life sciences

BIRTH DEFECTS

Testing for Tay-Sachs

Using an enzyme assay technique developed within the last month, scientists at the University of California at San Diego can identify before birth infants who have a fatal neurological disease.

The Tay-Sachs syndrome is a genetic defect that occurs when an enzyme necessary for the metabolism of lipids in the brain is missing. In this always-fatal disease, claiming the lives of its victims in the first three and a half years of life, excessive quantities of fats are stored in the brain, causing nerve cells to balloon.

Recently, Drs. John S. O'Brien and Shintaro Okada showed that hexosaminidase A is the enzyme that is absent in this defect. Now they have perfected a method for determining whether this enzyme is present by fluorescing cells withdrawn from the fetus at sixteen weeks. If the enzyme is not present and the child has Tay-Sachs syndrome, therapeutic abortion may be recommended.

This inheritable defect occurs primarily in Jews: 1 out of 40 carries the genes for this disorder which is thought to have arisen as a mutant in the Middle Ages.

The defective gene can be identified in parents, and if both have it, the chances are one in four that the child will have the disorder. In such cases, the test is recommended.

PHARMACOLOGY

Effect of epilepsy drug shown

Follow-up X-rays of the skull, back and pelvis of epilepsy patients under 20 years of age have shown bone changes as a result of long-term treatment with Dilantin.

Only six patients have been studied so far by Dr. Kenneth R. Kattan, a radiologist at the University of Cincinnati College of Medicine, but in all of them there was widening of the skullcap and thickening of the tissue in the skeleton of the head.

Dilantin is a trade name for diphenylhydantoin, which has been in use for more than 30 years to control epileptic seizures and other conditions such as neuralgia or peripheral neuritis.

The group so far observed was small, and parents should not be deterred from having the medication continued if young patients need it, but it might be wise to have follow-up X-rays if long-term therapy is given.

X-rays are usually taken when an epileptic first starts treatment. Dr. Kattan told the annual meeting of the American Roentgen Ray Society in Washington, D.C., that before drug therapy his patients' skulls were normal. One of the six had an especially noticeable widening of the skullcap, mainly due to thickening of the tissue between the bones of the skull.

GENETIC ENGINEERING

Transforming defective cells

Attempts to transform defective human cells into healthy ones by inserting fresh genetic material have met with partial success. In the past, geneticists' efforts at cell transformation have focused on bacterial cells and on human cells that have been transformed by DNA from viruses.

Now, scientists attending the annual meeting of the American Society of Human Genetics learned, temporary transformation of human cells by normal human DNA has been achieved.

Skin cells from patients with a genetic defect known as the Lesch-Nyhan syndrome lack an enzyme essential for incorporation of purine bases into new nucleic acids. Such cells, deficient in hypoxanthine-guanine phosphoribosyl transferase (HGPRT), were derived from Lesch-Nyhan patients and grown in culture. Then, normal DNA was placed upon these cultured cells with the expectation that the enzyme-deficient cells would take up the new DNA and use it to produce the disease-causing enzyme.

Indeed, explained Dr. Theodore Friedman of the Salk Institute for Biological Studies in San Diego, some of the Lesch-Nyhan cells did incorporate the DNA and for a short time produced detectable levels of the previously missing HGPRT. Why only some cells took up for DNA and why it coded for enzyme production for only a short time is not entirely clear, although scientists speculate that some material in the diseased cells degraded or broke down the new DNA, thereby destroying its ability to function.

Dr. Friedman reported his finding with Drs. W. Fujimoto of Salk Institute, J. E. Seegmiller of the National Institutes of Health and J. H. Subak-Sharpe of the University of Glasgow, Scotland.

IMMUNE REACTION

Alternative to drugs

Draining the lymph from patients prior to kidney transplantation may be preferable to pretreating them with potent immunosuppressive drugs as is now general practice, a team of University of Texas researchers reported at the annual meeting of the American College of Surgeons in San Francisco.

Instead of completely knocking out the patient's immune system with potent drugs and thus laying him open to ordinary infection, Dr. Jay C. Fish of Galveston suggests surgically opening the thoractic duct and drawing off lymph fluid. In experiments with 19 patients and 35 calves, he and his colleagues removed from this fluid the lymphocytes that destroy foreign tissue, returning the cell-free lymph fluid to the patient in order to maintain protein and fluid balance.

In this way, tissue-attacking lymphocytes are removed while levels of circulating antibody, the immune agent that fights invading viruses and bacteria, remain undisturbed. Immunosuppressive drugs, on the other hand, destroy lymphocyte and antibody alike, which leads to dangerous susceptibility to infection.

When 90 percent of the lymphocytes are drained, Dr. Fish says, chances of improved graft survival are good. For periods varying from 14 to 78 days after a kidney transplant, his patients received no immunosuppressive therapy while their wounds got a good start on healing and developed no infections. After that, they received low doses of prednisone and Imuran to suppress immunity and prevent rejection.