MEDICINE

May Stockpile Blood Cells

This possibility of preparedness against an atomic bomb attack comes with the discovery of a way to separate the elements of the blood from each other.

By JANE STAFFORD

➤ RED BLOOD cells from millions of pints of blood, stockpiled at strategic points throughout the nation, will be ready for use to save lives if an atomic bomb attack is launched on any American city.

Individual bottles of red cells, typed for each member of the family, will be kept in the deep freeze locker along with the family's meat, vegetable and strawberry pie reserves, ready for emergency transfusions.

Extracts of the blood chemical, thromboplastin, that starts the clotting process, will be available in sufficient supply for victims of some bleeding diseases.

These are the possibilities for the not too distant future, say five years or so from now. Conservative scientists are not publicly making such predictions. But the research they are reporting and the pilot plant studies now under way point to these goals.

All these possibilities, and maybe more, depend on the discovery of a way to separate the red blood cells, white blood cells and other formed elements of the blood from each other and from the liquid part of the blood quickly and gently. The quick and gentle features of the new method insure that the various kinds of blood cells come through the separation process intact and alive.

Red Cells Die in 21 Days

Red blood cells in blood, for example, die 21 days after the blood has been drawn from a donor's arm, even with the best of present preservatives. Even in the blood circulating in the body their life-span is limited to about four months. But if they can be separated from the white blood cells before these disintegrate, and before various enzyme chemicals in the blood can act, the red cells might live almost indefinitely. And red blood cells are as good as, and in about a third of the cases better than, whole blood for transfusion.

The way to separate them before they are damaged has been discovered by Dr. John G. Gibson, II, and associates of Harvard Medical School, following leads reported earlier by Drs. Allen H. Minor and Lee Burnett of New York and Dr. Seymour Gray of Chicago. The method consists in adding fibrinogen, a blood protein involved in the clotting process, to the blood as it is drawn from the donor's arm. This makes the red cells pile up face to face like a stack of coins and settle out together within an hour.

The fibrinogen used is one of the blood fractions obtained by methods developed by Dr. Edwin J. Cohn, also of Harvard, and his colleagues during the war. In Jacksonville, Fla., Dr. Cohn told members of the American Pharmaceutical Association about this newest application of fibrinogen.

Up in Boston, Dr. Charles P. Emerson at Massachusetts Memorial Hospitals is running pilot plant studies on collection of the blood and the new separation method. Results of his studies will be applied, perhaps within another six months, at Red Cross National Blood Program donor stations. The hope is that perhaps one-tenth of the blood now being collected will in future be drawn into special, silicone-coated bottles with special tubes and needles. The bottles will be turned upside down at once, and within an hour the separated red cells drawn from the bottom layer can be rushed to their storage place, while the white cells and plasma are rushed to processing centers.

One million pints a week for the first three weeks are needed to build our first line of medical defense against an atomic bomb attack.

Filling this huge prescription may become possible, now that a way has been found for large scale separation of red and white blood cells and blood platelets from each other and from the liquid part of the blood. As soon as the best methods of preserving these parts of blood have been worked out, enough can be stockpiled to take care of that million-pint-a-week prescription.

This prescription was written by medical authorities who studied the "Hiroshima incident." Of the 80,000 who died when the world's first atom bomb attack fell on that Japanese city, 20,000 could have been saved, it has been estimated, if adequate medical relief facilities had been available.

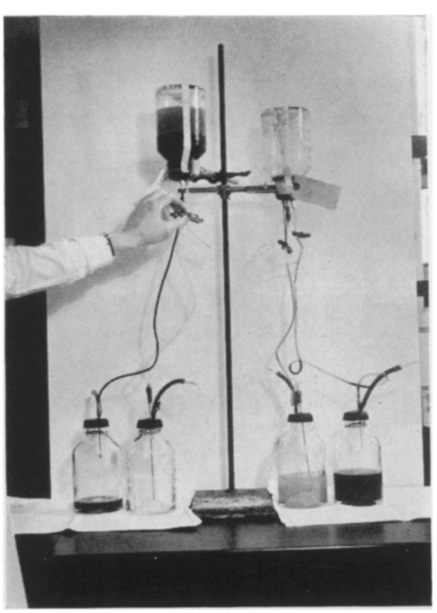
If an atom bomb dropped on an American city, there would be no trouble finding 3,000,000 Americans ready to donate their blood. But by the time enough doctors, nurses and technicians could be mustered to draw the blood and to test, type and process it for transportation, it might arrive at the scene too late. And since whole blood can be stored for only about three weeks, it is questionable whether enough could be stockpiled for such a disaster, even with thousands of men and women now giving blood generously to the Red Cross National Blood Program.

