# BLOOD COMPONENT THERAPY

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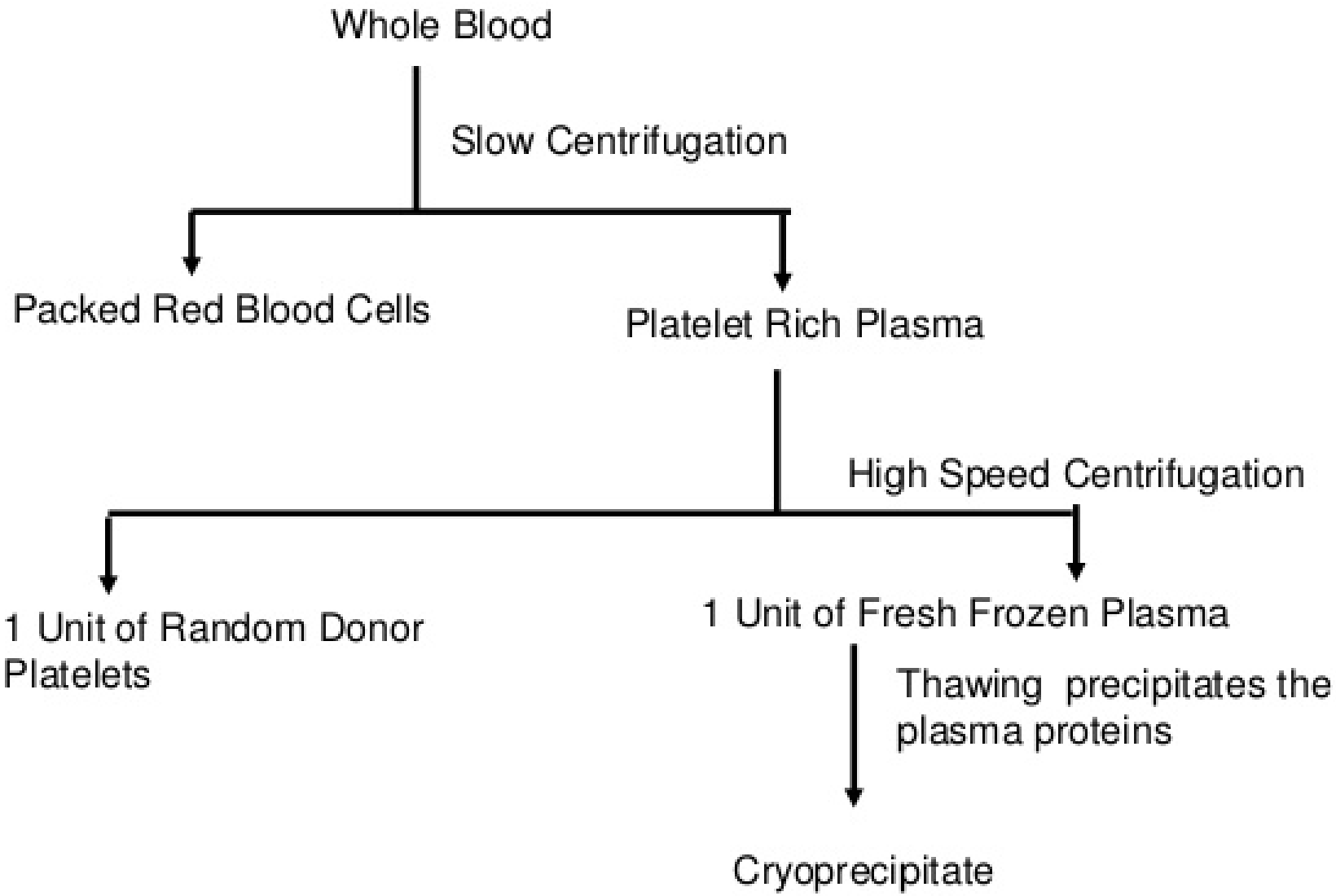
*In the name of God*

# 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
03/02/0
Utilizzare per infusione adatto dispositivo per microaggregati, infondere entro 2 ore
Scadenza: 23.08.2008 07:28
ESITO NEGATIVO CONTROLLI SIEROLOGICI PRE
ABOGr ALT HBsAg HCVAb HIV NAT-B NAT-D NAT-
RhGr TPHA
USO OMOLOGO
0 POS
CcDee
kk
Conservare fra +2 e +6 °C
POS CcDee kk
040608013811
Emc 01
0000805011

## TABLE 16-3. CLINICAL INDICATIONS OF TISSUE HYPOXIA[52,53]

- Unstable vital signs
  - Tachycardia
  - Hypotension
  - Tachypnea or dyspnea
- Laboratory and invasive monitor indices
  - Mixed venous $O_2$ saturation ($SV_mO_2$) <50%
  - Central venous $O_2$ saturation ($SV_cO_2$) <60%
  - Increased $O_2$ extraction ratio ($O_2ER$) >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

