MEDICINE—CHEMISTRY

Find Chemical Difference Between Cancer and Normal Cell

Discovery by German Scientists That Amino Acids In Cancer Cells May Be "Right-Handed" Is Confirmed

HAILED as a promising new lead on the cancer problem, an important chemical difference between cancer cells and normal cells, reported by two Dutch scientists publishing in German journals, has been confirmed by Dr. E. Schroeder, working under the direction of Dr. Ellice McDonald at the Biochemical Research Foundation of the Franklin Institute.

Curiously the same effect was prognosticated in 1907 by an American physician, Dr. Margaret Cleaves, who at that time was treating cancer patients with enzymes in New York City. Digging into the medical literature brought to light this interesting fact.

The discovery, expected to speed the fight against cancer, is said to give a possible chemical approach to better understanding and treatment of this dread disease.

This new cancer research that has stirred the medical world comes from the University of Utrecht's Chemical Institute in Holland. Prof. F. Kögl, director, and Dr. H. Erxleben published their results in German medical and chemical journals, whence it filtered to the rest of the world, causing experimenters to interrupt their present problems to work on this more promising possibility.

In the Protein

The difference between the cancer cells and the normal cells is in the protein building blocks they contain. These building blocks, essential constituents of living matter, are known as amino acids. In the natural form, these acids might be called left-handed, because when a beam of polarized light is passed through them, they turn it to the left. In cancer cells, it has been discovered, the protein building blocks occur both in natural and unnatural forms, some of them being the natural left-handed variety and some the unnatural, right-handed kind which turn the polarized light to the right.

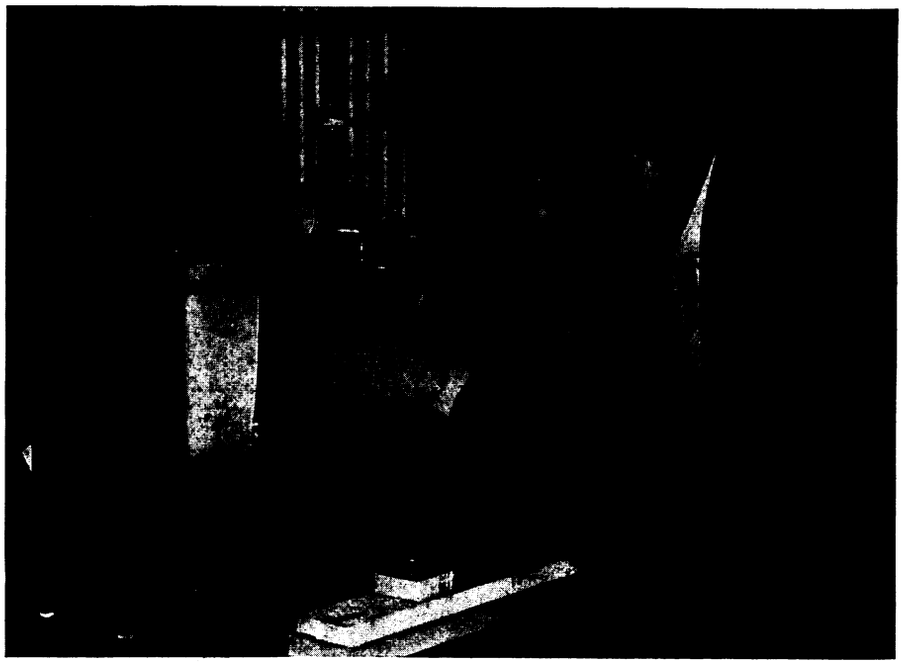
This is the first qualitative chemical difference that has been found between malignant and cancer cells, Prof. Carl Voegtlin, director of the U. S. National Cancer Institute, Washington, stated when interviewed. His laboratory is following up the discovery vigorously.

Discussing possible practical applications of the discovery, if confirmed, Prof. Voegtlin recalled that the great Michael Faraday was asked what practical results might follow his discovery of electromagnetism, now the basis of the electrical industry. At that time Faraday when asked what use was his discovery, replied: "What good is a baby?"

A possible practical result of the discovery, in the opinion of another cancer authority, would be the prevention of cancer by the use of enzymes, the substances which play a powerful role in the chemical changes going on in the body. A familiar enzyme is pepsin, the protein-digesting enzyme of the stomach.

The day of practical application of this nature is still in the future. Following confirmation of the discovery of the chemical differences between malignant and normal cells, such as Dr. Schroeder is about to report, scientists will have to find an enzyme that can turn the unnatural forms of the cancer's amino acids back to natural forms, or better still, perhaps one which can keep all the amino acids in the body from turning into the unnatural forms. These ideas, of course, are purely speculative. There is no evidence yet that the difference just found between cancer cells and normal cells is the cause of cancer—it may be a difference that arises after something else has caused the cancer to start its uncontrolled growth.

Dr. Cleaves, the American physician, was working on this idea in 1907, actually using an enzyme, trypsin, from the pancreas, in treatment of cancer. Her idea was that in certain disease conditions such as cancer, the proteins of the tissues were susceptible to trypsin's action because of "their special configuration." While she evidently did not go any deeper into the chemical aspects, the difference just discovered between cancer and normal cells is a difference



MEASURES A WHISTLE

This surface indicator, being operated by J. A. Sams, of the General Electric Works Laboratory, who developed it, is so sensitive that it will indicate the thickness of a fingerprint on a piece of smooth glass as its minute irregularities are felt out by a sapphire-pointed stylus. The device is used to determine the smoothness of metal or painted surfaces. Mr. Sams is measuring the vibrations caused by a whistle.

in the configuration or pattern of the building blocks of the cell protein. With the greater knowledge of body chemistry that has accumulated in the past 32 years, scientists are in better position to test the role of enzymes in cancer.

