Blood Transfusion & Reactions

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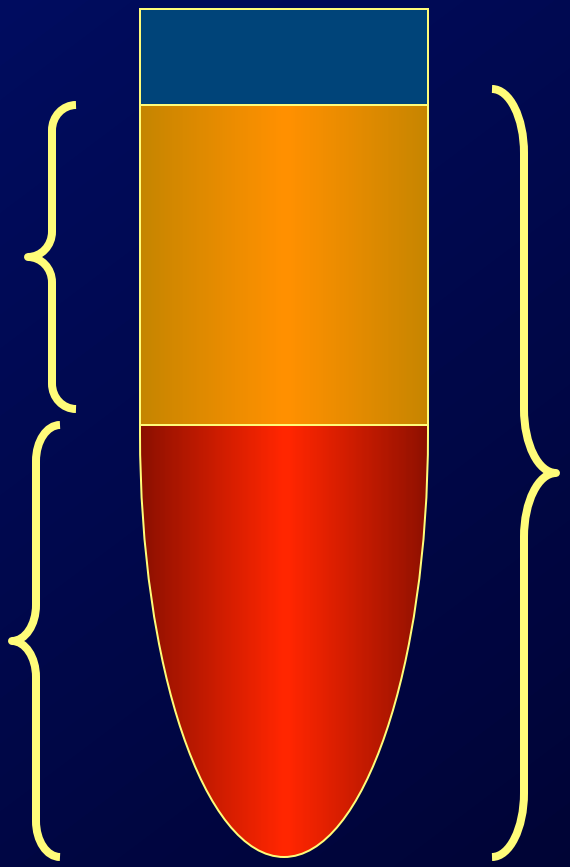
Blood Transfusion

Infusion of whole blood
or a component
from 1 individual (donor)
to another (recipient)

