

Bidirectionality of AIDS questioned

Heterosexual transmission of the AIDS virus may be less likely than has been thought, two new reports suggest.

At the recent American Public Health Association meeting in Washington, D.C., epidemiologist Nancy Padian of the University of California at Berkeley described her study of 22 women partners of men who had AIDS or antibodies to the AIDS virus. Only one woman's blood showed signs of infection.

Heterosexual transmission estimates have been based on incidence rates in Africa, the U.S. Armed Forces and partners of intravenous drug users and hemophiliacs (SN: 4/27/85, p. 260), but it is possible that different factors are at work in these instances, Padian says. Among the possibilities: coexisting disease that promotes virus spread, a more virulent form of the virus or a greater susceptibility in certain women.

But given her small sample size, Padian is not ready to exonerate heterosexual contact, either vaginal or anal. "I feel I can argue it either way at this moment in time," she says.

In the Dec. 13 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, B. Frank Polk of Johns Hopkins University in Baltimore claims that no currently available data show significant female-to-male transmission of the AIDS virus, and that preliminary studies have failed to find the virus in cervical secretions from nonmenstruating antibody-positive women.

New beginnings for health research

Three months into fiscal 1986, President Reagan and Congress have approved an '86 budget for the National Institutes of Health (NIH). The Bethesda, Md.-based research center gets \$5.5 billion, up from Reagan's initial \$4.85 billion proposal (SN: 2/9/85, p. 85). Congress and Reagan approved the budget in December, but the final figure could change as a result of federal budget-cutting efforts. Included in the budget is about \$141 million of the \$244 million Department of Health and Human Services outlay for AIDS research.

In separate action, Congress overrode a presidential veto and established an arthritis institute and a center for nursing research at NIH. NIH, the Chicago-based American Medical Association and other organizations fought the override, saying it called for too much congressional direction of scientific research.

And Otis Bowen, an Indiana physician and politician (SN: 11/16/85, p. 308), was confirmed as the secretary of the Department of Health and Human Services, NIH's parent agency.

Asthma deaths increasing

In an analysis of national health data, R. Michael Sly of Children's Hospital in Washington, D.C., has found that the death rate from asthma has increased since 1977. While there were 0.8 asthma deaths per 100,000 people in the United States in 1977, this figure rose to 1.4 in 1982 and to an estimated 1.6 in 1984, he reported at the recent International Congress on Allergology and Clinical Immunology held in Washington, D.C.

Revisions in asthma definitions may account for some but not all of the increase, Sly says. Paradoxically, the availability of better drugs may have led to a more casual attitude toward severe asthma and thus to less careful treatment by both physicians and patients, he says.

Robert C. Strunk of the National Jewish Center for Immunology and Respiratory Medicine in Denver and co-workers recently found that 21 severely asthmatic children who died were psychologically less well-adjusted to their condition than were other children with the same degree of illness; the nationwide increase in asthma deaths, at least among children, could be due to the same unknown factor that seems to be pushing up the adolescent suicide rate, he hypothesizes.

JANUARY 4, 1986

Stefi Weisburd reports from San Francisco at the meeting of the American Geophysical Union

Oxygen trickle puts theory in a pickle

Oxygen atoms in the atmosphere can sometimes acquire enough energy from the sun's heat to escape the hungry grasp of the earth. This loss of oxygen is thought to be a rather rare event because the escape energy required depends on the mass of the atom, and oxygen is a fairly heavy element; lighter atoms like hydrogen are much more likely to zip off into space.

But now a group of space scientists has discovered that the trickle of escaping oxygen is much greater — 10^{37} times greater — than the theoretical rate associated with thermal processes alone. Using a spectrometer aboard NASA's Dynamic Explorer (DE-1) satellite, Andrew Yau of the Canadian National Research Council in Ottawa, along with Edward Shelley and William Peterson of the Lockheed Palo Alto (Calif.) Research Laboratory, found that about 5×10^7 kilograms of oxygen are lost from the polar regions of the ionosphere each year. This new value for the oxygen trickle is still small; it accounts for only 5 percent of the total oxygen content of the atmosphere over the last billion years. Moreover, the researchers estimate that this loss is more than counterbalanced by the addition of oxygen to the atmosphere from the dissociation of water vapor and the subsequent escape of hydrogen atoms.

But what is giving the oxygen atoms the extra energy to escape? Yau's group notes that the greatest amount of oxygen is lost when the activities of the sun and the earth's magnetosphere are at their peaks. The researchers think the oxygen atoms in the polar caps and the adjacent auroral regions of the earth are given an extra boost by charged particles, originally from the solar wind, which are trapped by and travel down the earth's magnetic field lines toward the poles. According to Yau, it wasn't until after the launch of the DE-1 satellite, which was the first spacecraft with the correct orbit and onboard instruments to see the effect, that the researchers realized there was a large outflow of energized oxygen atoms. "It was a surprise," he says. "No one had previously made a connection between magnetosphere physics and atmospheric processes."

Seismic waves trapped in a fault

Just as physicians use sonar waves to image the inside of the human body, so seismologists send seismic waves through the earth's crust to learn about its structure. Now seismologists at the University of Southern California in Los Angeles have an idea for using certain seismic signals not just to detect the static structure of the crust but also for real-time monitoring of the changes in this structure along a fault, in the hope of catching the stresses that build up prior to earthquakes.

The key to this idea lies with trapped, or standing, waves — the kind of waves that are set up in organ pipes. Peter C. Leary and his colleagues have recently recorded such waves in a fault intercepted by a bore hole in Oroville in northern California. The researchers believe the seismic waves, generated at the surface and sensed in the hole, become trapped in the fault zone because it is weaker and has more cracks than the surrounding rocks. This difference in strength and structure means that waves, which travel more slowly in the fault zone, are reflected back into the zone when they try to escape.

Waves trapped inside the fault zone are more sensitive to changes in the fault rocks than are waves that travel once across the fault; hence, Leary thinks they would be more diagnostic of fault stresses leading to earthquakes. The big question is whether standing waves can be set up or detected in large faults with significant earthquake potential. In particular the researchers would like to test their idea on the San Andreas fault with a bore hole 4 kilometers away in the Cajon Pass. This drill hole has recently been made the "kickoff" hole of the U.S. Continental Scientific Drilling Program, which plans to begin extending the 2-km-deep hole to 5 km next August.

11