

MEDICINE

Cancer Upsets Albumin

► A CHEMICAL that will keep egg white from getting hard-boiled, no matter how long you heat it, and the process that prevents the hardening, form the basis of a new cancer detection test.

How the test is made and the significance for cancer fighting of the underlying chemistry, were explained by the man who developed the test, Dr. Charles B. Huggins, University of Chicago professor of surgery. Dr. Huggins spoke as guest of Watson Davis, director of Science Service, on the Adventures in Science radio program, broadcast each Saturday over the Columbia Broadcasting System (See SNL, April 23, p. 259).

"The important thing," Dr. Huggins said, "is that the presence of cancer in an individual upsets the mechanism of serum albumin. The person with cancer makes a defective albumin."

Albumin is seen most frequently by the lay person in the white of the egg he eats for breakfast. But albumin, which is a protein, is also present in blood serum. Scientists think, from present evidence, that the blood serum albumin is manufactured in the liver. When cancer develops, according to the theory, it depresses the liver's synthetic activity so that it makes faulty albumin.

"The chief interest in this whole research, more important perhaps than the detection test itself, is what light the disturbed albumin casts on the general nature of the disease we call cancer," Dr. Huggins emphasized.

The cancer detection test shows that the blood serum has this faulty albumin. Here is how it works:

Thermal coagulation is one of the commonest every day operations of the kitchen: when one boils an egg, the albumin and other proteins change from a clear liquid to an opaque solid which we call hard-boiled. What happens, in essence, is that the globe-shaped molecule of egg albumin changes to a string-like, or fibrous, state. Accompanying this unfolding there is a liberation of sulfhydryl, that is, sulfur-hydrogen groups which previously had been coiled in the globular protein and upon liberation of hydrogen a sulfur to sulfur bonding takes place.

That is the chemical language for hard-boiled eggs. When human serum is heated in a tube of boiling water the same process takes place; solidification, cloudiness and the formation of sulfur to sulfur bridges to form a three-dimensional lattice.

Iodoacetic acid is used in the test. This chemical compound at neutrality, provided a minimum quantity is present, has the peculiarity of preventing coagulation of egg white and also of human serum; no matter how long they are heated, neither

of these protein solutions becomes hard-boiled.

If somewhat less than the minimum quantity of iodoacetic acid is added to egg albumin or human albumin and the mixture is boiled, a very curious effect is observed. The albumin coagulates but does not become cloudy: instead a translucent glassy state occurs. The hard-boiled proteins have rubbery elastic qualities and may be stretched considerably and will recoil when tension is released. But the strangest property is their translucency: they are so glassy that one can read a newspaper through the hard-boiled proteins.

The opacity of serum or of a hard-boiled egg is due to the cross linkages of sulfur atoms and its "hardness" is due to arrangement in parallel bundles of amino acid polymers of rather long length. Iodoacetic

acid first blocks the side chain binding and in larger amount prevents the formation of long chains, hence the protein remains liquid. The serum of most cancer patients requires far less iodoacetic acid to prevent coagulation by heat than the serum of normal persons.

That is the background to Dr. Huggins' development of what is for all practical purposes a simple, cheap and reasonably sure blood test for cancer. In the experimental series, the test has been made on almost 300 persons, divided equally between cancer patients, apparently healthy persons and patients with diseases other than cancer. The test proved positive for all cancer patients, negative for all normal persons and negative for all other patients except those with lung tuberculosis and massive acute infections.

Doctors won't be able to give this test today or tomorrow. It may be months before arrangements can be made for its wider trial and still later before it becomes generally available.

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METEOROLOGY

Weather Reporting Pact

► NORTH ATLANTIC weather stations on vessels of six nations will remain in operation for a new three-year period, in compliance with an agreement just signed in London by member states of the International Civil Aviation Organization, after the present pact has expired.

Ten stations stretching from the Western Hemisphere to the coast of Norway will continue to make weather observations and radio reports at frequent intervals for the benefit of transoceanic air traffic, and also for vessels on the ocean. A total of 25 ships will be used for the purpose. Coordinating with their work, land-based stations in Canada, Greenland and Iceland will continue.

The United States, as the nation most interested, will provide 14 vessels for the purpose. The United Kingdom will provide four, and France, the Netherlands and Norway, two each. Canada will provide one. Belgium and Denmark will make financial contributions annually to Norway toward the cost of operation of one station off the Norwegian coast. Ireland and Portugal will make small annual contributions toward the scheme in general.

The ten stations of the network will continue to supply weather data, communications and rescue services now being provided North Atlantic air traffic under a London, 1946, agreement. This expires June 30, 1950, and the new agreement will then go into effect. This re-locates the stations for increased efficiency and economy in operation.

At another ICAO committee meeting, a plan was adopted for international financ-

ing of weather stations in Greenland and a loran station in the Faroe islands. Both are Danish possessions. The Faroe group is centrally located in the ocean about an equal distance from Iceland, Scotland and Norway. Loran is the war-developed navigation system which provides radio beams by means of which a plane or ship is able to determine its geographical position. Denmark will operate these stations, but other nations will contribute to the cost about in proportion to their share in North Atlantic air traffic.

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Words in Science— METEOR—METEORITE

► A METEORITE is a solid body of mineral or metallic composition which arrives on the earth's surface from outer space. Meteorites range in size from a few milligrams to many tons. If one is seen to fall and is later picked up, the meteorite is called a "fall." If the meteorite is not seen to fall, but instead is found in the countryside, it is called a "find."

A meteor is seen only as a fiery or luminous body flashing across the sky, especially in the fall of the year. While in the sky it is a meteor; when it falls to earth it is a meteorite. Meteors, because they appear much larger than they really are, are wrongly called "shooting stars" or "falling stars."

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