

# **BLOOD COMPONENT THERAPY**

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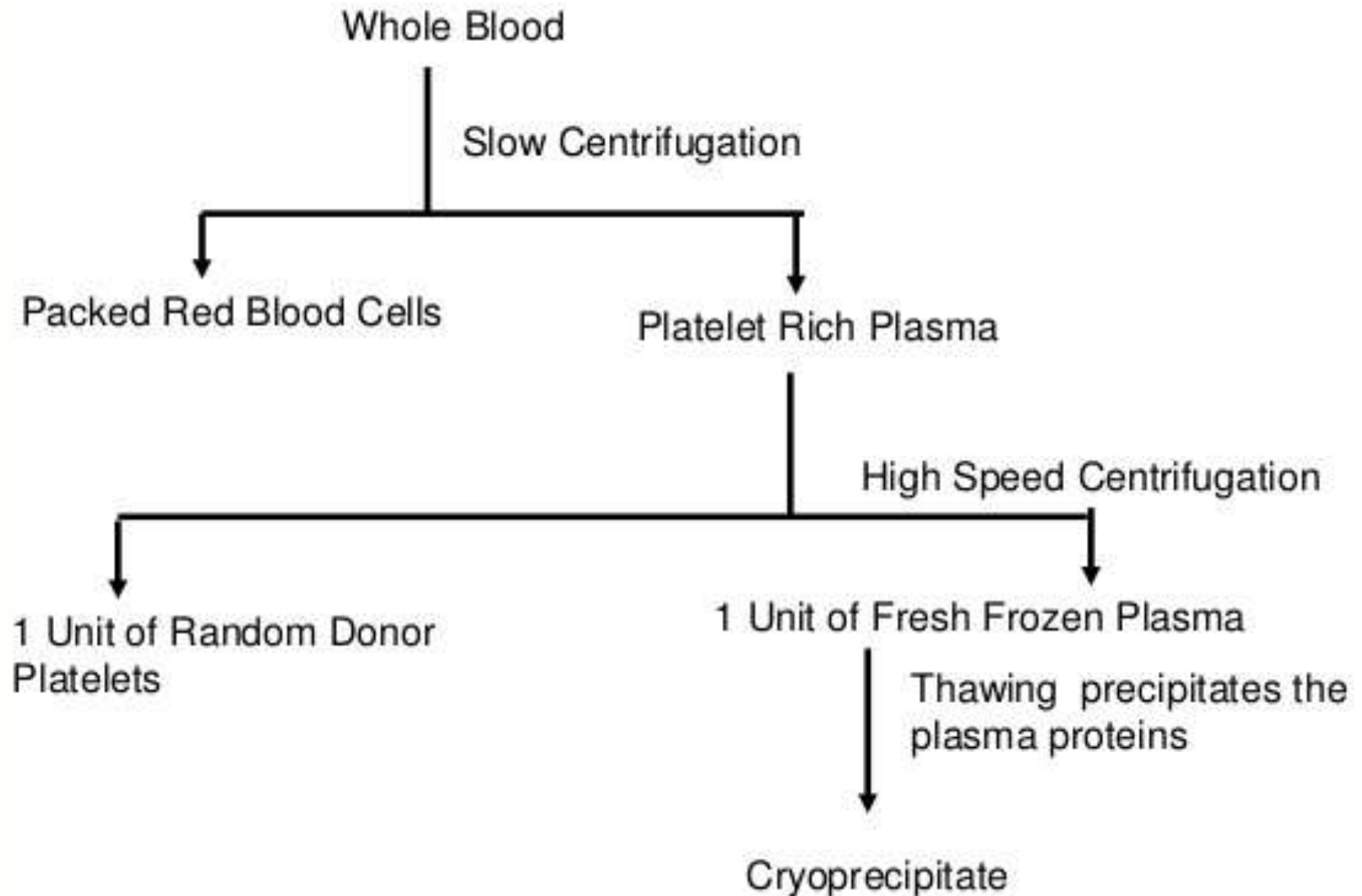
**GUMS**

**Dec. 2022**

*In the name of  
God*



# BLOOD COMPONENTS



# PACKED RED BLOOD CELLS

- PRBCs contain the same amount of Hb as whole blood, but much of the plasma has been removed. The Hct value is 40% in whole blood & 70% in packed erythrocytes.
- Except for a rare situation ( hypovolemic shock ) , whole blood is not necessary.
- The administration of PRBCs is facilitated by reconstituting them with a crystalloid or colloid
- ASA practice guidelines:  
RBC transfusion is rarely indicated when the Hb is greater than 10 g/dl & is almost always indicated when it is less than 6 g/dl.  
For Hb between 7 & 10 g/dl transfusion is recommended in patients with : critical noncardiac end-organ ischemia, active blood loss, or clinical indication of tissue hypoxia.





