medical sciences

BLOOD GROUPS

Enzymes change blood type

A great deal is known about the biochemistry of the ABO blood-group system; enough, in fact, to enable scientists to think about manipulating it. "Though there are still significant technical barriers to altering blood types clinically," says Dr. David Aminoff of the University of Michigan, "at the lab-bench level it can be done."

For purposes of banking blood, treating patients in emergency situations or blood-matching transplant recipients and donors, it would be useful to be able to convert A, B or AB blood to the universal O type. In addition, work in this direction has importance for research in other human systems such as the antigens produced in transplant operations, and for investigations of the genetic control mechanisms involved in establishing molecular differences among individuals.

Blood cells, like tissues, carry antigens on their surfaces that separate them into one of various groups. "A and B and AB blood cells each carry a distinguishing sugar molecule," Dr. Aminoff pointed out at an international symposium on blood and tissue antigens at the University of Michigan in Ann Arbor. "Universal O groups carry no such molecule." Using specific enzymes, glycosidases, researchers are able to remove these distinguishing sugars, thus converting blood cells to the sugar-free O type.

CYTOGENETICS

Cyclamates indicted

When cyclohexylamine, a product of the artificial sweetening compound cyclamate, is injected into rats, it breaks their chromosomes. According to Dr. Marvin Legator and co-workers at the U.S. Food and Drug Administration, the incidence of chromosomal breaks noted in sperm and bone-marrow cells is directly related to the dose of cyclohexylamine, a toxic chemical the body produces as it metabolizes cyclamate.

Reporting in the Sept. 12 issue of SCIENCE, Dr. Legator indicated that single chromatid breaks, or breaks in only one portion of the chromosome, predominated. Such an abnormality is most likely to have cancer-causing effects, he points out. When multiple breaks occur, the chromosome is likely to be unable to reproduce itself and pass a defect on to daughter cells.

The implications of this finding for human consumption of cyclamates "have yet to be determined," Dr. Legator says. But he points out that the breaks in rat chromosomes occurred with relatively low doses that may be comparable to quantities ingested by human beings.

SERENDIPITY

Drug for weight gain

Cyproheptadine, a drug normally used in the treatment of asthma, puts badly needed pounds on underweight patients.

Dr. Rudolph E. Noble of the University of California Medical Center, San Francisco, first became aware of the drug's effects when other doctors reported that asthmatic children increased their weight significantly while taking cyproheptadine.

Dr. Noble tested the drug's weight-increasing properties in an experiment with 20 volunteers. He administered cyproheptadine to 10 underweight adults over a 2-month period while at the same time giving placebos to a control group of 10 other underweight persons. The patients on cyproheptadine gained an average of 8.4 pounds while those taking placebos added an average of 2.8 pounds.

"There is a large and significant portion of the population who really are skinny and can't gain weight," he says. He notes that there is presently no other special drug a doctor can prescribe for weight gain.

CELL FUSION

Mice immunized to cancer

Using a technique for fusing cells, two Oxford University researchers have immunized mice against some kinds of cancer. The fusion technique, employed by Drs. John Watkins and Louise Chen, strengthens the animals immune defense mechanisms. Cancer cells from the mice are extracted and, in culture, fused with nonmalignant hamster cells, thus changing the nature of the cancerous mouse cells.

When the hybrid cells are injected into mice, they set up an immunological reaction like that which occurs when any foreign material or organism is injected into the body. As well as developing an immune response to the hybrid cells, the mice also respond immunologically to the cancer cells from which the hybrids were derived, Dr. Watkins says.

The hybrids, in this case a mix of Ehrlich ascites mouse tumor cells and hamster cells transformed by a virus, carry on their surface antigens of both of the original two cell types, thus stimulating rejection of both cell types by the body.

GENETICS

Test for missing enzyme

About one in 3,000 white Americans inherits a genetic defect in which the body produces only abnormal forms of an enzyme called pseudocholinesterase. Under usual circumstances this defect, which occurs infrequently in persons of African or Oriental descent, presents no problem. However, if these individuals are given a potent muscle-relaxant, succinycholine, serious side effects may ensue.

The drug, used to relax muscles during anesthesia and to treat patients with epilepsy or those undergoing electric shock therapy, is broken down by pseudocholinesterase. In persons lacking the ability to metabolize the drug, its normally short-acting effect (it produces muscle paralysis and suspended breathing) is prolonged dangerously.

Now, scientists at the University of Washington in Seattle have devised a test to spot this defect in advance. Dr. Arno G. Motulsky, with Mrs. Anne C. Morrow, treated a patient's blood with combination of colored reagents. Gross color differences, they find, occur between normal and defective individuals.