Cancer Gene May Be Relatively Common

A year and a half ago, two separate groups of researchers found defects in a particular gene among several families with a rare, inherited syndrome of breast cancer and malignancies of bone and soft tissues. "Breast Cancer Gene Found," trumpeted some of the headlines of news stories on the development, "Screening Test Available Soon." But at the time, scientists could only speculate that the same gene underlies cases of breast cancer in families without a history of the unusual disease, called Li-Fraumeni syndrome (SN: 12/1/90, p.342).

Now, two other research teams — one including some members from an earlier group — have verified that hypothesis. In back-to-back papers in the May 14 NEW ENGLAND JOURNAL OF MEDICINE, they report that heritable defects in a gene named p53 can show up in cancer patients with no previous family history of the disease.

Although the finding still does not confirm p53's role as *the* breast cancer gene, experts agree that it has important implications for the prevention and treatment of many types of cancer. They say it suggests that physicians could use tests for defective p53 genes to identify patients at high risk of developing cancer, particularly if those patients have a close relative with cancer. They add that it might also help doctors single out and follow more closely those cancer patients likely to get a second, different type of cancer later in life.

The normal protein encoded by an intact p53 gene is known to be involved in telling a cell when to stop dividing. Researchers have found defective p53 genes in most types of malignant tumors. They believe the p53 gene mutates in some people only after the process of cancer has begun, whereas in others — including those with Li-Fraumeni syndrome — the p53 mutations are present from birth in every cell in the body.

In the first study that contributed to the new finding, a team led by cancer researcher David W. Yandell of the Massachusetts Eye and Ear Infirmary in Boston analyzed DNA taken from the blood cells of 196 people with various types of sarcoma, or cancer of the bone or soft tissues. Fifteen of the patients had either a family history of cancer or more than one type of cancer in their lifetimes. For controls, the researchers analyzed DNA from 175 healthy volunteers and from 25 people with noncancerous bone or soft-tissue tumors.

They found that eight of the 196 sarcoma patients (4 percent) had mutations in the p53 gene, while none of the 200 controls had such mutations. Moreover, three of the eight sarcoma patients had no family history of cancer, suggesting that their mutations originated in their mother's egg or father's sperm. Two of these patients had had two different types of cancer during their lives; the third died from his first cancer. One of the surviving patients went on to have a daughter with an identical mutation who developed cancer during childhood.

Yandell concludes that p53 mutations "look much more extensive than just Li-Fraumeni syndrome." Although researchers must perform further studies to determine the proportion of cancers caused by the defective gene, "it looks like there are probably lots of patients out there who have multiple primary cancers in their lifetime that can be traced to p53," he asserts.

In the other study, investigators led by pediatric oncologist Stephen H. Friend of Massachusetts General Hospital Cancer Center in Charlestown examined whether p53 might underlie the cancer risk of children and young adults with multiple cancers. Friend also led one of the earlier groups that studied Li-Fraumeni syndrome. The new study turned up p53 mutations in four of 59 patients (7 percent). Although none of the four had a family history of cancer, close relatives of three of these patients had the same p53 mutation and were diagnosed with cancer during the study period.

Friend says his group's study "gives us a clue that [p53] . . . might be useful in screening people who had no reason to believe they were at an increased genetic risk for cancer." But he cautions that p53 is probably responsible for only a fraction of all cancers: An unpublished study by his group indicates that only 1 percent of women with breast cancer have a defective p53 gene. Friend's team is now studying all new cases of childhood bone sarcoma in the United States to determine whether p53 accounts for a greater fraction of these cancers.

Alfred G. Knudson of the Fox Chase Cancer Center in Philadelphia calls the new studies "exciting. . . . I think it's going to make people scurry around to see why some families show more [cancers due to] the gene than others."

"I'm sure we'll learn that there are other, modifier genes involved," he adds.

— C. Ezzell

New approach makes silicon's red glow blue

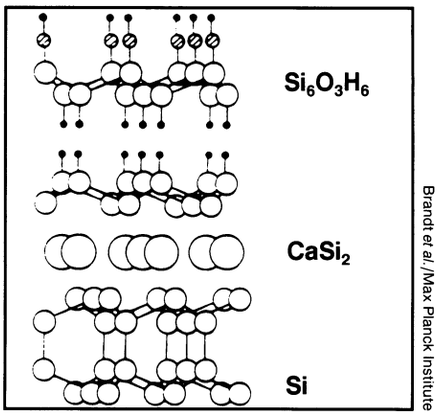
Research done more than a century ago sheds new light on the recent discovery of luminescence in silicon, a semiconductor previously thought to lack the ability to emit a strong glow. Just two years ago, British scientists obtained luminescence at room temperature from silicon samples made porous by etching in acid. That announcement and subsequent reports that light or electricity will make porous silicon emit light prompted a flurry of research because of the possibility of making silicon-based optoelectronic devices (SN: 2/15/92 p.103).

But silicon in those applications may not require acid etching at all, says Martin S. Brandt of the Max Planck Institute for Solid-State Science in Stuttgart, Germany. In combing the German scientific literature, he and his colleagues discovered reports from 1863 and the 1920s discussing the conversion of a silicon-calcium compound to a strongly luminescing silicon material called siloxene.

Following up on that research, the Stuttgart team has now demonstrated the potential for incorporating siloxene thin films onto silicon computer chips. "It would be, in principle, compatible with existing silicon technology," Brandt says.

He and his colleagues first grow the calcium-silicon compound on silicon and then create a thin film of siloxene by replacing the calcium with hydroxyl groups. With this technique, they have made a 400-nanometer-thick siloxene film that "has the same properties as porous silicon," Brandt reported this month at the Materials Research Society's spring meeting, held in San Francisco.

"That's an exciting possibility," comments Ulrich M. Gösele, a solid-state physicist at Duke University in Durham, N.C. Siloxene presents a better surface for attaching metal contacts than does the



Brandt *et al.*/Max Planck Institute

Diagram shows formation of siloxene ($Si_6O_3H_6$) from calcium-silicon compound ($CaSi_2$) deposited on silicon (Si).