Biomedicine

Joanne Silberner reports from Monterey, Calif., at the American Heart Association's Science Writers Forum

Heart work

Women in highly demanding clerical jobs with little supervision have a higher rate of heart disease, and certain women who work with video display terminals (VDTs) suffer an increased incidence of heart pain, according to studies by Suzanne Haynes of the National Center for Health Statistics in Hyattsville, Md.

After an analysis of data from the Framingham, Mass., heart study showed that women with clerical jobs suffered more heart disease than housewives and women with nonclerical jobs (SN: 2/9/80, p. 86), Haynes and Andrea Lacroix of Johns Hopkins University in Baltimore took a closer look to tease out the possible causes. They considered the level of job demand—such factors as frequency of overtime, tight deadlines and night work—and the clarity of supervision—whether the worker knew what was expected of her and how she was doing.

Among women with clerical jobs entailing high demand and little clarity of supervision, 31.3 percent developed heart disease in the 10-year period studied, compared with only 2.4 percent of women in low-demand, high-supervision jobs. (In a separate, national survey, Hayes reports, jobs such as stenography and waitressing were deemed to be highly demanding and low in supervision, while natural scientists, real estate agents and librarians were found to have low-demand, high-supervision jobs.)

In a study of telephone operators in North Carolina, Haynes compared 278 women who worked all day at VDTs, which constantly monitored their productivity, with 218 clerical workers in the same companies who did not use VDTs. Twice as many VDT users reported chest pain as clerical workers in the same companies—20 percent compared to 10 percent. VDTs, says Haynes, can be "the ultimate nonsupportive boss."

Heartening news for babies

A baboon heart was not the only life-prolonging option for Baby Fae (SN: 11/3/84, p. 276). Other babies in her situation have undergone surgical repair in a two-operation procedure developed by William I. Norwood when he was at Children's Hospital in Boston. Aldo R. Castaneda, head of cardiac surgery at Children's, says Norwood's operation, with a few changes, is now successful in over half the operations there. And in separate work, treatment for two other congenital heart defects has also improved due to tiny balloons that can be inflated in the heart.

Baby Fae had hypoplastic left heart syndrome, in which a small left side of the heart can't force blood out through malformed arteries and valves. "Until 1979 this was one of the few lesions you couldn't operate on," says Castaneda. "You would have to put the baby aside and wait for it to die."

The surgical procedure relies on shunting blood around a blocked valve and engineering a new route to the lungs; a couple of years later, the underdeveloped chamber on the left side of the heart is permanently bypassed.

Using a slight modification of Norwood's procedure, Boston surgeons have kept 14 of 25 children alive. And three of five children have survived the second operation. Castaneda doesn't see animal transplants as a quick fix for the condition. "Through the limited information that we have I would say it doesn't seem a major breakthrough in xenotransplantation."

Babies with either of two types of narrowing in the heart now have a brighter outlook. Balloons can be blown up in the narrowed areas to push them into a more normal configuration, says Jean S. Kan of Johns Hopkins University in Baltimore. In the procedure, a tiny tube with a deflated balloon at the tip is threaded into the heart. The balloon is inflated, and after it has done its work it is withdrawn.

Kan reports that she and her co-workers have achieved "lasting effectiveness" in 30 of 32 children with narrowed pulmonary valves. Seven of nine children who had constricted aortas despite surgery also benefited from balloons, she says.

Earth Sciences

When the earth quakes the sand blows

The 1886 earthquake in Charleston, S.C., was the biggest earthquake to rattle the eastern seaboard in 300 years of recorded history there. Now it appears that the Charleston area also played host to at least two earthquakes of comparable magnitude prior to the written record. The finding—by Stephen F. Obermeier, Gregory S. Gohn and colleagues at the U.S. Geological Survey in Reston, Va., adds to the understanding of eastern U.S. earthquakes, which have received increasing attention since the 1970s (SN: 10/10/81, p. 232).

The evidence for the ancient quakes rests with dozens of filled "sand blow" craters found exposed along the walls of a human-made drainage ditch spanning a few kilometers near Hollywood, S.C. Sand blows occur when the pressure of water contained in buried layers of sand is driven up by the violent and cyclic shaking of an earthquake until it becomes so great that the wet sand erupts like fluid in a fountain. According to Gohn, these sand geysers, which reached tens of feet into the air during the 1886 quake, typically result from earthquakes measuring greater than 5.5 on the Richter scale.

The researchers know that some of the craters predate those made during the 1886 earthquake because they are richer in humates, or organic matter. As reported in the Jan. 25 SCIENCE, radiocarbon dating of one crater puts its age between 1,380 and 4,680 years. Obermeier's group concludes that there were at least two earthquakes prior to 1886 because one of the larger humate-rich craters cuts across another. The researchers believe the earlier quakes were about as strong as the 1886 earthquake (magnitude 6.6 to 7.1) because the craters are all about the same size.

With the mechanism for the 1886 quake still to be resolved, the recent work shows at least that recurring large earthquakes near Charleston are possible. Now, says Gohn, sand blown craters provide a way to look in greater detail at the seismic history of the rest of the eastern United States.

Supercooled water in cirrus clouds

While the laws of physics demand that water spontaneously freeze at −40°C, atmospheric water frequently complies at much higher temperatures of −10°C and above because tiny ice crystals or other particles in the air provide ready nucleation sites for the water molecules. For this reason, atmospheric scientists have come to expect that drops of liquid water are very unlikely inhabitants of cirrus clouds, the thin, fleecy clouds that rule the high altitudes where temperatures can dip anywhere from −20°C to a chilling −60°C.

Now, however, Kenneth Sassen and his co-workers at the University of Utah in Salt Lake City say they have proved the conventional expectations wrong. In the Jan. 25 SCIENCE, the scientists report that they observed supercooled water drops in a cirrus cloud that was hovering over Boulder, Colo.

Recent remote sensing studies have suggested that liquid water might be present in cirrus clouds. But those data have been open to interpretation, says Sassen. What makes the study by Sassen's group more conclusive is that the group also took direct measurements of the cloud composition with an airplane. The aircraft records show that liquid water was found at temperatures of about −35°C.

Sassen's group used these data to estimate the effect of a thin layer of water in a cirrus cloud on the energy exchange in the atmosphere. Because water absorbs infrared energy, the addition of this layer caused an almost twofold increase in heating at the base of the cloud. But the layer also reduced the surface temperature by about 15 percent because it blocked the incoming sunlight. The net result is not known, explains Sassen, but the effects are important and should be considered in future climate models.