

MEDICINE

Separate Blood New Way

By adding to the blood extra fibrinogen, a protein in blood which aids clotting, the blood cells can be separated quickly and without damage.

► HUMAN BLOOD, which millions of Americans are donating to the Red Cross blood program, will be used in more ways to save more lives, thanks to a discovery reported at the meeting of the Federation of American Societies for Experimental Biology in Detroit.

The discovery is a new way to separate, rapidly and effectively, the red cells of blood from the white cells and other parts of blood. It was reported by Drs. Edward S. Buckley, Jr., Marvin J. Powell and John G. Gibson, II, of Harvard Medical School.

The new method not only separates the red cells but does it so fast and so gently that they are not damaged in the process. And it makes possible the recovery of the even shorter-lived, more fragile white blood cells for study and possible use of their germ-fighting ability.

Ordinary methods of separating red cells from blood plasma leave the red cells in a gluey mass of hurt cells that have very little medical use and are generally thrown down the drain. The red cells, however, are the important oxygen-carrying part of the blood. For about a third of the patients who get blood transfusions, red cells would not only be as good as whole blood but actually better.

The new method involves the use of fibrinogen, a protein of blood involved in the clotting process. Fibrinogen makes red cells pile up face to face like stacks of coins. It does this very fast. By adding enough extra fibrinogen to the blood as it is drawn from a blood donor's vein, the red cells will settle to the bottom of the

flask in about 50 minutes, the Harvard team reported. Ordinarily it takes 24 hours or more for all of them to settle out of the plasma when the blood is allowed to stand.

In the same time about 80% of the plasma containing about 80% of the white blood cells is obtained. These white cells contain and some scientists think they manufacture the germ-fighting antibodies. Getting them out of the blood so fast, before they have time to disintegrate, will let scientists learn more about this germ-fighting ability and perhaps put it to use.

Platelets, which produce the substance in blood that starts the clotting process, also can be obtained with the new, speedy method of separating blood cells. The importance of this lies in the fact that many bleeding diseases are due to deficiency of platelets in the blood. The bleeding tendency caused by radiation from atomic bombs to X-rays is believed due to destruction by the rays of these blood particles. When enough of them become available for further study, scientists may find a way to use them to help patients with bleeding disorders, just as another part of blood can now be used to help hemophiliacs, persons with a different, hereditary bleeders' disease.

Credit for originating the method of using fibrinogen to separate red cells from the blood is given by the Harvard group to Drs. Allen H. Minor and Lee Burnett who developed it on a test tube basis at the Sloan-Kettering Institute, New York. The Harvard group modified it to use with pint quantities of blood such as are collected from Red Cross blood donors.

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With this method they were able to give the first complete explanation of what happens to a heart when the body suffers a loss of oxygen. A state of oxygen lack occurs during the first few minutes after a coronary thrombosis type of heart attack, during acute bleeding and at high altitudes.

At such times the electrocardiogram shows a peculiar pattern. The change, the scientists found, results from a more rapid recovery in various parts of the heart.

The fact that the lower sixth of the heart, which recovers more rapidly, is the warmer part has long been suspected but never previously determined. It is warmer because it lies on the diaphragm and liver.

Differences in the rate of recovery of different parts of the heart show up in the wavy line, known as the "T-Wave" of the heart. The Yale doctors' report provides the first adequate explanation of this T-Wave and will help doctors to a more accurate diagnosis.

Physicians will be able to find exactly where a blood clot may have formed, where "skips" in heart beat originate and other baffling heart activities by applying the new theory presented for interpreting the electrocardiogram. This theory contradicts ideas held for a quarter of a century. It is based on the concept that it is the interaction of opposite electrical forces from different zones of the heart which creates



CANCER DETECTION — Dr. Charles Huggins, University of Chicago scientist, developed a blood test for cancer which is based on a disturbance of albumin, a protein, in the body. This promises to become an effective screening method for spotting early cancer cases. (See SNL, April 23, p. 259)

MEDICINE

Bottom of Heart Warmer

The lower sixth of the heart is warmer because it lies on the diaphragm and liver. This finding may lead to better diagnosis and treatment of heart disease.

