

MEDICINE

Heparin Used to Prevent Adhesions After Operations

Anti-Blood Clotting Substance From Lungs of Cows Used Successfully In a Few Human Cases as Preventive

ONE OF the greatest unsolved problems facing surgeons in their life-saving operations, the formation of peritoneal adhesions after operations inside the abdomen, may soon be conquered. Promising results in prevention of adhesions by heparin, the anti-blood clotting substance obtained from cows' lungs, were reported by Dr. Floyd Boys, assistant professor of surgery at the University of Virginia Medical School, at the meeting of the Virginia Academy of Science in Richmond.

Peritoneal adhesions, Dr. Boys pointed out, are one of the chief causes of the dangerous condition, intestinal obstruction. They result from the organization of an inflammatory exudate or juice lying between opposed injured surfaces of the peritoneum, which is the membrane lining the inside of the abdominal walls.

"At first the exudate is unclotted," Dr. Boys explained, "but it soon becomes co-

agulated and an adhesion composed of fibrin is formed. If, and when, the opposing peritoneal layers covering the organs in this zone are destroyed by inflammation, the exposed sub-peritoneal connective tissue and blood vessel elements are stimulated to proliferate (grow) over the fibrin which acts as a scaffolding. By this process, termed organization, the fibrinous adhesion is replaced by scar tissue and a permanent adhesion remains."

Between one and two of every 100 major abdominal operations, it is estimated, are performed for relief of intestinal obstruction due to such adhesions.

Many methods have been tried to prevent these adhesions during the 150 years since the condition has been known. None, however, proved satisfactory. When purified heparin was developed for prevention of dangerous clots within blood vessels, Dr. Boys and Dr. Edwin P. Lehman, professor of surgery at the

University of Virginia, believed it might prevent adhesions also by preventing the coagulation of the inflammatory peritoneal exudate which is the starting point of adhesion formation.

Studies on rabbits and dogs were so promising that the heparin treatment for prevention of adhesions was used in a "few cases of intestinal obstruction" in humans "without any untoward effects." Chief danger in the use of heparin lies in the possibility of hemorrhage within the abdomen but care during the operation to prevent bleeding from the small veins and arteries should eliminate this danger, Dr. Boys indicated.

"An enormous number of cases must be treated with heparin before a sufficient number of cases will come to re-operation or post-mortem to offer a basis for judging the efficiency of the method employed," Dr. Boys stated. "It would seem necessary, therefore, that primary acceptance of such a method must rest upon laboratory and animal assay evidence.

"If the experimental value of heparin in preventing peritoneal adhesions is confirmed by other investigators, its use should offer considerable promise for this heretofore essentially unsolved surgical problem."

Science News Letter, May 17, 1941

PSYCHOLOGY—PHYSIOLOGY

Human Guinea Pigs Test Poisonous Toluene Fumes

FUMES of toluene, chemical from which TNT is manufactured, are being inhaled regularly by three volunteer "human guinea pigs" at the National Institute of Health, to determine just how toxic it is when inhaled. Directing the research are Dr. W. F. von Oettingen, Dr. Paul A. Neal and Dr. D. D. Donohue.

With the rushing of the defense program, more and more toluene is being used in industry. Yet the possible hazards to workmen who are exposed to its fumes have never yet been exactly determined.

It is for this purpose that the three Public Health Service scientists who have volunteered for the experiment go twice a week at nine o'clock in the morning into a specially built gas chamber where they breathe the fumes until noon. After a half-hour luncheon recess, they return to the gas chamber and stay there until five.

Certain concentrations of the fumes are mildly intoxicating. It makes you feel as though you had had a couple of



GAS CHAMBER

In this chamber tests are being carried on to determine the toxicity of toluene. The atmosphere is charged with toluene of a predetermined concentration. In the foreground Dr. D. D. Donahue is preparing the apparatus used to analyze the exhaust air of one of the subjects. In the rear chamber Dr. J. W. Miller is taking a psychomotor test supervised by Dr. E. C. Hammond.

cocktails on an empty stomach. After prolonged inhaling it may cause sleepiness and headache.

Concentrations of the toluene fumes in the gas chamber are varied in different test periods and the men are given a variety of physiological and psychological tests to find out just what effect there is on vision, speed of movement, coordination, as well as breathing, heart rate, circulation, and body chemistry, particularly for traces of toluene in the blood. The effect on white and red blood cells is watched.

