BIOCHEMISTRY

Isolate Growth Hormone

Human and monkey hormone molecules promoting growth isolated for first time. Consisting of about 240 amino acids, they are nearly half the size of the cattle hormone.

➤ HUMAN and monkey pituitary growth hormones have been isolated for the first time, stimulating renewed hope this important secretion eventually may be available for the treatment of human disease.

The achievement was reported to the American Cancer Society meeting in New York by Dr. C. H. Li, director of the University of California Hormone Research Laboratory.

The human and monkey hormone molecules appear to be similar and both are markedly different from the growth factor of cattle, which provides the foundation of knowledge accumulated in 35 years of work on this hormone.

Dr. Li suggested the big difference may explain why the cattle growth hormone, although it readily stimulates growth in rats, has not been consistently effective in humans.

The scientist reported that monkey and human growth hormones appear to be about half the size of the cattle hormone, a molecular weight of about 27,000 against 46,000, with about 240 amino acids instead of the 400 in the cattle factor.

Also the cattle hormone molecule has a cumbersome Y structure, with two N-terminals and one C-terminal amino acids, while the human and monkey hormones have the much simpler straight chain amino acid structures, with a single terminal amino acid phenylalanine on each end.

Dr. Li said the monkey hormone is now being tested at the National Cancer Institute to see whether it works in man. Efforts to use the cattle hormone in humans to treat dwarfism have not been successful.

He said the biological activities of the large hormones may lie in "cores" of the hormone molecules. The "core" that stimulates growth in the human, monkey and cattle hormone may be a small molecular segment that is identical in each hormone.

The rat, Dr. Li speculated, may be capable of degrading the cattle hormone and using the "core," while man may not have this ability.

The scientist said human and monkey hormone had been tested in rats and found to be equally as effective as cattle hormone. In view of the difference in size of the hormones, this would seem to support the "core" idea.

Dr. Li said the new research was made possible by the recent development of polio vaccine and of surgical operations to remove the human pituitary. Eli Lilly & Co., a maker of polio vaccine, supplied pituitaries from monkeys used in making the vaccine. Drs. Rolf Luft and Herbert Olivecrona of the Karolinsk Institut, Stockholm, Sweden, pioneers in the human pituitary operation, provided a dozen human glands for the extraction of human hormone.

From the human glands only a minute amount of hormone was obtained, 29 milligrams in the form of a white powder. There was just enough to test its activity in rats and obtain its molecular weight and something about its structure.

Future work, says Dr. Li, depends upon getting larger quantities of human and monkey glands. The scientist wants to determine for certain whether monkey and human growth hormone are identical. After that, the job would be to learn how to degrade cattle hormone and obtain the active "core" which then might be active in man.

There is little possibility that enough monkey hormone could ever be obtained for widespread use in treatment of disease, but the cattle hormone could be obtained in fairly large quantities.

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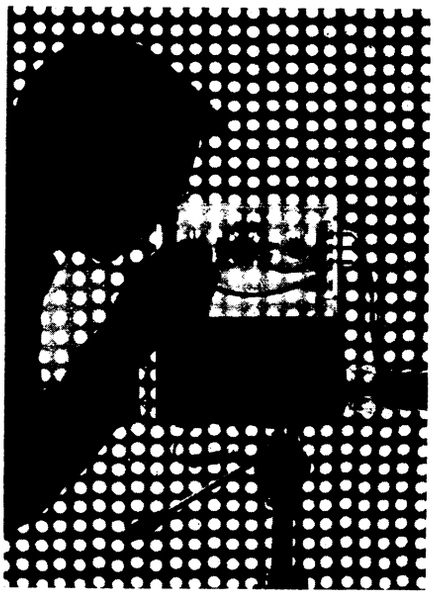

SENSITIVE "EYE"—A test pattern background silhouettes the Ebicon, from the phrase, electron bombardment induced conductivity, a new type television camera tube being developed at Westinghouse Research Laboratories.

PHYSICS

Low Temperature "Brains"

➤ ELECTRONIC "BRAINS" that work in the very frigid region near absolue zero, or close to 459 degrees below zero Fahrenheit, are foreseen through the use of cryotrons.

They would no longer be called "giant," because a large-scale computer might well occupy only about one cubic foot, not including the refrigerating and answer-printing equipment. Present-day computers using vacuum tubes occupy about 300 times this space.

A cryotron operated at very low temperatures serves as a nearly perfect electronic switch, scientists at Arthur D. Little, Inc., Cambridge, Mass., report.

In its simplest form, the cryotron consists of a straight piece of wire about a tenth of an inch long, wound with a control wire about the size of human hair. It operates in a bath of liquid helium at only a few degrees above absolute zero.

At such low temperatures, many metals are superconducting, offering so little resistance to the passage of electrical currents that, once the current is started, it appears to continue indefinitely. The superconductor's normal resistance returns, however, if sufficient magnetic field is applied.

When the cryotron is cooled by liquid helium, the central wire can be made superconducting or resisting by raising or lowering the magnetic field created by the control current flowing in the surrounding coil. Thus it makes, breaks or changes connections in an electrical circuit as does any electronic switch.

The cryotron can also control a larger current than is needed to actuate it. Great numbers of cryotrons can be interconnected to form the logical network of an electronic computer, as is done with vacuum tubes and transistors.

Not only would space be saved using the new devices, the A. D. Little scientists report, but considerably less power would be needed. The power saving would come from a very large reduction in the amount of current required to warm up the machine, and elimination of the need for the cooling system essential in operating a vacuum-tube computer.

An adequate supply of liquid helium can be stored easily, compactly and safely. With suitable refrigerating equipment, the helium would not have to be replenished frequently.

The A. D. Little scientists foresee the early use of cryotrons as the "memory" of a computer, and possibly as an automatic dictionary for literal translation of foreign words and phrases.

Although the cryotron's operating speed is now slow, they forecast a hundredfold increase by further research.

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