



# MedStar Health *Institute for Quality and Safety*

**MedStarBloodless.org**

International Training Center for  
Bloodless Medicine and Surgery

MedStar Franklin Square Medical Center  
MedStar Georgetown University Hospital  
MedStar Good Samaritan Hospital  
MedStar Harbor Hospital  
MedStar Montgomery Medical Center  
MedStar National Rehabilitation Network  
MedStar Southern Maryland Hospital Center  
MedStar St. Mary's Hospital  
MedStar Union Memorial Hospital  
MedStar Washington Hospital Center  
MedStar Family Choice  
MedStar Medical Group  
MedStar PromptCare  
MedStar Visiting Nurse Association  
MedStar Institute for Innovation  
MedStar Health Research Institute

## Patient Resource Packet

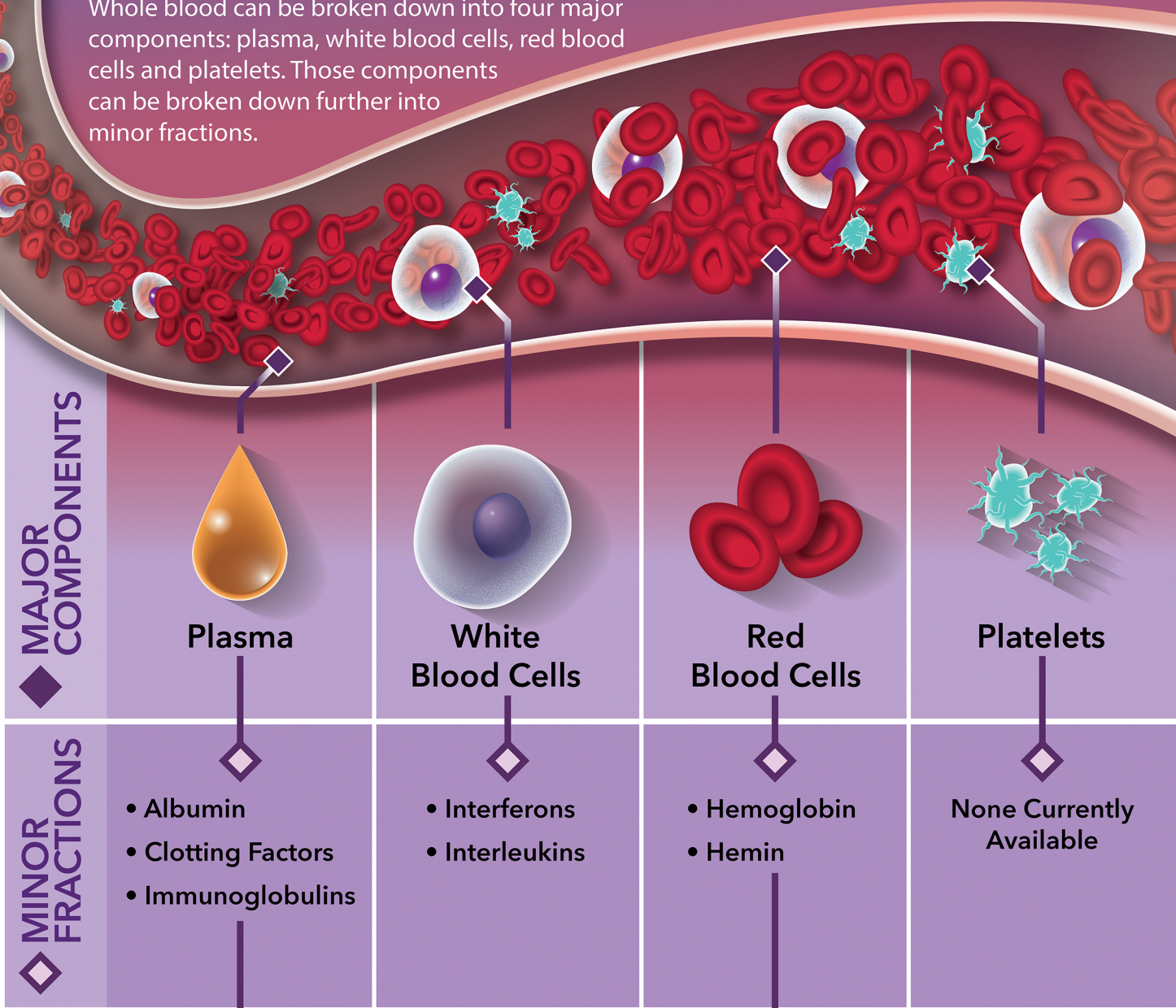
Whole Blood Components and Fractions  
Hemodilution Overview