Later, concentrations in the test chamber known to produce certain degrees of intoxication or poisoning will be compared with the concentrations actually found in industry.

It is hoped through these human experiments and others now being conducted on animals to discover some simple physical examination to detect toluene poisoning in the earliest stages before it has done permanent damage to the body's organs.

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PSYCHOMOTOR TEST

Dr. E. C. Hammond (right), is testing the ability of P. J. Valaer, chemist at the National Institute of Health to perform certain tests after inhaling toluene. The test is to place the pencil alternately in the two holes in the block as rapidly as possible.

CHEMISTRY

Charred Documents Made Readable by Chemical

CHLORAL HYDRATE, ingredient of "knockout drops" with which criminals used to drug their victims, now serves in the revival of documents "knocked out" by fire.

Two research workers in the Metropolitan Police Laboratory of London, W. D. Taylor and Henry J. Walls, give a brief description of their method for treating charred documents to restore their legibility. (*Nature*, April 5).

The blackened pages are covered with a 25% solution of chloral hydrate in alcohol, then dried at 140 degrees Fahrenheit. This is repeated several times, until a mass of chloral hydrate crystals appears on the surface. A final treatment is given with a similar solution to which 10% of glycerin has been added. After drying, the document is ready to be photographed.

The method works equally well with printed and typewritten matter, the two scientists state, and reading matter on both sides of the page is restored.

No chemical or physical explanation has yet been found for the process, but investigations on its basis are going forward, with the hope of further improvements. It has been found especially valuable in the restoration of the many documents charred in fires following Nazi incendiary raids.

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PSYCHIATRY

Mental Disease May Be Banished by Frozen Sleep

Four Out of Ten Patients Improved, With One Death; Method Considered Promising Enough for Further Tests

DISPELLING the fog of unreality which clouds the minds of patients sick with schizophrenia, widespread and generally hopeless mental illness, may be possible by means of frozen sleep, the refrigeration treatment originally devised for cancer patients.

Use of this treatment with great improvement in four out of ten schizophrenia patients and significant but transitory improvement in three more was demonstrated by Dr. John H. Talbott and Dr. Kenneth J. Tillotson, of Boston, in an exhibit at the meeting of the American Psychiatric Association.

Altogether 14 patients, most of whom had been confined to a mental hospital for two or more years and had been given other forms of treatment including insulin and metrazol shock, were given the frozen sleep treatment. They were first given a light anesthetic and then placed between cold blankets through which a refrigerant at a temperature of 32 degrees Fahrenheit or lower circulated.

Internal body temperatures as low as 75 degrees Fahrenheit were achieved in the patients. Normal body temperature is 98.6 degrees Fahrenheit. The low temperature was maintained for from 24 to 72 hours. During most of the time internal body temperatures were maintained between 80 and 90 degrees Fahrenheit, which has been found to be a safe working range for continuous hypothermia. Hypothermia, meaning abnormally low temperature, is the name Dr. Talbott gives to the treatment, in preference to such popular names as frozen sleep, refrigeration or hibernation treatment.

Although one death occurred in the group of patients and in some improvement was only transitory, Drs. Talbott and Tillotson concluded that the results of the treatment were sufficiently good to justify its further use in schizophrenia. Their results show, they believe, that during the first years of schizophrenia irreparable damage to the important central nervous system does not occur and if

the course of the treatment can be altered during these important years there may be great hope for recovery.

Effects of the treatment on heart and kidney action were reported in detail by Dr. Talbott at the meeting in Atlantic City on May 5 of the American Society for Clinical Investigation.

One of the most interesting cases described was that of a young medical student who had been admitted to the hospital several years before. She had not talked in more than two years. When her bodily temperature reached 89 degrees Fahrenheit she talked clearly and logically and with insight. When her

temperature reached 93 degrees Fahrenheit her conversation became confused and her speech thick. In describing her Dr. Tillotson said:

"During the four intervening hours she had looked and acted quite normally and could not have been diagnosed as suffering from schizophrenia. Her conduct during the following three months was possibly somewhat better. During the second treatment two months later she duplicated her previous performance. When her temperature reached 88 degrees Fahrenheit she became mentally clear and conversed for nearly four hours with her father."

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of the way cancerous growth spreads.