Whole Blood

1 unit of whole blood will increase Hb by 1 g

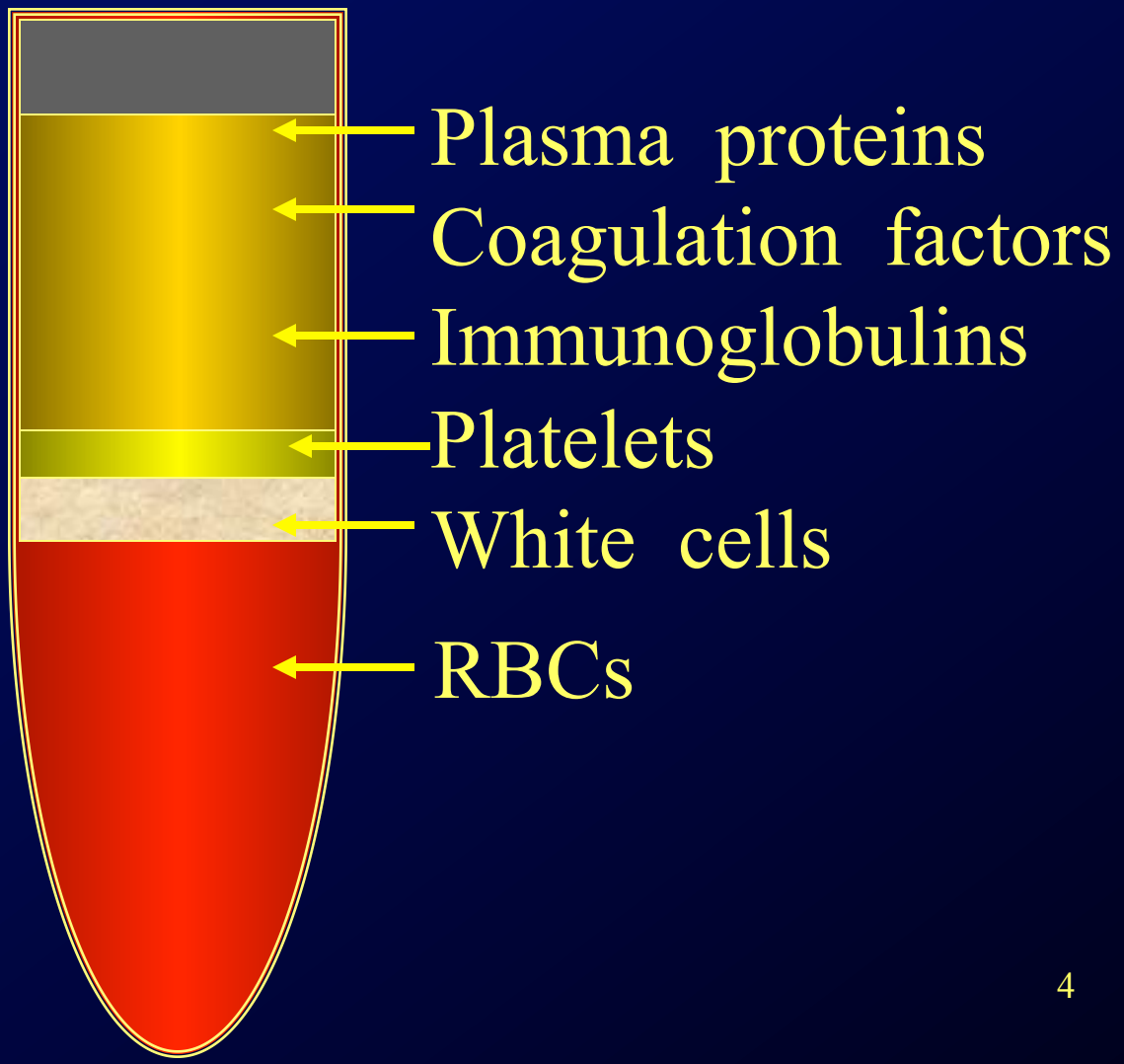
Plasma



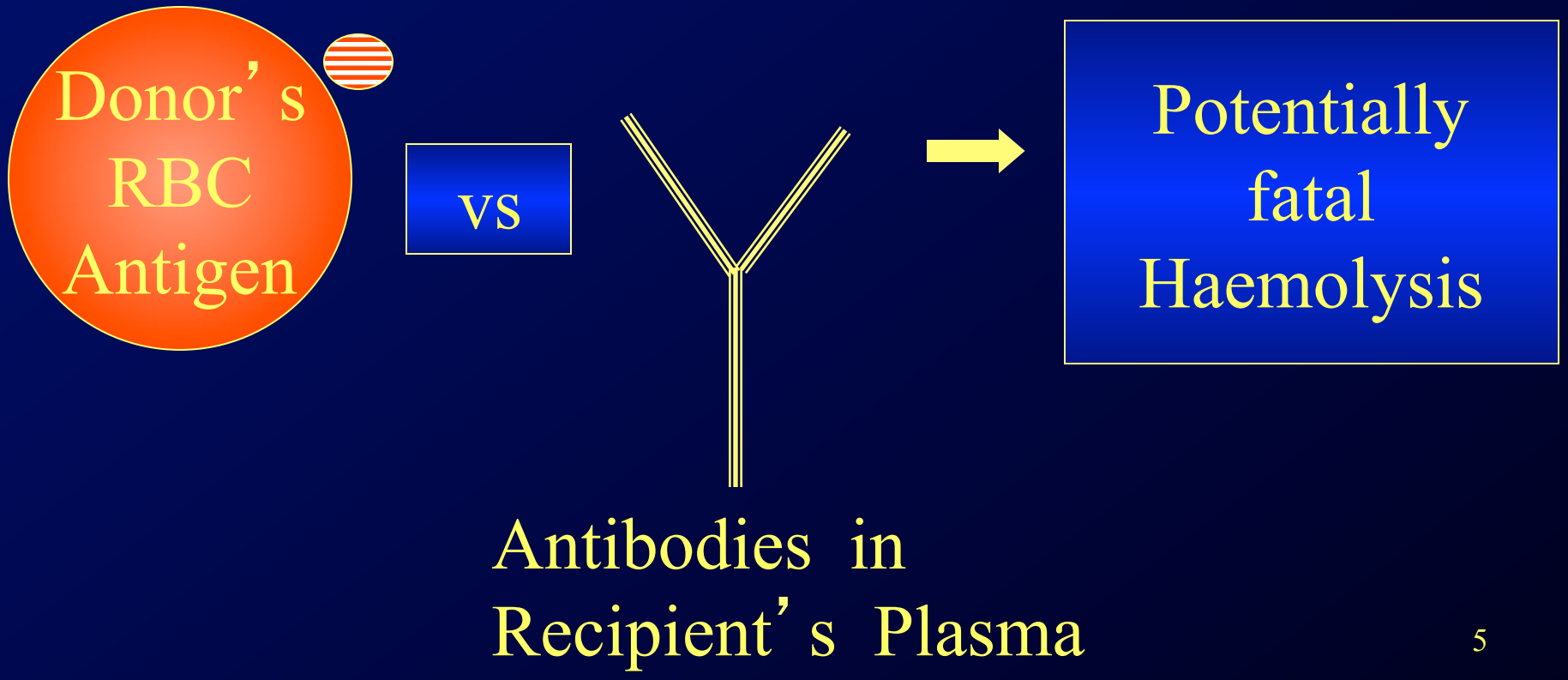
450 ml

34 - 44 %
Contains RBCs
WBCs, Platelets

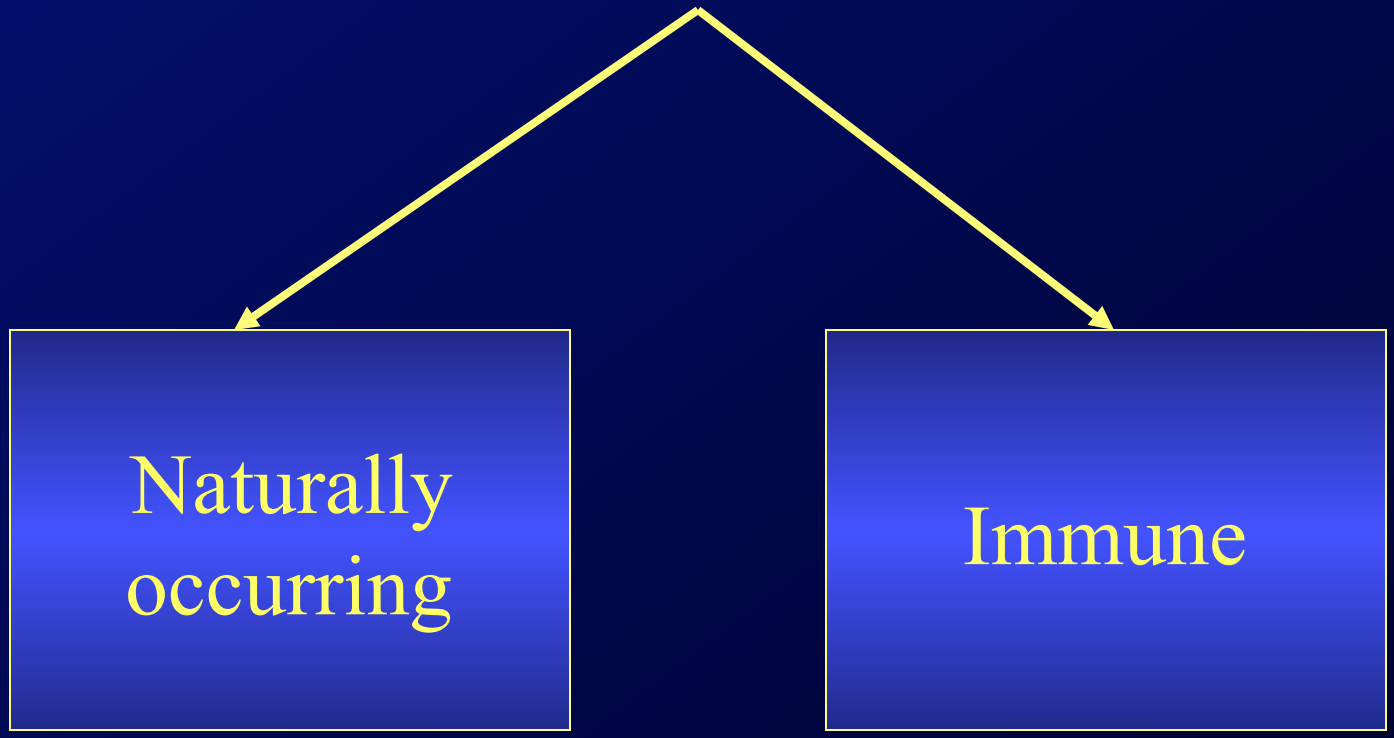
Whole Blood


Plasma proteins
Coagulation factors
Immunoglobulins
Platelets
White cells
RBCs

Blood Transfusion



Blood Group Antibodies



Naturally occurring

- Without antigen exposure
- - without transfusions
- - without pregnancy
- Most important are Anti A & B
- IgM
- React at cold temperature
- Optimally 4^0 C