(PALL)

10406 08 013811

Prelievo: 12.07.2008 07:28

Preparazione: 12.07.2008 10:47

Emazie senza buffy coat

CPD

SAGM

VOL. 296 mL

Utilizzare per infusione entro 2 ore

Microaggregati, intondere entro 2 ore

Scadenza: 23.08.2008 07:28

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**TABLE 16-3. CLINICAL INDICATIONS OF  
TISSUE HYPOXIA<sup>52,53</sup>**

- Unstable vital signs
  - Tachycardia
  - Hypotension
  - Tachypnea or dyspnea
- Laboratory and invasive monitor indices
  - Mixed venous O<sub>2</sub> saturation (SV<sub>m</sub>O<sub>2</sub>) <50%
  - Central venous O<sub>2</sub> saturation (SV<sub>c</sub>O<sub>2</sub>) <60%
  - Increased O<sub>2</sub> extraction ratio (O<sub>2</sub>ER) >50%
  - Lactic acidosis (metabolic acidemia with lactate >2 mmol/L)
- Signs of end-organ dysfunction
  - Electrocardiographic (ST changes, onset of arrhythmias) or echocardiographic indications of myocardial ischemia
  - Electroencephalographic indications of cerebral hypoperfusion
  - New onset oliguria (less than 0.5 mL/kg/h for >6 h)



**TABLE 61-14 COMPATIBILITY OF BLOOD WITH INTRAVENOUS SOLUTIONS**

Blood to Intravenous Solution (1:1 Ratio)	Hemolysis at 30 Minutes	
	Room Temperature	37° C
5% Dextrose in water	1+	4+
Plasmanate*	1+	3+
5% Dextrose in 0.2% saline	0	3+
5% Dextrose in 0.4% saline	0	0
5% Dextrose in 0.9% saline	0	0
0.9% Saline	0	0
Normosol-R, pH 7.4†	0	0
Lactated Ringer solution	0 (clotted)	0 (clotted)

**TABLE 61-13 COMPARISON OF WHOLE BLOOD  
AND PACKED RED BLOOD CELLS**

<b>Value</b>	<b>Whole Blood</b>	<b>Packed Red Blood Cells</b>
Volume (mL)	517	300
Erythrocyte mass (mL)	200	200
Hematocrit (%)	40	70
Albumin (g)	12.5	4
Globulin (g)	6.25	2
Total protein (g)	48.8	36
Plasma sodium (mEq)	45	15
Plasma potassium (mEq)	15	4
Plasma acid (citric-lactic)	80	25 (mEq)
Donor-to-recipient ratio	1 unit per patient	1 unit per 4-6 patients



# PLATELET CONCENTRATES

- Are obtained either as pooled concentrates from 4-6 whole-blood donations or as apheresis concentrates obtained from one donor
- Are the only blood product stored at room temperature
- They are satisfactory to use 7 days after collection when stored at room temperature
- **Bacterial contamination** is the third leading cause of transfusion-related deaths
- The incidence of platelet-related sepsis is 1 case in 12000 people
- For any patient who develops a **fever** within 6 hours after receiving platelets, **sepsis** from platelets should be considered

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1 658338



96

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05 AUG 2007  
31 JULY 2007

111

5507 1 859839

0700120



- **FDA Drug Bulletin** recommend that platelets *should not be given* to patients with immune thrombocytopenic purpura, prophylactically with massive blood transfusion, or prophylactically after CPB
- **ASA** recommends:  
prophylactic platelet transfusion is rarely indicated when  $P > 100,000$  & is usually indicated when  $P < 50,000$   
between these , the determination should be based on the risk for more significant bleeding
- When possible, ABO-compatible platelets should be used. Specific testing is difficult. ABO-incompatible platelets produce very adequate hemostasis



**TABLE 16-4. INDICATIONS FOR PLATELET TRANSFUSION<sup>31,53,55,57,58</sup>**

Stable patients without evidence of bleeding or coagulopathy	<10,000/ $\mu$ L
Prophylaxis for invasive procedures such as lumbar puncture, neuraxial anesthesia, central venous catheterization, endoscopy with biopsy, liver biopsy, or major surgery	<50,000/ $\mu$ L
Stable patients with clinical evidence of bleeding or coagulopathy	<50,000/ $\mu$ L
Patients with DIC and signs of ongoing bleeding	<50,000/ $\mu$ L
Patients undergoing massive transfusion	<75,000/ $\mu$ L
Patients having surgery at critical sites such as the eye or central nervous system	<100,000/ $\mu$ L
Microvascular bleeding attributed to platelet dysfunction such as uremia, liver disease, post-cardiopulmonary bypass	Clinician judgment

DIC, disseminated intravascular coagulation.

