Unit-I

PHARMACOLOGY OF DRUGS ACTING ON BLOOD AND RESPIRATORY SYSTEM

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Key Contents

i) Haematinics

- Anticoagulants, Vit K, Haemostatic agents
- Fibrinolytic and Anti-platelet drugs
- Blood and plasma volume expanders

ii) Drugs acting on Respiratory system

- Antiasthmatic drugs including bronchodilators
- Anti-tussives and expectorants
- Respiratory stimulants

HAEMATINICS

- Hematinics are the substances used in the prevention and treatment of anemia.
- Iron
- Vitamin B12
- Folic acid

- **Anemia**
- Reduced oxygen carrying capacity of blood due to various reasons including reduced Hb content or reduced number of RBCs or abnormal RBCs.

- **Symptoms are-**
- Blood loss
- Impaired red cell formation – iron, vit b12,folic acid deficiency
- Bone marrow depression
- Erythropoietin deficiency
- Hemolytic anemia.

DISTRIBUTION OF IRON

PROTEIN	TISSUE	IRON(MG)
HAEMOGLOBIN	ERYTHROCYTES	2600
MYOGLOBIN	MUSCLES	400
ENZYMES	LIVER	25
TRANSFERRIN	PLASMA AND ECF	8
FERRITIN AND HEMOSIDERIN	LIVER, SPLEEN, BONE MARROW	410 48 300

IRON PREPARATIONS

Oral preparations

- Ferrous sulphate
- Ferrous gluconate
- Ferrous fumarate

Parenteral preparations

- Iron dextran
- Iron sorbitol citric acid complex

Therapeutic uses of iron

- Treatment of iron deficiency anemia
- Prophylaxis of iron deficiency anemia
  -Pregnancy, Lactation
  - Infants and growing children
  - Professional blood donors

VITAMIN B12

Preparations
Cyanocobalamin
Hydroxocobalamin
Methylcobalamin

Its major site of storage is in liver, excreted through bile, shedding of intestinal epithelial cells. Most of excreted are again absorbed in intestine.

Uses of Vitamin B12

1. treatment and prophylaxis of vitamin B12 deficiency (megaloblastic anemia).
2. Vit B12 injection in pernicious anemia (condition where Vit B12 is not absorbed from the stomach).

FOLIC ACID

- Folic acid is given orally which gets loosely bound with albumin from where cell take it up easily.

- Its site of absorption is from proximal jejunum and gets widely distributed via blood on the body and excreted in urine and stools.

- Metabolic function-
- **Folic acid** → **DHFA** → **THFA**(active form)
- folate synthetase DHF reductase

- Deficiency-
- Inadequate dietary intake
- Malabsorption
- Biliary fistula
- Chronic alcoholism
- Increased demand during pregnancy and lactation.

Daily requirements

- An adult is < 0.1 mg but dietary allowance of 0.2 mg/day is recommended.
- During pregnancy, lactation 0.8 mg/day is considered.

Preparations and dosage

- Folic acid tab 5mgs
- Prophylaxis 0.5 mg/day
- Folinic acid N5 formyl THFolinic acid 3 mg/ml inj.

