Blood Transfusion

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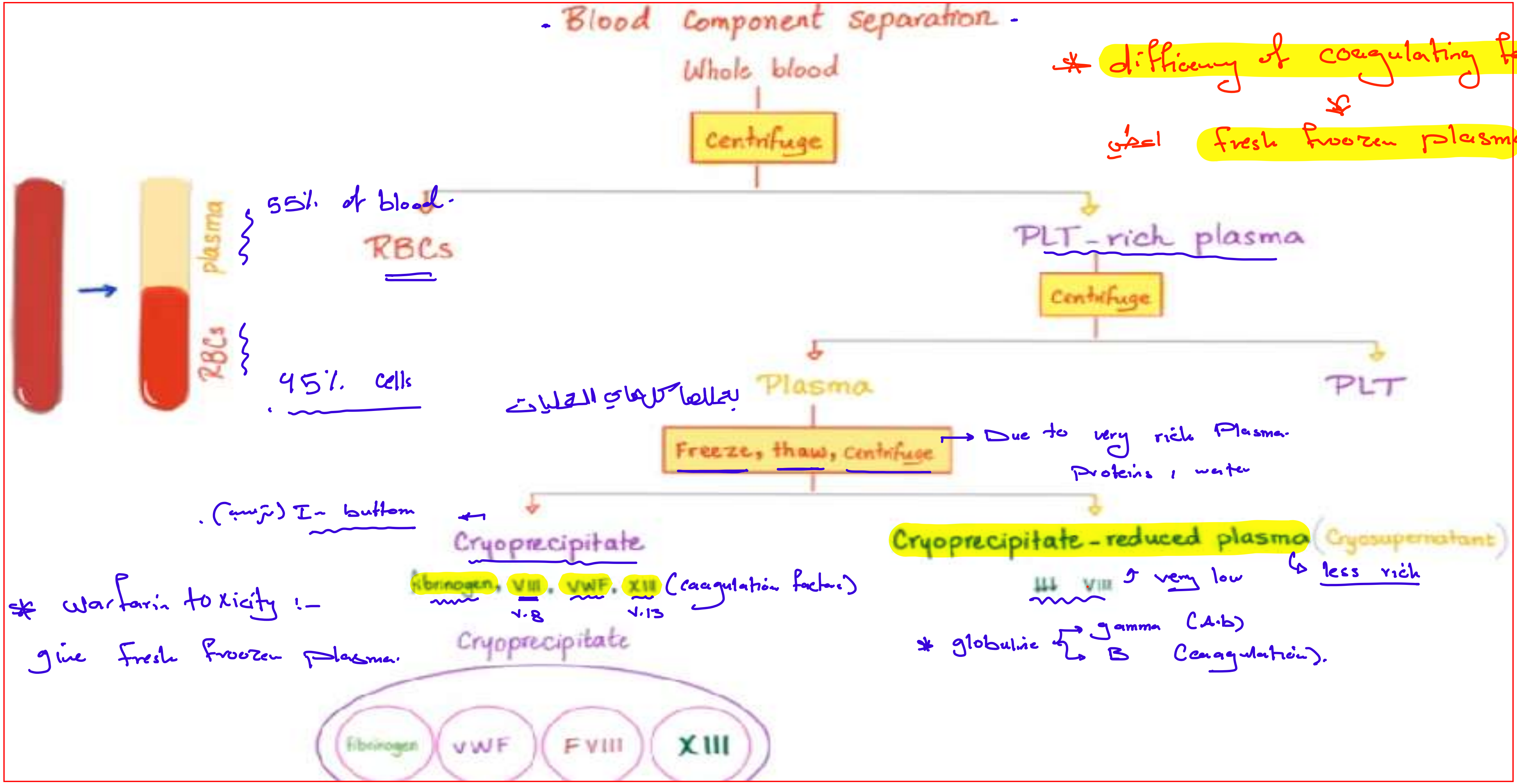
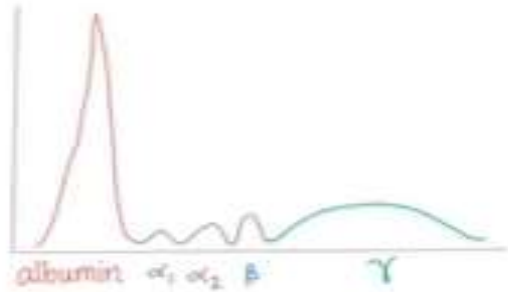


