

Excess Vitamin A Causes Birth Defects

Women who consume large amounts of vitamin A early in pregnancy increase their risk of having children with serious birth defects.

A study of more than 22,000 pregnant women indicates that taking almost four times the recommended daily amount of vitamin A results in a higher rate of birth defects affecting the face, head, brain, and heart. "Any woman who may become pregnant should be aware of the risks associated with excess vitamin A intake," says lead investigator Kenneth J. Rothman of Boston University School of Medicine.

Furthermore, damage to the developing fetus may occur before a woman even knows she is pregnant, he explains. And because vitamin A is stored in fat tissues, taking excessive daily doses prior to conception may also cause problems.

The researchers note that some multivitamin formulations, as well as many vitamin A supplements, contain 10,000 international units (IUs) or more—an amount that places babies at risk. The current recommended daily allowance for adult or pregnant women is 2,700 IU.

Although vitamin A is essential for normal embryonic development, researchers have been suspicious of excessive amounts for some time. Chemical cousins of the vitamin—including the anti-acne drug Accutane—cause malformations of the head and face, the central nervous system, the thymus, and the heart. Excess vitamin A has been shown to cause similar defects in animals.

Earlier human studies indicated an association between vitamin A and birth defects. In light of such evidence, some physicians advised pregnant women against excess vitamin A, although they could not tell the women what dose was hazardous to their fetuses.

The Boston researchers studied 22,748 pregnant women from 1984 through 1987. The investigators interviewed each woman about the type and amount of food she ate and the type and amount of vitamins she took in the early months of pregnancy. The researchers then estimated the total amount of vitamin A each woman ingested daily, divided the women into groups depending on the kind and amount of vitamin A taken, and compared the rates of birth defects in their infants.

As the researchers reported last week at a press conference in Boston, 1.3 percent of babies born to women who took 5,000 IU or less of vitamin A supplements had cleft lip, cleft palate, hydrocephalus (fluid on the brain), or major heart defects. In contrast, 3.2 percent of infants

born to women who took over 10,000 IU per day had such defects. Researchers estimate that 1 in 57 infants of mothers who took the higher dosage suffered birth defects as a result of the supplementation.

Excess beta carotene—a precursor to vitamin A—did not cause an increase in birth defects, however. Rothman explains that beta carotene must be converted into vitamin A in the body and that "the body regulates the amount of beta carotene it converts."

John A. Harris of the California Birth Defects Monitoring Program in Emeryville, Calif., says this study "just illustrates how important it is to look at the nutritional contribution to birth defects." He notes that while the Boston group's findings are intriguing, he worries that women considering pregnancy will avoid

all multivitamins in response to the news.

"Taking multivitamins containing folic acid during the very earliest stages of pregnancy has been shown to prevent defects like spina bifida," Harris points out.

Rothman agrees that vitamin supplements are important for people whose diets are deficient in vitamins. Taking vitamin A in recommended amounts and eating fruits and vegetables rich in beta carotene do not increase the risk of having babies with birth defects, he emphasizes. But he maintains that women should ensure that they don't exceed those amounts.

The group's findings will be published in the Nov. 23 NEW ENGLAND JOURNAL OF MEDICINE. The journal released the findings early as a public service, its editors say.

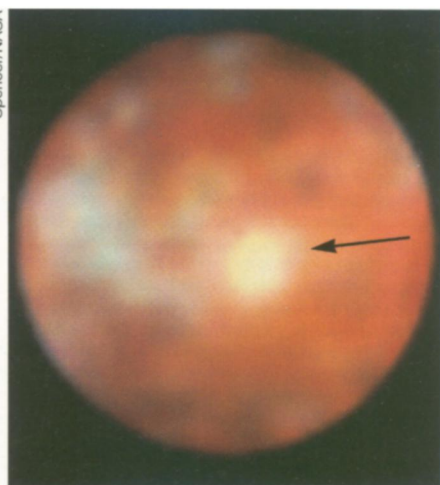
—L. Seachrist

Hubble finds surprises in solar system

Designed to image the most distant denizens of the universe, the Hubble Space Telescope rarely gazes at objects in our solar system. But Hubble observations over the past few months document acts of violence among a variety of Earth's neighbors. These include an apparently fresh volcanic eruption on Jupiter's moon Io and the ejection of a blob of material from Comet Hale-Bopp.

