



Blood donation is a safe and relatively painless procedure. It is a safe and easy process which takes approximately 30 minutes. When a person walk into a reputed and safe blood bank or a camp organised by a regional transfusion centre or a Govt. blood bank a few questions will be asked to determine health status (general questions on health, donation history etc) of donor. Then a quick physical examination will be done to ensure donor's health status. If found fit to donate, the donor will be asked to lie down on a donor couch. Donor's arm will be thoroughly cleansed. With antiseptic disposable blood collection bag the required amount of blood will be collected. The blood bags contains anticoagulants like CPDA or CPDA with SAGM. This prevents clotting and provides nutrition for the cells. This blood is stored at 2-6 C. Donated blood undergoes various tests like blood grouping, antibody testing for infections like diseases hepatitis, B&C HIV, Malaria, syphilis. Prior to transfusion blood undergoes compatibility test with recipients blood.

Our body has 5.5 ltr of blood. Majority of healthy adults can tolerate withdrawal of one unit of blood. Approximately 350 ml of blood can be collected in one donation. Those who weigh more than 50 Kg can donate 450 ml of blood. The withdrawn blood volume is restored within 24 hours and the hemoglobin and cell components are restored in 2 months. Therefore it is safe to donate blood every three months.

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### **Blood and Blood Component Therapy – Certain Facts**

Blood may be transfused as whole blood or as one of its components. Whole blood is the term used in transfusion medicine for human blood from a standard blood donation. Because patients seldom require all of the components of whole blood, it makes sense to transfuse only that portion needed by the patient for a specific condition or disease. This treatment, referred to as "blood component therapy," allows several patients to benefit from one unit of donated whole blood. Blood components include red blood cells, plasma, platelets, and cryoprecipitate. Up to four components may be derived from one unit of blood.

Whole blood is a living tissue that circulates in the body through heart, arteries, veins, and capillaries carrying nourishment, electrolytes, hormones, vitamins, antibodies, heat, and oxygen to the body's tissues. The average human body holds about 4-5 liters of blood. A person may lose his life if 20-30% of blood is lost from his body and if the lost blood is not immediately replaced. Whole blood contains red blood cells, white blood cells, and platelets suspended in fluid called plasma.

If blood is treated to prevent clotting and allowed to stand in a container, the red blood cells, which weigh more than the other components, will settle to the bottom; the plasma will stay on top; and the white blood cells and platelets will remain suspended between the plasma and the red blood cells. A centrifuge may be used to hasten this separation process. The platelet-rich plasma is then removed and placed into a sterile bag, and it can be used to prepare platelets and plasma or cryoprecipitate. To obtain platelets, the platelet-rich plasma is centrifuged, resulting to the settling of platelets at the bottom of the bag. Plasma and platelets are then separated and made available for transfusion. The plasma also may be pooled with plasma from other donors and further processed, or fractionated, to provide purified plasma proteins such as albumin, immunoglobulin (IVIG), and clotting factors.

**Red blood cells** are perhaps the most recognizable component of blood. Red blood cells contain hemoglobin, a complex of iron-containing protein that carries oxygen from the lungs throughout the body and carbon dioxide back to the lungs. Red blood cells give blood its red color. The percentage of blood volume composed of red blood cells is called the “hematocrit.” The average hematocrit in an adult male is 47 percent. There are about one billion red blood cells in two to three drops of blood and for every 600 red blood cells; there are about 40 platelets and one white cell. Red blood cells are continuously being produced in the bone marrow. They live for approximately 120 days in the circulatory system and are eventually removed by the spleen.

Red blood cells are prepared from whole blood by removing plasma, or the liquid portion of the blood. They can raise the patient's hemoglobin levels while minimizing an increase in volume.

Patients who benefit most from transfusions of red blood cells include those with chronic anemia resulting from disorders such as kidney failure, malignancy, or gastrointestinal bleeding and those with acute blood loss resulting from trauma or surgery. Since red blood cells have reduced amounts of plasma, they are well suited for treating anemia patients who have congestive heart failure or who are elderly or debilitated; these patients might not tolerate the increased volume provided by whole blood.

Improvements in cell preservative solutions over the last 15 years have increased the shelf life of red blood cells from 21 to 42 days. Red blood cells may be treated with glycerol and frozen for extended storage (up to 10 years).

