BIOCHEMISTRY

'Artificial Insulin' Made

A synthetic chemical that could take the place of animal insulin for the control of diabetes has been produced for the first time—By Faye Marley

➤ A SYNTHETIC CHEMICAL that could control diabetes—an "artificial insulin"—has been produced for the first time.

After five years of research at the University of Pittsburgh, a team headed by Dr. Panayotis G. Katsoyannis has achieved the synthesis of an insulin that may keep diabetics alive.

The new compound, if not exactly the same as the hormone from animal pancreatic glands, is close in chemical structure. It could free medicine from its dependence on the animal product.

The achievement means that for the first time biological activity associated with a naturally occurring protein has been obtained in the laboratory with manmade chemicals.

All proteins are made from amino acids, just as all English words are spelled from the 26 letters of the alphabet. Molecules of previously synthesized compounds have consisted of a single string of these amino acids. But the insulin material consists of two strings, or "chains"—insulin A, which contains 21 amino acids, and insulin B, which has 30—linked together by two "bridges" consisting of sulfur atoms. In addition, there is a sulfur atom "bridge" within the insulin chain.

To synthesize insulin requires highly sophisticated chemical processes that align the 51 amino acids in two separate chains, properly link the two chains and create the disulfide "superstructure" in the A chain.

Dr. Katsoyannis, with Dr. Kouhei Fukuda, a Japanese postdoctorate fellow, and Andrew Tometsko, a United States graduate student, all of the University of Pittsburgh, have reported success in assembling the insulin A chain from several smaller fragments, and in constructing, but only partially purifying, a synthetic B chain.

They definitely have synthesized "an insulin" but not necessarily as it exists in nature.

Work is continuing to achieve greater purity of the B chain, after which another recombination with the A chain will be made.

The actual yield from this recombination, if it approximates that of the natural chains, will indicate whether the structure of insulin originally proposed by Dr. Frederick Sanger, 1958 Nobelist, in Great Britain is correct, or whether changes will have to be made in the basic structure of the molecule to achieve true synthetic insulin.

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MEDICINE

Virus-Causing Tumor

➤ A VIRUS that produced a nonmalignant tumor in a monkey produced the same tumor in man in a laboratory accident.

Although there is no proof yet that human cancer is caused by a virus, Dr. James T. Grace Jr., assistant director of the Roswell Park Memorial Institute, Buffalo, told the 17th World Medical Assembly in New York that available evidence points to this basic concept.

It is now no longer a theory that viruses can cause cancer in the animal kingdom, Dr. Grace stated. He traced studies in laboratory animals that showed the one unique property of tumor viruses to be their ability to induce heritable, malignant changes in host cells.

Obviously it is not possible to inject potential cancer-producing materials into humans, but the laboratory accident he described, in which a laboratory assistant accidentally pricked his hand with a virus-contaminated needle, showed that the same virus in monkey and man would produce a noncancerous tumor.

Within seven days an antibody to the virus appeared, and four months after the skin puncture, a noncancerous tumor appeared.

Dr. C. Gordon Zubrod, director of intramural research at the National Cancer Institute, Bethesda, Md., told the delegates from more than 40 nations that drugs can achieve temporarily complete remissions in 12 different types of cancers.

The 12 cancers are: acute and chronic lymphocytic leukemias, acute and chronic myeloid leukemias, Hodgkin's disease, lymphosarcoma, reticulum cell sarcoma, giant follicle sarcoma, Wilms' tumor rhabdomyosarcoma, neuroblastoma, choriocarcinoma, seminoma and adrenal cancer.

The following drugs have brought about temporarily complete remission of one or more of the cancers listed: nitrogen mustard and the related drugs TEM and thiotepa, cyclophosphamide, sarcolysin, chlorambucil, myleran, methotrexate, 6-mercaptopurine, DDD, actinomycin D, Vinca alkaloids and methyl GAG.

Although there are more than two million deaths a year in worldwide terms from uncontrolled cancer, Dr. Zubrod said two approaches would reduce this figure. Early diagnosis and surgical removal is one, but the next improvement will be from advances in drug therapy.

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Fremont Davis

DR. LINUS CARL PAULING—The Nobelist is shown demonstrating with rope strands how molecules are twisted into the structure of protein.

GENERAL SCIENCE

Pauling Wins Peace Prize, His Second Nobel Award

➤ TWO GREAT EVENTS in the colorful and controversial life of American chemist Dr. Linus Carl Pauling took place within three days of each other.

One was the formal signing by the United States of the partial ban on nuclear testing; the other was Dr. Pauling's winning of the 1962 Nobel Peace Prize.

Dr. Pauling, who for years has been an outspoken opponent of atom bomb testing, marked the occasion by renewing his criticism of "massive" stockpiles of nuclear weapons on both sides of the Iron Curtain.

It was the second Nobel Prize for Dr. Pauling, 62. He won the 1954 prize in chemistry for his theory on the fundamental nature and behavior of molecular bonds.

The only other person to win two Nobel Prizes was Mme. Curie, codiscoverer of radium.

Dr. Pauling, a professor at California Institute of Technology, Pasadena, will receive his prize, worth $51,440, at the traditional glittering Nobel ceremony at Oslo University in Norway on Dec. 10, the day commemorating the death of inventor-philanthropist Alfred Nobel.

The Nobel committee, at that time will announce why Dr. Pauling won the award.

Other Americans who have won the Peace Prize are: Theodore Roosevelt (1906), Elihu Root (1912), Woodrow Wilson (1919), Charles G. Dawes (1925), Frank B. Kellogg (1929), Jane Addams and N. M. Butler (1931), Cordell Hull (1945), Emily G. Balch and John R. Mott (1946), Ralph J. Bunche (1950), and Gen. George C. Marshall (1953).

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