Dr. Cleaves died in 1917, without the knowledge that over 20 years later scientists would be attacking the cancer problem from the enzyme angle on which she worked.

Science News Letter, July 29, 1939

MEDICINE—CHEMISTRY

British Fail to Confirm Cancer Cell Discovery

HARD on the heels of news that an important chemical difference between cancer cells and normal cells had been found, comes a British report that the finding could not be confirmed.

At the Imperial College and the Research Institute of the Royal Cancer Hospital (Free) in London, scientists were unable to find the difference between the cancer cells and normal cells, observed by Prof. K. Kögl and Dr. H. Erxleben, of the University of Utrecht. Reporting to *Nature* (July 8), Drs. A. C. Chibnall, M. W. Rees, G. R. Tristram, and E. F. Williams, of Imperial College, and Dr. E. Boyland, of the Royal Cancer Hospital, state:

"These preliminary results are not in agreement with those of Kögl and Erxleben, and show the need for a more extended investigation."

The Dutch discoverers, defending their findings (*Nature,* July 15), state that a difference in chemical methods accounts for the fact that Prof. Chibnall and his associates failed to confirm the Dutch work. The English scientists, they claim, used a test which, while good for detecting the natural form of the acid, is not apparently able to detect the change in this acid to the unnatural form.

Science News Letter, July 29, 1939

Airplane pilots are tested for physical fitness every 90 days.

Women in ancient Egypt carried basket loads on their heads.

The old game of jackstones has gone modern with plastic jacks in gay colors.

There are about 90,000 Diesel-powered vehicles in use, only about 3,000 of them registered in the United States.

A bicolored ground snake found recently at Grand Canyon is believed new to science and unknown elsewhere.

PHYSICS

Blood's Oxygen Carrier Studied With Spectroscope

First Studies of Hemoglobin Within Its Natural Environment of Red Blood Cells Reported to Meeting

THE FIRST studies ever made of hemoglobin, the red, oxygen-carrying material of the blood, within its natural environment of the red blood cells themselves, were reported to the Massachusetts Institute of Technology spectroscopy conference at Cambridge by Dr. David L. Drabkin of the University of Pennsylvania.

Previous spectroscopic researches in this knotty but highly significant field have been limited to investigations of concentrated solutions of the pigment, prepared by actual destruction of the red cells themselves. Thus much of our knowledge has been drawn from studies not of the substances in their natural environment but of their solutions obtained by extraction, a procedure possibly risking chemical change.

Dr. Drabkin dealt with a rather complicated turbid suspension of the red blood cells which gave a distorted picture requiring interpretation. His results constitute the first accurate deductions ever made on biological material. Preliminary studies indicate that the spectra of hemoglobin and its derivatives are the same within the blood cells as those obtained extracellularly.

The method has already found an additional application, in facilitating accurate determination of hydrogen ion concentration within the red blood cells. This is done by intracellularly converting the hemoglobin to methemoglobin, its oxidized form, and using the well known indicator properties of this latter compound.

Dr. Drabkin said that this unique method of using the main cellular constituent to determine reactions within the cell appears "most promising." Heretofore such methods as puncturing the cell with a micro-needle, which injures the cell, have been used.

Dr. Drabkin also reported progress in a spectroscopic study of protein denaturation which may throw considerable light on the structure of the complex protein molecule. Urea, he found, may play an important role in the denaturation process, for whereas hemoglobin is denatured no more rapidly in alkali than in concentrated urea solution, the presence of both reagents speeds the process some sixty-fold.

Science News Letter, July 29, 1939

Study Make-Up of Virus

THE first spectroscopic analysis ever made of viruses, ultra-microscopic disease-producing entities, and their constituent proteins and nucleic acids, has been made by Dr. George I. Lavin of the Rockefeller Institute for Medical Research.

Dr. Lavin investigated three plant viruses—the classic tobacco mosaic virus, latent mosaic virus and tobacco ringspot virus, all of them crystallized in the pioneer researches in this field by Dr. Wendell M. Stanley and Dr. Hubert S. Loring of Princeton.

Crux of his technique, as explained to the spectroscopy conference, was the use of a continuous light source, in preference to the more usual source, and fractionation or splitting of the complex biological substances with which he was dealing, a procedure which may well revolutionize accepted spectroscopic methods of attacking intricate medical and biological problems.

Nucleic acid is apparently a rather prominent constituent of some viruses at least, for Dr. Lavin found it in all three of the plant viruses with a particularly high concentration in the tobacco ringspot. The presence of indoleacetic acid was also indicated.

That the amino acids which go to make up a protein may at times be hitched together in a very peculiar way was indicated by Dr. Lavin's study of papain, a protein-splitting enzyme, in which he was unable to find the amino acid, tyrosine, until after the enzyme had been hydrolized by Dr. J. S. Fruton.

He has also used the spectrograph to analyze urine, photographic fractions prepared by Drs. K. Dobriner and C. P. Rhoads so precisely that he was able to identify a number of physiologically im-