"Such observations have led to the conclusion that the pattern of cancerous growth is influenced decisively by surface forces," Prof. Lucké stated. "Thus, if the outgrowths from the cancer extend into the cavity of the eye where they are completely surrounded by fluid, and where in consequence interfacial forces are equalized, the resultant form is cylindrical. If, instead, the outgrowths make contact with a firm surface such as the lens, the interfacial relations become such that the edges of the growing tumor are drawn over the lens, forming a spreading membrane. If, however, the proliferating tumor pushes into the clefts of a loose tissue, such as the iris, the invading cells become arranged as spheres or cylinders, again through the operation of surface forces."

It was also possible to study cancer growth through a far wider range of temperature than is possible with higher animals, because the frog is cold-blooded. Growth was observed at temperatures ranging from only a few degrees above freezing to that of a warm summer day. Low temperatures retarded growth, high temperatures speeded it. At low temperatures the outgrowths were short, stubby, solid, whereas the more rapid growth induced by warmth produced long branching outgrowths that tended to become bulged with fluid.

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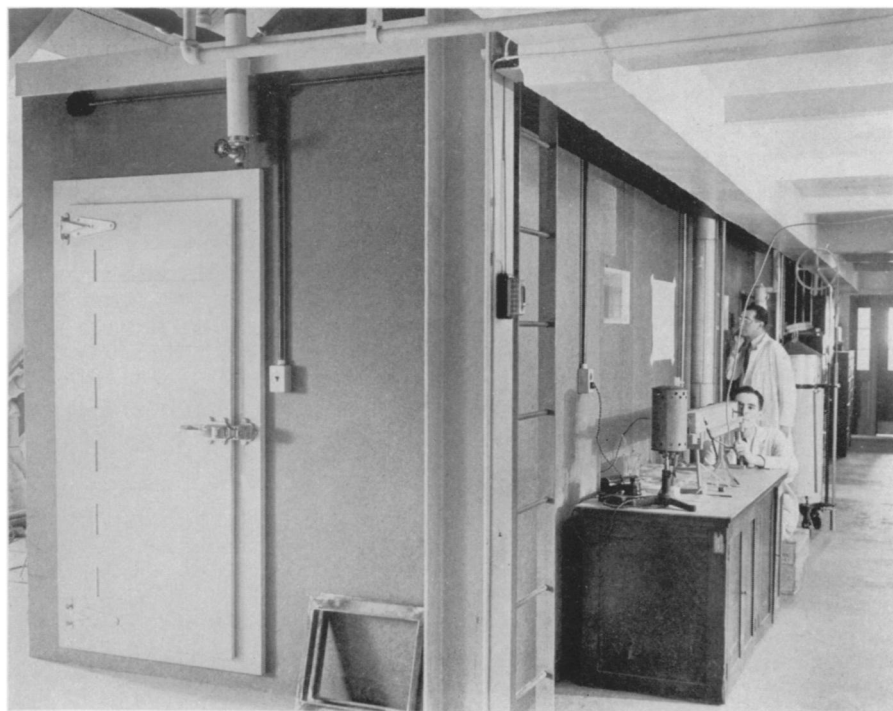
PHYSIOLOGY

Cancer Watched In Frog's Eye; New Facts Learned on Spread

Pattern of Growth Seen To Be Influenced Decisively By Surface Forces; In Fluids, Cancer Is Cylindrical

CANCEROUS tissue growing between the pupil of the eye and the curved, transparent front surface can be watched as if through a window, and studied in detail with a microscope, Prof. Bal-

duin Lucké and Dr. Hans G. Schlumberger of the University of Pennsylvania told the American Philosophical Society meeting in Philadelphia. Their investigations have led to new knowledge



TEST CHAMBER EXTERIOR

This shows the airtight door of the toluene chamber. The scientists shown are measuring the concentration of gas inside the chamber.

ARCHAEOLOGY

Armageddon Battlefield Figures in Oil War

THE BIBLE'S most famous battlefield, Armageddon, toward which international conflict is drawing, has new significance in the present struggle, for crossing the famous Palestine plain runs a pipeline to carry the Near East's most precious fighting material—oil.

The pipeline, carrying Mosul oil gushing from Baghdad west to the port of Haifa in Palestine, was opened in 1934.

If armies converge on Armageddon, as they did in the World War in 1918, and as they have been doing since at least as far back as 1479 B. C., the fighting will appear different from any battles there before, because never before has this Biblical plain seen mobile tanks in attack at 50 miles an hour. World War tanks moved at a snail's pace. Ancient Assyrians fighting at Armageddon had wheel towers for carrying battering rams or soldiers, rather suggesting forerun-