ANTICOAGULANTS

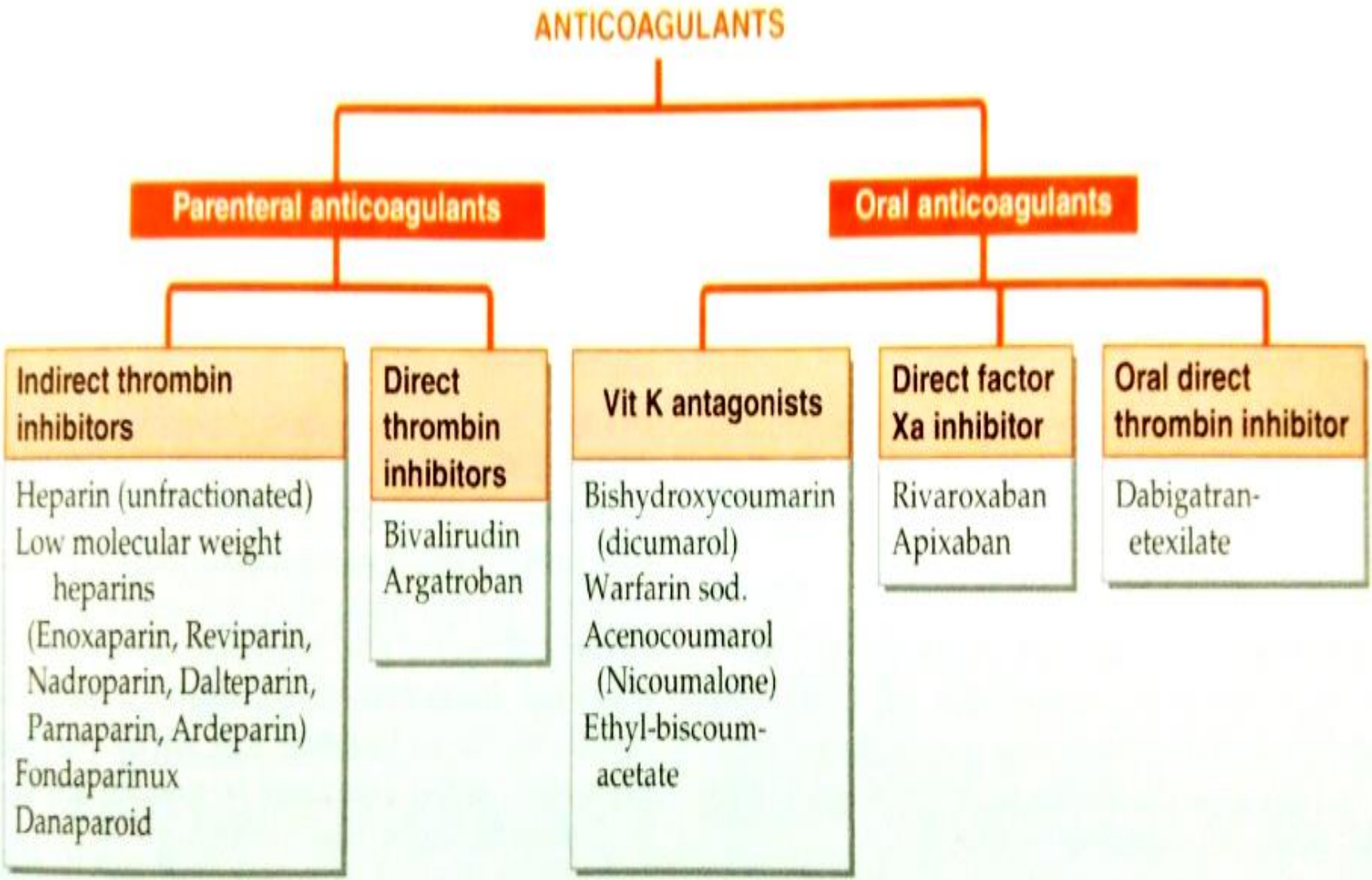
Substances which prevent or postpone coagulation of blood are called anticoagulants.

Anticoagulants and antiplatelet agents are medicines that reduce blood clotting in an artery, a vein or the heart.

Anticoagulants are of 3 types:

1. Anticoagulants used to prevent blood clotting inside the body, i.e. in vivo (In the living organism).
2. Anticoagulants used to prevent clotting of blood that is collected from the body, i.e. in vitro.
3. Anticoagulants used to prevent blood clotting both in vivo and in vitro.

