of cells from patients with xeroderma pigmentosum show they are able to mend other DNA damage, such as a clear-cut break in the strand of chemical bases. Such breaks could be identified without the aid of an endonuclease.

To test the possibility of genetic engineering, Dr. Cleaver now plans to take cells from xeroderma patients, grow them in the laboratory and infect them with the SV-40 virus, an agent known to cause cancer in animals but thought to be harmless in man. In the process of infection, the SV-40 virus will empty its DNA into the nucleus of a xeroderma cell, thereby giving it a transfusion of genes. In this case, the virus is merely the vehicle for transporting the new DNA because it is able to penetrate the nuclear membrane and get into the nucleus of the cell.

Hopefully, the deficient cell will incorporate the viral DNA into its own genetic machinery and use the information it contains to make the endonuclease it cannot produce on its own. Preliminary experiments with hybrid man-mouse cells (SN: 10/11, p. 323) and with viruses show this may be possible, but whether the effect would be long-lasting and whether the deliberate introduction of viruses into a human being is safe are questions that have yet to be answered. □

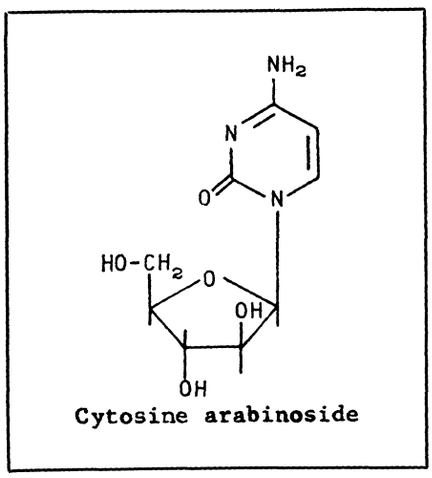
LEUKEMIA

A stronger arm in the arsenal

During the past several years, drug therapy has been the most effective mode of treatment for acute leukemia in both adults and children (SN: 12/21, p. 626). These anticancer drugs act against cells during their reproductive cycles, one cycle of which is DNA synthesis. By inhibiting this synthesis, the production of leukemic white blood cells causing the disease can be halted.

Recent results in humans show that a drug, cytosine arabinoside, that acts during this cycle, but in a different way than previous drugs, may be the most promising in this arsenal to date. Clinical studies show that the drug induces complete remissions of acute granulocytic leukemia in adults and acute lymphocytic leukemia in children in from 40 to 60 percent of patients, for up to periods of 18 months. This remission rate is both higher and of longer duration than any drug used thus far. Although the drug is not a cure, the results of human tests are regarded as more than satisfactory and have elated cancer specialists.

With leukemia, white blood cells proliferate uncontrollably—probably a result of cancerous mutation of the cell. Cytosine arabinoside destroys these cells in their reproductive stage by preventing the conversion of cytidine to deoxycytidine, a chemical component which is necessary for the synthesis of new DNA and therefore new white cells.



Cytosine arabinoside

Formula for a more specific fighter.

Other antileukemia drugs which inhibit DNA synthesis act by a different pathway. They inhibit as well the synthesis of RNA and, in some cases, proteins, which are synthesized prior to DNA. Such inhibitions limit the usefulness of these drugs because both leukemic and normal cells are destroyed by them. A drug that zeros in on the DNA phase is more selective, singling out mainly the weaker leukemic cells for destruction.

The National Cancer Institute, which conducted most of the clinical studies done with cytosine arabinoside, reported that of 184 patients with acute leukemia—both adults and children—the drug induced complete remissions in 69, giving an overall remission rate of 37 percent. And Dr. Emil Freireich, chief of experimental hematology at M. D. Anderson Hospital in Houston, reported complete remissions in up to 56 percent of patients. When the drug was given in combination with other drugs to patients under 30, an overall remission rate of 80 percent was obtained. Dr. Freireich calls cytosine arabinoside a "whole new direction in cancer treatment."

According to Dr. Freireich, the drug has two other advantages: It can be given in large doses because of its relatively low toxicity, and though it does deplete bone marrow, it shows few side effects on other parts of the body.

Information on cytosine arabinoside was presented last week at an all-day conference on the drug called by the National Cancer Institute. Dr. Gordon Zubrod, scientific director for chemotherapy at NCI called the meeting an "experiment in communications." He used the Food and Drug Administration's approval of the Upjohn Company's application on the drug as a way to wave a research success in the face of the budget cutters (SN: 9/20, p. 236).

Development of the drug was the result of cooperation involving Federal Government, industry, universities and independent research institutions. The Chemotherapy Program of the NCI, established by Congress in 1955, allows the Government to help develop new drugs where the profit potential is too small to stimulate the pharmaceutical industry. In the case of cytosine arabinoside the production costs were so high—originally $57 per gram—that more extensive clinical studies were precluded.

Other than NCI and Upjohn, the project included the Sloan-Kettering Institute for Cancer Research, Roswell Park Memorial Institute and the Henry Ford Hospital in Detroit. In addition, grants for research were provided by the American Cancer Institute.

Dr. Saul A. Schepartz, associate scientific director and chief of the Cancer Chemotherapy National Service Center at NCI, said that "perhaps 1,000 patients have been treated with the drug, and the cost for clinical studies has well exceeded $1 million." □

HEAVY-ION ACCELERATORS

The cry from the South

Nuclear physics has always been a major subject of study at Oak Ridge National Laboratory. The laboratory was founded to contribute to the development of the nuclear bomb. Since World War II, it continued to build on the base established in the 1940's, stressing the study of the atomic nucleus in its pure scientific and its practical aspects in nuclear physics, nuclear chemistry and radiation biology.

The laboratory's cooperation with Southern universities has helped to build up a regional constituency in these fields, many of whose members work at universities that were hardly known for scientific research before the war.

But while Oak Ridge was building up its capabilities in nuclear sciences, other national laboratories went after the new field of particle physics, and others—like Brookhaven, Argonne, Lawrence Radiation Laboratory—were the ones that got the big new particle accelerators. "We think the Southern part of the country has been underprivileged in these large accelerators," says Dr. Arthur H. Snell, assistant director of Oak Ridge, and an effort is being made to redress the balance. The vehicle is an accelerator proposal for nuclear, not particle physics.

After existing in something of a