BIOMEDICINE

Predicting leukemia relapses

Acute myeloblastic leukemia is most commonly found in adults and, unlike childhood leukemia, generally does not have a good prognosis. Now Michael A. Baker of the Toronto (Ontario, Canada) Western Hospital and his colleagues report in the Dec. 20 NEW ENGLAND JOURNAL OF MEDICINE that they have devised a means of determining which AML patients are most likely to have a relapse.

Baker and his colleagues tested the hypothesis that AML patients whose bone marrow reacts with antisera to leukemia cell-associated antigens will eventually relapse because the antisera reveal leukemia antigens in their marrow. The researchers took marrow samples from 47 patients in remission, determined whether the marrow reacted with antisera or not, then followed the patients' outcomes. Indeed, of 26 patients who eventually relapsed, 21 had shown marrow reaction to the antisera one to six months earlier — a highly significant result, strongly confirming the hypothesis and indicating that the antiserum is a pretty reliable tool for predicting AML relapses.

One more motherhood hormone

The female hormone estrogen has been implicated in the mothering instinct that mammalian mothers engage in after the birth of their offspring. Now another female hormone has also been involved, say Cort Pedersen and Arthur Prange of the University of North Carolina at Chapel Hill. The hormone is oxytocin, which has long been known to play a role in the birth process by helping the uterus expel a baby then clamp down to prevent bleeding.

Pedersen and Prange injected oxytocin directly into the brains of female virgin rats, then placed the rats into cages with newborn rat pups. Within 20 minutes, 42 percent of the female rats started showing five mothering behaviors toward the pups: They built nests, grouped the pups in the nests, licked the pups, attempted to nurse the pups and retrieved pups that were removed from the nests. Pedersen and Prange conclude that oxytocin helps trigger the mothering instinct as well as assists in the birth process.

Diabetes: More insights

Research into the causes, diagnosis and treatment of diabetes is leading to some interesting findings these days, and two of the more recent are reported in the Dec. 21 SCIENCE by Arthur Like of the University of Massachusetts at Worcester and his colleagues, and in the Dec. 6 NATURE by Mark van Houten and Barry I. Posner of McGill University in Montreal.

Past studies have suggested that juvenile diabetes has an autoimmune basis and possibly also a viral basis (SN: 9/9/78, p. 182; 6/2/79, p. 357). Like and his team now bolster evidence for an autoimmune hypothesis. They injected antiserum to rat lymphocytes (immune cells) into rats with a diabetes comparable to juvenile diabetes. The antiserum reversed diabetes in 36 percent of the animals. Then the investigators injected the antiserum into rats susceptible to juvenile-like diabetes, and it protected them from diabetes.

As for van Houten and Posner, they have found that blood vessels in the central nervous system have receptors that bind to insulin. Because diabetes is characterized by a paucity of insulin or insulin effects, and because diabetes often leads to blood vessel complications, van Houten and Posner suspect that their findings may have relevance for the vascular complications of diabetes. They are now trying to find out whether insulin-receptor blood vessels also exist outside the central nervous system.

EARTH SCIENCES

A deeper look at New Madrid

Among geological litanies is one that goes: For every earthquake there must be a responsible crustal structure. In most cases, the dictum holds true: Californians can point to the San Andreas fault for most of their geologic woe, while the Mideast quakes believed responsible for biblical miracles can be traced to the rifting of the Red Sea between Africa and Asia. But what about earthquake-prone places that aren't caught in some tectonic confluence?

Such is the problem that geologists have with the New Madrid, Mo., region — an area covering southeastern Missouri, southern Illinois, western Kentucky and Tennessee and northeastern Arkansas — that was the site in 1811 and 1812 of a series of quakes believed to be the most violent in U.S. history. Located in the center of a continental plate, no fault or plate boundary is visible that would account for the still active seismicity.

Recent studies uncovered a fault buried beneath Mississippi sediments that appears related to some of the activity (SN: 11/3/79, p. 310). But that structure appears too shallow to account for the deeper-focused quakes. Now, another look has revealed a 50-mile wide, 200-mile-long trough that may represent the region's original zone of weakness. Martin F. Kane of the U.S. Geological Survey in Denver told the American Geophysical Union meeting that the trough, or graben (an elongated crustal block, bounded by faults, that has dropped below its original level), was detected from anomalies in magnetic and gravity surveys. Stretching from Paducah, Ky., to Little Rock, Ark. and buried under 20,000 feet of sediments, the 10,000-foot-thick structure indicates, says Kane, that the region may at one time have begun a rifting process similar to that now splitting Asia and Africa. The stretching and thinning caused the graben to drop; related stresses on the weakened zone may be responsible for the quakes. The fault detected earlier lies above the graben and so is "intimately" related to the graben and the quakes, says Kane. But whether or not the graben is the ultimate answer to the geologists' prayer remains to be seen; other researchers still question if it can account for the area's deepest quakes.

Yellowstone's swell

To a nonscientist it may look like a park full of geysers and hot springs, but to University of Utah's R. B. Smith, Yellowstone National Park is "a natural laboratory for studying dynamic processes of the interior of the earth." Geologists can trace three cycles of intense volcanic activity there during the past two million years. The latest cycle, which created Old Faithful, began about 150,000 years ago and continued until 70,000 years ago. Scientists believe that a partially molten reservoir of material from the earth's upper crust may still underlie the caldera, or volcanic crater, formed about 600,000 years ago. And, Smith reported at the recent American Geophysical Union meeting and in SCIENCE (vol. 206, no. 4425), recent measurements indicate something may be brewing under the caldera.

According to Smith and co-workers J. R. Pelton and R. L. Christiansen, a comparison of leveling measurements made in 1923 with those made in 1975, 1976 and 1977 shows that the caldera is swelling about 14 millimeters per year, ranging from a total of 700 mm to 726 mm. The region is an elliptical dome that stretches from Old Faithful in the southwest to 40 kilometers northwest. The uplift suggests increased pressure from the addition of material to the molten reservoir believed to extend 250 km below the caldera, say the researchers. Whether or not it heralds a fourth round of volcanism is unclear. But the researchers assure that such activity would be preceded by "earthquake swarms, increased hydrothermal activity and further deformation of the surface."