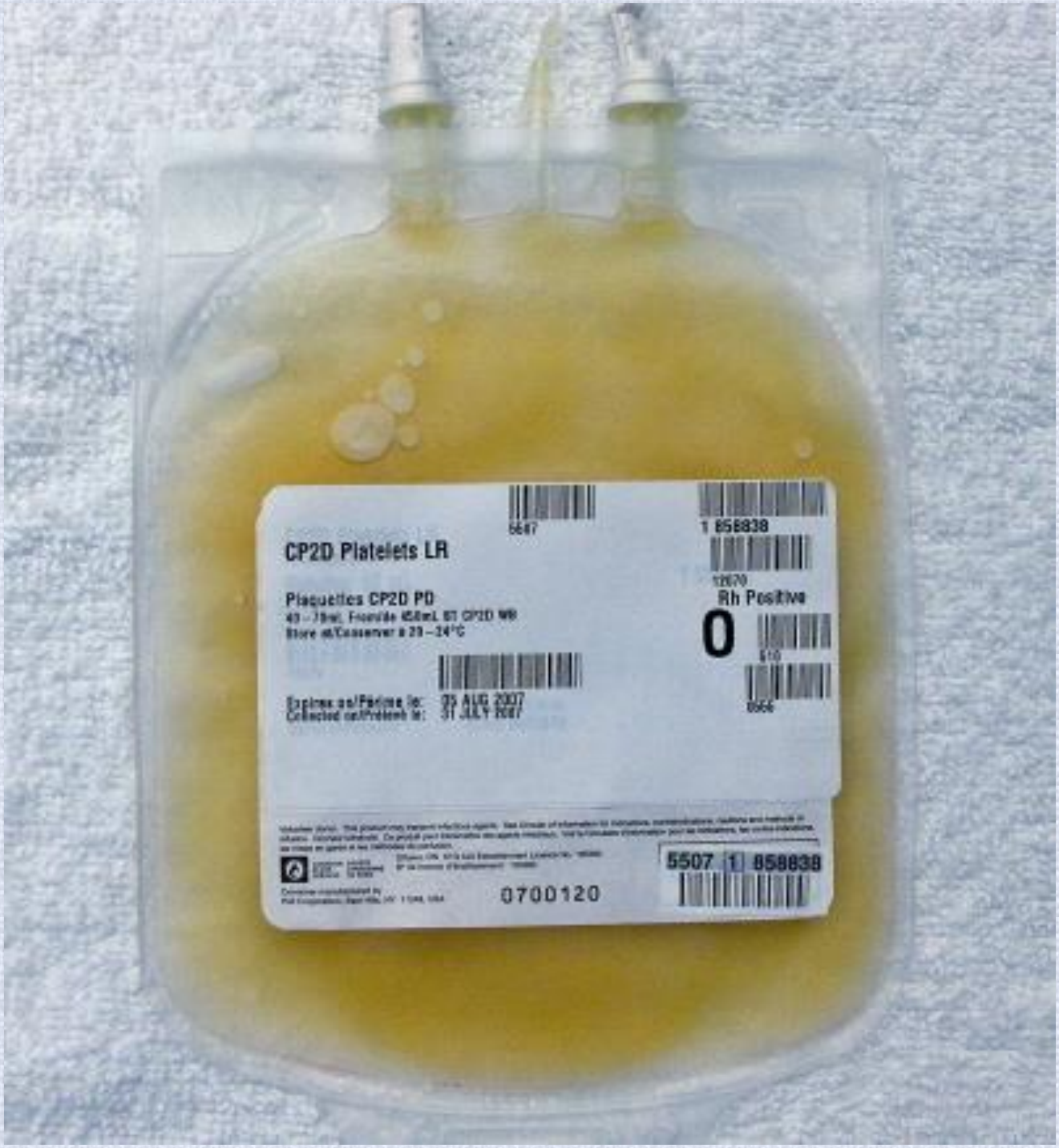
| Blood to Intravenous Solution (1:1 Ratio) | Hemolysis at 30 Minutes | |
|---|---|---|
| | Room Temperature | 37° C |
| 5% Dextrose in water | 1+ | 4+ |
| Plasmanate* | 1+ | 3+ |
| 5% Dextrose in 0.2% saline | 0 | 3+ |
| 5% Dextrose in 0.4% saline | 0 | 0 |
| 5% Dextrose in 0.9% saline | 0 | 0 |
| 0.9% 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

| Value | Whole Blood | Packed Red Blood Cells |
|---|---|---|
| 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 a 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


