabolism by Mark Hyman, MD

How to ignite the fat burning DNA hidden inside your body

...for the first time ever, Mark Hyman, MD unveils his groundbreaking but simple plan for automatic weight loss in his new book, UltraMetabolism. Never before have all seven keys to permanent weight loss been integrated into a single plan. Based on the cutting-edge science of Nutrigenomics, in UltraMetabolism, you'll discover:

- How to re-program your genes to automatically LOSE weight and GAIN health...
- Why you actually need to eat carbs to lose weight...
- Why eating less and exercising more can actually make you fat, and much more...

Dr. Hyman is a leader in a rapidly emerging field called functional medicine and both he and UltraMetabolism have been profiled in Life Extension Magazine in the past. Dr. Hyman explains how food talks to your DNA and can either switch on health and vitality or disease and obesity depending on what you eat.

Right now Dr. Hyman has made special arrangements for you to download a sneak preview of UltraMetabolism free of charge, plus a metabolism-boosting 60-minute online video and a free 7-step course on how to re-program your genes to turn on health and vitality and turn off disease and obesity.

[Click here for more details and to download your free sneak preview](#)

## Life Extension

### Life Extension Vacation Club

In order to offer you even greater advantages, an exciting new addition has been made to your member benefits—the LE Vacation Club. In partnership with Caribbean Islands Travel, Life Extension has recently created a unique and convenient travel website that

offers exclusive deals for members only.

At **LEVacations.com** you'll discover more than 100 specially discounted vacation packages and cruises including USA, Hawaii, Canada, the Caribbean, Mexico, Asia, South and Central America, and Europe. You'll also find suggestions for great vacation getaways, travel tips, hot deals, and links to the most important cruise lines—all at your fingertips! You can even enjoy savings on specific travel products such as tours, charters, and excursions.

This comprehensive and easy-to-use website also allows you to purchase airline tickets, reserve cars, and make hotel reservations online quickly and easily.

We hope you'll take advantage of this new member benefit the next time you're planning a vacation. It's just another of the many ways in which Life Extension is working to make your life better.

<http://www.levacations.com>

If you have questions or comments concerning this issue or past issues of *Life Extension Update*, send them to [ddye@lifeextension.com](mailto:ddye@lifeextension.com) or call 954 202 7716.

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