

the urethra and the kidney's major collecting duct, while the newly induced epithelium becomes the organ's plumbing. In the knockout mice, this transformation did not occur, and the knob eventually shrank, Kreidberg says.

The Wilms' tumor-suppressor gene directs the production of a protein whose molecular structure suggests it binds to DNA, either activating or suppressing gene activity. "But how that contributes to kidney development is really unknown," says Kreidberg, who hopes the mouse strain will provide researchers a way to study this process.

"Now people can look at particular target genes for Wilms' tumor gene regulation, and it provides a model system for testing various mutants," Williams says.

The Whitehead group would also like to use the mouse as a model for studying how these faulty suppressor genes lead to Wilms' tumor. Children who inherit one good and one bad copy of the gene can develop kidney cancer if the good copy gets destroyed or misplaced somehow in one cell, which then multiplies out of control. That one bad gene can also lead to malformed genitals and urinary tracts, the scientists note.

But, unlike people, mice do not develop the tumor, even if they're born with just one copy of the suppressor gene, says Kreidberg. So the researchers hope to figure out a way to disable both copies of the normal gene after the kidneys form. Then perhaps these mice would get cancer.

— E. Pennisi

## 1976 dioxin accident leaves cancer legacy

Next week in Arlington, Va., the Environmental Protection Agency will hold a workshop to review human data on the toxicity of dioxins. One sure topic for discussion will be a paper, published this week, reporting elevated cancer rates among adults near Milan, Italy. All had lived in areas downwind of a 1976 chemical accident in Seveso that resulted in the highest documented human exposures to TCDD, the most potent dioxin.

In the September *EPIDEMIOLOGY*, Pier Alberto Bertazzi of the University of Milan and his co-workers describe how they tracked down nearly all 20- to 74-year-olds who had resided in one of three areas through 1986: about 550 people from neighborhoods nearest the Seveso accident; roughly 4,000 from a less contaminated zone; and some 26,000 persons from areas with low and patchy dioxin tainting. They identified cases of cancer from area hospitalization records.

Few cancers turned up among people who had lived nearest the accident—even in those who had developed a disfiguring acne from their initial, heavy dioxin exposure. However, with so few people in this group and the short follow-up, this "cannot be taken as sound indication of a lack of carcinogenicity," Bertazzi's team says—especially in light of a numerically small but statistically significant excess of cancers in the next-most-exposed region.

Here, the scientists found a quintupling in the expected incidence of gallbladder and bile duct cancers among women and a more than doubling in men. They also observed about double the expected rate of cancers in blood-forming tissues, but which cancers predominated differed between men and women. An apparent excess of certain soft-tissue sarcomas showed up in both sexes, and among men, the researchers saw twice the expected rate of liver cancer.

Even in the patchy-exposure zone, Bertazzi's team observed a slightly elevated incidence of some of these cancers.

The incidence of estrogen-dependent cancers, such as those of the breast and uterus, by contrast, were strikingly lower than expected in the two most exposed zones. Similar trends, seen in dioxin-exposed rats, have been explained by TCDD's ability to decrease the number of estrogen receptors in some tissues and to interfere with the hormone's metabolism.

In an accompanying editorial, Olav Axelson of University Hospital in Linköping, Sweden, concludes that these Seveso data "certainly represent sound epidemiology and are crucial contributions to the elucidation of the relations between dioxin-related exposures and cancer risk."

— J. Raloff

## Mars Observer: The sounds of silence

Acknowledging that the first U.S. mission to Mars in 17 years is almost certainly a failure, NASA has appointed a task force to find out what went wrong. Engineers lost contact with the Mars Observer spacecraft on Aug. 21, just three days before it was to begin orbiting the Red Planet. NASA scientists say they now have little hope of regaining communication with the craft.

"I think it's lost," says Glenn E. Cunningham, project director for the Mars Observer at NASA's Jet Propulsion Laboratory in Pasadena, Calif.

Because of the craft's silence, no one knows whether Mars Observer fired its thrusters on Aug. 24 as planned and entered an orbit around Mars or if it simply flew past the planet. The \$980 million space vehicle might also have been blown to bits shortly after ground controllers commanded it to pressurize its fuel tanks. That normally routine procedure, which requires the craft to detonate a gas valve, may have fatally jarred electronic equipment or caused an explosive leak in the fuel system.

NASA scientists now theorize that a master clock, the timekeeper for most of the craft's computers, may have contained a faulty pair of transistors, each of which controls a duplicate timer. If both failed after the tanks were pressurized, the craft's computers could not function and the Observer would remain lost in space.

That explanation, researchers note, is only one of many under investigation by the NASA task force, headed by Timothy Coffey, director of the Naval Research Laboratory in Washington, D.C. The theory came to the fore because of problems discovered in a similar master clock before the launch of the NOAA-13 weather satellite. During testing last June, researchers found that the satellite's master clock failed to operate. They traced the problem to a faulty weld in a transistor and replaced the defective parts before

the Aug. 9 launch of the weather satellite, which has since failed for other reasons (SN: 8/28/93, p.134).

The finding came too late for the Mars Observer, launched in September 1992 with a master clock containing transistors from the same troublesome lot. However, Charles Thienel at NASA's Goddard Space Flight Center in Greenbelt, Md., says it's unlikely that two transistors failed on the Observer, because testing revealed only a few defective transistors in the manufacturing lot.

Thienel said that an earlier weather satellite, NOAA-8, had a problem with its master clock in 1984. But only one of its two timing devices was affected. After about eight months, an interval during which the satellite remained silent for weeks at a time, NOAA-8 finally switched to its backup timekeeper. It remains unclear whether the experience with NOAA-8 warrants a glimmer of hope that Mars Observer might eventually resume useful communication with Earth.

This week, NASA began considering several strategies for carrying out some of the studies that would have been conducted by Mars Observer. NASA manager Wesley T. Huntress says that spare parts from the Observer might be assembled into another craft, possibly as early as 1994. However, a limited supply of the costly rockets needed to launch the craft and transfer it into a Martian orbit could hamper such efforts, notes John Logsdon, a space policy analyst at George Washington University.

Scientists are also considering using small satellites originally intended for defense research to study Mars. One such craft, known as Clementine, is scheduled for launch in January to explore the moon. But at least one researcher expressed concern that NASA may be grasping at straws in an effort to salvage some of the scientific treasures the agency had hoped Mars Observer would radio home.

— R. Cowen