Whole blood has been called the number one medicine for saving lives of atomic bomb victims. Blood, however, is a compromise. So long as white cells, red cells and other elements of blood all have to live together in one fluid that can circulate throughout the body, each of these elements must put up with conditions suited to all, just as members of a family may have to sacrifice individual comfort or convenience to get quarters that somehow work out best for the whole family.

Changing the Environment

Red blood cells, which transport oxygen throughout the body, might for example be much happier with a different degree of acidity in their environment, and might live much longer without some of the enzymes and other chemicals that surround them.

The red cells of the blood with their stores of oxygen are the part of blood needed by anemia victims. Atomic bomb victims get a special kind of anemia, in which they lack both red and white cells and hemoglobin. But for some kinds of anemia, perhaps also that which occurred in atomic bomb victims, the fluid part of the blood is not needed. Now that the cells can be separated from each other and from the fluid part of blood, there is hope that just



BLOOD SEPARATION—This shows the new blood separation method. The upturned bottles contain donors' blood to which fibrinogen has been added. Red cells, piled up on the bottom, are drained off first, leaving the clear plasma on top.

the parts needed by atomic bomb victims or other patients could be given.

The tiny elements in blood called platelets might be particularly valuable for atomic bomb victims and for some other patients with bleeding tendencies. The bleeding tendency following irradiation, by atomic bomb or otherwise, is now thought due to lack of platelets. These elements contain thromboplastin, the chemical which when released from the platelets starts the chemical process by which blood clots when shed. The clot is what stops bleeding.

Platelets are very short-lived. They die within one or two days at most, maybe within a matter of hours. They make up a very tiny part of blood, about one-tenth of one per cent of the volume of whole blood. It would be mechanically impossible to give enough blood by transfusion to make up for the platelet lack in severe states of deficiency. There is great promise now that scientists will be able to get in pure form the thromboplastin from platelets separated from donor blood by the new method.

A blood medicine for this, another blood extract for that, a third blood substance for still another disease condition may be the kind of prescriptions your doctor will be writing some day in the future.

To some extent he is already doing that. He is giving gamma globulin, a substance from blood, to ward off or lessen the severity of measles. In the operating room, the surgeon is using fibrinogen and thrombin from blood to stop oozing of blood from tiny blood vessels cut by his knife.

Blood in its entirety, whole blood, is ordered for transfusion to save a life threatened by loss of blood, and to help patients with some kinds of anemia.

But blood contains many substances besides the hemoglobin in its red cells that give it color and carry oxygen, and the measles-fighting globulin and the clotting substances, fibrinogen and thrombin. It contains hormones from the various glands of the body, and white cells which are concerned with fighting disease germs.

These and many other substances in blood are not there just by accident.

"Every part of the human blood performs an important natural function," in the opinion of Dr. Cohn. He qualifies this statement by calling it an assumption only so far. But he and his colleagues and other scientists inspired by him are hard at work to discover, separate and study each of the many parts of human blood with the object of making as many of them available for medical use as possible.

Another new development gives promise that blood and its various parts will be available for many more uses in the future. This is an entirely new method of fractionating the plasma part of the blood. It was the plasma fractionation method developed by Dr. Cohn which gave us the albumin for fighting shock in the wounded during World War II, fibrinogen and thrombin and the anti-measles globulin. The new method, Dr. Cohn says, should make available some of the less stable components of the blood plasma which were destroyed in the earlier process.

Some of these less stable components may prove medically useful in themselves, or may help in preserving the red cells, white cells and platelets that now can be separated.

The final details of the red cell storage and preservation have not yet been worked out. Pushing the studies on this phase of the work is Dr. Robert B. Pennell of Sharpe and Dohme, now on loan to the Red Cross for this research.

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