Biomedicine

Protein limits bladder cancer spread

People who have had surgery for bladder cancer can look forward to better survival prospects than those recovering from many other malignancies. Removal of a cancerous bladder can confer years of life.

Some of these patients get shortchanged, however, if their bodies fail to produce enough of a cancer-fighting chemical called p21 protein, researchers report in the July 15 JOURNAL OF THE NATIONAL CANCER INSTITUTE (JNCI).

In a study of 242 bladder cancer patients whose bladders had been removed, researchers analyzed tumor tissue taken during surgery. Samples from 86 patients lacked a full complement of p21 protein. Within this group, three-fourths suffered a recurrence of cancer within 5 years of the surgery, and three-fourths of those deficient in p21 died in that time. Of those patients with normal concentrations of p21 in their tumors, only 30 percent had a cancer recurrence and nearly two-thirds lived more than 5 years after surgery, according to study coauthor Richard J. Cote, a pathologist at the Norris Comprehensive Cancer Center at the University of Southern California in Los Angeles.

Inside cells, p21 can put the brakes on runaway cell growth, says Curtis C. Harris, a physician at the National Cancer Institute in Bethesda, Md.

The dearth of p21 protein observed in many of the patients doesn't appear to be caused by mutation of the gene that encodes it. Such a mutation is rare. Production of p21, an enzyme inhibitor, appears to depend in some cases on another cancer-suppressor protein, p53. Absence of p53 and mutations in its gene have been implicated in many other cancers.

In the new study, Cote and his colleagues explored the cascade of cellular events that begins with p53 production and leads to p21 formation. They were surprised at their findings. Although p53 is a key cell-cycle regulator, reduced p53 activity didn't pose a danger in bladder cancer patients who had normal p21 levels. On the other hand, patients with normal p53 in their tumors still faced a high risk of cancer recurrence if they lacked p21.

The unveiling of p21's importance may have clinical ramifications. Chemotherapy after bladder removal is common, but doctors face a difficult choice in deciding whether to give that harsh treatment to patients whose tumor cells haven't spread to other parts of the body. If a patient lacks p21 protein—and is therefore more susceptible to a cancer recurrence—chemotherapy might be more readily recommended.

"We can define a population within that group [of patients] that is at high risk of [cancer] progression," says Cote. "This could lead to a different way to manage cancer."

Indeed, Cote and his colleagues have already begun a study in which cancer patients' concentrations of p21 are measured and considered as part of the decision whether or not to administer chemotherapy after bladder removal.

The JNCI article "contributes to our understanding of factors involved in . . . bladder cancer," Harris says. The next step is to better define the role of p53, he adds. —*N.S.*

FDA clears thalidomide for leprosy use

The infamous drug thalidomide continued on the long road back to respectability last month as the Food and Drug Administration approved it—under tight restrictions—for use against leprosy. Tests of thalidomide, a sedative that caused thousands of birth defects before its ban more than 35 years ago, have also shown the drug to heal painful mouth ulcers in AIDS patients (SN: 11/11/95, p. 311; SN: 12/24&31/94, p. 424).

Research is under way to assess its potential value against cancer, autoimmune diseases, and macular degeneration—a leading cause of blindness. Celgene Corp. of Warren, N.J., plans to manufacture the drug, and a team from Boston University will monitor its use on leprosy patients. —*N.S.*

Physics

Putting the squeeze in superconductors

Shrinking a crystal from the sides can make it bulge upwards. Unexpectedly, in at least one case, such slimming also boosts the maximum temperature at which the material superconducts, letting electrons flow free of resistance.

Reducing the girth of a thin crystal of a low-temperature superconductor known as 214—a blend of lanthanum, strontium, copper, and oxygen with the formula $La_{1.9}Sr_{0.1}CuO_4$—increased its maximum superconducting temperature from 25 to 49 kelvins, researchers report in the July 30 NATURE. That unexpectedly steep jump may point the way to similar boosts among sister copper oxides, says the study's leader, Jean-Pierre Locquet of IBM's Zurich Research Laboratory in Rüschlikon, Switzerland. These oxides include the world's record holder for high temperature superconducting.

Earlier studies have shown that external pressure on that highest temperature superconductor raises its maximum from 133 kelvins to about 164 kelvins—but only as long as the pressure remains. Locquet's group has now caused a permanent increase in a crystal of 214 by making it pattern itself on a supporting material whose atoms are closer together than those of 214.

Whether the temperature jump results from the lateral squeeze or the accompanying vertical stretching—and whether it will work for other compounds—remains unknown, says team member Jean Fompeyrine. At a deeper level, "this experiment brings out a means to find out really what is the mechanism [underlying high-temperature superconductivity]," he says. —*P.W.*

Uncontainable boron floats into view

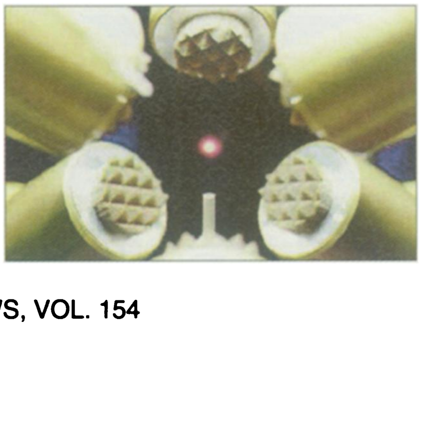
Like a patient who won't stand still for an X-ray, liquid boron's hot, ornery nature makes it a tough customer for scientists wanting to probe its atomic innards. Molten only above a sizzling 1,800°C, the element's liquid form is so corrosive that no container can resist reacting with it—destroying the boron's purity and, sometimes, eating away the container.

Now, a team of scientists from Argonne (Ill.) National Laboratory and Containerless Research in Evanston, Ill., reports finally capturing liquid boron on X-ray camera by levitating a tiny droplet on a carefully controlled jet of argon gas. Their results appear in the July 20 PHYSICAL REVIEW LETTERS.

"The unique contribution we've made is levitating boron for the very first time and simultaneously measuring the structure of the liquid" with X-ray diffraction, says Shankar Krishnan of Containerless Research. In previous studies, the researchers have levitated molten aluminum oxide and other hot, hard-to-handle liquids.

Although liquids don't have the extensive atomic structure of solids, they do contain small neighborhoods of order. For the immediate surroundings of each atom in liquid boron, the team found a surprising similarity to certain of the solid's remarkably complex forms. Any order beyond that neighborhood remains unclear.

Deciphering the element's molten structure may lead to a new class of boron-based metals with useful properties, says Argonne physicist David L. Price. —*P.W.*



S. Krishnan

Levitation allows study of molten substances, including aluminum oxide (shown here) and boron, that are so hot and reactive that they combine with and destroy containers.