

MEDICINE

Can We Really Cure Cancer?

World Health Organization experts say three out of four human cancers are potentially preventable. Here are some of the latest facts about efforts to combat the disease.

By FAYE MARLEY

► MEDICAL SCIENCE is confident of ultimate success in prevention of the group of diseases called cancer. There is growing assurance of early detection and even cure.

In the "precancerous" state, cancer can be prevented from developing, World Health Organization experts report. Knowledge of factors that cause cancer is growing and these causes can be either removed or controlled.

How normal cells become malignant is still a puzzle to scientists. Today they speak of "causes" rather than one cause of cancer, for just as there are many kinds of cancer there are probably many causes, even though a common thread may run through all of them.

Chemicals, heavy cigarette smoking and radiation, especially from the explosion of the atom bomb, are some of the better-documented causes of cancer.

Viruses Leading Suspect

Viruses are among the leading suspected causes of human cancer because similarities in animal viruses, definitely known to produce cancer, have been shown with the electron microscope. Leukemia virus in the human blood compares almost identically with animal cancer virus. But no one has proved yet that human cancer is caused by a virus.

Generally speaking, the cause of cancer appears to be the result of the greatest possible damage to a cell, causing it to become malignant through its release from so-far unknown growth-controlling factors. This malignant cell tends to divide, to differentiate, or change, to invade nearby normal tissues and sometimes to metastasize, or spread.

The survival rate during a 20-year period has increased even when cancer has developed. Statistics show that there has been an impressive increase in survival by persons with cancer of the large intestine, the rectum and the uterus, or womb. Also notable has been the increase in survival of persons both with acute and chronic lymphatic leukemia.

Breast, stomach and lung cancer survival have shown lesser increase. Survival improvement figures are given in a 1964 report from the National Cancer Institute, Bethesda, Md., summarizing the experience of more than 100 hospitals of various types and sizes in the United States.

Dr. Sidney J. Cutler of the National Cancer Institute told SCIENCE SERVICE that there had been a change in treatment over the past 15 or 20 years, with more surgery being

used for solid tumors, such as those of the breast, stomach, lung, and uterus. These cancers are called carcinomas or sarcomas.

Leukemias and lymphomas, which are neoplasms, or cancer, of the blood and lymph system, have been treated with a sharp increase of chemotherapy, or drugs.

X-ray, or irradiation, is the third most widely used treatment for cancer.

Combination of two or all three of these treatments is often effective.

In the past three years several new drugs have been developed for the treatment of acute leukemia. Of these, vincristine, an alkaloid from the periwinkle plant, *Vinca rosea*, is perhaps the most important, particularly in bringing about rapid remissions, or temporary stoppages of growth.

Cyclophosphamide is useful in maintaining these rest periods, although it is not so effective in bringing them about.

Methotrexate remains one of the leading older compounds in treating leukemia. Methotrexate given in massive doses to women with choriocarcinoma, a cancer that develops in the womb following childbirth in approximately 300 cases each year in the United States, has shown encouraging results.

In combination with the drug chlorambucil, a nitrogen mustard derivative, supplemented with actinomycin, an antibiotic drug, isolated from mold, temporary regressions have been brought about with Methotrexate in cases of cancer spreading to the lung after choriocarcinoma of the male testis. Such cases had previously not been helped by a single compound.

Regional Perfusion

The technique of regional perfusion, or infusion, blocks off circulation around a tumor while an anticancer drug, such as Methotrexate, is introduced into the blood vessels of the isolated region, thus shutting off normal cells from the dangerous effects of the drug.

Perfusion on the extremities is simpler than in other parts of the body because tourniquets can be used to aid the process, but the head and neck, the brain, lungs, chest wall, and liver also have been perfused with some success.

What is the probability that a person will get cancer? Statisticians estimate that the chances a person now under the age of 20 will develop cancer at some time during his or her life are about one in four for males and slightly higher for females if present death rates and cancer occurrence remain at their present levels.