Blood Component separation
Whole blood
Centrifuge
plasma
RBCs
55% of blood
RBCs
45% cells
PLT-rich plasma
Centrifuge
Plasma
PLT
Freeze, thaw, centrifuge
Due to very rich Plasma proteins, water
I- bottom
Cryoprecipitate
fibrinogen, VIII, VWF, XIII (coagulation factors)
Cryoprecipitate-reduced plasma (Cryosupernatant)
very low
less rich
* difficiency of coagulating factors
fresh frozen plasma
* warfarin toxicity :-
give fresh frozen plasma.
* globulin → gamma (Ab) → B (coagulation).
Cryoprecipitate
Fibrinogen
VWF
FVIII
XIII

Blood Products

- Whole blood
- Blood Components
  - RBCs
  - PLTs
  - Plasma
    - FFP
    - Cryoprecipitate
    - Cryosupernatant
- Plasma Derivatives
  - albumins
  - Coagulation factors
  - immunoglobulins

Globulin



Normal SPEP

FFP

↓ levels of blood proteins { Coagulation factors; others (e.g. immunoglobulins)

- Replacement of coagulation factors in cases of factor def. (e.g. hemophilia
- ~~Antidote to Warfarin toxicity.~~ • ATIII deficiency • Tx of TTP.
- Replacement of immunoglobulins in cases of immunodeficiencies

↓ gamma

⚠ Allergy, TACO, TRALI

- FFP → expensive.

{Do NOT use FFP as a volume expander of Blood.

→ Use Saline instead. "Crystalloids or Colloids"

{0,9% NaCl

(free frozen plasma نقل -)

TTP (THROMBOTIC THROMBOCYTOPENIC PURPURA)

platelets الخراب بال

↑ Bleeding time

بوازن وجود نقص

Path: ADAMTS-13 deficiency = vWF

↓ ↑

Labs: ↑Bleeding Time, Thrombocytopenia ↓ platelets.

Presentation: Anemia, Thrombocytopenia, Fever, Neurologic Sxs, Renal Dysfunction

غير مرتبطة مع بعض البعض.

symptoms.

Cells: Schistiocytes (RBCs شكل)

مهزعة Not biconcave RBCs.

واضحة بالعينة very clear

What is TRALI

- TRALI- Transfusion Related Acute Lung Injury
- It is defined as acute dyspnoea with hypoxia and bilateral pulmonary infiltrates during or within 6hr of transfusion, not due to circulatory overload or other likely causes
- This is an Acute reaction
- TRALI's clinical presentation is:
  - Acute dyspnoea (difficult or laboured breathing)
  - Hypoxia (reduced oxygen levels in blood)
  - Bilateral pulmonary infiltrates

What is TACO

- TACO- Transfusion Associated Circulatory Overload
- This is defined as the presentation of at least 4 of the following symptoms within 6hrs of transfusion:
  - Acute respiratory distress
  - Tachycardia
  - Increased blood pressure
  - Acute or worsening pulmonary oedema
  - Evidence of positive fluid balance
- This is also an acute reaction

FFP vs PF24

frozen within 24 hours.

- Phlebotomy → Blood → Centrifugation → Separated
- Phlebotomy → plasma → Freeze within {24 hours}

حتى؟ → Frozen solid @ -18°C within 8 hrs.

1 unit = 150-300ml of FFP

Plasma.