Immune Antibodies

- Develop in response to exposure
- - transfusions
- - transplacental during pregnancy
- Ig G usually some Ig M in early phase
- Optimally at warm temperatures 37^0 C
- Most important Anti D

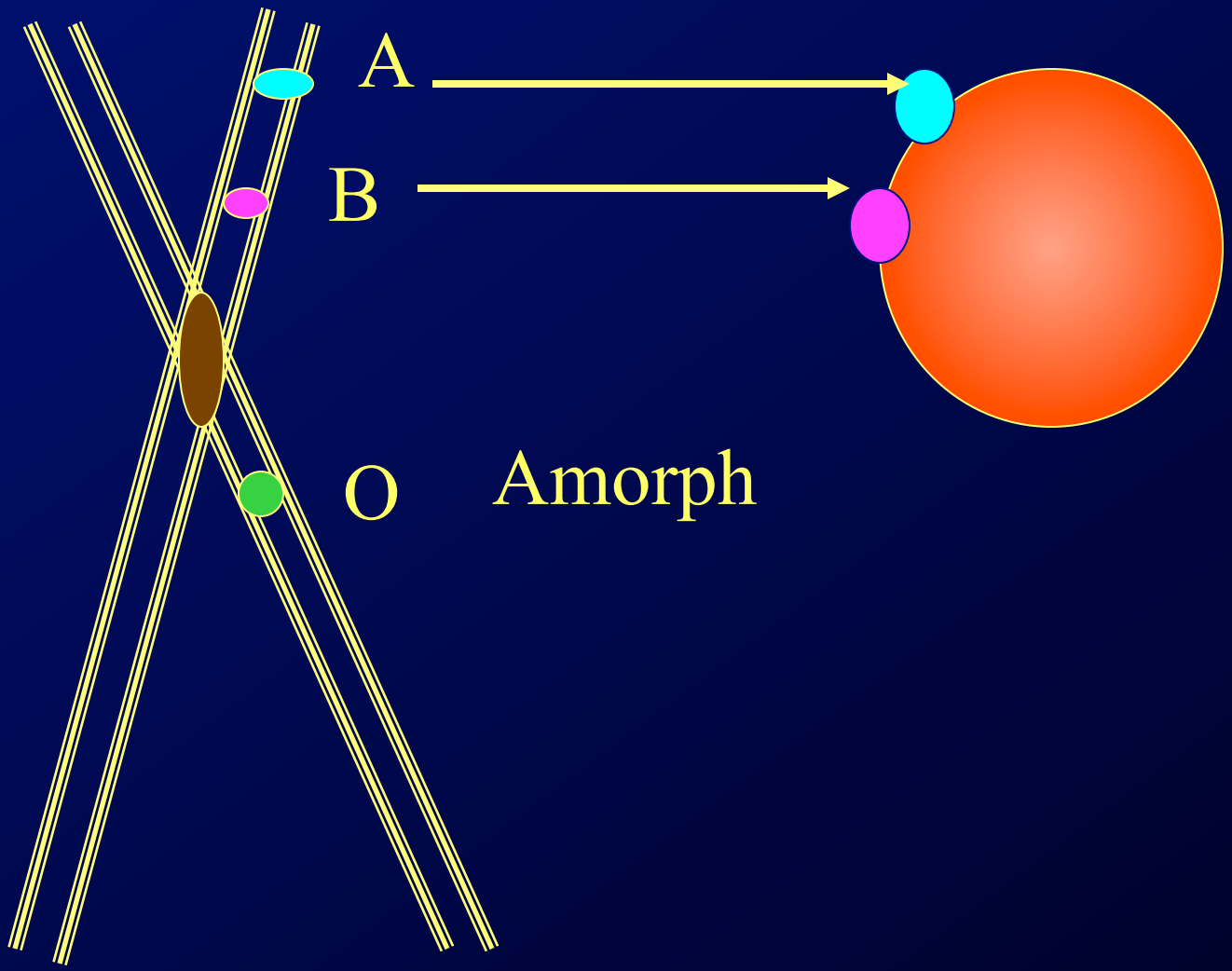
Blood group Antigens

- Over 400 RBC blood group antigens described
- ABO
- Rh
- Kell
- Duffy
- Kidd MN