There are only three ways to control cancer: by prevention, earlier detection and

improvement in treatment. Greater alertness on the part of family doctors along with knowledge of patients that they should seek early advice will lead to earlier treatment. Wider availability of diagnostic techniques also is necessary.

Prevention of human cancer can come only through closer cooperation between medical practitioners and laboratory scientists. Doctors must take time to keep up with laboratory advances in virology, chemistry, genetics and other fields.

The fear of cancer, which is at present the second leading cause of death, is being partially replaced with interest in ways of fighting it. We have only to remember that tuberculosis was once a leading cause of death and that smallpox, like the plague, once terrorized civilized man.

Cigarettes a Risk

Cigarette smoking as a cause of lung cancer has not been entirely explained but the Smoking and Health Report to the Surgeon General of the Public Health Service early in 1964 definitely implicated cigarettes as a cause of this disease, which kills 41,000 persons a year.

The risk of developing lung cancer increases with duration of smoking and the number of cigarettes smoked each day. It is lessened when a person stops smoking. Laryngeal cancer in the male was linked to cigarettes in this report, and cancer of the lip was related to pipe smoking.

Causes of cancer in the environment are



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MICE INJECTED—A technician at the John L. Smith Memorial for Cancer Research, Maywood, N. J. injects experimental compounds into tumor-implanted mice for studying the tumor-inhibiting capacity of the compounds.

suspected in a number of occupations and in polluted conditions in the atmosphere.

Here are some of the occupational causes of cancer reported by the World Health Organization, based on well-documented evidence:

1. Coal distillation and fractionation products including tar, pitch, creosote, anthracene oil, tar oils and soot—containing aromatic polycyclic hydrocarbons affecting the skin and lungs.

2. Products of shale oil, petroleum and hydrogenated coal oils including tar, asphalt cutting oils and crude waxes—also containing aromatic polycyclic hydrocarbons and other cancer-causing constituents injuring the skin and lungs.

3. Compounds such as 2-naphthylamine, 4-aminodiphenyl and benzidine affecting the bladder.

4. Some products of chromium and nickel-ore processing affecting the lungs and nasal sinuses.

5. Ionizing radiation, both by X-rays and from radioactive compounds affecting the skin, bone, lungs and blood.

6. Ultraviolet radiation, affecting the skin.

7. Inorganic arsenic compounds injuring the skin and lungs.

8. Asbestos, affecting the lungs.

9. Isopropyl oil affecting the nasal sinuses.

In addition to these, beryllium, commercial benzol and mustard gas are among suspected cancer-causing hazards of industry.

Cancer hazards are believed to be linked with unwise use of pesticides and some cleaning agents that are in everyday household use. The U.S. Food and Drug Administration has taken steps to get more precise labeling and has warned that they should be

kept out of the reach of young children. Workers need to know the risks to which they are exposed, and measures to protect them should be enforced by factory inspectors.

Finding Viruses

Among the more hopeful outlooks for prevention of cancer, especially of leukemia is finding a virus or viruses that cause human cancer as they now cause cancer in animals.

One theory that would explain why no one has definitely found cancer-causing viruses in humans is that they disappear. By the time cancer is discovered, they are gone.

An unusual type of lymphoma, which shows up as malignant growths of the lymph nodes, has been found among African children. The disease affects Negro, Asian and European children living in Africa, and thus is a disease common to the country.

The disease occurs only in children living in certain geographical areas of Africa, which have common features of low altitude, high humidity and high mean temperature. It has been suggested that this disease may be caused by a virus caused and transmitted by insects.

This tumor may be widely distributed in various organs of the body, but usually involves the bones of the face and the jaw.

As the search for leukemia virus continues around the world, "something is going to crack sooner or later in the field of cancer virus research," to quote Dr. Wendell M. Stanley, Nobelist of the University of California at Berkeley.

• Science News Letter, 87:251 April 17, 1965

PUBLIC HEALTH

Men Quit Smoking Easier

► WOMEN have a harder time than men in giving up cigarettes.

A person who started cigarettes before he was 14 years old has twice as much trouble quitting as one who started after 14.

