Cancer protection from fruits and veggies

Two nutrients in fresh fruits and vegetables may help prevent a precancerous colon condition, according to a new report. A second study adds to evidence that diets rich in such foods help guard against colorectal cancer, a disease that will kill 57,000 Americans this year.

The first study supports previous research suggesting that colon cancers arise when there is a reduction in a biochemical process called methylation – the addition of methyl side groups to a cell's DNA. Other studies suggest that insufficient methylation activates cancer-causing genes. To accomplish methylation, cells need plenty of folate, a substance abundant in fresh fruits and leafy vegetables. The essential amino acid methionine, a constituent of high-protein foods such as fish, chicken, and dairy products, is also needed during methylation.

Epidemiologist Edward Giovannucci of the Harvard Medical School in Boston and his colleagues report that diets low in folate and methionine may elevate the risk of developing polyps in the colon and rectum.

The Boston researchers sent questionnaires to women participating in the Nurses' Health Study and men enrolled in the Health Professionals Study. The team asked detailed questions about diet and the use of vitamin supplements. They then homed in on men and women who had undergone colonoscopy or sigmoidoscopy, procedures that allow physicians to look at the lining of the rectum and intestine. As it turned out, 564 of the 15,984 women and 331 of the 9,940 men had colon or rectal polyps.

A statistical analysis revealed that study participants with diets rich in folate had the lowest incidence of such polyps. That association held true even when the epidemiologists adjusted for factors that increase the risk of developing colorectal polyps. People who took folate supplements enjoyed even greater protection than those who ate a folate-abundant diet, Giovannucci says.

The researchers also discovered that people who consumed at least two alcoholic drinks per day were 85 percent more likely than nondrinkers to develop colorectal polyps. Alcohol blocks DNA methylation; thus it may be even more important for people who imbibe alcohol to eat plenty of fruits and vegetables, Giovannucci adds.

In the second report, Robert S. Sandler of the University of North Carolina at Chapel Hill and his colleagues confirm earlier studies suggesting that diets rich in fruits and vegetables protect against precancerous colorectal polyps. Although Sandler and his co-workers didn't study folate and methionine specifically, their findings are consistent with those of the Harvard study. Both studies appear in the June 2 JOURNAL OF THE NATIONAL CANCER INSTITUTE.

Despite the increasing list of health benefits ascribed to vitamins and certain nutrients, many researchers advise against taking supplements containing these compounds (SN: 5/22/93, p.327). Public health expert Gladys Block of the University of California, Berkeley, argues that it is time to reconsider that cautious approach.

"There can be no disagreement that people should eat a balanced diet rich in fruits, vegetables, and whole grains," she writes in an editorial in the same issue of the journal. "But people are not eating enough of these foods and are unlikely to do so in the foreseeable future," she notes.

"Our data suggest that there may be a benefit to multivitamin supplements," Giovannucci agrees, noting that most multivitamin pills contain folate. Still, neither of the studies rules out the notion that fresh fruits and vegetables contain some as-yet-unheralded substance that protects against colon cancer. "Our primary recommendation is to eat plenty of fruits and vegetables," he adds.

– K.A. Fackelmann

Synthetic path to new transplant drugs

Scientists have finally succeeded in synthesizing rapamycin, a complex chemical first isolated 20 years ago from a soil fungus found on Easter Island. In recent years, researchers have eyed the substance's potential as a drug that would suppress the body's urge to reject a transplanted organ or tissue. The ability to make the molecule using the techniques of organic chemistry – rather than having to rely on microorganisms – may usher in a new class of immunosuppressant drugs, writes a group of chemists in the May 19 JOURNAL OF THE AMERICAN CHEMICAL SOCIETY.

Over the past decade, transplant success rates have risen, thanks largely to cyclosporin, another immunosuppressant drug obtained from a fungus. Cyclosporin, however, can cause serious side effects, such as hypertension and kidney and liver damage, so scientists have been eager to find an alternative. Researchers at the pharmaceutical company Wyeth-Ayerst in Princeton, N.J., have begun clinical trials of rapamycin. At present, they produce the drug by fermentation, a process that involves culturing large batches of the fungus.

The new synthesis technique will not replace the current production method, but it will enable scientists to develop chemical relatives of rapamycin, says K.C. Nicolaou, leader of a research team at the University of California, San Diego, and the Scripps Research Institute in La Jolla, Calif. Indeed, he and his colleagues are now aiming to make improved versions of rapamycin that will resist quick degradation in the body.

To synthesize rapamycin – a 31-carbon ring structure – the scientists first constructed an open chain of 29 carbons. The chain had the same variety and placement of highly sensitive side groups as rapamycin. They then closed the ring using a process called "stitching cyclization," in which a two-carbon fragment containing reactive tin groups forms a bridge between the ends of the chain. The group obtained a "modest" yield of 28 percent, "quite satisfying" considering the molecule's complexity, says Nicolaou.

New versions of rapamycin with different side groups will help scientists probe the mechanisms of immunosuppression, says Nicolaou. "We're hoping to use the analogs that we create with this chemistry to increase our knowledge about how these kinds of drugs interact with the immune system," he says.

– K.F. Schmidt

Hubble observations back merger theory

Galaxies come in various shapes, including fuzzy footballs, elongated smears, hazy pinwheels, and glowing whirlpools. In the 1920s, astronomer Edwin Hubble resolved some of the confusion by classifying galaxies as either spiral (disk-like and compact) or elliptical (egg-shaped and diffuse). But the fundamental question remains: Why do galaxies look so different?

In recent decades, some astronomers have argued that spirals can merge to form larger, elliptical galaxies. Now, images from the Hubble space telescope provide some of the strongest evidence to date for the merger theory.

Astronomer Bradley C. Whitmore of the Space Telescope Science Institute in Baltimore and colleagues peered into the core of the elliptical galaxy NGC 7252, already suspected to be the product of a merger between two spiral galaxies, and saw something strange and unexpected. "Just for one terrible moment I thought, 'Oh my God, I gave them the wrong coordinates!'" Whitmore recalls.

Fortunately, Whitmore had indeed pointed Hubble in the right direction. And to his surprise, the telescope images revealed a pinwheel-shaped whorl of gas and stars in the galaxy's center. This