Biomedicine

Thyroid cancer rose after Chernobyl

The 1986 nuclear accident at Chernobyl in Ukraine unleashed radioactive pollution, including iodine, over a vast area now encompassing parts of Russia, Belarus, and Ukraine. The amounts far exceeded releases from any previous nuclear power station accident. Millions of people were exposed.

Since the accident, anecdotal evidence of increased cancer rates near Chernobyl has mushroomed like a radioactive cloud. Researchers now have hard proof that thyroid-cancer cases in children, while still rare, have multiplied in northern Ukraine during the post-accident years.

On average, doctors in northern Ukraine diagnosed 12 cases of childhood thyroid cancer annually in the 5-year period before Chernobyl. Between 1986 and 1990, they found 22 new cases per year. Between 1991 and 1995, the rate soared to 63 cases, and during the next 2 years, it climbed to 73 cases per year, the researchers report in the July 1 CANCER.

Children who were 5 years old or younger in 1986 were most likely to develop the cancer. Also, four children who were still in the womb at the time of the accident subsequently contracted thyroid cancer.

All but a few of the children have survived. Thyroid cancer is treated by removal of the thyroid gland. Patients must then take thyroid-hormone replacements for the rest of their lives.

While previous reports indicated thyroid-cancer incidence was up in the region, they lacked the statistical rigor of this comparison, says study coauthor Virginia A. LiVolsi, a pathologist at the University of Pennsylvania Medical Center in Philadelphia.

The thyroid gland needs iodine to manufacture thyroid hormone, which is essential to body metabolism and growth. The children in the Ukraine might have been slightly deficient in iodine before the accident, LiVolsi says, causing their thyroids to readily accept iodine—radioactive or not. Radioactive iodine kills cells or retards their development. The radiation also causes DNA damage, genetic mutations, and sometimes cancer.

Data for the new study came from a registry compiled by the Academy of Medical Sciences of Ukraine in Kiev. Scientists suspect that exposed adults might also have a higher thyroid-cancer incidence since the accident, but the researchers are only now collecting data on adults. Because children have smaller thyroid glands, their radioactive dose of iodine is proportionately larger and so has a greater impact, LiVolsi says. *—N.S.*

Antiviral drug limits heart disease

A drug given to people who have recently received an organ transplant seems to thwart heart disease in later years among these patients, a study in the July 6 CIRCULATION indicates.

The drug, ganciclovir, is prescribed routinely for organ recipients because it controls cytomegalovirus, a form of herpes virus that can cause dangerous infections in people taking immune-suppressing drugs. Innocuous in healthy people, cytomegalovirus infection after transplant can lead years later to heart disease in heart recipients, says study coauthor Hannah A. Valantine of Stanford University School of Medicine.

In the test, 76 heart-transplant patients received ganciclovir for about a month after surgery, while 73 others received an inert substitute. During the first year, 14 were excluded from each group for reasons such as heart attacks and transplant rejection.

Ganciclovir had a long-term effect on patients who weren't getting drugs called calcium-channel blockers. These medications limit coronary artery spasms and slow progression of atherosclerosis. Of 28 who had received ganciclovir but not calcium-channel blockers, only 7 had heart disease 4 to 7 years after their operations. Of 25 patients who received neither, 13 had heart disease during those years, Valantine and her colleagues find. Ganciclovir seemed to impart little benefit for those who got calcium-channel blockers. *—N.S.*

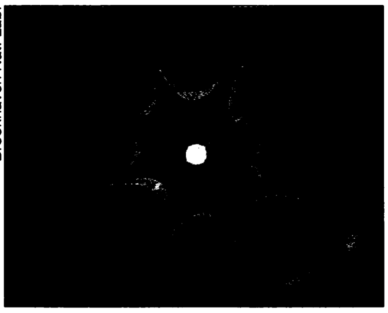
Physics

Ion collider, doomsday fears rev up

The knob is rattling on a door to the remote past. However, no monster lurks on the other side, say officials at the Relativistic Heavy Ion Collider (RHIC), a $600 million particle accelerator that took its first step toward full operation last month.

On July 16, gold ions began zipping around one of RHIC's two 3.8-kilometer rings at Brookhaven National Laboratory in Upton, N.Y. Rumors were already circulating that the machine, some 8 years in the making, might destroy Earth.

In experiments scheduled to begin in November, nuclei will collide in mighty blasts at six spots around the ring. Researchers expect protons and neutrons in the explosions to dissolve into wads of so-called quark-gluon plasma (SN: 9/21/96, p. 190), the primordial stuff from which all atomic nuclei were born in the Big Bang. "We are creating a new state of matter—new, that is, since the Big Bang," says Satoshi Ozaki, RHIC's director.



Brookhaven Nat. Lab.

The magnetic field around the collider beam (white dot) must vary little. Green area around the beam is within proper range.

The lab faces an odd safety question: Will collisions create black holes, starting a chain reaction that eats up Earth?

Each blast is too tiny to make a black hole, Ozaki says. Nevertheless, the lab has convened a panel to address the doomsday scenarios.

As RHIC comes to life, two other large, extraordinary physics tools are also debuting. At the Thomas Jefferson National Accelerator Facility in Newport News, Va., the world's most powerful free electron laser has attained an average power of 1.7 kilowatts—more that 150 times better than its predecessor at Vanderbilt University in Nashville. Both basic researchers and industry scientists are using the unusual laser.

Researchers working at Oak Ridge (Tenn.) National Laboratory have published results for the first time from the Holifield Radioactive Ion Beam Facility. The facility—the first of its kind in the United States and second in the world—accelerates beams of short-lived radioisotopes. In the July 5 PHYSICAL REVIEW LETTERS, scientists describe using a beam of unstable fluorine ions to study an elusive nuclear state of neon critical to understanding stellar explosions called novae. *—P.W.*

Taking bytes from molecular sandwiches

Here's an idea for creating inexpensive computer circuits that are faster and much denser than today's devices: Mass-produce cheap components from single molecules, then wire together the good ones while disabling the bad ones.

In the July 16 SCIENCE, Charles P. Collier of the University of California, Los Angeles and his colleagues describe their first steps toward such a molecular computer (SN: 11/8/97, p. 293).

The scientists made an array of devices by sandwiching a one-molecule-thick layer of synthetic organic chemicals called rotaxanes between electrodes. They showed that each device could be in a 1 or 0 state, like bits, and that two or three together could act as simple digital circuits. By applying a suitable voltage, they disabled selected devices to prove they could bypass flawed components without preventing others from working.

Philip J. Kuekes of Hewlett-Packard Laboratories in Palo Alto, Calif., who is one of the experimenters, explains that in these prototypes, electrodes sprawl across several million rotaxane molecules. Next stop on the route to devices using single molecules: The group is targeting nanometer-scale electrodes, possibly carbon nanotubes, linking to fewer rotaxane molecules per device. "We're working on it right now," he says. *—P.W.*