

## MEDICINE

# Cancer Cure Sought

**Methotrexate is among the most successful anti-cancer drugs so far found in the \$100,000,000 push to save millions of lives in the future, Faye Marley reports.**

► THE DRUGS that can cure cancer may be hidden among the 160 or more that medical research is now actually using in treating patients with human cancer by clinical trials.

No one knows just what drugs may be successful—some of the compounds have not even been named—but the leading researchers on one of the world's great killers are confident they are on the right track.

So far, the great hope for those who have any form of this disease today is still, as all cancer advice tells, early detection, surgery and radiation. Cancer is not a completely hopeless disease, for 50% of the cases could be cured if patients got to physicians fast enough. Actually, 35% is the cure rate for curable cancer. There are, however, still many cancers that are hopeless from the time of their discovery.

Surgery and radiation have been used for treating and sometimes curing thousands of people in the United States, but these methods are frequently not effective against cancer that has spread to other parts of the body (metastasized), or against leukemia, cancer of the blood.

The treatment of such disseminated cancer is the major problem in cancer

treatment, and it is here that chemotherapy gives hope.

Treatment with drugs that can reach and destroy malignant cells wherever they may be in the body has been at least temporarily effective against some 30 forms of cancer.

Dr. Stuart M. Sessoms, associate director for chemotherapy, National Cancer Institute, Bethesda, Md., told SCIENCE SERVICE that one of the promising drugs is methotrexate, which has been used at the Institute for a number of years. Its primary use is against leukemia.

"This is the nearest thing to a cure that we can show," he said. Dr. Roy Hertz, chief of the Institute's endocrinology branch, has used methotrexate in treating a number of women patients with choriocarcinoma, a rare cancer that occurs in the placental tissues during the process of childbearing.

Dr. Hertz is a world authority on choriocarcinoma. More than five years have passed since he and his colleagues reported the first successful use of methotrexate to suppress this disease. Some of his choriocarcinoma patients have shown no return of the cancer since 1955.

Methotrexate was first synthesized in

1947 by Dr. Subba Row, now dead, when he was director of research for Lederle Laboratories, Pearl River, N. Y., working with others. Aiding in methotrexate research was Dr. Sidney Farber of Children's Medical Center, Boston, who acted as Lederle consultant and did the clinical tests in Boston.

Dr. Robert D. Sullivan of the Sloan-Kettering Institute for Cancer Research and Memorial Hospital, New York, has combined methotrexate with treatment at the same time by an antidote called leucovorin.

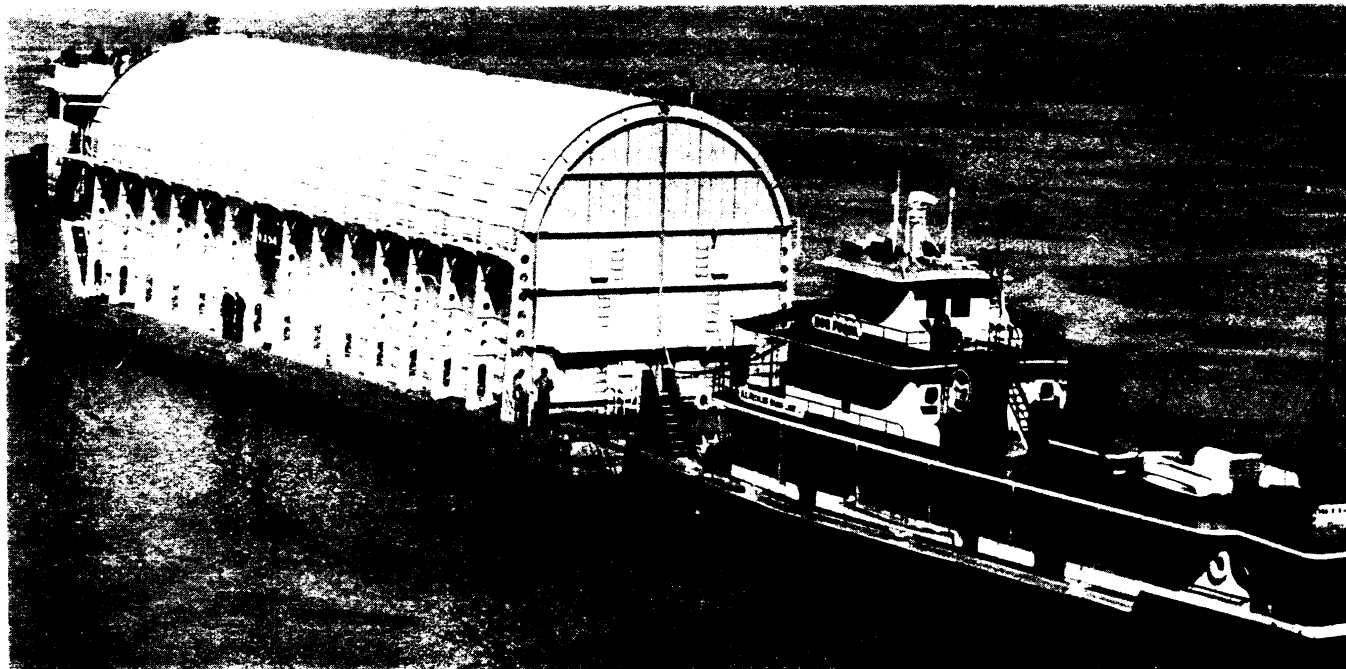
First tried in New York, leucovorin is now being tested along with methotrexate in Kenya, Africa, where cancer patients have had no previous treatment with surgery and radiation. Sloan-Kettering with the African Research Foundation is continuing work Dr. Sullivan began with 24 African patients.