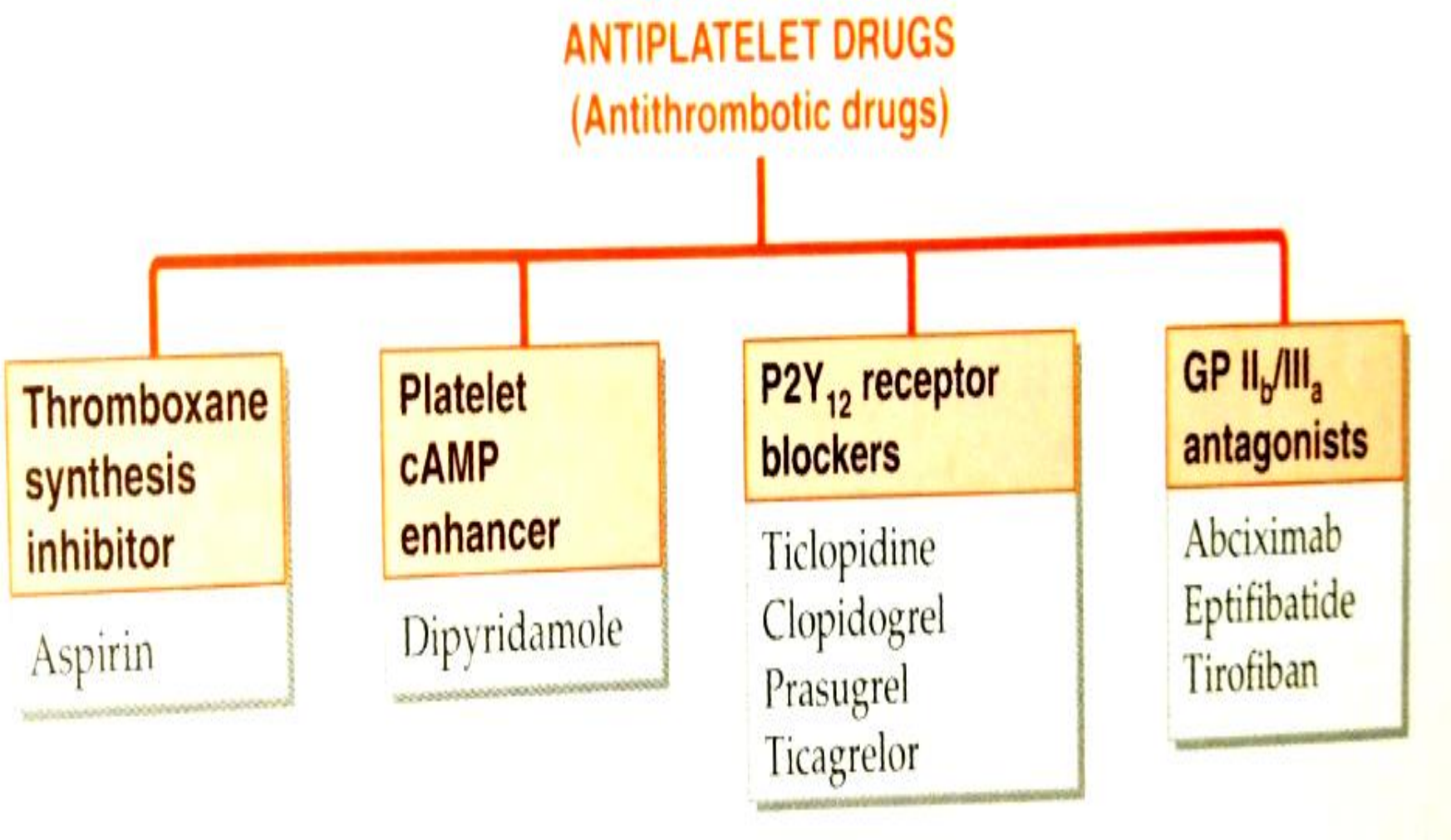
Drugs:
Warfarin
Heparin



Reference: Textbook of K D Tripathi

ANTIPLATELETS

- Antiplatelet drugs are also known as anti-thrombotics.
- They are a group of medicines that stop blood cells (called platelets) from sticking together and forming a blood clot.
- It decreases platelet aggregation and inhibit thrombus formation.
- They are effective in arterial circulation, where anticoagulants show minute effect.



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COAGULANTS(HAEMOSTATICS)