ABO System

- 3 allelic genes
- A, B, O
- A & B codes for enzymes
- O gene is an amorph

ABO SYSTEM

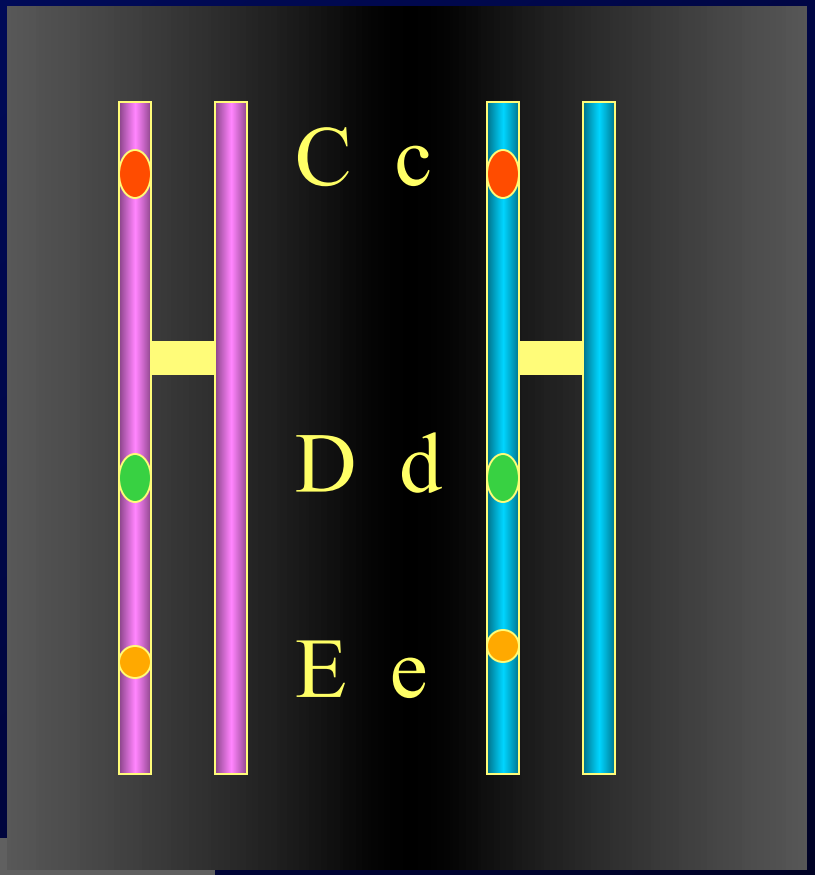


ABO system

- Present in most cells
- WBC's & Platelets
- 80% secrete the antigen
- plasma, saliva semen
- sweat
- Important for forensic purposes

Rh system

- Coded by 3 allelic genes
- Closely related
- C c
- D d
- E e
- If "D" is present - Rh positive



