

BIOCHEMISTRY

Enzyme aids study of aging

One approach to research on the aging process is to evaluate the function of specific biochemical systems that appear less able to adapt to changes as an organism grows old. A case in point is the regulation of the enzyme glucokinase, which is involved in sugar metabolism.

Dr. Richard C. Adelman of Temple University's Fels Research Institute in Philadelphia fasted groups of rats, varying in age from two months to two years, for 72 hours. After the three-day fast, the animals were fed a sugar-rich diet for 24 hours.

Immediately after the fast, the levels of glucokinase were reduced in all of the animals because they had little sugar in their bodies. After consuming a high sugar diet, the enzyme levels rose markedly in young rats within four hours and balanced off at normal levels within eight hours. But the older, two-year-old animals were unable to respond as quickly. In these rats, glucokinase levels did not increase to metabolize the sugar for about eight hours, and balanced at normal levels only after 24 to 48 hours.

Dr. Adelman and his group hope to identify the molecular mechanism responsible for regulating the glucokinase system and to determine differences in its activity in young and old animals.

BONE GROWTH

Silicon linked to calcification

Silicon appears to be a factor in bone calcification, according to Dr. Edith M. Carlisle of the University of California School of Public Health in Los Angeles.

Dr. Carlisle made approximately 5,000 electron-probe microanalyses for calcium, phosphorus and silicon levels in bone, using 50 rats and mice ranging in age from one to 28 days old. The results, reported in the Jan. 16 *SCIENCE*, show that silicon is uniquely related to the maturity of bone.

"The more mature the bone material, the smaller the amount of measurable silicon," she says. And when tissue calcium levels are low, less than 0.1 percent, silicon levels are also minute.

However, in bone samples containing moderate amounts of calcium, suggesting that the process of calcification is under way, silicon levels rise.

REPRODUCTIVE PHYSIOLOGY

Multiple births preventable

By modifying the fertility drugs used to induce ovulation in previously sterile women, it may be possible to reduce the risk of the multiple birth these drugs can cause. Dr. A. C. Crooke, a consultant at the Birmingham Hospitals in England, studied women who took the hormone preparations between 1961 and 1968 and says he can "draw a clear line between twins and triplets-plus."

The hormone preparation his patients took contained follicle-stimulating hormone, which causes an egg to ripen in the ovary, and luteinizing hormone (LH), which triggers the release of the ripe egg. One danger of the

drug is that it generally induces the release of several eggs simultaneously, thus leading to multiple births.

"With a careful control of doses and the use of a preparation with a low LH concentration, I believe we can reduce drastically the number of triplets or more being born," he says. Of 22 women taking high LH preparations, five had triplets or more. Of 38 women taking a drug low in LH, only one bore triplets.

NITROSAMINES

Carcinogens in the environment

In addition to known cancer-causing chemicals in the environment, there may be carcinogenic agents that act only in combination with other chemicals.

One of these potentially dangerous agents is a class of compounds known as nitrosamines. They may be formed in the body as the result of chemical reactions between nitrites and another class of compounds called secondary amines, Drs. Samuel S. Epstein of Harvard Medical School and William Lijinsky of the University of Nebraska report. In the Jan. 3 *NATURE*, they suggest that the ingestion of nitrites and secondary amines could lead to the formation of carcinogenic nitrosamines that have been tied to cancer of the lung, esophagus, stomach and other organs in animals.

Nitrate-containing sources, from which nitrites are derived, include fertilizers, water in agricultural areas, green vegetables and meats and fish preserved in nitrate or nitrite compounds. Secondary amines form when protein foods are cooked. Neither compound is carcinogenic singly. "Reduction of human exposure to nitrites and certain secondary amines, particularly in foods, may result in a decrease in the incidence of human cancer," Dr. Epstein says.

IMMUNOLOGY

Diabetes and autoimmune disease

Certain types of diabetes, particularly acute diabetes in children and young adults, may be a form of autoimmune disease in which the patient's body destroys its own insulin-producing cells in the pancreas.

Deliberately induced autoimmune diabetes in white rabbits provides a model for study and lends some support to the theory linking diabetes and autoimmunity in man. In the December *AMERICAN JOURNAL OF PATHOLOGY*, two San Francisco investigators report that they created autoimmune diabetes in rabbits that were injected with insulin from cows. The rabbits mounted an immune response to the foreign insulin but the anti-insulin antibodies they produced destroyed their own insulin as well by attacking the insulin-producing cells.

In some rabbits, the resultant high-sugar levels in their blood persisted as long as a year after cow insulin injections were discontinued.

Drs. John C. Lee and Gerold M. Grodsky report that microscopically the insulin-producing cells of the diabetic rabbits were strikingly similar to those of some diabetic patients before they were treated with insulin. Some diabetic patients have been found to carry anti-insulin antibodies prior to insulin therapy, again suggesting that they may be immune to certain of their own pancreatic cells.