## BLOOD AND BLOOD COMPONENTS

#### **BLOOD BANKING:**

- STORAGE IMPAIRS RED CELL FUNCTION
  - Less efficient oxygen delivery
  - $\downarrow$ pH,  $\downarrow$ 2,3 DPG → left shift in dissociation curve (i.e. less oxygen delivery for given partial pressure)
  - More spherical/rigid
- Stored with citrate solution as preservative

# **BLOOD TYPING:**

- MAIN TESTS:
  - ABO group
    - Incompatibility results in acute haemolysis
  - o Rh
  - Antibody screen
- UNIVERSAL DONOR = BLOOD TYPE O

## **MASSIVE TRANSFUSION:**

- Defined as transfusion equivalent of patient's blood volume within 24 hours
- CAN RESULT IN:
  - Hypothermia
  - HYPOCALCAEMIA  $\rightarrow$  infusion of calcium may be necessary
  - o Dilutional thrombocytopaenia

#### TRICC TRIAL:

- Demonstrated that transfusion threshold of <70g/L was as safe as <100.
- Those with IHD may benefit from higher threshold
- In those with recent AMI, anaemia was deleterious (aim haematocrit >33%)

# **BLOOD COMPONENTS:**

- PACKED RED CELLS:
  - Given to improve oxygen delivery to tissues at microvascular level
  - One unit raises Hb by 10g/L

# **ARTIFICIAL OXYGEN CARRIERS:**

- Hb-based
- Found to HARM:
  - Cause vasoconstriction (endothelin, NO-scavneging-related)

# • FFP:

- Given as part of massive transfusion
- $\circ$  To correct coagulopathy in those actively bleeding or prior to procedure
- Needs to be used within 6 hours of thawing
- Screening tests (INR) do NOT correlate well with clinical risk of bleeding (larger amounts may be needed  $\rightarrow$  up to 30mL/kg)
- **PLATELETS:** 
  - Infusion indicated prophylactically if level <10

- One "bag" of pooled platelets raises count by 40-60
- Reasonable haemostasis even if level 5

#### **COMPLICATIONS OF TRANSFUSIONS:**

- IMMUNE VS NON-IMMUNE
- IMMUNE REACTIONS:
  - ACUTE:
    - Intravascular Haemolytic Transfusion Reaction
      - ABO incompatibility
      - Intravascular destruction of red cells → haemoglobinaemia and haemoglobinuria
      - FEVER, HEADACHE, NAUSEA, VOMITING
      - HYPOTENSION, DIC, ATN
      - TREATMENT:
        - STOP THE TRANSFUSION!
        - Aggressive fluid resus
        - Diuretics to improve UO
        - o Pressors
    - Febrile Transfusion Reaction:
      - MOST COMMON
      - >1C rise without explanation
      - Believed to result from antileukocyte antibodies
      - Warrants leuko-depleted red cells in the future
    - Allergic reaction:
      - From urticaria to anaphylaxis
      - "Washed" red cells in future
    - TRALI:
      - Aka Transfusion-Related Acute Lung Injury
      - Leading cause of transfusion-related mortality
      - Occurs within 6 hours of infusion of any blood product
      - Non-cardiogenic pulmonary oedema
      - Decreased rates from male donors for plasma
      - Treatment = stop transfusion and supportive
  - DELAYED:
    - Extravascular Haemolytic Transfusion Reaction:
      - Non-ABO mediated immune reaction
      - Fever, anaemia and jaundice
      - Rarely oliguria or DIC
    - Transfusion-Associated GVHD:
      - Rare
      - Occur when transfused lymphocytes proliferate and attack the recipient
      - Cell-mediated immunodeficiency is a risk factor
      - Onset 3-30 days  $\rightarrow$  fever, diarrhoea,  $\uparrow$ LFT, pancytopaenia
      - Treatment is BONE MARROW TRANSPLANT

## • NON-IMMUNE REACTIONS:

- ACUTE:
  - Circulatory overload:
    - Especially in chronically anaemic, normovoleamic elderly patients
  - Bacterial contamination:
    - YERSINIA ENTEROCOLITICA → grows well in cool, iron-rich environments
    - Fewer than 1 in one million with PRBC, higher in platelets due to higher storage
    - 60% mortality rates
    - Resuscitation and broad-spectrum antibiotics
  - Other:
    - Hypocalcaemia
    - Hyperkalaemia
    - Acidosis
    - Hypothermia
- CHRONIC:

## • Viral transmission:

- Much safer since institution of screening
- HIV/HCV  $\rightarrow$  1 in 2 million
- HBV → 1 in 200,000
- CMV, West Nile virus
  - CMV negative products in stem cell or solid-organ transplant patients receiving blood products