Gene blocks prostate cancer's journey

Like an insidious invader, cancer cells can spread through the bloodstream, spawning tumors at distant sites.

Prostate cancer, however, can be a reluctant traveler. Yet for an unlucky few men, this cancer can metastasize and kill. To date, doctors have had difficulty diagnosing prostate cancers likely to spread.

Now, a study reported in the May 12 SCIENCE suggests that prostate cancer patients with reduced expression of a particular gene may run the risk of metastasis.

J. Carl Barrett of the National Institute of Environmental Health Sciences in Research Triangle Park, N.C., and his colleagues had had hints that the KAI1 gene on chromosome 11 retards cancer's lethal movement. When working properly, such a suppressor gene carries the blueprint for a protein that slows the spread of cancer.

Would KAI1 thwart the movement of aggressive prostate cancer cells? To find out, the team first isolated KAI1 from human chromosome 11 and inserted it into prostate cancer cells taken from rats. Next, the researchers injected these treated cancer cells just under the skin of 58 mice. A group of 52 control mice received an injection of rat prostate cancer cells with no human KAI1 gene.

After about 4 to 5 days, the malignant rat cells took hold and produced a cancer at the injection site in both groups of mice. This indicates that KAI1, unlike a classic tumor suppressor gene, is powerless to stop a primary tumor's growth, says Jin-Tang Dong of Johns Hopkins University School of Medicine in Baltimore.

But KAI1 does seem to curb the cancer's spread. The researchers let the original tumor grow for about 43 days and then studied the lungs, a common site of metastasis.

All of the control mice showed malignant cells on the surface of the lung. The researchers noted an average of 30 to 47 metastases per untreated mouse.

Of the 58 treated mice, 53 developed malignancies in the lung. Yet mice with a high expression of the human KAI1 gene fared best in the race to beat the cancer's travel: The team found between six and seven metastases per mouse.

Those results hint that KAI1's protein product somehow prevents or slows prostate cancer's ability to journey through the bloodstream, comments David I. Kleinerman, a researcher at the University of Texas M.D. Anderson Cancer Center in Houston. Kleinerman and his colleagues have studied another gene involved in the suppression of prostate cancer.

"It's an excellent paper," Kleinerman says. He wonders whether such research may one day lead to a drug that will boost expression of KAI1 in prostate tumors, thus reducing a man's risk of metastatic cancer.

Barrett's team believes KAI1 may lead to a diagnostic test for travel-prone prostate tumors. He predicts that "cancers where the KAI1 gene is not expressed would have a higher probability of being metastatic."

Men who got such bad test results could undergo more aggressive therapy, Barrett adds. — *K. Fackelmann*

Hubble eyes evidence of comet reservoir

Flaunting dusty tails as they near the sun, short-period comets, by definition, visit the inner solar system at least once every 200 years. Over a span of about 10,000 years, some of these icy bodies break apart or crash into the sun, a planet, or a moon. Gravity ejects others. Nonetheless, about the same number swings past the inner planets each year, suggesting that the solar system harbors a reservoir of these comets.

Astronomers call this vast, ring-shaped storehouse, thought to lie beyond the orbits of Pluto and Neptune, the Kuiper belt (SN: 11/19/94, p.334).

Since 1992, astronomers have used ground-based telescopes to detect 23 objects whose orbits and distance from Earth suggest that they populate this proposed reservoir. However, most of those objects have a diameter of more than 100 kilometers, at least 10 times bigger than the typical comet for which astronomers have size estimates.

Now, in a single day of observations with the Hubble Space Telescope, astronomers report that they may have found another 30 or so members of the belt. Moreover, the researchers estimate that these bodies are far smaller, about 6 to 10 km in diameter. In fact, they are similar in size to Comet Halley and may directly replenish the supply of short-period comets.

In their initial announcement, the researchers took a cautious stance, calling their finds "candidate Kuiper-belt objects." That's because the scientists rely on statistical arguments to place the objects in the Kuiper belt and because the exact orbits of the faint bodies remain unknown. But if the new findings are confirmed, says study coauthor Anita L. Cochran of the University of Texas at Austin, "this is the final chapter in finding the belt."

She and her colleagues — Harold F. Levison and Alan Stern of the Boulder, Colo., office of the Southwest Research Institute and Martin Duncan of Queen's University in Kingston, Ontario — initially reported their discovery in an April 17 circular of the International Astronomical Union (IAU). They have since revised their findings and will present new details in June at a meeting of the American Astronomical Society in Pittsburgh.

Because they sought only objects in the solar system, team members directed Hubble to view a patch of sky that appears virtually devoid of stars and galaxies in archival photographic plates. The group further eliminated unwanted signals by subtracting light from objects beyond the solar system in each of the Hubble images.

The faint, barely detectable blobs remaining could presumably have come from only two possible sources: "noise" from the telescope's electronic light detectors or light reflected from a body in the distant reaches of the solar system.

To verify an object's presence in the Kuiper belt, Cochran and her colleagues used two methods to combine the light emissions recorded in all the images. In one, they shifted the images to mimic the motions of more than 100 possible orbits of comets in the belt. In the other, in an effort to weed out electronic noise masquerading as real objects, they shifted consecutive images in a direction exactly opposite to the expected orbital motion of comets in the Kuiper belt.

Using the first method, the researchers detected 244 objects. Using the second, they found 185 objects, they report in the IAU circular. The difference between the two results suggested that the group had discovered 59 possible Kuiper belt residents. An updated analysis now indicates a number closer to 30, Cochran told SCIENCE NEWS.

Based on the limited detail reported in the IAU circular, it remains "an open question" whether or not the team has actually detected some 30 new members of the reservoir, says astronomer David Jewitt of the University of Hawaii in Honolulu. He notes, for example, that it's "a little surprising" that the team found so many objects in orbits that do not describe the motion of bodies in the Kuiper belt.

"They put in a physically implausible orbit . . . and they still get a large detection rate," says Jewitt.

Cochran and her colleagues maintain, however, that the rate merely indicates the expected amount of noise inherent in trying to detect very faint objects. — *R. Cowen*