**Plasma** is the liquid portion of the blood — a protein-salt solution in which red and white blood cells and platelets are suspended. Plasma, which is 90 percent water, constitutes about 55 percent of blood volume. Plasma contains albumin (the chief protein constituent), fibrinogen (responsible, in part, for the clotting of blood), globulins (including antibodies), and other clotting proteins. Plasma serves a variety of functions, from maintaining a satisfactory blood pressure and volume to supplying critical proteins for blood clotting and immunity. It also serves as the medium of exchange for vital minerals such as sodium and potassium, thus helping to maintain a proper balance in the body, which is critical to cell function. Plasma is obtained by separating the liquid portion of blood from the cells. Plasma is usually not used for transfusion purpose but is fractionated (separated) into specific products such as albumin, specific clotting factor concentrates and IVIG (intravenous immune globulin).

Fresh frozen plasma is plasma frozen within hours after donation in order to preserve clotting factors, stored for one to seven years, and thawed before it is transfused. It is most often used to treat certain bleeding disorders, when a clotting factor or multiple factors are deficient and no factor-specific concentrate is available. It also can be used for plasma replacement via a process called plasma exchange.

**Cryoprecipitate** is the portion of plasma that is rich in certain clotting factors, including Factor VIII, fibrinogen, von Willebrand factor, and Factor XIII. Cryoprecipitate is removed from plasma by freezing and then slowly thawing the plasma at 40C. It is used to prevent or control bleeding in individuals with hemophilia and von Willebrand's disease; which are common inherited major coagulation abnormalities. Its use in these conditions is reserved for times when viral-inactivated concentrates containing Factor VIII and von Willebrand factor are unavailable and plasma components must be used. It may also be used as hemostatic preparation [fibrin sealant or fibrin glue] in surgery.

Platelets (or thrombocytes) are very small cellular components of blood that help the clotting process by sticking to the lining of blood vessels. Platelets are made in the bone marrow and survive in the circulatory system for an average of 9–10 days before being removed from the body by the spleen. The platelet is vital to life, because it helps prevent massive blood loss resulting from trauma, as well as blood vessel leakage that would otherwise occur in the course of normal, day-to-day activity. Units of platelets are prepared by using a centrifuge to separate the platelet-rich plasma from the donated unit of whole blood. The platelet-rich plasma is then centrifuged again to concentrate the platelets further.

Platelets also may be obtained from a donor by a process known as aphaeresis, or plateletpheresis. In this process, blood is drawn from the donor into an aphaeresis instrument, which, using centrifugation, separates the blood into its components, retains the platelets, and returns the remainder of the blood to the donor. The resulting component contains about six times as many platelets as a unit of platelets obtained from whole blood. Platelets are used to treat a condition called thrombocytopenia, in which there is a shortage of platelets, and in patients with abnormal platelet function. Platelets are stored at room temperature for up to five days.

**White blood cells** are responsible for protecting the body from invasion of foreign substances such as bacteria, fungi, and viruses. The majority of white blood cells are produced in the bone marrow, where they outnumber red blood cells by two to one. However, in the blood stream, there are about 600 red blood cells for every white blood cell. There are several types of white blood cells; Granulocytes and macrophages protect against infection by surrounding and destroying invading bacteria and viruses, and lymphocytes aid in immune defense.

**Granulocytes** can be collected by aphaeresis or by centrifugation of whole blood. They are transfused within 24 hours after collection and are used for infections that are unresponsive to antibiotic therapy. The effectiveness of white blood cell transfusion is still being investigated.

Plasma derivatives are concentrates of specific plasma proteins that are prepared from pools (many units) of plasma. Plasma derivatives are obtained through a process, known as

fractionation, developed during World War II, and are heat-treated and/or solvent detergent-treated to kill certain viruses, including HIV and hepatitis B and C. Plasma derivatives include:

- # Factor VIII Concentrate
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- # Anti-Inhibitor Coagulation Complex (AICC)
- # Albumin
- # Immune Globulins, including Rh Immune Globulin
- # Anti-Thrombin III Concentrate
- # Alpha 1-Proteinase Inhibitor Concentrate