► THE lower part of the human heart is the warmer part. As a result, it recovers at a more rapid rate after contraction than the upper, cooler part. This and other findings expected to lead to better diagnosis and treatment of heart disease were reported by Drs. Louis H. Nahum and Hyman M. Chernoff of the Yale School of Medicine at the meeting in Detroit of the Federation of American Societies for Experimental Biology.

The new discoveries came from studies of electrocardiograms, the written record of the electrical impulses of the heart during each beat. But the Yale scientists make their electrocardiograms in a different way from that your doctor uses. Instead of attaching two electrodes to two parts of the body simultaneously, they use a single electrode. This, they find, provides a more accurate picture of the action of different parts of the heart.

each electrocardiogram.

Much of the new information on interpretation of electrocardiograms was gained

with the aid of X-ray pictures used to map the position of the heart while the electrocardiograms were being taken.

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PHYSIOLOGY

Spinal Cord Kept Alive

► NEW knowledge of how the central nervous system works, of different diseases affecting it such as convulsions, multiple sclerosis and even mental disease, and how morphine, caffeine and anesthetic drugs influence the nervous system is expected from research by two University of Chicago physiologists.

These men, Dr. Ralph W. Gerard and Robert T. Tschirgi, have succeeded in keeping a long section of the spinal cord of a rat alive and working outside the animal's body. The spinal cord with the brain makes up the central nervous system. The one and one-half inch section of the rat's cord which has been kept functioning outside the body corresponds to the part in a human from the bottom of the neck to the middle of the back.

This piece of spinal cord is cut out and placed in a small trough.

Functioning of the nervous system is maintained by continually feeding of synthetic or real blood through the cord arteries, first by a syringe and later by an elaborate pumping system.

To test the functioning of the spinal cord, the sensory nerve roots (the dorsal roots) are stimulated and the electrical impulse in the motor nerve roots (ventral roots) is measured after amplification on a cathode ray oscilloscope.

The reflex action of the spinal cord of the rat, Dr. Gerard and Mr. Tschirgi found, was generally lost in one or two minutes when oxygen was omitted from the fluid sent to the cord. If glucose were omitted, the reflex action was lost in two to four minutes. Even when activity is lost

for over 30 minutes, full reflex activity can be restored in one to two minutes after re-adding the missing oxygen or glucose.

Five substances, the University of Chicago investigators discovered, can replace the normal glucose (simple sugar) as the source of energy to keep the reflexes in the nervous system active.

Until the new investigation, glucose was believed to be the only chemical capable of producing usable energy in the nervous system. The five substances substituting for glucose are: pyruvate, iso-citrate, alpha ketoglutarate, glutamine and glutamate, all related to sugars or proteins.

On the other hand, succinic acid which is also related to glucose and which is burned vigorously by tissue, including nervous tissue, was a failure in supporting reflex function. The isolated spinal cord used succinic acid even more than glucose, but succinic acid failed to support reflex response—the motor turned, but the car failed to run.

An additional dozen other common biologically important substances to the body, alcohol, acetate, lactate, and several of the amino acids, also failed to keep the reflex working.

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Common *mustard seed*, spread by the U. S. Forest Service on burned-over areas to get a quick soil cover, is sown in the ashes as soon as they cool off; the ashes anchor the seed against wind, thus giving it a quick start.

Question Box

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What causes a receding chin? p. 281.

ASTRONOMY

How far has the telescope on Mt. Palomar penetrated into space? p. 274.

CHEMISTRY

From what may summer clothes be made in the future? p. 280.

ENGINEERING

What are the advantages of the new steel-making process? p. 278.

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What two kinds of nerves are involved in itching? p. 280

PLANT PATHOLOGY

What kind of plants are plant breeders attempting to create? p. 282.

On This Week's Cover

► A "BLANK" of glass, behind which the workman is seen fuzzily, is lifted off the production line by rubber suction cups. The glass is on its way to the grinding line in the Rossford, O., plant of Libbey-Owens-Ford Glass Company, where it will be transformed by grinding and polishing into a transparent clear glass.

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