Gene-cancer link firmed

Another two pieces were added to the complicated cancer gene puzzle last week, strengthening the theory that normal genes gone awry or genes introduced by viruses can cause cells to become cancerous.

Both studies were the result of international efforts. In one, researchers from the National Cancer Institute (NCI) in Bethesda, Md., and a cancer research institute in Milan, Italy, produced more evidence indicating that a single chemical change in a cell's genetic material can be an important step in cancer. And Israeli, British and U.S. collaborators detailed a striking similarity between a molecule involved in normal cell growth and a protein produced by a virus that causes cancer in chickens.

The NCI-Milan study, published in the Feb. 17 SCIENCE, was based on recent work by the NCI group and others (SN: 11/13/82, p. 316) showing that a single mutation in certain genes, called protooncogenes, can make apparently normal cells become cancerous.

Genes, which direct protein synthesis, are arrayed along DNA molecules that are shaped roughly like spiral steps. The researchers found a misstep in cells from a lung tumor of a 66-year-old Italian male smoker. The change was in just one of the 40,000 steps in that particular gene, one of thousands of genes on that chromosome, which in turn is one of 23 chromosome pairs in each cell. Cells from the man's healthy tissue did not show the change.

Previous studies showed that the oncogene (the gene with the misstep) promoted tumor-like changes when placed in laboratory-grown cells. In the current work the "point" mutation was found by a direct biochemical assay. This lab and others have also found point mutations in other tumors.

"It is quite likely," says Stuart Aaronson, in whose laboratory at NCI the research was conducted, "that the activation of the gene plays a role in the development of the tumor."

"What we're really closing in on," he says, "is at least some of the pathways involved in the malignant process. We can only really focus [on clinical applications] when we have convincing evidence that altered genes are important in the development of particular tumors. This study is a nice step in that direction."

Unlike the SCIENCE report, which concerned a cell's own gene transformed into a cancerous one, the Israeli-British-U.S. effort concerns cancer genes introduced into a cell by a virus. In the Feb. 9 NATURE, the researchers report their study of a gene from a virus that can cause cancer in chickens. They compared pieces of the protein responsible for the transformation with a protein involved in promoting normal cell growth, because the growth factor triggers cell changes similar to those that occur in tumor cells.

What the researchers, from the Imperial Cancer Research Fund in England, the Weizmann Institute in Israel, and Genentech in South San Francisco, found was a remarkable similarity in 6 of 14 pieces checked. Looking at the order of the amino acids, the constituents of proteins, the pieces had 74 of 83 in the same place as in the viral protein. This is the second instance of a growth factor-cancer gene link (SN: 6/18/83, p. 388).

The virus's ancestor, they suggest, picked up part of the growth factor gene from a cell it had infected; the ability of the virus to cause cancer in chickens may be due, in part, to this "inappropriate acquisition."

"The result," says an accompanying editorial, "is as dramatic as it will be important for research on normal and abnormal development of cells."

"With this kind of momentum," says Aaronson about the two studies, "we're very hopeful that we'll have a much better understanding of how cells become malignant. If we can do that, we hope to develop a better approach to diagnosis and treatment." —*J. Silberner*

Routine fetal scans nixed

Ultrasound scans of pregnant women should only be performed when medically warranted and not on a routine basis, a panel of experts convened by the National Institutes of Health in Bethesda, Md., cautioned last week.

Stanford Univ. News Bureau

Ultrasound image of five-month-old fetus

Although the 20-year-old tool used to monitor fetal development has revolutionized obstetrics by permitting physicians to spot problem pregnancies, its safety and efficacy in routine use have yet to be proved, the panel reports. Panel members also stressed that the risk associated with the technology is "hypothetical," based on ambiguous results from studies in animals and tissue samples (SN: 6/12/82, p. 385). No harm to humans has ever been conclusively shown, they say.

According to several recent studies, between 15 and 40 percent of all pregnant women undergo at least one ultrasound imaging exam, says panel chairman Fredric Frigoletto of Harvard Medical School in Boston, though he suspects that the actual number is higher and increasing. The panel cited 27 instances when ultrasound imaging might clearly be worthwhile, ranging from an investigation of the cause of vaginal bleeding, to the pinpointing of fetal age, to reassurance of exceptionally anxious parents that their pregnancy is progressing normally. Roughly one-third of all pregnant women might require ultrasound scans based on the panel's criteria, Frigoletto says.

Requests for scans merely to check the sex of the fetus, view the baby, or obtain a photo for the family album should be actively discouraged, the panel suggests, as should scans performed solely for educational or commercial demonstrations.

Concern about the effects of ultrasound stems primarily from the ability of the high frequency soundwaves to generate heat, and thereby damage cells. Subtle changes in cells could translate to the slowed prenatal growth, immune system abnormalities, hearing problems and other defects detected in a few of the 35 animal studies the panel reviewed.

However, the panel noted that several of the studies have been refuted, and most used energy levels much higher than those used in a medical exam. Two human studies that looked specifically at prenatal growth and hearing in babies scanned in the womb with ultrasound found no effect, Frigoletto notes.

Diana Petitti, a panel member from the University of California at San Francisco, called for a randomized clinical trial of routine ultrasound screening to better pinpoint any benefits to patients from the test, which can cost from $50 to $300.

"The safety issues are not going to go away in the next 10 to 15 years [when subtle effects might first surface]," she told SCIENCE NEWS. "But in the absence of proven benefit, any amount of potential risk is too great." Petitti also says she hopes that women who might clearly benefit from ultrasound scans for medical reasons will not forgo the test because of the small possibility of risk. "There are unquestionably enormous benefits from ultrasound in the diagnosis and treatment of ectopic pregnancy [where the embryo implants in an abnormal place], for instance," she says. The technique has enabled many women to avoid unnecessary surgery, says Petitti, by permitting their doctors to easily distinguish between an ectopic pregnancy and a ruptured cyst or pelvic inflammatory disease, which call for more conservative treatment. —*D. Franklin*