Biomedicine

Heart defect may lie behind 'bends'

A hidden, residual defect in the heart, left over from early development in the womb, may explain many cases of decompression sickness, or the "bends," in adult scuba divers, preliminary research suggests. If confirmed in larger studies, the findings could lead to changes in the U.S. Navy's decompression tables, which spell out the maximum rate at which divers should ascend from deep dives. Or it may lead to stricter requirements for medical testing among those seeking certification for deep-water dives.

Decompression sickness results when tiny, dissolved nitrogen bubbles expand in blood before they can escape through the lungs as outside pressures decrease. Richard E. Moon and his colleagues at the Duke University Medical Center in Durham, N.C., examined the hearts of 30 patients with a history of decompression sickness. Using two-dimensional echocardiography, a technique more sensitive than traditional Doppler methods, the researchers sought evidence for a heart defect called patent foramen ovale. The defect consists of a small hole in the wall separating the left and right atria — a hole normally present before birth that usually closes in the first hours after birth. While it appears in only 5 percent of the general population, evidence of the heart defect showed up in 37 percent of the divers. Of 18 patients with the most serious decompression symptoms, 61 percent showed the defect.

"We know that in a substantial number of divers — sport divers and professional divers — bubbles do form in venous blood but are ordinarily trapped by the lungs," says Moon. "But in the event of a patent foramen, theoretically some gas bubbles could pass through the left atrium [bypassing the lungs] and be distributed to the tissues. What we show here is epidemiologic evidence of that."

The researchers, who report on their work in the March 11 LANCET, plan further studies to test the findings.

U.S. health: The good and the bad

In the United States, blacks have a shorter lifespan than whites, according to the most recent health statistics compiled by the U.S. Public Health Service. Blacks increasingly are dying of AIDS, pneumonia and homicide, says Department of Health and Human Services Secretary Louis W. Sullivan.

In a report released last week, the agency says the average black child born in 1986 will live an estimated 69.4 years, down from 69.5 years in 1985. In contrast, the average white American's lifespan keeps getting longer. The average white child born in 1986 will live about 75.4 years, up from 75.3 years in 1985, the report notes.

Infant mortality rates, one key indicator of the nation's health, continue at a disturbing level. "The mortality rate for black infants remains twice as high as that for whites," Sullivan says. Black infants die at a rate of 18 per 1,000 live births, compared with the white infant death rate of 8.9 per 1,000 live births. Overall, the nation's infant mortality rate declined by 2 percent from 1985 to 1986, reaching 10.4 deaths per 1,000 live births, according to the report.

Other highlights include statistics showing a 31 percent drop in the overall death rate due to heart disease between 1970 and 1986. The heart disease mortality rate for white males dropped 32 percent during this period, to 235 deaths per 100,000. For black males the rate declined 22 percent, to 294 deaths per 100,000.

However, death due to lung cancer increased in 1986 to 39 deaths per 100,000, up from the 1985 figure of 38.8 deaths per 100,000. For males, the lung cancer rate has risen steadily from 1970 to 1986. Lung cancer death rates among females nearly doubled during that same period, due to the increasing number of female smokers, the report says.

Earth Sciences

Flowering plants leave Earth cold

The dinosaurs roamed a world much hotter than the one we inhabit. Since the Cretaceous period, which ended 65 million years ago, the Earth's surface has cooled substantially, perhaps by an average 5° to 10°C. While scientists usually invoke plate-tectonic activity to explain this temperature drop, a climate researcher from New York University proposes that a certain class of plant may have played a large role.

The end of the Cretaceous marks the transition from the age of reptiles to the age of the mammals, but the plant world was playing out its own drama back then as well. At that time, the angiosperms or flowering plants — a group that includes grasses and deciduous trees — were starting to compete seriously with the more established type of land plant called gymnosperms, which includes coniferous trees. In the February GEOLOGY, Tyler Volk suggests the rise of the angiosperms could have cooled the Earth's surface by lowering the amount of carbon dioxide in the atmosphere and thereby weakening Earth's greenhouse effect.

Before humans entered the picture and started burning fossil fuels, the amount of carbon dioxide in the atmosphere represented a balance between two general forces: volcanic-tectonic processes that put carbon dioxide into the air, and chemical weathering of rocks that pulls carbon dioxide out of the air. Scientists traditionally have attributed the post-Cretaceous drop in atmospheric carbon dioxide to the slowing down of the source of the gas — namely tectonics.

However, Volk points out, angiosperm-deciduous ecosystems weather rocks much faster than conifer-evergreen systems, for reasons scientists don't understand. By constructing a model, he shows that the spread of angiosperms since the late Cretaceous must have increased the global weathering rates of rocks, which would lower atmospheric carbon dioxide and cool the world. In the past, scientists dealing with the carbon cycle have assumed that biological influences on weathering have not changed over the eons. Volk's theory joins a growing movement by scientists to examine how biological changes can affect the climate.

Quick flip-flop in the magnetic field

Boy Scouts learn that compass needles point to the north, but this survival fact will not always hold true. Over geologic time, Earth's magnetic field has flipped back and forth, sometimes pointing north and other times pointing south. Researchers have now found a relatively recent reversal in the magnetic field that had escaped almost all attention.

The evidence comes from rocks drilled from the ocean floor between the Philippines and Borneo as part of the Ocean Drilling Program's Leg 124, which ended in January. By examining magnetic grains buried in the sediments, the investigators found that the magnetic field reversed itself for a 10,000-year period about 1.1 million years ago. Signs of this switch had previously shown up in rock from an Oregon mountain, but scientists say they need evidence from more than one location to document a reversal.

The investigators found the reversal in both the Celebes Sea and the Sulu Sea, the two ocean basins they examined, says Eli Silver from the University of California at Santa Cruz, co-chief scientist on the cruise. Because sediments were rapidly accumulating in these basins at the time of the reversal, the sedimentary record from this region may help researchers study fine details about the magnetic flip-flop, he says. Geoscientists still do not know how or why the magnetic field switches polarity.

Leg 124's magnetic find came as a surprise, says Silver. The investigators were actually drilling in the area to learn how and when the two ocean basins formed.