BIOCHEMISTRY

Body Enzyme Harnessed

Regulation by citric acid of an enzyme that acts as catalyst for many biochemical reactions may provide treatments for schizophrenia and Wilson's disease.

➤ CITRIC ACID has been used by a team of Florida State University chemists to harness an essential body enzyme.

The important catalytic enzyme called ceruloplasmin (CP) is an active, minute protein molecule in the blood stream and contains virtually all the copper ions of the blood which trigger many key biochemical processes.

Some chemical reactions that CP stimulates are beneficial to healthy humans, but the same reactions can cause harmful by-products in persons with specific diseases, the researchers said.

One of the most important possible benefits that could come from the use of citric acid as a regulator of this essential enzyme is its application in stabilizing prominent biological substances such as adrenaline and vitamin C.

Application to schizophrenia, the most common mental disease, is dependent on proof of preliminary research done in Canada. This research indicated that abnormal levels of adenochrome, a by-product of CP-adrenaline activity, in the body can produce a psychosis on the order of a split personality, severe depression and other mental disease symptoms.

Based on this theory, the Florida research may have provided a treatment for the biochemical psychosis by short-circuiting the powers of CP to burn up, or oxidize, valuable body supplies of vitamin C.

The Florida research also could apply to another illness, called Wilson's disease, in which a deficient supply of CP causes deposits of copper to form in the liver and brain. This was reported little more than a year ago by physicians at the Albert Einstein College of Medicine, New York.

Dr. Shigemasa Osaki, a research associate from Tokyo, Japan, who headed the Florida research team, will present its findings at the International Congress of Biochemistry in New York, July 27.

Dr. Earl Frieden, chairman of Florida State's department of chemistry, with James McDermott, also of Florida State University, collaborated on the study.

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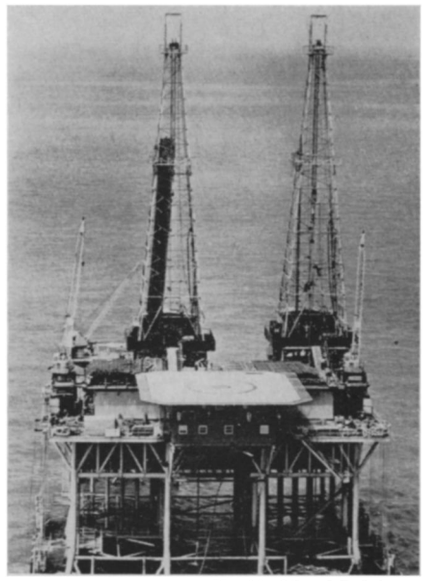

Humble Oil and Refining

OFFSHORE DRILLERS—The twin derricks, towering 238 feet above the waters of the Gulf of Mexico, drill two wells at a time in an experiment by Humble Oil and Refining Company to reduce costs of producing oil and gas from reservoirs far offshore. The 4,000-ton platform contains living quarters and recreational facilities for the men who operate the drills.

BIOCHEMISTRY

Cancer, Heredity Linked

➤ CANCER PRODUCTION has been traced to changes in the genetic material of cells, the "blueprints" of heredity.

These conclusions were drawn after several years of study into the complex relationships between enzyme chemistry and cellular growth and reproduction, the Sloan-Kettering Institute for Cancer Research, New York, reported.

The results have two profound and sweeping implications for present-day cancer research:

1. If the cancer cells are produced from normal cells as a result of chemical alterations of the genetic material or chromosomes, then the cause of cancer growths would appear to be chemical, not biological.

This indicates a switch by Sloan-Kettering in research emphasis from viruses to chemical changes as the cause of cancer. Sloan-Kettering has long advocated viruses as the probable cause of cancer.

2. When chromosomes change within cancer cells, enzymes, the chemicals which carry out biological processes of the cells, are also altered.

Biochemists at Sloan-Kettering have devised techniques to detect these enzyme mutations associated with cancer. Tests, still experimental, can be used to determine the levels of these enzymes in the blood.

The fruits of these experimental identification tests, it is hoped, will soon lead to the long-awaited blood test for cancer diagnosis.

The report also describes a number of studies, each of enormous value to the work of finding chemical agents to arrest and prevent cancer production. An enzyme, fibrinolysin, has been effective in stopping the spread of cancer in the body.

An enzyme, asparaginase, has been shown to destroy certain chemicals necessary for cancer production in experimental animals. Plans are now being made to try this same treatment as a means of arresting cancer growths in humans.

Sloan-Kettering researchers believe they have also discovered one of the fundamental clues for the further production of chemical agents to arrest cancer. When a certain enzyme, 6-mercaptopurine, was observed to stop the growth of cancer cells and not normal cells, researchers conducted intensive studies of this striking phenomenon.

Cancer cells apparently cannot produce certain enzymes that are essential in the production of the genetic material, the nucleic acids, in the cells. This is due to a metabolic or energy consumption difference between normal and cancerous cells.

This discovery, Sloan-Kettering reports, has given biochemists a most important clue in the production of chemical agents to halt cancer in human beings.

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SURGERY

X-Rays Before Surgery Help Cancer Treatment

➤ SUCCESS in treating animals with X-rays before removal of malignant tumors has led surgeons to use the technique on humans at the Washington University School of Medicine, St. Louis.

Drs. W. E. Powers and L. J. Tolmach found that in some mouse cancers, a small dose of radiation given before surgery significantly increased the number of cured mice. Larger doses are necessary to kill malignant cells that resist radiation, which occur in about one percent of the mouse tumor cells.

The nature of tumor growth is such that even with the best surgical techniques cancer cells are sometimes left in the area of operation and grow to produce another tumor.

The scientists reasoned that a small dose of preoperative radiation would kill the majority of the tumor cells, including any that might be spilled or missed during surgical removal of the tumor, and in this way the chance of tumor recurrence due to this cause would be reduced.

More than four-fifths of the mice receiving a 500-rad dose of X-rays to their tumors were cured of the malignancy when the tumors were surgically removed immediately after being X-rayed.

Now the technique is being tried on human cancers. The American Cancer Society supported the laboratory investigation.

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