CP2D Platelets LR
Plaquettes CP2D PD
Rh Positive
0
0700120
5507 1 858838

- **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

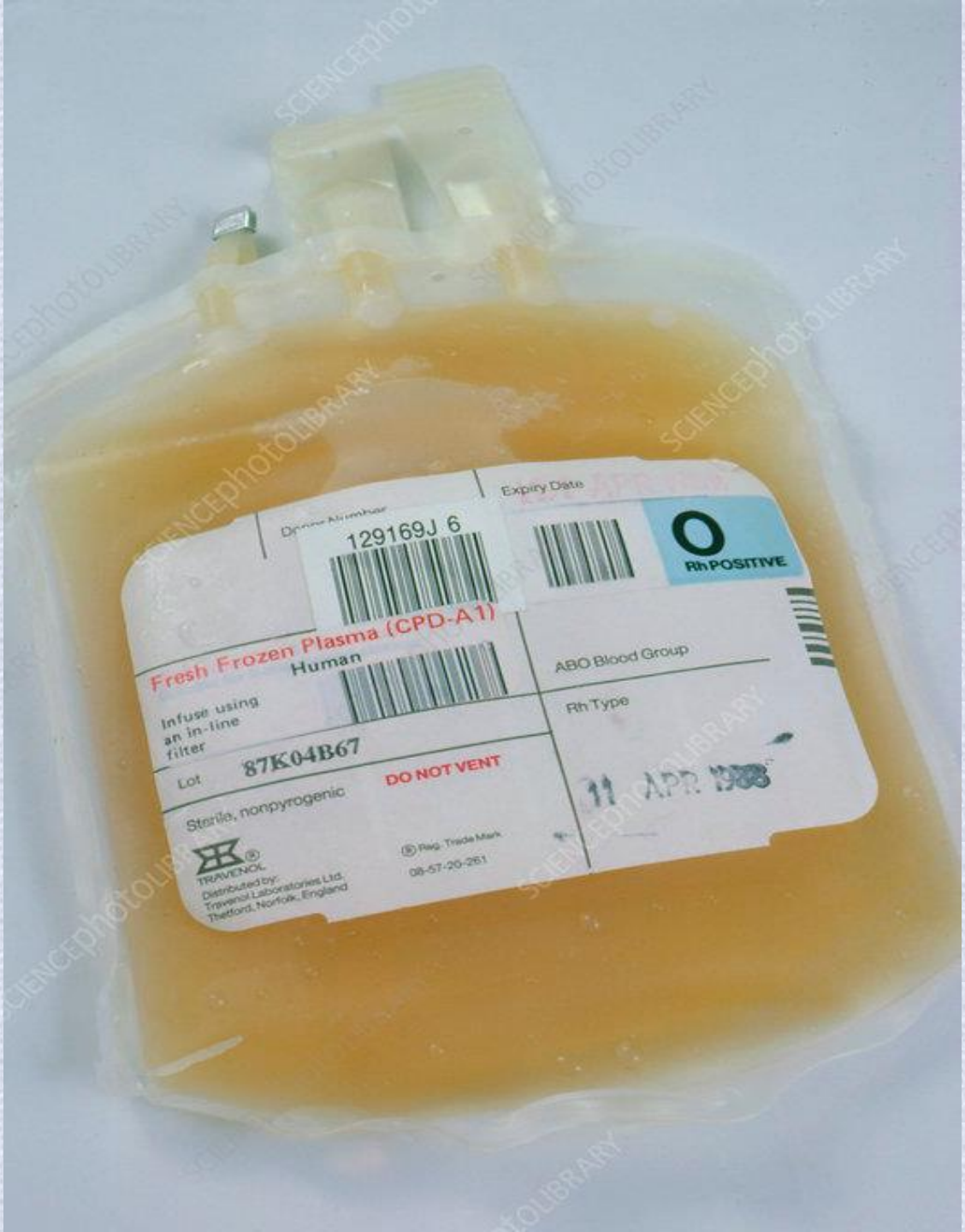
## TABLE 16-4. INDICATIONS FOR PLATELET TRANSFUSION[31,53,55,57,58]

| | |
|---|---|
| Stable patients without evidence of bleeding or coagulopathy | <10,000/μL |
| Prophylaxis for invasive procedures such as lumbar puncture, neuraxial anesthesia, central venous catheterization, endoscopy with biopsy, liver biopsy, or major surgery | <50,000/μL |
| Stable patients with clinical evidence of bleeding or coagulopathy | <50,000/μL |
| Patients with DIC and signs of ongoing bleeding | <50,000/μL |
| Patients undergoing massive transfusion | <75,000/μL |
| Patients having surgery at critical sites such as the eye or central nervous system | <100,000/μL |
| 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.


