While heroin itself does not appear to be a direct mutagen, "it seems to act by preventing the cell from repairing DNA damage done by mutagens," Falek says. Such a mechanism could render a person more susceptible to the development of cancer, he suggests. "It is likely there is an increased rate of mutation among heroin addicts leading to genetic defects which are manifest in an increased rate of carcinogenesis," he says. However, no increased rate of birth defects has been reported among the offspring of opiate addicts, according to Falek, "so it remains to be determined whether these mutations have been passed on through the chromosomes in the germ cells to the next generation." Also participating in the study were John J. Madden, David A. Shafer and Jean H. Glick. □

Artificial blood succeeds in humans

Artificial blood made from fluorochemicals has been used to replace up to 80 percent of blood in mice, rats and dogs and has kept many of them alive for years with no signs of ill effects (SN: 9/28/74, p. 203). Now, artificial blood made from such compounds is being injected into humans. The first use was last April, in a Japanese man bleeding severely, following prostate surgery. The artificial blood was used until blood of the patient's type could be obtained. Six more cases have followed throughout the world, the most recent being in the United States.

In September a patient at the University of Minnesota Hospital in Minneapolis refused a blood transfusion following surgery because his religion (Jehovah's Witnesses) forbids blood transfusions on the basis that the Bible prohibits eating blood. When the patient became severely anemic, Robert Anderson, professor of surgery at the University of Minnesota Medical School and a researcher with an interest in artificial blood made from fluorochemicals, sought permission from the Food and Drug Administration to give an injection of perfluorocarbons developed by a Japanese drug company for artificial blood use. FDA permission was granted, and on Nov. 14 the patient received two liters of the chemicals, constituting about 25 percent of his total blood volume. After that, his condition improved, the artificial blood was slowly excreted from his body (its life in the body is about a week), and his bone marrow produced enough natural blood to correct the anemia.

What is the future of the use of artificial blood in humans? Anderson foresees that it will probably be limited to emergency room or accident situations in which not enough of a patient's normal blood type can be obtained immediately or in rare situations, such as blood transfusions for Jehovah's Witnesses. □

Testing the short-term chemical tests

As demands increase for chemical safety, a wide variety of rapid techniques to identify cancer-causing agents have arisen in laboratories around the world. The International Program for the Evaluation of Short-term Tests for Carcinogenicity has just tallied results from 66 investigators who tested a set of 42 pure chemicals in a total of 29 short-term assays. According to preliminary results presented to a public meeting at the National Institutes of Health, no single assay or set of assays stands out as obviously best suited for carcinogen screening. Most of the assay systems gave both false positives and false negatives. "It is probably necessary to use more than one test for a wide range of chemicals," says Iain Purchase of Imperial Chemical Industries, Ltd., in England.

The tests that look at single point mutations in bacteria (including the Ames test) are useful in screening, the program concludes, but because they often label innocent chemicals as carcinogens, they must be followed with other tests, says Frederick J. de Serres of the National Institute of Environmental Health Sciences. In contrast, the program does not recommend for initial carcinogen screening tests that measure DNA repair in bacteria. John Ashby of ICI says such tests are not better than the mutation assays and there is uncertainty as to whether the changes observed are relevant to cancer.

Two advantages were listed for the group of tests that examine genetic changes in yeast, instead of in bacteria. Although the yeast tests are on the whole less sensitive than those using bacteria, growing yeast metabolize chemicals as animals do. Also, yeast tests identified two carcinogens that bacterial tests missed.

A group of tests that uses mammalian cells grown in laboratory culture also picked up carcinogens that bacterial tests miss. "The pattern of performance in these tests tends to fill in gaps in the prokaryotic [bacterial] tests," Purchase says.

Intact animals, such as fruitflies and mice, are used in the final group of short-term tests. Although these tests missed more than half the carcinogens tested, they seldom identified a non-carcinogen incorrectly. While such tests are not suitable for primary screening of chemicals, they could be useful for verifying positive results as a second tier of tests.

Patterns are beginning to emerge among the test results. Some chemicals seem to be potential carcinogens in bacterial and yeast tests, but not in tests with intact animals. Another chemical appears negative in bacterial tests, but according to Ashby is an "absolute knockout" in short-term animal tests.

The number of short-term tests is extensive, but still not sufficient to flag all chemicals that cause cancer. For example, the program found no group of short-term tests that clearly identifies chloroform as a carcinogen. "The mechanism by which chloroform causes cancer is not represented in any of these tests," Ashby says.

The program is making no recommendations on which assays could be best grouped into a test battery. Purchase says the profile of such testing depends on the use intended for test results. A regulatory decision, for instance, would have different requirements than a chemical company's decision early in product development. However, the large set of data collected by the program should identify tests suitable for various uses and for further development. □

Psychoses: A 40-year follow up

Behavioral scientists are learning considerably more about the causes and treatment of serious emotional disturbances than they knew even a few years ago. Still, most agree that it is still far too early to talk of "curing" the majority of psychoses; in the meantime, thousands of persons diagnosed with schizophrenia and serious, psychotic depression continue to struggle—with varying degrees of success — to overcome their chronic problems.

Just how such persons cope over a lifetime has been difficult to determine, primarily because of the problems in tracking down former patients. Now, however, psychiatrists at the University of Iowa College of Medicine report they have followed the progress of 557 patients over 30 to 40 years and compared them with a control group of 144 nonpsychiatric surgical patients. The subjects were tested on a variety of psychiatric, occupational, marital and residential tests.

The results, reported in the November ARCHIVES OF GENERAL PSYCHIATRY, indicate that diagnosed schizophrenics have considerably more difficulty adjusting over the years than do persons with "affective" disorders such as depression and manic depression. (The controls had the most favorable outcomes.) Faring better than schizophrenics but worse than affective cases are persons with schizoaffective disorders—a condition with symptoms of each of the other two categories. Psychiatrists have appeared undecided as to how to classify schizoaffective disorder; researchers Ming T. Tsuang and G. Michael Dempsey say their results indicate the problem frequently does include elements of both schizophrenia and depression and mania but that in some cases it may be a distinct affliction. □