*Knowledge and Compassion*  
**Focused on You**



# WHOLE BLOOD

Whole blood can be broken down into four major components: plasma, white blood cells, red blood cells and platelets. Those components can be broken down further into minor fractions.



- PRODUCTS THAT CONTAIN PLASMA FRACTIONS**
- Erythropoietin
  - Streptokinase
  - Colony Stimulating Factors
  - Synthetic Interleukins
  - Synthetic Interferons
  - Cryoprecipitate
  - Prothrombin Complex Concentrate (PCC)
  - Tissue Adhesives/ Sealants
  - Platelet Gel (made with own platelets)

- PRODUCTS THAT CONTAIN RED BLOOD CELL FRACTIONS**
- Hemoglobin-Based Oxygen Carriers (not widely available)
  - Normosang
  - Panhematin

\*Talk with your doctor about the potential risks and possible side effects of minor fractions, as well as what your other options may be.



## Plasma Fractions



### Albumin

Albumin is a protein made in the liver that flows through the body in plasma, which is the colorless fluid part of blood. Albumin helps keep blood volume in a normal range. It can be separated from plasma and used as a treatment to increase volume before or after surgery if needed. Products that may contain albumin: erythropoietin, streptokinase, colony stimulating factors and interleukins.

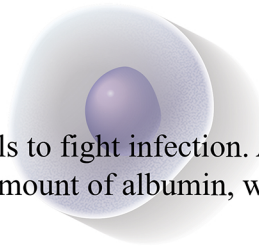
### Clotting Factors

Clotting factors are a group of proteins that flow in blood plasma. They can be separated from plasma and used to help stop bleeding in patients who bleed easily. Products that contain clotting factors: cryoprecipitate (contains fibrinogen, von Willebrand factor, factor VIII, factor XIII), prothrombin complex concentrate (PCC).

### Immunoglobulins (or Immune Globulins)

Immunoglobulins are a special group of proteins found in blood plasma. Also called antibodies, they are separated from pooled plasma and used in medicine that helps fight viruses and bacteria. Example: RhoGam.

## White Blood Cell Fractions



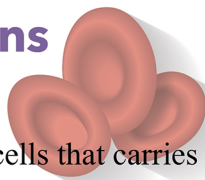
### Interferons

Interferons are proteins made by white blood cells to fight infection. As medicine, interferons are often synthetic (man-made) and may contain a small amount of albumin, which is a plasma fraction.

### Interleukins

Interleukins are proteins made by white blood cells to help cells communicate with each other. As medicine, interleukins are often synthetic (man-made) and may contain a small amount of albumin, which is a plasma fraction.

## Red Blood Cell Fractions



### Hemoglobin

Hemoglobin is a protein in red blood cells that carries oxygen. Hemoglobin can be separated from red blood cells to make Hemoglobin-Based Oxygen Carriers (HBOCs), which are blood substitutes. HBOCs are not currently widely available.

### Hemin

Hemin is a salt that blocks the production of substances called porphyrins. Hemin can be separated from red blood cells and used to treat a condition called Porphyria..