Moderate smokers, those smoking between one and two and a half packs a day, are twice as successful in quitting as either the very light or the very heavy smokers.

These are typical of the perplexing data under analysis by some of the nation's leading social scientists in the development of effective programs to help people stop smoking. This set of facts was compiled from records of the Roswell Park Memorial Institute, Buffalo, N.Y., and was outlined by Dr. Charles A. Ross at a seminar of the American Cancer Society in New Orleans, La.

Commenting on the effect of the drug, lobeline, widely regarded as an anti-smoking crutch, Dr. Ross said that "lobeline is effective in aiding smoking withdrawal initially but has no continuing effect beyond the time that it is used."

Meanwhile, those actively engaged in conducting anti-smoking clinics or plans defend their effectiveness despite continuing study by psychiatrists and psychologists into the

most successful techniques. Roswell, for example, reports 69% success in "changing the habits of participants." Of 588 participants 403 "stopped, reduced or switched" to cigars or a pipe.

A spokesman for the clinic told SCIENCE SERVICE that the regular group meeting pattern established there is regarded as successful.

Significant in the Roswell findings is the downgrading of lobeline as an answer to how to quit smoking.

Many early clinics and programs were based on use of the drug.

Many current lozenges and nostrums on the market have a lobeline base which is supposed to cut down the craving.

At Roswell, half the groups were given the drug and the other half a placebo (a non-medicinal substance). At the end of a week, those who got the drug were "significantly more successful" in quitting than those who received the placebo.

However, at the end of six months, there was no difference in the ability of the two groups to stay off cigarettes. Men who received the placebos were more successful in stopping than women given lobeline.

• Science News Letter, 87:251 April 17, 1965

RADIOLOGY

High-Pressure Oxygen Aids Cancer Treatment

► A HIGH PRESSURE oxygen chamber can provide a favorable climate for later radiation treatment of some types of cancer, a Seattle radiotherapist reported.

The addition of high pressure oxygen to normal radiation therapy is most effective for patients who have cancers in which the natural flow of oxygen to the cancer cells is blocked, Dr. Orlliss Wildermuth, chief of radiotherapy at the Swedish Hospital in Seattle, told the American Radium Society meeting in New Orleans.

After observing 3,766 treatments since January 1963, Dr. Wildermuth noted that use of high pressure oxygen followed by radiation therapy was most effective against cancers of the mouth and throat, esophagus and lungs. Cancers of the pancreas, liver, spine, stomach and bowels did not respond as well.

The radiotherapist cautioned that use of high pressure oxygen alone may be dangerous. If the patient is not treated with radiation after exposure to the oxygen, he said, the spread of cancer tends to develop more rapidly and become larger than expected.

It is known that cancer cells lacking oxygen are more resistant to radiation than those at normal or increased levels of oxygen saturation. By increasing the oxygen supply, Dr. Wildermuth found that he could reduce the total radiation dose needed to destroy the cancer cells.

This decreased radiation not only spared surrounding normal tissue, but resulted in much less scarring and other tissue damage, he pointed out.

Patients showed few psychological problems and required no anesthetic during treatment in the clear plastic high pressure oxygen chamber. Because of this, many of them were able to receive treatment as outpatients, the radiotherapist said.

The total time for a patient in the tank is less than 30 minutes, including actual treatment time.

• Science News Letter, 87:251 April 17, 1965

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Children With Cancer Need Earlier Diagnosis

► EARLIER cancer diagnosis is needed in children as well as in adults. Sixty-five percent of children who died of malignant disease in the Manchester, England, area were already beyond the reach of treatment at the time the diagnosis was first made, *The Lancet*, 1:534, 1965, pointed out.

In the United States, cancer in children ranks second only to accidents.

Of 58 tumors called neuroblastomas, proper treatment was delayed by wrong diagnosis in 43 for more than three months, one study showed.

Cancer specialists should treat children with malignant disease, *The Lancet* said.

• Science News Letter, 87:251 April 17, 1965