Astronomers presented the pictures this week at the annual meeting of the American Astronomical Society's Division for Planetary Sciences at Kohala Coast, Hawaii.

Planetary scientists planned last July's photo shoot of Io—the only volcanically active moon known in the solar system—as a scouting mission for the Galileo spacecraft. Researchers hoped that Hubble might record an intriguing feature that Galileo could examine in detail during its upcoming tour of Jupiter and its moons. But Io investigators John R. Spencer of Lowell Observatory in Flagstaff, Ariz., and his colleagues got more than they bargained for.

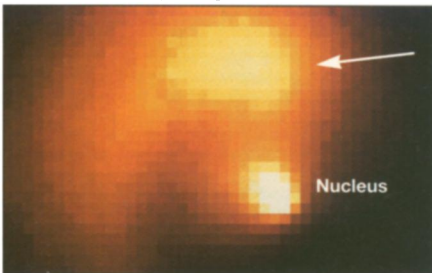


Yellow-white feature (arrow) on Io may represent a fresh volcanic deposit.

The images reveal a huge yellow-white spot that may represent the freshest volcanic deposit ever imaged on Io. Some 320 kilometers in diameter, the spot surrounds the volcano Ra Patera. Spencer suggests that the spot's location and color, yellower than previously recorded bright features, indicate that the blemish is frozen sulfur dioxide from a recent eruption of Ra Patera.

The yellow-white feature does not appear in Hubble images taken 16 months earlier, suggesting that it formed recently, he adds. Indeed, the emergence of the spot represents the most dramatic change recorded on Io since 1979, when the moon was last viewed close-up, by Voyager 2.

Spencer rejects the notion that Io is



Blob of material (arrow) ejected from the nucleus of Comet Hale-Bopp.

suffering volcanic eruptions more frequently now than it did in the past. "It's hard to believe that [nothing much] has happened in the 15-year gap between Voyager and Hubble," says Spencer. The Hubble images "suggest that eruptions happen from time to time and then fade without a trace."

Visible-light telescopes on Earth could not have detected the bright spot. But ground-based infrared telescopes—if they were focused on Io at just the right time—probably would have recorded the "hot spot" that must have accompanied the eruption, Spencer speculates.

Because Hubble's wide-field and planetary camera took images at 11 visible-light wavelengths, researchers have a chance of identifying the chemical composition of the spot. Sulfur dioxide is a likely candidate, says Spencer, since it's a known resident of Io's atmosphere and associated with volcanic activity on the moon. Detailed infrared spectra taken by Galileo once it reaches Jupiter in December may unveil the composition—if the spot hasn't already vanished.

Imaging a tiny object beyond Jupiter's orbit, Hubble recently recorded another type of outburst. Observations of newly discovered Comet Hale-Bopp taken Sept. 26 brought both good news and bad news. Harold A. Weaver of Applied Research Corp. in Landover, Md., and his colleagues had hoped Hubble would take a high-resolution image of the comet, which may dazzle skywatchers when it nears the sun in April 1997 (SN: 9/23/95, p.200). But an error in positioning Hubble prevented it from taking spectra of the comet or imaging the body at a resolution sharp enough to estimate the size of its nucleus.

The comet pictures do reveal a blob of debris flung out of the nucleus, however.

Weaver says the debris probably represents a chunk of the comet's icy crust hurled into space by a combination of solar heating and the comet's rapid rotation. The spiral path of the debris, he adds, reflects the rotation of the nucleus, which completes one revolution in a week.

Piecing together data from Hubble and images taken hours to days later by a

telescope at Teide Observatory in the Canary Islands, Spain, Weaver estimates that the debris moves at 109 km an hour and probably separated from the comet a mere 2 days before Hubble took the picture. Hubble will try to achieve its original goal—obtaining a high-resolution image and spectra—at the end of the month. —R. Cowen

Controversy sparks panel

To avoid any repeat of the sort of abuses some people suffered in federally sponsored radiation experiments before and during the Cold War, President Clinton last week set up a committee charged with setting clear ethical standards for human research.