# FRESH FROZEN PLASMA

- FFP is the most frequently used plasma product.
- It contains all the plasma proteins, particularly **factors V & VIII** , which gradually decline during the storage of blood
- Although FFP is a reliable solution for intravascular volume replacement in acute blood loss, alternative therapies are equally satisfactory and considerably safer
- No documentation exists that FFP has a beneficial effect when used as part of transfusion management of patients with massive hemorrhage.



Donor & Manufacturer

129169J 6

Expiry Date

0

Rh POSITIVE

Fresh Frozen Plasma (CPD-A1)  
Human

Infuse using  
an in-line  
filter

Lot 87K04B67

Sterile, nonpyrogenic

DO NOT VENT

ABO Blood Group

Rh Type

31 APR 1988



Distributed by:  
Baxter Laboratories Ltd.  
Macclesfield, Cheshire, England

Reg. Trade Mark  
08-57-20-261



- **Guidelines for FFP administration :**
  - 1- replacement of inherited single coagulation factor deficiencies
  - 2- replacement of multiple coagulation factor deficiencies with bleeding, DIC, or both
  - 3- as a component of plasma exchange in TTP
  - 4- reversal of warfarin when severe bleeding is present
  - 5- prevention of dilutional coagulopathy in major trauma or massive hemorrhage

**TABLE 16-6. INDICATIONS FOR THE USE OF FRESH FROZEN PLASMA**<sup>31,53,56,60,61</sup>

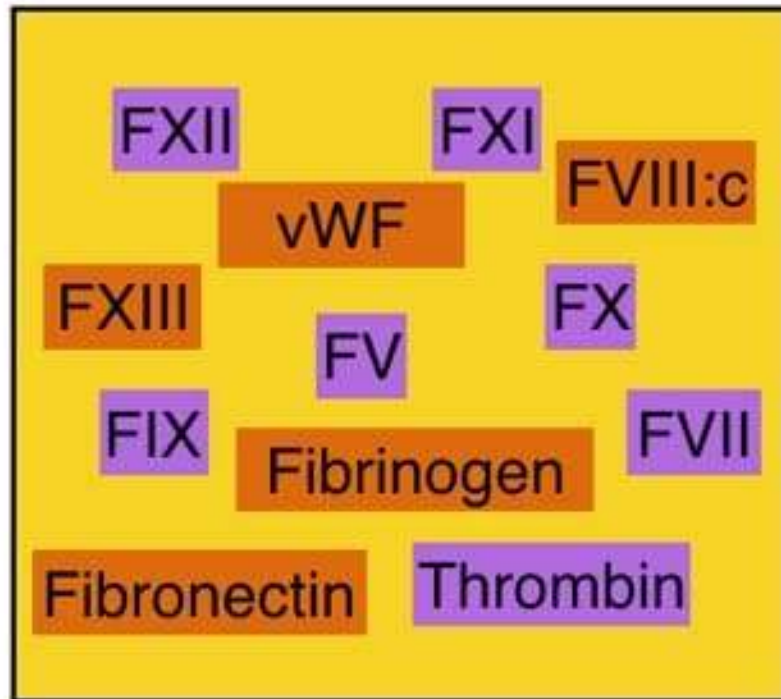
- Correction of inherited factor deficiencies when there is no specific factor concentrate (e.g., factor V) and when the PT or aPTT is >1.5 times the mean control
- Correction of acquired multi-factor deficiencies with clinical evidence of bleeding or in anticipation of major surgery or an invasive procedure with PT or aPTT >1.5 times the control
  - Liver dysfunction with clinical signs of bleeding
  - DIC with clinical signs of bleeding
  - Microvascular bleeding associated with massive transfusion and estimated blood loss > one blood volume (when PT and aPTT are >1.5 times the control or cannot be obtained)
- Reversal of vitamin K antagonists (warfarin)<sup>a</sup>
- Heparin resistance secondary to antithrombin deficiency when AT concentrate is not available
- Treatment of thrombotic microangiopathies (thrombotic thrombocytopenic Purpura, HELLP syndrome, or hemolytic uremic syndrome)
- Treatment of hereditary angioedema when C1-esterase inhibitor is not available