"d" Antigen does NOT exist

Rh system

- Antibodies rarely occur naturally

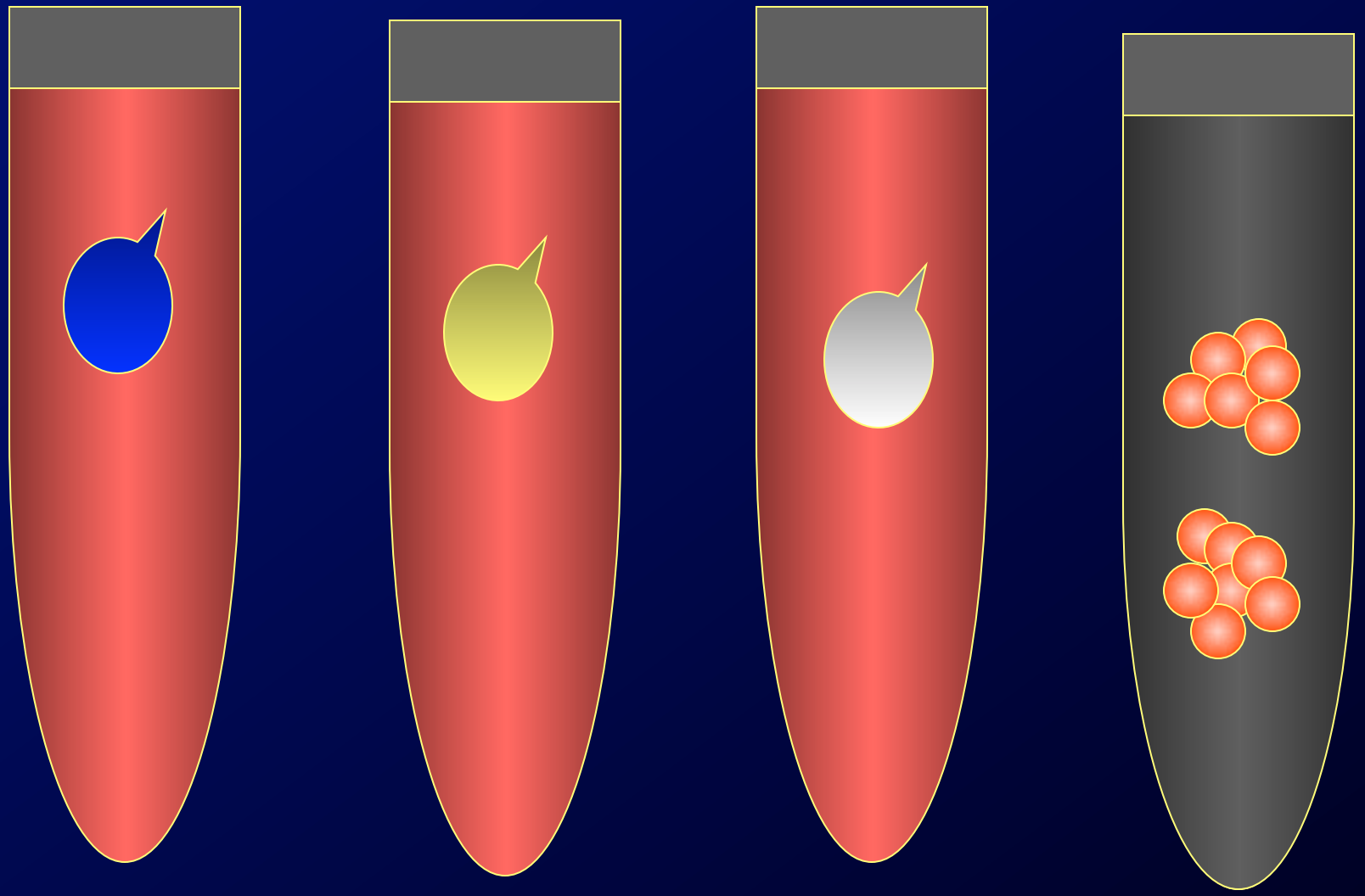
- Most after exposure
- - immunity from pregnancy
- - or previous transfusion

