SCIENCE NEWS of the week

Gene Therapy Corrects Mouse Lupus

Researchers have used gene therapy to cure a lupuslike autoimmune disorder afflicting mice. They hope such research will lead to better therapy for humans suffering from systemic lupus erythematosus (SLE).

Lupus is a sometimes fatal disorder that can cause inflammation and injury to various parts of the body, including the joints, skin, kidneys, lungs, blood vessels, and central nervous system. People with lupus generate antibodies that launch an offensive against healthy tissue in their own bodies.

The mice that star in the new study develop a lupuslike condition also characterized by kidney disease, arthritis, and lung disease. John D. Mountz of the University of Alabama at Birmingham and his colleagues started that investigation with the knowledge that these mice suffered from a defect in a gene called Fas. They wondered whether this mutant gene and its protein product caused the massive autoimmune disease afflicting these mice.

The scientists began their experiment by obtaining mouse embryos that had inherited two copies of the flawed gene. Next, they inserted a normal Fas gene into the embryos and returned them to the fallopian tubes of female mice.

Less than 3 weeks later, those murine moms delivered their pups. The researchers then conducted tests to make sure the inserted gene had turned on in T lymphocytes, a type of white blood cell. Sure enough, the genetically engineered mice appeared to manufacture healthy amounts of the normal Fas protein. The team describes its work in the March 15 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES.

For 5 months, the researchers observed the mouse pups, looking for signs of the autoimmune disorder. They found no indication of kidney or lung disease or arthritis. The genetically engineered mice also showed no overproduction of antibodies that home in on the body's own tissues.

Prior to this study, researchers didn't know if a mutant Fas gene by itself could cause this disorder. The new findings indicate that the flawed gene is responsible for the destructive symptoms in mice, comments Michael D. Lockshin of the National Institute of Arthritis and Musculoskeletal and Skin Diseases in Bethesda, Md.

Mountz explains that a normal Fas gene directs the production of a protein receptor that plays a key role in apoptosis, or programmed cell death. That cellular suicide is the body's way of destroying immune cells that have a dangerous propensity to attack healthy tissue. The new research suggests that immune cells with a defective Fas gene don't get the message to commit cellular hara-kiri. Rather than self-destruct, they continue to mount their blitz against the body.

Further studies with this mouse model may offer scientists a glimpse of the mechanism underlying apoptosis, says Philip Cohen, a researcher at the University of North Carolina at Chapel Hill. Scientists still don't have a detailed picture of how an immune cell commits suicide, he adds.

Does a defect in apoptosis lead to lupus in humans? Nobody knows for sure. However, Mountz's team has unpublished research indicating that some people with lupus have a defect in the same gene. More than one gene probably regulates apoptosis in humans, Mountz says. He speculates that a variety of gene defects may underlie this disorder.

Right now, physicians give lupus patients steroid drugs, which Mountz believes may control symptoms by triggering apoptosis. But steroids also produce serious side effects, he adds.

If researchers can pinpoint the exact defect in humans, they might develop a targeted way to initiate cellular suicide. "If you could correct [the defect] at any point, you could potentially terminate the disease," Lockshin says, noting that such a therapy remains far from reality as yet.

—K.A. Fackelmann

Element 106 takes the name seaborgium

Of the elements with large atomic numbers, uranium remains the highest to occur naturally. Those with higher atomic numbers merit the title "transuranium" and are created by scientists using particle accelerators.

Soon, the transuranium element 106 will officially bear the name of the chemist who paved the way for its discovery, scientists announced at a meeting of the American Chemical Society in San Diego this week.

Element 106 will be called seaborgium, denoted Sg, in honor of Glenn T. Seaborg, who shared the 1951 Nobel Prize with Edwin M. McMillan for the discovery of plutonium and nine other transuranium elements. This marks the first time an element has been named after a living scientist.

Discovered in 1974 and confirmed last August, element 106 remained nameless for 2 decades because of questions about which scientific group found it first. In 1985, the International Union of Pure and Applied Chemistry (IUPAC) and the International Union of Pure and Applied Physics established the Transfermium Working Group to resolve the dispute.

In 1992, the group awarded joint credit for element 106 to scientists at the Lawrence Berkeley and Lawrence Livermore national laboratories in California. That gave the California scientists the right to name the element. They chose to honor Seaborg, who had contributed to the element's discovery and served as the group's mentor. The name becomes official when approved at the next IUPAC meeting.

When they published their discovery of element 106 in the Dec. 16, 1974 PHYSICAL REVIEW LETTERS, Berkeley chemist Albert Ghiorso and his colleagues described bombarding an isotope of the heavy element californium with oxygen ions. This produced element 106, with its half-life of 0.9 second. The scientists checked the element's presence by measuring alpha particle emissions as it decayed to form the "daughter" and "granddaughter" elements rutherfordium and nobelium.

Seaborg

In the March 7, 1994, issue of the same journal, Kenneth E. Gregorich, a chemist at Lawrence Berkeley, and his colleagues reported confirming element 106's existence.

Seaborg — a towering, lanky legend, who at 82 still serves as associate director-at-large of the Lawrence Berkeley Laboratory — described the honor as "greater than winning the Nobel Prize."

"A thousand years from now, seaborgium will still be in the periodic table, whereas the 20th-century Nobel Prize-winners will seem a very small part of history," said Seaborg, who also serves as chairman of the board of trustees of Science Service. "This honor will last as long as civilization."

—R. Lipkin