## Platelet Fractions



None Currently Available





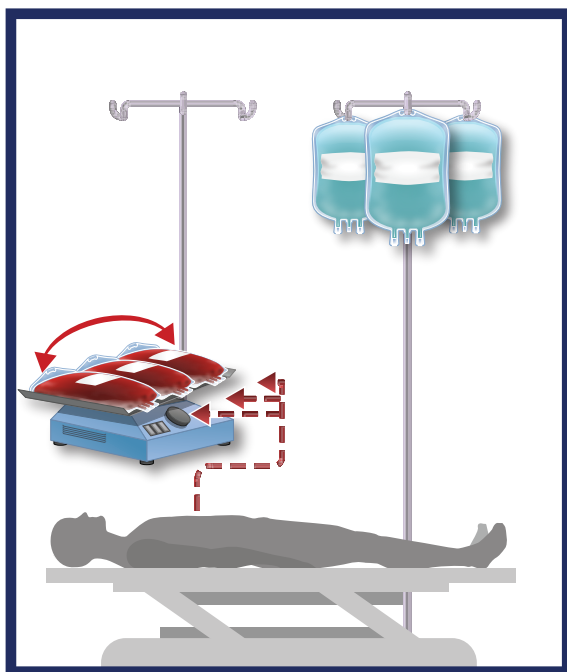
## HEMODILUTION

Hemodilution is a procedure used during surgery to lessen the effect of blood loss by diluting the patient's blood. When a patient loses diluted blood, fewer red blood cells are lost than if the blood has a normal concentration.

The process involves three steps:

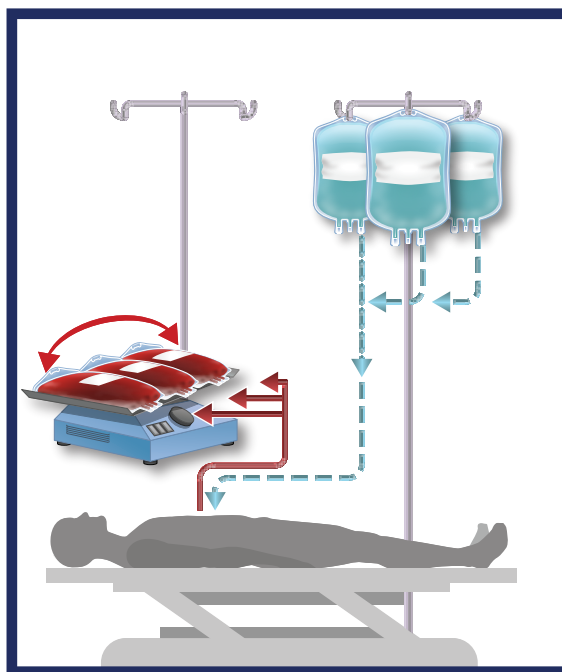
### 1. REMOVE

At the beginning of surgery, the team removes some of the patient's blood. The blood is placed on rockers to prevent clotting, and is saved for later.



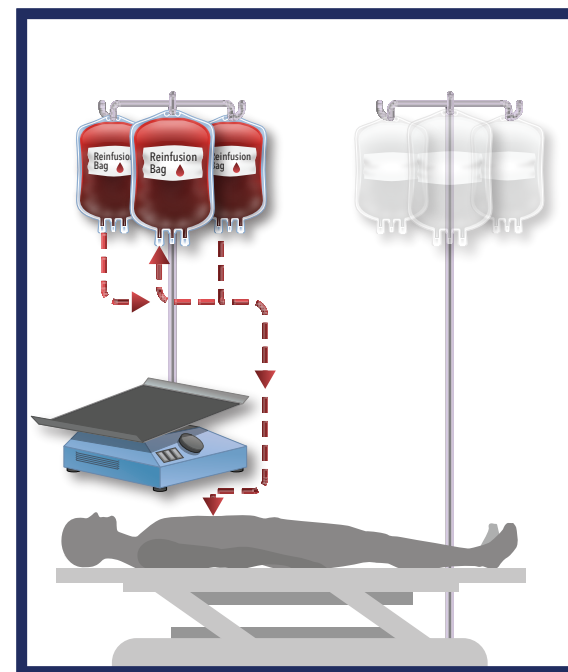
### 2. REPLACE

The team then replaces the removed blood with the non-blood liquid. This helps maintain the right amount of blood volume.



### 3. RETURN

At the end of surgery, the blood removed at the beginning of patient is given back to the patient.



The surgical team makes every effort to maintain a closed surgical system. Talk with your care team if you have any concerns about the procedure or any other aspect of your medical care.