Biomedicine

El Niño's health impact in Venezuela . . .

Cycles of malaria in Venezuela correlate with an abnormal weather pattern called El Niño. That's the conclusion of a study in the Dec. 3 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION by Menno Jan Bouma of the London School of Hygiene and Tropical Medicine and his colleagues.

Bouma's team studied 45 years' worth of data and 11 El Niños. In some places, an El Niño can result in excessive rainfall, but the effect in Venezuela is typically drought, Bouma says.

The team's findings show that Venezuela experienced a rise in malaria cases each year following an El Niño.

How does the weather pattern lead to more cases of malaria? No one knows for sure. One theory is that the drought triggered by an El Niño leads to famine. People who don't get enough to eat may not mount a vigorous immune response to the microorganism that causes malaria.

Bouma finds that explanation unlikely because the drought in Venezuela didn't result in food shortages.

His team favors another explanation. The scientists think that the mosquitoes that transmit malaria may experience a population explosion the year after an El Niño.

The authors suggest that early warning of an El Niño may help Venezuela and other malaria-prone countries prepare for the disease by stocking up on malaria-fighting drugs. An aggressive mosquito-control program might also help ward off the disease, Bouma notes. —*K.F.*

. . . and in Peru

Malaria isn't the only health concern related to El Niño. The unusually high temperatures the weather pattern brings to some regions have resulted in an upswing in the number of children suffering from diarrhea and dehydration in Lima, Peru.

So say Eduardo Salazar-Lindo of the Cayetano Heredia Hospital in Lima and his colleagues. The team monitored the patients admitted to the rehydration unit at the hospital and found a higher-than-expected number of cases of diarrhea and dehydration during the first 9 months of 1997. The researchers detail their findings in the Nov. 29 LANCET.

The authors wonder whether Peru and other countries affected by El Niño should brace not only for more diarrhea and dehydration but also for an outbreak of cholera, a disease characterized by these symptoms.

Researchers know that the bacterium that causes cholera lives in copepods, marine animals that feed on algae (SN: 4/6/96, p. 218). The speculation is that El Niño warms the water, leading to an algae bloom—and a rise in the copepod population. —*K.F.*

Quick fix for insulin resistance?

A 7-day course of walking or stationary biking helped some women turn around a dangerous condition called insulin resistance.

Researcher Michael D. Brown, now at the University of Michigan in Ann Arbor, and his colleagues studied black women with the condition, in which the body's cells don't respond readily to insulin's message to take up fuel in the form of glucose. Insulin resistance can lead to high blood pressure, which disproportionately affects black people in the United States. People with high blood pressure face a greater risk of heart attacks, stroke, and kidney failure.

The new study showed that even a short regimen of exercise could improve insulin's ability to remove glucose from the blood. The team noted that only 6 of 11 women remained insulin-resistant after the exercise program, which required about an hour a day of moderate cycling or walking.

The study, published in the December HYPERTENSION, suggests that women, and particularly black women, may reap a dramatic health benefit from a regular exercise program. —*K.F.*

Materials Science

From a meeting in Boston of the Materials Research Society

Sound waves track head injuries

People who have suffered head injuries often go through an uneasy period of watchful waiting to see whether their injuries become more severe over time. Computer-aided X-ray tomography (CT) can help in that surveillance, but brain scans are expensive and potentially dangerous if a comatose patient must be moved. Now, researchers are testing the feasibility of using an inexpensive ultrasound method to monitor the status of such patients at their bedside.

The method, being developed by researchers at the University of Cincinnati, involves attaching a sound wave emitter to a person's skull and recording an ultrasound "fingerprint," or pattern of images, of that person's head. Changes in the fingerprint indicate changes in the brain, such as swelling or the appearance of bleeding.

The ultrasound technique, says Peter B. Nagy, is like "looking through a frosted glass," unlike the clear picture of the brain given by a CT scan. For example, ultrasound can indicate that a change in the brain has occurred, but it cannot identify the exact location. If doctors notice a change, they can then order a CT scan, Nagy says.

So far, the researchers have tested the method on a fake head—a skull filled with gelatin, cadavers, and several healthy volunteers. They plan next to expand the study to head injury patients. —*C.W.*

Growing cells on a knitted polymer

On a loom originally designed for knitting fiber meshes used in the aerospace industry, Frank K. Ko of Drexel University in Philadelphia spins together polymer fabrics to guide the growth of cells—such as skin or bone cells—employed in medical grafts. Ko and his colleagues are studying how the overall structure of the fabric and the size of fibers influence cell growth.

The wide variety of available weaves provides the researchers with a range of nanostructures to study. Using these knitting techniques, they "can control fiber direction, porosity, and density [of the materials]," Ko says. Moreover, knitting is an easy, practical way of manufacturing large quantities of potential materials.

The researchers also examined the materials close-up and discovered that the size of the fibers affects the way bone cells grow on them in the lab. On fibers about 10 to 20 micrometers in diameter—the same width as a cell—the cells encircled the fiber like a bracelet. On fibrils one-tenth the diameter of a cell, the cells grew in one direction.

"That's very exciting," says Ko. "We know cells don't grow accidentally; they have a preference for different surface chemistries and electrical properties. Now we know to look at the nanostructure as well." —*C.W.*

Silk ties to keep bones together

Silk threads may one day stitch together not only clothing, but muscles and bones as well. Researchers are examining the material as a replacement for tendons and ligaments. Silk fibers have been used for years in surgical sutures and have nearly the same mechanical strength as tendons do, says Yasushi Tamada of the National Institute of Sericultural and Entomological Science in Tsukuba, Japan.

In order to be a good replacement for these body parts, however, silk would need to bind well to bone. Tamada, along with his colleagues at the institute and at Kagoshima University, chemically modified silk fabric and tested its ability to bond with a form of calcium phosphate called hydroxyapatite, the main mineral constituent of bone. Negatively charged phosphate molecules added to the silk enabled the fabric to absorb 10 times more calcium than untreated fabric and to support a growing layer of hydroxyapatite. —*C.W.*