Anti A

Anti B

Anti AB

Anti D

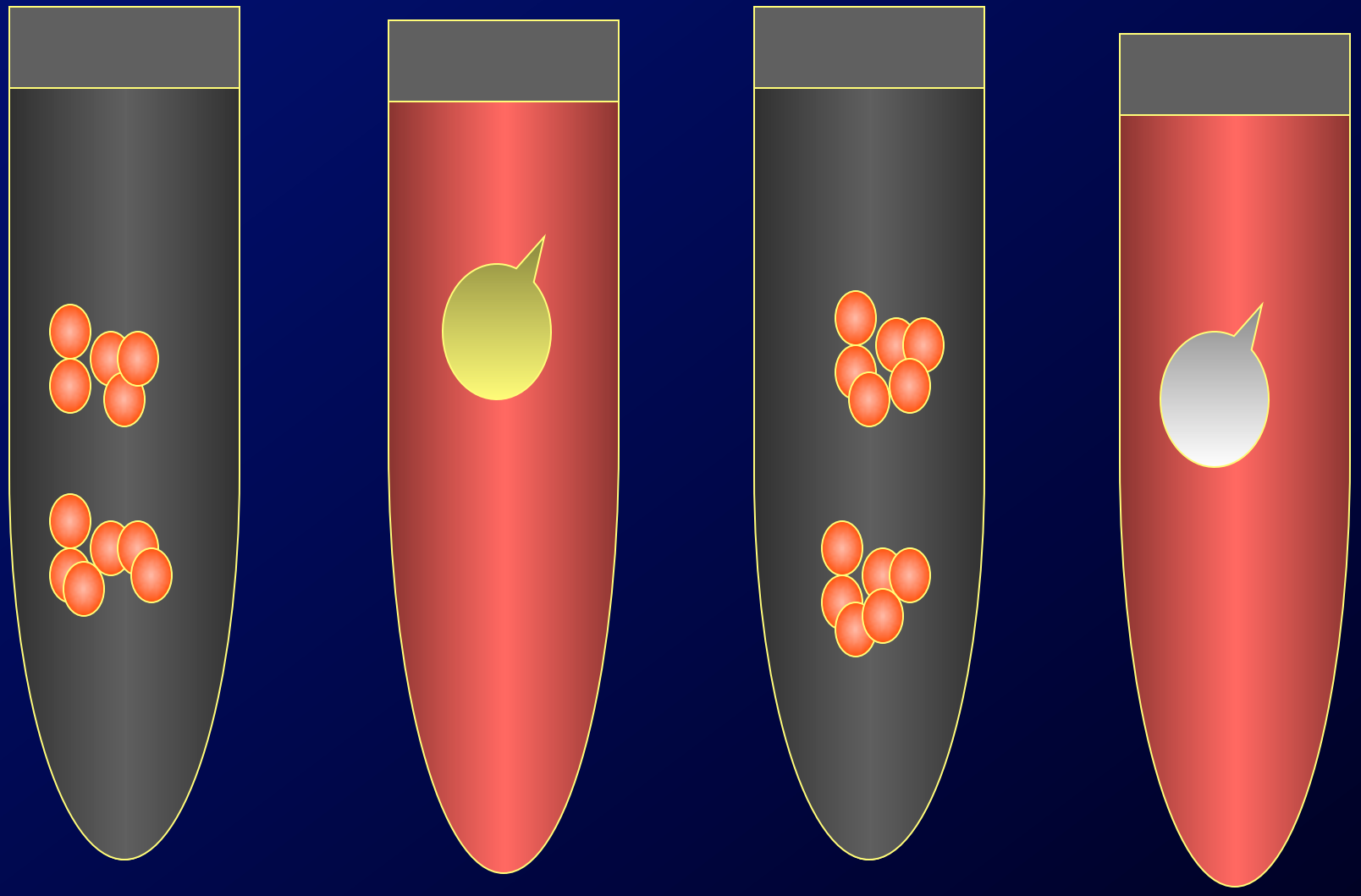


Anti A

Anti B

Anti AB

Anti D



Transfusion Reactions

Haemolytic Transfusion Reactions

- Immediate
- Delayed

Haemolytic Transfusion Reactions

- Immediate

- Massive intravascular haemolysis with Ig M / Ig G - AB Antibodies

Haemolytic Transfusion Reactions

- Delayed

- Extravascular immune antibodies - Rh antibodies (unable to activate complement)

Early Complications of Blood Transfusion

- Reactions due to infected blood
- Allergic reactions to WBCs, platelets & proteins
- Pyrogenic reactions to plasma proteins, HLA antibodies

Early Complications of Blood Transfusion

- Circulatory overload
- Air embolism
- Thrombophlebitis
- Citrate toxicity
- Hyper kalaemia
- Clotting abnormalities

Late Complications of Blood transfusion

- Transmission of diseases

- Viral - Hepatitis A, B, C & others
  HIV CMV
- Bacterial - Tr. Pallidum Brucella
  Salmonella

Late Complications of Blood transfusion

- Parasitic - Malaria Toxoplasma
  Microfilaria
- Transfusional iron overload
- Immune sensitization to Rh D antigen

Clinical Features of a major haemolytic transfuion reaction

- **Haemolytic shock phase**
- even after a few ml or at the end of the transfusion
- Urticaria lumbar pain flushing
- headache precordial pain rigors
- hypotension vomiting fever
- Hburia DIC jaundice ↑ WBC

Clinical Features

- **Oliguric phase** - Renal tubular necrosis with ARF

- **Diruretic phase** - Electrolyte imbalance during recovery from ARF

Investigation of an Immediate Transfusion reaction

- Recheck Labels
- Donor blood & post transfusional blood
- - Repeat group & cross match
- - Direct Coombs on post Tx sample
- - Check plasma haemoglobinaemia
- - Test for DIC
- - Donor sample for bacterial contamination

Investigation of an Immediate Transfusion reaction

- Post transfusion urine for haemoglobinuria
- 6 - 24 hours after transfusion for WBC, Serum bilirubin, Free Hb, Meth Hb
- In the absence of positive findings
- Patient's serum in 5 - 10 days for RBC & WBC antibodies