Cold facts on diabetes

Children's chances of developing diabetes vary dramatically, depending in part on where in the world they live, according to the first international collaborative effort to examine the incidence of insulin-dependent diabetes mellitus (IDDM) in children. The study documents wide variation in its occurrence, with the average annual incidence for children under age 15 ranging from 1.7 per 100,000 per year in Japan to 29.5 per 100,000 in Finland.

The project, begun in 1986, is based on 24 registries in 15 countries. U.S. incidence ranges from a low of 9.4 per 100,000 in San Diego to 20.8 per 100,000 in Rochester, Minn. These differences in incidence are greater than those of most chronic diseases, notes the Diabetes Epidemiology Research International Group, reporting in the August DIABETES.

The work corroborates a previously observed connection between climate and IDDM risk, with higher risk in colder regions. Examining race and ethnicity as factors, the group found lower risk among U.S. blacks and Hispanics than among U.S. whites. In New Zealand, children of European descent are at three times the risk of the Maoris and Polynesians.

Causes of these "extraordinary" distribution differences remain unknown, says Marian Rewers of the University of Pittsburgh, who took part in the study. Both genetic and environmental factors appear necessary for the disease. Thus, the study group cautions that in future studies researchers must take care in interpreting geographic and climate factors in relation to such factors as lifestyle, diet, ethnicity and the prevalence of certain viruses.

Another study published this month echoes the theme that in diabetes, things are not always what they seem. In treating IDDM, many physicians attempt to keep blood sugar levels as close to normal as possible with intensive insulin therapy. This "tight control" approach, many believe, delays or prevents diabetes' serious complications, such as kidney failure, heart disease and blindness. But first-year results from a 10-year investigation of the benefits or drawbacks of the approach show it may lead to weight gain, which itself has potentially adverse consequences.

The report of the Diabetes Control and Complications Trial, which confirms and extends the findings of smaller, uncontrolled studies, appears in the July/August DIABETES CARE. The study involves 278 diabetics who are receiving a standard or experimental treatment. Both groups follow careful diets and self-monitor their glucose levels. Patients in the standard group give themselves the one or two daily insulin injections typically used to treat IDDM. Experimental patients give themselves more than three injections a day, or receive continuous insulin from an infusion pump, and adjust their diet and insulin to maintain strict glucose control.

Those in the intensive group gained "significantly more" weight in the first year: 5.1 kilograms versus 2.4 kg in the standard group. The researchers detected no relation between these weight changes and reported caloric intake or exercise. This leads them to suggest that improved utilization of calories produced the weight gain. "It was predictable, but this is the most scientifically valid demonstration yet that insulin causes people to gain weight," says Simeon I. Taylor of the National Institute of Diabetes and Digestive and Kidney Diseases, in Bethesda, Md. "It's an exquisitely well-controlled study."

Although the significance of the weight gain remains unclear, the researchers cite two negative implications. Patients' concerns about unwanted weight gain could diminish compliance with treatment, they note, and if weight gain persists, it could lead to higher blood pressure and increased risk of cardiovascular disease. *— C. Eron*

Stitch stops clot

Sutures laced with a natural clot-dissolving compound can significantly reduce the number of postsurgical blood clots in animals, and may prove useful in humans, researchers report. Clot formation is a common post-surgical complication, especially in smaller vessels. The clots can block circulation to nearby tissues, or break free and lodge elsewhere, blocking blood flow and oxygen supply to parts of the heart, lungs or brain.

Carlton A. Eddy, of the University of Texas Health Sciences Center in San Antonio, and his colleagues incorporated the anticlotting drug prostacyclin into a biodegradable polymer, polycaprolactone, and made the mixture into a monofilament suture. The researchers cut, then repaired, the left and right femoral veins in 13 rats, suturing one vein in each rat with the drug-containing filament and the other vein in each with an untreated polycaprolactone filament. Examination after 24 hours showed all drug-releasing sutures intact and revealed no clots. Eight of 13 untreated vessels contained dense blood clots that completely blocked the vessels.

The sutures may be tested in humans within the next two years, the researchers reported in San Antonio last week at the World Congress on Medical Physics and Biomedical Engineering. □

Vents would scald a primordial soup

Experiments testing how quickly organic molecules decompose at high temperatures are quenching a popular idea among earth scientists that life may have originated in vents of superheated water on the ocean floor.

"This is probably *the* most unlikely area for the origin of life to occur," says Jeffrey L. Bada from the University of California, San Diego, who reports on the experiments along with colleague Stanley L. Miller in the Aug. 18 NATURE.

In submersible dives during the late 1970s, researchers discovered vents near ocean ridge crests that spew out jets of water at temperatures greater than 350°C. The heat comes from chambers of molten rock below the ocean floor. Some oceanographers have suggested that in the oceans of the early Earth, heat from similar hydrothermal vents might have driven the chemical reactions that converted simple molecules into the first living organisms.

The reported discovery of bacteria cultured from 250°C vent water bolstered the idea that organisms can survive at such high temperatures; however, other researchers found that experimental error produced the appearance of bacterial growth and that no organisms live directly in the hottest vent water.

Biologists and chemists have objected to the vent theory for the origin of life because organic molecules are notoriously unstable at high temperatures, says Miller. Proponents of the vent theory have countered that high pressures at the ocean bottom may protect organic compounds from decomposition.

To test that argument, Miller and Bada measured how amino acids—the building blocks of protein subunits called peptides — survived at 350°C and 265 atmospheres, which is within the range of the 200 to 400 atmospheres of pressure at the ocean floor vents. The researchers found the amino acids decomposed quite rapidly, some within seconds. "The amount of stability you gain from [high pressure] is absolutely insignificant," says Bada. He adds that even if amino acids could survive in the vent outflow, they could not have joined together spontaneously to form peptides because this reaction requires dry conditions.

In an accompanying editorial Gerald Joyce of the Salk Institute for Biological Studies in La Jolla, Calif., says, "The problems of conducting useful chemical synthesis in the high-temperature outflow tract seem to be insurmountable."

Where, then, did life start? Miller speculates that some synthesis of important molecules probably happened in the atmosphere and then in lagoons, lakes or cool parts of the ocean. *—R. Monastersky*