

Cabbage chemical may bar breast cancer

In publicly declaring his distaste for broccoli, President Bush found widespread bipartisan support. But if preliminary research results are confirmed, broccoli, cabbage, bok choy and other much-maligned cruciferous vegetables may eventually get a boost in the polls.

Two scientists report discovering that vegetables from the *Brassica* genus, whether raw or lightly cooked, contain a chemical that spurs the body to convert more of the hormone estrogen into an inactive form. Because estrogen can fuel the development of certain breast tumors, the crucifer compound might lower a woman's breast cancer risk, the researchers suggest.

Past studies have linked *Brassica*-rich diets to a lower risk of other cancers. But the new work is the first to show a connection between a specific crucifer compound and enhanced estrogen metabolism in healthy people, say Jon J. Michnovicz and H. Leon Bradlow of the Institute for Hormone Research in New York City. They add that it might help explain why Asian women, who eat lots of crucifers, have a much lower breast cancer rate than Western women.

"This may be a link between diet and protection against breast cancer," says Christopher Longcope of the University of Massachusetts Medical School in Worcester. He cautions, however, that future work must demonstrate that the compound can indeed help stave off breast cancer in women.

Michnovicz and Bradlow focused on various nitrogen-containing compounds called indoles, which other researchers had pegged as anticancer agents (SN: 11/25/89, p.351). In female rats, they discovered that a specific indole, known as indole-3-carbinol, significantly boosted the rate at which an enzyme converted a form of estrogen to 2-hydroxyestrone, an inactive version that doesn't trigger mammary tumor growth.

The researchers went on to test the compound in seven healthy men. (Men produce estrogen at low levels that do not fluctuate as much as women's, simplifying interpretation of laboratory results.) Each man received a daily dose of 500 milligrams of indole-3-carbinol, equivalent to the amount contained in half a head of cabbage. After a week on the indole extract, their production of 2-hydroxyestrone increased by about 50 percent as measured in urine samples. Michnovicz and Bradlow describe the findings in the June 6 *JOURNAL OF THE NATIONAL CANCER INSTITUTE*.

In a recent, unpublished study of five healthy women who got similar treatment, they obtained virtually identical results, Michnovicz told *SCIENCE NEWS*.

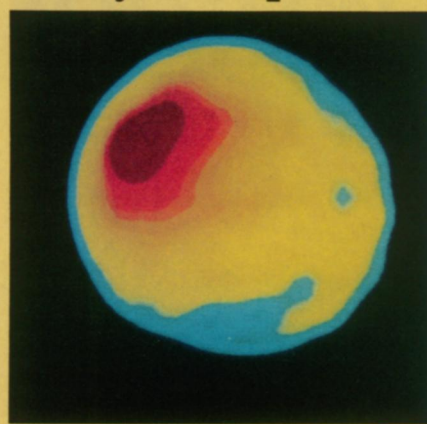
Cold message from Mercury's 'hot poles'

A day on Mercury lasts about 57 Earth days, and a Mercury year lasts but 1½ Mercury days. This astronomical oddity results from a gravitational "resonance" that causes Mercury to turn three times on its axis for every two trips it makes around the sun. As a result of gravitational resonance and the planet's elliptical orbit, the sun preferentially heats two particular surface areas. Some scientists refer to these areas as Mercury's "hot poles," even though they lie at the planet's equator rather than at the ends of its rotation axis. "The only reason we call them 'poles' is that they're 180° apart," says Jack O. Burns of New Mexico State University in Las Cruces.

Burns, Michael J. Ledlow of the University of New Mexico in Albuquerque and their colleagues have now used radio emissions — solar energy reradiated from just below Mercury's surface — to produce what they call the first radiofrequency images of the planet. The resulting maps, presented this week at the American Astronomical Society meeting in Albuquerque, clearly show the hot poles, but they also leave planetary scientists with a long-standing enigma.

The puzzlement first arose when the Mariner 10 spacecraft observed Mercury from a sun-circling orbit in March and September of 1974 and March of 1975. Measurements from the first and third encounters indicated the planet has an "intrinsic" magnetic field — one produced in Mercury's interior rather than merely "induced" by the impacts of charged particles from the solar wind.

Many planetary scientists have believed that an intrinsic magnetic field requires a "dynamo" effect, in which internal heat creates convection currents within a rotating planet. Mercury is small enough, however, that some theorists have argued that its core would have cooled and shut off the dynamo long ago. The dynamo idea is



Radio emissions from Mercury's "hot poles" suggest the planet has no molten core.

still an oft-invoked element in studies of planetary magnetospheres, so Mercury's intrinsic field has represented a quandary ever since its discovery.

Ledlow's team used the Very Large Array — a group of antennas near Socorro, N.M. — to study Mercury's radio emissions at wavelengths of 2 and 6 centimeters. "There does not appear to be any excess heat arising from the core of Mercury," they report. "The temperature map can be explained by reradiation of solar energy."

If Mercury were adding any more than about 1 kelvin to the heat coming from the sun, the data would have revealed that contribution, Burns says. "This indicates that Mercury does not have a large, hot molten core that many believe is needed to produce the strong magnetic field via the dynamo model," the researchers conclude.

Their results, combined with Mercury's slow rotation on its axis, indicate the planet "doesn't match the dynamo model at all," says Burns. The model remains in evolution, however, and study coauthor Galen R. Gisler of Los Alamos (N.M.) National Laboratory asserts, "I think you can still squeeze some kind of a dynamo in." —J. Eberhart

The team hypothesizes that 2-hydroxyestrone may block estrogen receptors in breast cells, thus helping to prevent estrogen-fueled cancers. In addition, Longcope suggests, increased 2-hydroxyestrone production may mean the body forms less 16-alpha-hydroxyestrone, a potentially carcinogenic form of estrogen.

New, unpublished results with female mice already hint at indole-3-carbinol's power to prevent breast cancer. The New York researchers gave the compound to mice infected with a virus that leads to mammary tumors. After eight months, only 25 percent of the mice developed

breast tumors, compared with 80 to 90 percent of virally infected control mice, Michnovicz told *SCIENCE NEWS*.

It will take years, he says, to establish the chemical's cancer-preventing potential in women — and even then, some finicky eaters will continue to turn up their noses at the first whiff of a crucifer. Michnovicz suggests his research might overcome that hurdle with an indole-3-carbinol dietary supplement that would allow women to gain protection without forcing down the hated vegetables. He notes, however, that real crucifers offer additional benefits such as vitamins A and E.

—K.A. Fackelmann