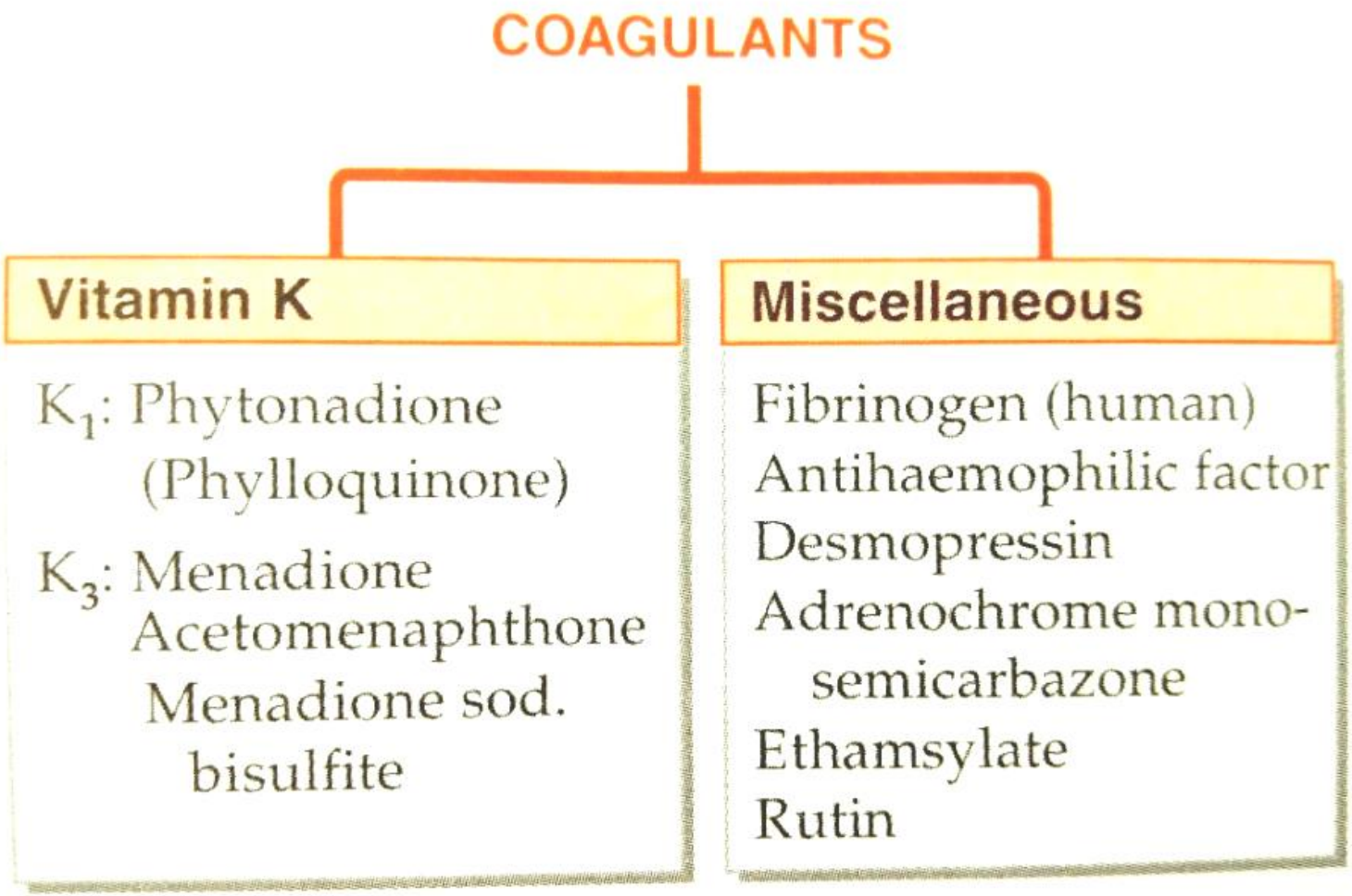
- These promote coagulation and are indicated in haemorrhagic states.
- Fresh whole blood or plasma provide all factors needed for coagulation.
- They are best therapies for deficiency of any clotting factors as they act immediately.
- Drugs used to restore haemostasis are Vit K, Fribinogen, Desmopressin.etc.

VITAMIN K

- Vit K acts as a cofactor in synthesis of coagulation proteins from liver such as prothrombin, factors VIII, IX and X.

- Vit K1
- Phytonadione, Phylloquinone
- ***Plant source***, Fat soluble

- Vit K3:
- ***Synthetic***
- Fat soluble: Menadione, Acetomenaphthone
- Water soluble: Menadione sod. bisulphite Menadione sod. diphosphate



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BLOOD CLOT

- Blood clot is defined as the mass of coagulated blood which contains RBCS, WBCS and platelets entrapped in fibrin meshwork.
- RBCS and WBCS are not necessary for clotting process.
- However, when clot is formed, these cells are trapped in it along with platelets.
- The trapped RBCS are responsible for the red color of the clot.
- Fibrinolysis

FIBRINOLYSIS

- Lysis of blood clot inside the blood vessel is called fibrinolysis. It helps to remove the clot from lumen of the blood vessel. This process requires a substance called plasmin or fibrinolysin.

- Plasmin is formed from inactivated glycoprotein called plasminogen. Plasminogen is synthesized in liver and it is incorporated with other proteins in the blood clot. Plasminogen is converted into plasmin by tissue **plasminogen activator(tPA).** It is a protein involved in the breakdown of blood clots.