Expiry Date
129169J 6
O
Rh POSITIVE
Fresh Frozen Plasma (CPD-A1)
Human
ABO Blood Group
Infuse using an in-line filter
Rh Type
Lot 87K04B67
DO NOT VENT
Sterile, nonpyrogenic
11 APR
TRAVENOL
Distributed by:
Travenol Laboratories Ltd.
Thetford, Norfolk, 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 sever bleeding is present

  5- prevention of dilutional coagulopathy in major trauma or massive hemorrhage

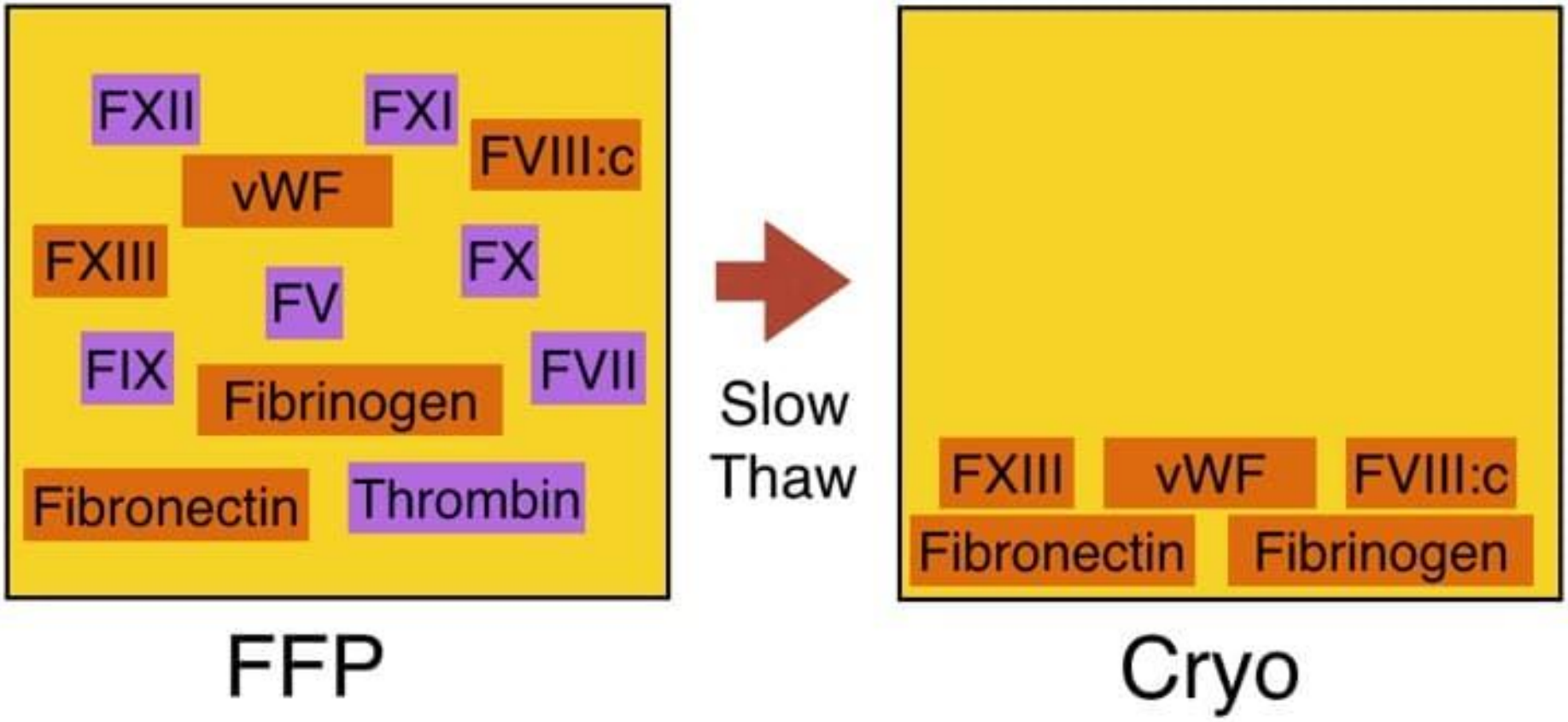
## TABLE 16-6. INDICATIONS FOR THE USE OF FRESH FROZEN PLASMA[31,53,56,60,61]

- 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)[a]
  - 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




Cryoprecipitated AHF LR
Rh Positive
A
0601184
5507 0 851850

## TABLE 16-7. INDICATIONS FOR THE USE OF CRYOPRECIPITATE[31,60,68–70]

- 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 plateletI (RDP) | Platelet atleast $5.5x10^{10}$ | Thrombocytopenia | 1unit/10kg Raise 30,000-50,000/cumm |
| Single donor platelet (SDP) | Platelet atleast $3x10^{11}$ | Thrombocytopenia | 1 collection equals 6RDP |
| Whole blood | All | Acute blood loss | Severe trauma |


Thank You!