Leucovorin is a derivative of folic acid and is a potent enemy of aminopterin and other folic acid antagonists such as methotrexate.

The reason for giving the antidote is that methotrexate is being injected into the arteries at about ten times the lethal dose ordinarily given for leukemia. At the same time, leucovorin is being injected intramuscularly every six hours to prevent damage to bone marrow.

Dr. Sullivan and his colleagues two years ago first treated patients with cancer in the head, sinus and cervix, but they are further exploring liver and brain cancer treatment by injecting methotrexate into the hepatic and internal carotid arteries, while at the same time they inject leucovorin intramuscularly.

One 72-year-old man who was treated



**SPACE-AGE BARGE**—The 180-foot Palaemon barge hauls the first Saturn static-test booster down the Tennessee River to study the stresses the rocket will be subjected to during its 2,200-mile trip to Cape Canaveral, Fla. The barge will carry the first and second stages of the Saturn space vehicle to the Cape.

with the original 18 patients at the New York Veterans Administration Hospital is still alive and tumors have regressed in other patients.

No competent investigator with a real idea for cancer treatment need go without funds for research. The National Cancer Institute estimates that more than \$100,000,000 is presently being spent for research throughout the United States in attempts to find cures for cancer.

Many university medical centers are adding cancer research to their programs. Funds for a new Eleanor Roosevelt Institute for Cancer Research have just been made available to the University of Colorado Medical Center at Boulder. For research alone and to defray expenses of hospitalized cancer patients, who cannot pay for treatment, \$300,000 is provided.

No one drug can cure all the 30 major types of cancer. Many of the 160 drugs being tested on human beings after extensive animal experiments and screening will have to be discarded because of side effects or for other reasons, but many of them will give and are giving at least temporary relief and are causing regression. All are lethal poisons and must be administered with the greatest care.

In addition to the drugs already mentioned, there are some 20 or more in use by physicians treating cancer patients. Among those that have been used with beneficial effect, sometimes in connection with X-ray treatments, are:

Chlorambucil, 6-mercaptopurine, nitrogen mustard, myeleran, urethane, thio-TEPA, TEM, male or female sex hormones, cortisone, hydrocortisone, prednisone, prednisolone and ACTH. VLB, or Velban, is a new drug produced by Eli Lilly and Com-

pany. Cytoxan and Actinomycin D, an antibiotic, are also comparatively recent.

Orthoparaprime DDD, not available commercially, is at present being tested by the NIH's Cancer Chemotherapy National Service Center for a rare type of cancer, adrenal carcinoma. This drug is specific for tissue of the adrenal cortex.

In the eagerness of some researchers to find cancer cures, more hope can be held out than is warranted. This may be true of sarcosyl, a drug used in Russia and in Britain since its synthesis in 1953. Sarcosyl is a nitrogen mustard, but is in marked contrast to other nitrogen mustards, which have been effective in treatment of leukemia and Hodgkin's disease.

Sarcosyl has been effective on some solid tumors, including seminoma, reticulum cell sarcoma, Ewing's tumor (a bone tumor) and thymoma. The Russian and British physicians who have used sarcosyl say that these tumors have completely regressed, but U.S. cancer specialists believe the reports are exaggerated.

Thousands of substances are being tested on animals before they are considered fit for experiment with human beings. New drugs are being compounded constantly in the hope that some will be found that are more promising than any found so far.

Scientists are always cautious about using the term "cure." But this does not mean that cure is beyond the realm of scientific achievement.

Some causes of cancer are known—among them being radiation and chemicals in the dye industry—but the most hopeful field of research, into the relationship of virus to cancer, may give the chemotherapists a more specific primary agent to fight.

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#### GENERAL SCIENCE

## Key to World Peace

► WORLD PEACE now depends largely on the success of the East-West three-power talks on nuclear testing under way in Geneva.

Failure to reach a test-ban agreement would mean, at the very least, a step-up in the cold war as well as resumption of nuclear testing and subsequent contamination from radioactive fallout of the earth and its atmosphere.

Other more serious consequences are a dangerous East-West nuclear arms race and the spread of nuclear weapons to less stable governments capable of triggering a hot war.

While a time-limit has not been set on present negotiations, there is considerable pressure from both Administration and Congressional leaders to abandon negotiations if no agreement is reached by the end of summer.

The United Kingdom and the United States are resuming negotiations with the Soviet Union after a thorough review of the Western position on a nuclear test ban. The Western powers are reportedly prepared to make concessions on certain vital issues,

and they may take the initiative in offering them to the Russians.

Dr. Jerome Wiesner, Science Adviser to President Kennedy, said that he believes an agreement is possible if both sides are willing to make concessions.

At this point in the negotiations, the United States is believed to have superior nuclear power; so any yielding by the West will be made from a position of strength that could not possibly be interpreted as a mark of surrender, leaders here point out.

But although the atmosphere is hopeful, there is a growing conviction the inconclusive negotiations that have marked the past 27 months of meetings now must be terminated.

Sen. Clinton P. Anderson (D-N.M.), past chairman of the Joint Congressional Committee on Atomic Energy, applauded the willingness of the Kennedy Administration to make a strong, concerted effort to reach an East-West agreement on this important issue.

"I hope the present talks will bring about clear knowledge of whether we will or will not be able to negotiate fruitfully with the

Russians," he told SCIENCE SERVICE. "In the past, the Russians have said they wanted suspension without inspection."

Inspection is the key to any agreement that will be acceptable to the West, he said. And if the Russians are not willing to negotiate affirmatively on this point, then further talks with them can have no meaning.

Although Sen. Anderson is opposed to indefinite negotiation he does not believe that the two and a half year moratorium on testing in this country has impaired our nuclear strength.

It has not impaired exploitation of natural resources by means of underground nuclear detonations, as some have charged.

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