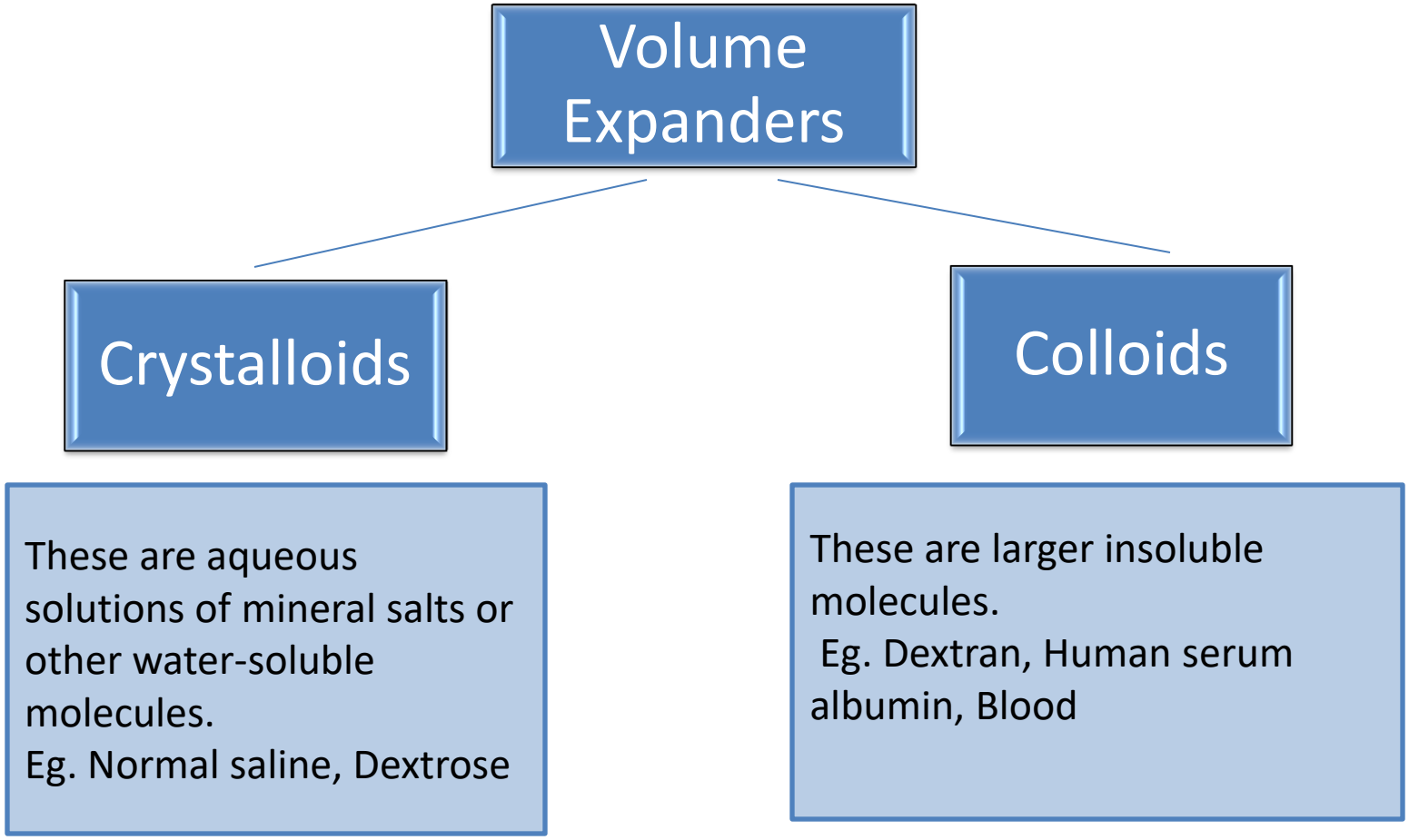
Fibrinolytic Drugs –

- Streptokinase
- Urokinase
- Reteplase

BLOOD AND PLASMA VOLUME EXPANDERS

- Plasma expanders are agents that have relatively high molecular weight and boost the plasma volume by increasing the osmotic pressure, drawing water into plasma from interstitial fluid.
- They are i.v. fluid solutions used to increase or retain volume of fluid in circulation blood.
- They are used when plasma is not available. Isotonic saline can also be used to replace lost blood volume.
- They are used to treat patients who have suffered haemorrhage or shock, to correct hypovolemia due to blood/plasma loss.
- They are used to replace fluids which when looses due to illness, trauma or surgery.

TYPES OF VOLUME EXPANDERS



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