BIOMEDICINE

Diabetic receives gene-splice product...

A Wichita homemaker has become the first diabetic to be injected with insulin made by genetically engineered bacteria. The insulin is identical to the hormone normally produced in the human body and slightly different from the cow and pig insulin that diabetics usually receive. The bacterial human insulin has already been tested on healthy volunteers in the United States, England, Greece and West Germany (SN: 7/26/80, p. 53). In the first long-term clinical experiments, about 50 patients will eventually be included in the test group at the University of Kansas School of Medicine in Wichita and several hundred patients world-wide will receive the drug, says a spokesman for Eli Lilly and Co., the pharmaceutical company that produced the insulin in its Indianapolis plant.

and clinical trials planned on another

Insulin is the first product of recombinant DNA technology to reach clinical tests, but it won't be alone for long. Genentech, the genetic engineering specialty firm in south San Francisco, plans to begin clinical trials in February of bacterially produced human growth hormone (SN: 7/14/79, p. 22). The hormone will be administered to 20 patients for a year at the Great Ormond Street Hospital for Sick Children in London. It will be the first treatment for half the group; the others have already been receiving treatment for three years with growth hormone extracted from human cadaver pituitaries. An article in the Dec. 11 NATURE reported that an official at Kabi Vitrum AG of Sweden, Genentech's industrial partner in the human growth hormone venture, expressed reservations about the adequacy of preliminary testing, but a Genentech statement says the hesitancy was "apparently due to a lack of information on Genentech's progress in producing test material." The physician who will conduct the London trial says that Genentech's toxicity testing on animals has been sufficient and the United Kingdom Department of Health has approved the material for clinical trials.

Human antibodies custom-made to virus

Bolstering the human immune system with made-to-order antibodies now appears to be a practical disease-fighting strategy. Researchers at the Wistar Institute in Philadelphia have created lines of laboratory cells that produce large amounts of pure human antibody to the measles virus. They predict the technique can be extended to make antibodies against other disease agents, including the antibodies responsible for autoimmune diseases.

Carlo M. Croce, Hilary Koprowski and colleagues made the new cell line by fusing cancerous cells from a patient with multiple myeloma to blood cells from a patient with subacute sclerosing panencephalitis, a severe disease associated with measles virus. (Patients with that disease produce extremely high levels of antibody to measles virus.) In two out of 20 cell fusions, the descendants of the hybrid cells produced antibody that binds the measles virus. The antibody is specific for one viral component, the major polypeptide of the virus coat or nucleocapsid. In the Dec. 4 NATURE the scientists say that the technique that allowed them to obtain human cell hybrids that secrete antibodies for a pathogenic virus "represents a breakthrough in work toward the possible application of this technology to human immunotherapy." Similar work at Stanford University already had established cell lines producing human antibodies, but it used a less convenient source — cells from spleens instead of blood cells — to specify what antibody would be made (SN: 8/9/80, p. 85). That work demonstrated the feasibility of the approach but had produced no useful antibodies.

SPACE SCIENCES

Pioneer 6: Still spry at 15

On Dec. 16, 1965, a little, simple, inexpensive spacecraft named Pioneer 6 was launched into a sun-circling orbit, where its specifications called for it to survive six months of studying the sun and the interplanetary medium. Last month, having traveled some 15 billion kilometers in the course of 17.5 trips around the sun, the probe passed its 15th birthday — still on the job.

Held steady by the fact that it spins like a gyroscope (at 60 rpm), Pioneer 6 lacks the three-axis system of gas jets used to stabilize more sophisticated and expensive interplanetary probes — so it has no gas supply to use up. While spacecraft sent to the dim reaches of Jupiter and Saturn have needed radioisotope power supplies for electricity, Pioneer 6 merely uses solar cells, since its path between the orbits of earth and Venus exposes it to plenty of sunlight. It has no movable parts such as tape recorders or photographic "scan platforms," so almost the only specific malfunctions that can beset it are individual old-age failures among its more than 56,000 components. One such failure cost the use of the probe's magnetometer a decade ago, but its other five scientific instruments continue to provide data whenever NASA's deep-space tracking network is available to listen to them.

When the end finally comes, it will probably be due not to a specific "glitch," but to a progressive disease: the gradual reduction of the voltage from the solar panels caused by the darkening effects of solar radiation. Engineers at NASA's Ames Research Center in California now believe that the first symptom showed up last August, when Pioneer 6 unexpectedly "turned itself off." At the time, it was near its maximum distance from the sun, says Jack Dyer of Ames, and the voltage apparently reached the probe's built-in cutoff level, which was provided so that most of the equipment would go off while there was still enough power to operate the receiver. Engineers were thus able to command the craft back on — it is now closer to the sun, where the solar panels' output is higher — but they expect the turn-offs to reoccur with increasing frequency as time — and the solar panels — wear on.

Lightning on Venus: An earthly amount

Earth has been variously estimated to experience an average of between 2 and 10 lightning flashes per square kilometer per year. Some Soviet researchers have concluded from Venera lander data that Venus may have far more (a 40-fold excess, according to V.A. Krasnopolsky), but U.S. analyses of data from the Pioneer Venus orbiter place Venus more in the terrestrial range.

Scanning 12.3 hours of readings from the orbiter's navigational starlight-detector at times when the detector was pointing at the planet's nightside, William J. Borucki of the NASA Ames Research Center has found virtually no differences from times when the detector was pointing at dark space; in other words, no detectable flashes representing lightning visible at the top of the atmosphere. This suggests an upper limit of 30 flashes/km^2/year, says Borucki, assuming that Venus lightning has an amplitude distribution similar to earth's.

Signals recorded by the orbiter's electric-field detector, meanwhile, are consistent with at least 0.03 flashes/km^2/year, according to Frederick L. Scarf of TRW Inc., and the number could be higher. Scarf's instrument can count no more than 2 pulses per second, and has "often" seen that many, but detectors aboard the Venera 11 and 12 landers reportedly noted 25 pulses per second or more. (Krasnopolsky says that the earlier Venera 9 and 10 landers, from which he made his high global estimate, recorded as many as 100.)