

Gathered at the annual seminar of the American Cancer Society last week in San Antonio

SYNERGISM

Chemical combinations promote tumors

There are hundreds of thousands of chemicals in the environment, but less than 5,000 have been tested for their cancer-causing effect. According to Dr. Umberto Saffiotti of the National Cancer Institute in Bethesda, Md., scientists need to develop simple and sensitive laboratory tests for evaluating even those chemicals that are present only in minor amounts. On the basis of animal experiments with carcinogenic chemicals, he concludes that exposure to even low doses of a compound may be unsafe.

In the course of studies on lung cancer, Dr. Saffiotti injected Syrian golden hamsters with low doses of diethylnitrosamine (DEN) and found that only six percent of the animals developed lung tumors. However, when those same animals were subsequently exposed to ferric oxide particles, inhaled into the lungs, the incidence of lung tumors climbed to 70 percent. Ferric oxide inhalation by animals not pretreated with DEN produced no lung tumors, leading him to presume that DEN and ferric oxide have a synergistic effect.

BIOCHEMISTRY

Technique for isolating a nucleus

Though it is possible, using conventional laboratory methods, to isolate the nucleus of a normal or malignant cell, techniques generally damage the isolated nucleus. Because of this, Dr. Wolff M. Kirsch observes, "Virtually all biochemical and morphological information regarding nuclear function is founded upon a technique which significantly departs from the true state of a nucleus in living tissue."

He reports that a new technique, developed in his laboratory at the University of Colorado School of Medicine in Denver, refines and simplifies attempts to circumvent this problem by applying freeze-drying methods to nuclear isolation. First, tissue is rapidly frozen while still alive, in order to minimize the incidence of structural change. Then it is dried under controlled conditions, making it easier to open the cell and extract the nucleus without altering shape or certain enzymatic activities.

GENETICS

Cancer susceptibility varies

Not all individuals are equally prone to cancer, and there is evidence that in some cases the tendency to develop malignancy runs in families. In addition, persons with inherited diseases are more likely to develop cancer, which lends further support to the presumption that genetic constitution is an important element in the occurrence of cancer. Patients with mongolism are five times as prone as the normal population; those with a rare genetic disorder called Fanconi's anemia are 20 times as likely to get tumors.

Dr. George Todaro of the National Cancer Institute

reports that a relatively simple laboratory test appears to predict those persons who are genetically susceptible to cancer. From volunteers he has taken small pieces of skin by biopsy and grown them in culture. Subsequently he exposed these cultured cells to viruses known to induce tumors in animals. Susceptible cells, he finds, are transformed by the virus, losing their ability to control proliferation in a normal way. The transformed human cells show the same changes seen in animal cells infected by carcinogenic viruses. Dr. Todaro suggests that genetic susceptibility may be inherited in some cases. In others, it may be related to genetic changes in individual cells produced by drugs, chemicals or radiation.

VIRUSES

Evidence in human sarcomas

New evidence that viruses play a role in human cancer has been found in immunological studies of patients with cancers of skeletal and soft tissue. Using immunofluorescent techniques, Dr. Donald Morton of the National Cancer Institute has found that all types of sarcomas in man carry a specific antigen. Antibodies to the sarcoma antigen, he reports, can be detected in the blood of individuals with the disease and in 80 percent of those patients' families and close associates. In addition, 29 percent of normal blood donors also had antibodies to the sarcoma antigen.

Though intact viruses have not been isolated from human sarcomas, virus particles have been found (SN: 10/4, p. 308). This fact, coupled to the widespread incidence of these antibodies among individuals in the general population, leads Dr. Morton to suspect that the common antigen may be a virus that infects numbers of persons though it does not always produce disease.

IMMUNOLOGY

Immune response yields prognosis

Because the development of malignant disease is associated with a weakened immune system, Dr. Frederick Eilber of the National Cancer Institute proposes that a test that measures immune competence will be valuable in helping physicians determine their therapeutic approach to individuals with cancer. Dr. Eilber reports that by testing for immune competence before cancer surgery, scientists can determine whether the tumor is localized or widespread, thereby giving some indication of whether surgery constitutes a sound approach in given cases.

In his preoperative study, he found that only 70 of 100 patients were able to mount a strong immune reaction to a highly antigenic chemical, 2,4-dinitrochlorobenzene (DNCB) when it was applied to the skin. Ninety-five percent of normal individuals react immunologically to DNCB. Of those 70 patients who did react to DNCB, 63 were in fact operable and free of disease six months after surgery. Only one of the patients who showed no response was found at operation to have a tumor that could be surgically removed.