# CRYOPRECIPITATE

- It contains significant levels of **factor VIII & fibrinogen** , ( and less ) **factor XIII & fibronectin**
- Is frequently administered as ABO compatible, but is not very important , because the concentration of Ab is very low
- The rate of administration should be at least 200 ml/h and infusion should be completed within 6 hours of thawing



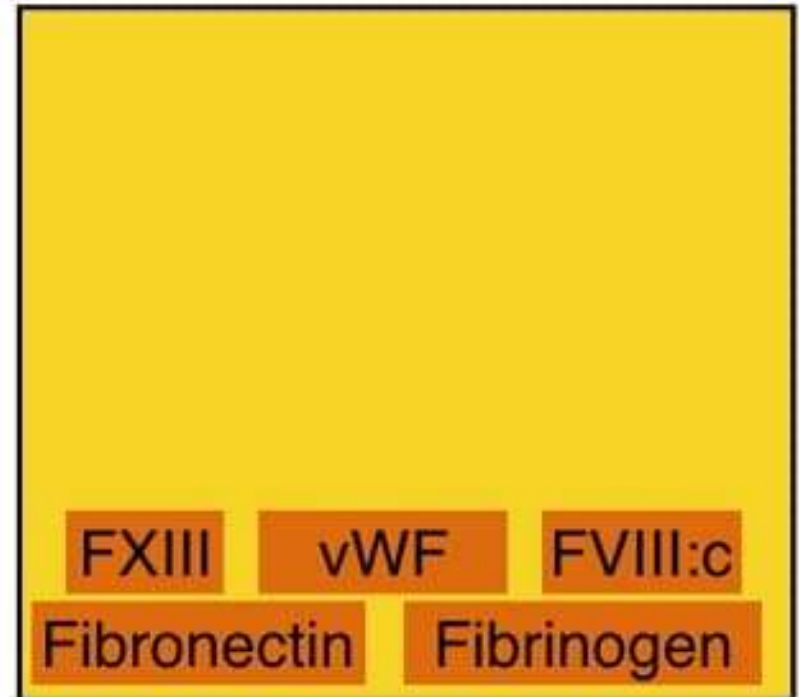
# CRYO Preparation



FFP



Slow  
Thaw



Cryo



## **TABLE 16-7. INDICATIONS FOR THE USE OF CRYOPRECIPITATE<sup>31,60,68-70</sup>**

- Microvascular bleeding with hypofibrinogenemia
  - DIC with fibrinogen <80–100 mg/dL
  - Hemorrhage or massive transfusion with fibrinogen <100–150 mg/dL
- Prophylaxis in patients with hemophilia A and vWD (if specific factor concentrates are unavailable or ineffective due to inhibitors)
- Prophylaxis for patients with congenital dysfibrinogenemias

DIC, disseminated intravascular coagulation; vWD, von Willebrand disease.



**TABLE 16-1. BLOOD COMPONENTS**

Component	Average Volume	Storage Parameters
Packed red blood cells	300 mL	1–6°C for 21–35 days or 42 days with additive solution
Red blood cells, frozen	300 mL	<–65°C for 10 years
Platelets, whole-blood-derived	50 mL per bag, usual dose 4–6 bags	20–24°C for 5 days
Platelets, apheresis	300 mL	20–24°C for 5 days
Plasma, fresh frozen	250 mL	<–18°C for 1 year or <–65°C for 7 years
Plasma, frozen within 24 h	250 mL	<–18°C for 1 year
Cryoprecipitate	15 mL per bag, usual dose 4–6 bags	<–18°C for 1 year

## Blood component therapy

Component	Constituent	Indications	Dose
FFP	All clotting factors	Many coagulation factor deficiency state	15ml/kg (gives 20-30%)
Cryoprecipitate	I, VIII, XIII, vWF	Corresponding deficiencies	5ml/kg
Random donor platelet (RDP)	Platelet at least $5.5 \times 10^{10}$	Thrombocytopenia	1unit/10kg Raise 30,000-50,000/cumm
Single donor platelet (SDP)	Platelet at least $3 \times 10^{11}$	Thrombocytopenia	1 collection equals 6RDP
Whole blood	All	Acute blood loss	Severe trauma

Thank You!

