blood, sufficient not only for its own needs but also for the smaller hospitals, nursing homes and general practitioners in its district. This supply is replenished from the Regional Blood Bank every week, or oftener if the necessity arises. In this way, it is ensured that no one who needs a transfusion will have to go without, even if the patient lives in a remote country district.

If the blood issued is not used within 28 days, it is returned to the Regional Transfusion Centre, where the fragile red cells are removed. The fluid which remains (plasma) is then sent to the Medical Research Council Laboratory at the Lister Institute in London to be dried. Blood plasma in this dried state can be stored indefinitely and is a valuable adjunct to whole blood. It is particularly valuable in cases of severe hæmorrhage, in maintaining life until supplies of blood of a suitable group can be obtained. For this reason, small hospitals, especially in remote parts of the country, carry a supply of dried plasma for emergency use. The dried plasma has two great advantages in these places. It can be stored without refrigeration, and it can be given to patients of any blood group.

Early Discoveries.

The idea of blood transfusion is one of the oldest in the history of medicine. It is vaguely referred to in the medical writings of the ancient Greeks, but the first recorded attempts to transfuse blood from one body to another were not made until after Harvey discovered in 1616 that the blood circulated through the body.

In 1665 at the suggestion of Sir Christopher Wren, Dr. Richard Lower successfully transfused blood from one dog to another. His experiments became known abroad and two years later a French doctor, named Denis, made the first blood transfusion on a human being, a boy of 15. The practice of transfusing human beings with animals' blood was taken up in many countries, but so many deaths were caused that it was made illegal, and in 1678 the Pope forbade it altogether.

For two hundred years the discovery remained dormant, but in 1818 a London doctor working at St. Thomas' and Guy's Hospitals invented an apparatus for transfusing blood and suggested that only human blood should be used for human beings.

The Four Main Blood Groups.

It was not understood why some blood transfusions were successful while others were not until 1901 when a young Viennese scientist named Landsteiner discovered that there were different kinds of human blood and that this accounted for the unsuccessful transfusions. It was finally determined that there were four main groups of human blood. These are called Group O, Group A, Group B, and Group AB.

Persons whose blood is group AB can be given blood of any group; persons belonging to groups A or B, can be given blood of their own blood group or group O blood. Persons belonging to group O can be given only group O blood. Thus persons of blood group AB are known as universal recipients, and persons of group O are known as universal donors.

Another difficulty was caused by the fact that blood clots soon after removal from the body, making it difficult to transfer blood from one person to another. The problem was solved by three scientists, working independently in America, Belgium and the Argentine, who, in the Spring of 1914, discovered that the addition of sodium citrate prevented the blood from clotting without causing harmful effects when introduced into the body.

Blood transfusion was first used widely during the 1914-18 war and saved thousands of lives.

Storing Blood.

The next problem was the storage of blood. It was known that blood should not be allowed to freeze or the blood cells would be destroyed, but that it had to be brought to the lowest possible temperature short of freezing to delay decomposition. The technique of storing blood was successfully developed in Russia, following discoveries by a Russian doctor named Andre Bagdasarov, and in the United States a system of blood banks was started.

Early in the last war it was found that transfusions using plasma alone were most successful and apparatus was set up to prepare plasma on a large scale.

Plasma and Serum.

Plasma, the fluid portion of blood which has been rendered incoaguable and from which the red cells have been removed, is a valuable substitute for whole blood and has the advantage that it can be stored for many months without deterioration and can be given safely to patients of any of the four blood groups.

Serum—the fluid separated from blood after it has clotted—also proved to be a valuable substitute for whole blood. It is more easily filtered than plasma, and has similar keeping properties.

In 1940, an even better method was developed. It was found that liquid plasma and serum could be dried into powder and could be stored for any length of time in any climate.

The Rh Factor.

Early in 1940 a new factor, called the Rhesus or Rh factor, was found in the red blood cells. This factor is present in the red cells of 85 per cent. of Europeans who are termed Rh-positive; the remaining 15 per cent., whose cells do not contain it, are termed Rh-negative.

The Rh factor is of importance in transfusion, because Rh-negative people may, under certain circumstances, produce antibodies to it which appear in their blood and will destroy red blood cells containing the Rh factor. Such people are said to have been immunised, or sensitised to the Rh factor.

Immunisation may occur if an Rh-negative patient is transfused with blood from an Rh-positive donor. No harm usually results the first time such a transfusion is given, but if the Rh-negative person receives a second transfusion of Rh-positive blood, a reaction, which may be serious, may occur.

Likewise, the Rh-negative wife of an Rh-positive husband, may bear an Rh-positive child. The mother may be immunised by the Rh factor present in her child before it is born, and produce antibodies which pass into the child, and by destroying its red blood cells which contain the Rh factor, cause a serious form of anæmia, accompanied by jaundice (haemolytic disease of the newborn).

It should be emphasised that only a small proportion of the offspring of Rh-negative mothers and Rh-positive fathers suffer from this disease, and that the disease usually appears only after a succession of healthy Rh-positive children have been born. It does not follow that, because the Rh groups of the mother and father differ in the way described, their children will be affected.

The discovery of the Rh factor has made transfusion safer, and, by explaining the cause of this obscure form of anæmia in infants, has enabled appropriate treatment to be given. The Rh antibodies lose their effect within a few weeks of birth. Transfusion of Rh-negative blood will usually save the lives of seriously affected infants by helping them over this critical period. Moreover, it is now possible to avoid sensitising women to the Rh factor by the transfusion of

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