{Higher levels of factors 5 & 8}

{lower levels of factors 5 & 8}

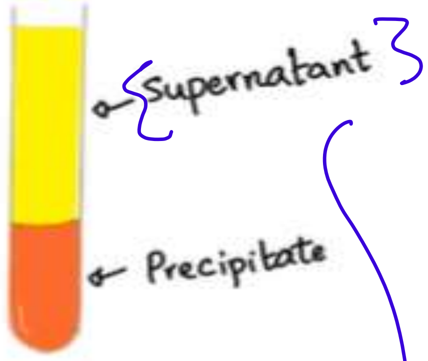
{Cryoprecipitate}

Fibrinogen | vWF | FVIII | XIII

متى نفعّل ؟

- Hemophilia
- vWD
- Hypofibrinogenemia / Afibrinogenemia
- DIC
- Reversal of excessive anticoagulant administration

TTP → ↑ vWF ·



لنفصلها هاد عشان
ما يزيد ال
vwf كثير

Cryosupernatant

(Cryoprecipitate - reduced plasma)

↓↓↓ VIII

Fibrinogen | vWF | XIII

- TTP
- HUS

DIC (DISSEMINATED INTRASVASULCAR COAGULATION)

Path: inappropriate widespread clotting activation

Labs: ↑ Bleeding Time, ↑ PT/PTT, ↓ Platelets, ↑ D-Dimer, ↓ Fibrinogen, Thrombocytopenia

Presentation: bleeding, sepsis, trauma

Cells: Schistiocytes

The mechanism on kidney

HUS (HEMOLYTIC UREMIC SYNDROME)

toxin of ecoli (O157 strain)

Path: toxin-mediated Hemolysis

Labs: ↑ Bleeding Time, Thrombocytopenia, ↑ Creatinine

Presentation: kidney failure, bloody diarrhea

Cells: Schistiocytes

↑ creatinine

Very Imp.

((RBC TRASFUSION))

Each unit of packed RBCs will raise your { Hgb by 1 g/dL ; HCT by 3 % }

(Role of 3 قاعدة الـ) # The rule of 3

RBC count x3	=	Hgb x3	=	HCT

لازم أعمل { MATCHING (ABO, Rh) } → To prevent hemolytic anemia

متى RBCs

Anemia — Hemorrhagic shock

Chemotherapy

لازم أعمل فحص للدم لأن ممكن يحصل → ⚠ * Allergy, Anaphylaxis, Infections, TRALI, ECF volume overload.

(Infections: HIV, Hep B, Hep C)

{ RBCs → 5 m ; Hb → 15 g/dl ; HCT → 45% } → Normal

- very slow (transfusion) first 15 min due to allergy then ↑.

Goal: Restore O_2 carrying capacity

★ Most common given

1 unit ≈ 250-300ml

Sodium Citrate (anticoagulant)
- Binds calcium
- ↑PRBCs → bleeding
- Monitor level/give Ca^{++}

Uses:
- Anemia

Stable - Transfuse <7g/dL
Unstable+ May be higher

1u PRBC = ↑1g/dL (recheck post)

- Use isotonic-fluid & inline filter

Generally start slow for first 15min
- Watch for reaction
★ Emergent = quicker!

(less common) PLT TRASFUSION

↓ PLT

Bleeding due to
- Thrombocytopenia
- Thrombasthenia

(Chemotherapy-related :D)

↳ ↓ function of platelets

لازم نعمل MATCHING "ABO, Rh"

1 unit ≈ 50ml (6 pack) ↑ platelets by 50,000 بزود PLT

→ If the process of PLT its okay.

⚠ Allergy. Anaphylaxis, Infections, TRALI

(حسب الوحدة مع الدم)

PINT = 1 unit = 500 ml

- Now how do estimate the total blood volume?
- the blood volume = 8% of our body weight expressed in kg.
- were we did get this number 8%?
- The blood cells 3% of body weight + blood plasma makes 5% of our body weight. So 3 plus 5 would be 8.
- 8% × 70kg equals to 5.6L which equals to 5.6 kg.

1kg = 1L → 5kg = 5L.

- one pint is called blood unit. Or 500ml half a litre
- 1 litre = half a court .

5L = 5000ml

- And one quart = 2 pints.

خروج الدم بالدقيقة

$\frac{500}{5000}$ = 0,1 عشر

فاخذ من الشخص اكثر من عشر

- In this example you got 10pints in your blood . So when you donate 1 pint you giving less than 1/10 of your blood body.

- So the person who less than 100 bound doesn't give blood. In other word when you donate blood you given 10% or less ,
- if you gave twice that you will lose a litre of blood, half a court of blood then you need a medical attention.