At a White House ceremony, Clinton described the National Bioethics Advisory Commission (NBAC), whose members will also comb existing federal research involving humans for ethical flaws. The President proposed the NBAC in response to the highly publicized reports of his Committee on Human Radiation Experiments. He accepted that committee's final report at the same event.

Both the committee's preliminary release of details on government-supported radiation experiments from 1944 to 1974 (SN: 10/29/94, p.276) and like studies by the Department of Energy last year revealed a startling pattern of secrecy and "abuse of patients' trust," according to committee head Ruth R. Faden, a bioethicist at Johns Hopkins University in Baltimore.

Some of the secret studies were part of the Manhattan Project, the World War II effort to build an atomic bomb.

In these experiments, researchers injected plutonium into people with cancer or other ills to note how long they'd retain the radioactive material. The injections offered patients no known benefits.

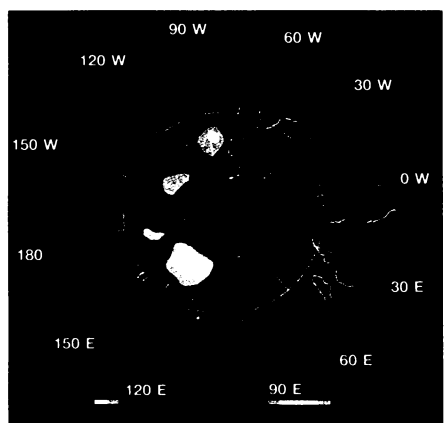
Last week's final report paints a more complete mural of the nearly 4,000 biomedical radiation studies. Most of them, the report states, involved radioactive tracers in amounts similar to those used today, and "most... were unlikely to have caused physical harm." These included immune-linked tracers for insulin, studies that spawned today's radioimmunoassays for trace hormones and other molecules.

But the report contrasts this work to such quiet Manhattan Project experiments as those designed to find what total body irradiation does to people with tumors known to be unresponsive to radiation.

Because the committee also found signs of "serious problems" in today's research—though nothing like what's in the Cold War report—the NBAC will probably begin with those.

Seriously ill patients, the report notes, may have unrealistic expectations about enrolling in studies because consent forms may be overly optimistic. —M. Centofanti

Ozone hole reemerges above the Antarctic



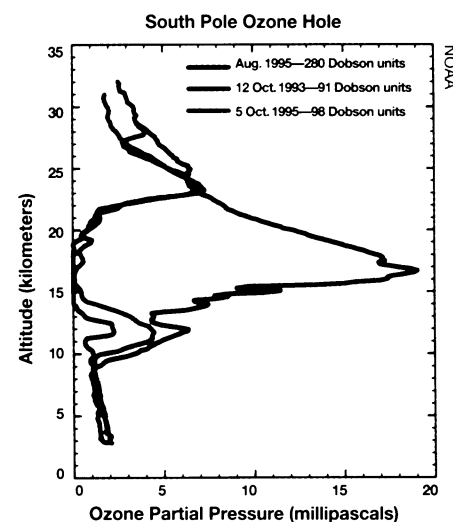
Like a continent-sized infection, the ozone hole has once again eaten its way across the Antarctic sky, reaching near-record proportions last week.

Each year since the late 1970s, much of the stratospheric ozone above Antarc-

Ozone hole appears as a magenta blotch over Antarctica in this satellite image (left). Graph (right) compares 1995 ozone loss over the South Pole (green line) with that of 1993 (red line). Blue line shows values before destruction started.

tica has disappeared during September, creating what is popularly called the ozone hole. Caused by chlorine and bromine pollution in the atmosphere, the ozone loss normally peaks in mid-October. The hole usually closes in November, when ozone-rich air from the north moves over Antarctica.

According to David J. Hofmann of the National Oceanic and Atmospheric Administration in Boulder, Colo., scientists tracking conditions at the South Pole measured ozone concentrations of 98 Dobson units last week. Though extremely low, the values did not break



the record established in 1993, when ozone dipped to 91 Dobson units at the South Pole. At that time, ozone loss spread over 23 million square kilometers, a region almost the size of North America.