Biomedicine

Kathy A. Fackelmann reports from Washington, D.C., at the annual meeting of the American Fertility Society

Let them drink cola

A 1989 epidemiologic study uncovered a connection between carbonated-beverage consumption and bone fractures among women over age 40 who had been athletes in college. That report sparked concerns that drinking lots of sodas might place women at risk of the degenerative bone disease called osteoporosis. Sodas made with extracts from the African tree *Cola acuminata* bore the brunt of that speculation because they contain phosphorus, which some scientists believe may spur bone loss by limiting the body's ability to use calcium.

To test the cola theory, researchers led by reproductive endocrinologist Samuel Smith at Sinai Hospital of Baltimore assessed the effects of a popular diet cola on bone density in rats, reasoning that many women opt for such low-calorie sodas. For three months, 20 laboratory rats had unlimited access to the diet cola and 16 others had unlimited access to water. The two groups received identical meals of rat chow.

Autopsies revealed that the leg and spinal bones of the cola drinkers were as dense as those of the control rats. The investigators say this refutes the notion that heavy cola drinking might cause weak bones.

However, these and other researchers say they don't recommend excessive swilling of cola or any other carbonated drink. Some women who drink lots of sodas might boost their risk of osteoporosis by cutting down on their consumption of calcium-rich milk, speculates Grace Wyshak of Harvard Medical School in Boston. Wyshak, who led the 1989 study, notes that U.S. soft-drink consumption has increased 300 percent in the last three decades. The women in her study reported drinking an average of 50 gallons of soda annually, she adds.

Seeking the AIDS virus in semen

AIDS is a sexually transmitted disease, yet scientists know very little about the prevalence of the AIDS-causing virus (HIV) in semen. A new report hints that semen from some HIV-positive men may harbor tiny amounts of the virus or none at all.

Bradley J. Van Voorhis, Deborah J. Anderson and their colleagues at Harvard Medical School obtained blood and semen samples from 25 homosexual men whose blood had previously shown antibodies to HIV. Using a technique called polymerase chain reaction (PCR), they searched the semen samples for a specific piece of HIV genetic material. They found the telltale DNA in only one of the 25 semen specimens.

Van Voorhis, now at the University of Iowa in Iowa City, says PCR typically detects one HIV-infected cell per million and thus may miss HIV at lower concentrations. Indeed, when the team cultured semen samples for a month, they discovered HIV in four of 24 samples.

Extremely low levels of semen HIV might help explain why some people remain free of the infection despite unprotected sex with an infected partner, Van Voorhis says. Anderson notes, however, that other research by her team showed that some infected men intermittently shed HIV in semen — a finding that underscores the gamble of unprotected sex. She and her co-workers are now attempting to unravel the mechanism underlying such shedding, in hopes that the work could lead to new methods of blocking sexual transmission of HIV in some cases.

In addition, future studies may improve the safety of donor semen used by infertile couples, Van Voorhis speculates. Semen consists of sperm and white cells, and the researchers suspect that semen HIV may reside in the white cells. If the researchers can confirm that suspicion, he says, clinicians might siphon out the white cells before sending sperm to donor banks. Fertility clinics currently screen semen donors with a blood test for HIV antibodies, which may fail to identify infection, he says.

Space Sciences

Jonathan Eberhart reports from Charlottesville, Va., at a meeting of the American Astronomical Society's Division for Planetary Sciences

Mars: Let it snow, let it snow...

The idea that snows might blanket the Martian poles first surfaced in the mid-1960s, when Earth-based studies showed Mars' seasonal polar caps consisted of frozen carbon dioxide (dry ice). Because those caps form in darkness, during the fall and winter, neither spacecraft nor Earth-based telescopes have observed whether that "ice" resulted from the condensation of frost or the falling of snow. However, new analyses of old spacecraft observations of Mars' poles now indicate snowstorms of "dry ice" are likely and probably very common, according to three California astronomers.

David A. Paige of the University of California, Los Angeles, and his colleagues reviewed infrared views of the poles recorded by the Mariner 9 Mars-orbiter in 1971 and 1972 and by two Viking orbiters between 1976 and 1979. They show that clouds of carbon dioxide in the Martian sky "are very dense and extend from the surface to altitudes of over 30 kilometers," Paige reports. During the cold seasons, another 3 millimeters of frozen carbon dioxide accumulates on the polar surfaces daily, he says, building to a depth of more than 1 meter.

Paige's team interprets the Mariner 9 data as indicating that carbon dioxide particles condense at the cloud tops and rain out as snow. Relatively little surface frost even forms if the clouds are overhead, they say.

The seasonal variations in the thickness of these snowy polar deposits may result from changes in Mars' orbital motion around the sun, Paige's team says. The researchers suggest that core samples collected from the polar caps by future Mars-landing craft may help further resolve the processes that affect climate change on Mars — and on Earth.

Oljato revisited

In December 1979, when Lucy A. McFadden first examined a mysterious, sun-orbiting object — now called 2201 Oljato — she could not discern whether it was a bare, rocky asteroid or a "dying" comet that had lost most of its ice. Ultraviolet observations of the celestial body by McFadden, a physicist at the University of California, San Diego, proved inconclusive, and measurements by other astronomers provided evidence for both possibilities. Now, after re-reviewing her own and other researchers' analyses of the object, McFadden remains uncertain of its origin, but she says the best available evidence argues that "we perhaps should now call [it] a comet."

The object's brightness, which astronomers have measured at different wavelengths, is "not characteristic of asteroids," she says. Moreover, radar beams bounced off 2201 Oljato's surface do not yield continuous echoes, she notes, thereby indicating that something — such as an irregular covering of ice — is absorbing part of the radar's energy. Finally, if Oljato were a comet, vaporization of its ice as it neared the sun would liberate water. McFadden's new calculations of its optical properties fit with the release of 40 kilograms of water per second.

Two new cometary molecules

French astronomers report finding both hydrogen sulfide (H_2S) and methanol (CH_3OH) in comets Austin and Levy — molecules not detected previously in comets. Jacques Crovisier of the Paris-Meudon Observatory and his co-workers discovered the new cometary ingredients during their spectroscopic analysis of the comets' microwave emissions, detected using the 30-meter radiotelescope at the Institut de Radioastronomie Milimetrique at Pico Veleta in Spain.

Crovisier's group notes that methanol and hydrogen sulfide solidify in space only at very frigid temperatures — below 100 kelvins and 60 kelvins, respectively. They say the presence of these molecules suggests the comets formed in the solar system's cold, outer reaches — beyond Uranus and Neptune.