

Vitamin pills reduce cancer risk in China

Certain vitamin and mineral supplements may help prevent specific types of cancers, including those of the esophagus and stomach, and reduce the risk of dying from cancer, researchers reported this week. A second study hints that such supplements might benefit people with a precancerous condition.

"This is a hopeful sign that vitamins and minerals may help prevent the onset of certain cancers in healthy individuals," says researcher William J. Blot of the National Cancer Institute (NCI) in Bethesda, Md.

However, the two studies focus on nutritionally deficient people living in China, points out Steven E. Benner, a cancer specialist at the University of Texas M.D. Anderson Cancer Center in Houston. Nobody knows whether the same supplements would ward off cancer in well-nourished populations, he comments. The two studies and an editorial by Benner appear in the Sept. 15 *JOURNAL OF THE NATIONAL CANCER INSTITUTE*.

A rural area in north-central China, Linxian County in Henan Province, provided investigators from NCI and the Chinese Academy of Medical Sciences in Beijing with a unique research opportunity. The people who live in this semi-arid region typically eat a diet poor in fresh fruit and certain vegetables. Although the resulting deficiency in some vitamins and minerals doesn't produce any obvious health problems, investigators wondered whether it contributed to Linxian County's extraordinarily high rate of esophageal and gastric cancers.

Death rates from the two malignancies run 100 times higher in Linxian than in the United States. A variety of factors — including a yen for pickled foods — might cause that high risk, the researchers noted. In the first study, Blot's group decided to find out whether certain nutrient supplements could protect Linxian residents from cancer, particularly esophageal and stomach cancer.

The U.S. and Chinese investigators began their effort by recruiting 29,584 Linxian residents age 40 to 69. The investigators randomly assigned those participants to one of seven groups that received a daily vitamin-mineral combination. An eighth group served as controls. The vitamin combos included the vitamin A precursor known as beta carotene, two B vitamins, vitamin C, vitamin E, or other nutrients thought to provide a shield against cancer. People assigned to the control group got a placebo pill that did not contain such nutrients.

The team relied on a bevy of "barefoot doctors," people with the equivalent of a high school education who bring health care to rural areas of China. The barefoot doctors made sure study participants took their vitamins and noted when

someone developed cancer or died, whatever the cause.

After about five years, the researchers discovered that people taking a specific vitamin-mineral combination (beta carotene, vitamin E, and selenium) experienced a statistically significant drop in their death rate from all causes, not just cancer. Researchers often look at the total death rate to make sure that treatment isn't producing an unforeseen rise in deaths.

Perhaps more significantly, those taking the beta carotene-vitamin E-selenium supplement showed a 13 percent drop in deaths from all types of cancer and a 21 percent decline in stomach cancer deaths.

The researchers found no significant benefits for people taking the other combinations.

The second study, this one led by Jun-Yao Li of the Chinese Academy of Medical Sciences, investigated whether vitamin-

mineral supplements could stop a precancerous condition called dysplasia from progressing.

This investigation, also a collaboration between U.S. and Chinese researchers, involved 3,318 Linxian residents age 40 to 69 who had esophageal dysplasia, a condition in which the cells of the esophagus appear abnormal and are at high risk of turning malignant. The researchers randomly assigned participants to groups given either a daily multivitamin supplement or a placebo.

After six years, the team noted a hint of a benefit for those in the vitamin group — namely, a slight drop in esophageal or gastric cancer deaths.

These findings lend themselves to more than one interpretation. On the one hand, vitamins may not help much once a precancerous condition is established, notes coauthor Peter Greenwald, also at NCI. On the other hand, vitamins may prove their mettle against dysplasia only after someone has taken them for more than six years, he points out.

— K.A. Fackelmann

Finding the origins of the X-ray sky

Point an X-ray telescope at a seemingly blank patch of sky and the detector will find a region ablaze with radiation. Astronomers discovered this cosmic sea of radiation, known as the X-ray background, in 1962. Researchers have debated its origins ever since.

Scientists have generally agreed that radiation pouring out of active galactic nuclei (AGNs) — quasars, Seyfert galaxies, and other compact sources — accounts for at least half the low-energy portion of the X-ray background. As in a Seurat painting, these point-like sources of light combine to form the broad brush strokes of the low-energy X-ray sky. But the bulk of the X-ray background — the high-energy spectrum above a few thousand electron-volts (eV) — remained a mystery. The few observations of AGNs didn't seem to account for the high-energy part of the background. Other sources, such as a proposed sea of hot intergalactic gas, proved false.

Based on newly analyzed data from three spacecraft, astronomers now report that emissions from AGNs do indeed match the high-energy X-ray background. Julian H. Krolik of Johns Hopkins University in Baltimore and his Polish colleagues, Andrzej A. Zdziarski and Piotr T. Zycki of the Copernicus Astronomical Center in Warsaw, detail their work in the Sept. 10 *ASTROPHYSICAL JOURNAL LETTERS*.

Krolik says researchers doubted that AGNs created the bulk of the X-ray background, because they thought each of these powerhouses emitted too little radiation at energies of 10,000 to 20,000

eV and too much at higher energies.

But new data tell a different story about the behavior of AGNs. Reviewing studies conducted with the Japanese satellite Ginga, Krolik's team noticed that AGNs emit more X-rays at about 10,000 eV than previously thought. More significantly, among the AGNs detected at high X-ray energies by NASA's Compton Gamma Ray Observatory, most declined dramatically in brightness between 50,000 and 100,000 eV, Krolik says. Observations with the Russian satellite GRANAT support this finding, he adds.

At first glance, the decline in AGN emission still wouldn't seem to account for the X-ray background, which takes a nosedive at a lower energy. But Krolik notes that the NASA craft could only detect nearby sources. Because more distant bodies recede faster than neighboring ones in an expanding universe, faraway AGNs would appear to have their output shifted to lower energies. Thus, distant AGNs would seem to drop in intensity at a lower energy than those closer. In this way, emissions from the distant powerhouses "provide an excellent fit to both the intensity and spectral shape of the X-ray background," the team writes.

Krolik emphasizes that the study assumes that faraway AGNs behave similarly to the nearer population.

"This is the best [analysis] I've ever seen," says X-ray astronomer Stephen S. Holt of NASA's Goddard Space Flight Center in Greenbelt, Md. "I'm almost willing to say now that AGNs create the background." — R. Cowen