Hematology

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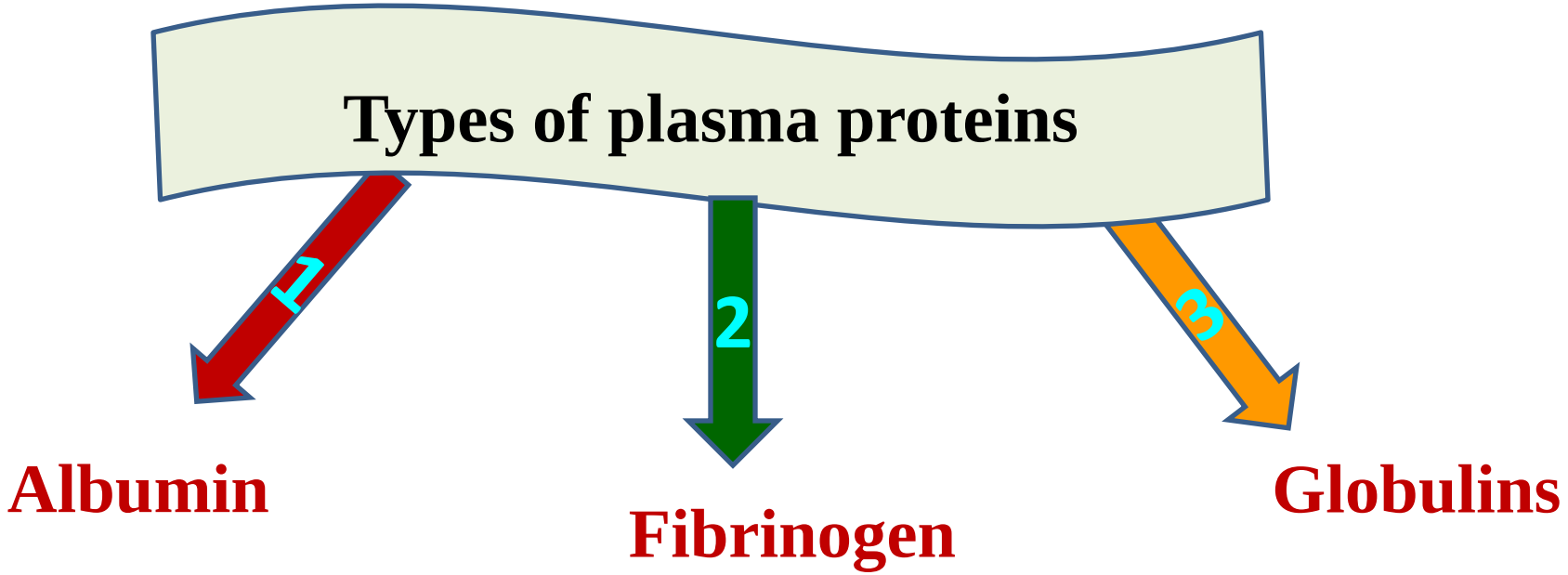
Plasma proteins

Plasma proteins are colloidal and non diffusible maintain osmotic pressure of blood

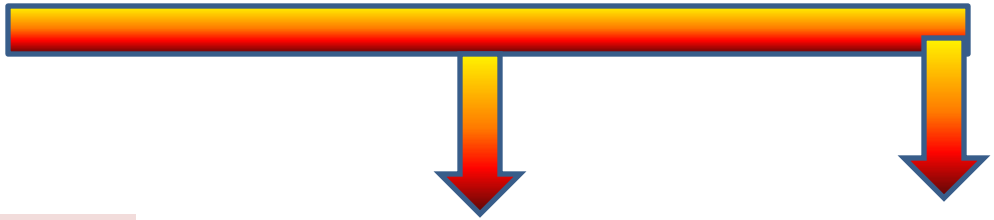


Sources of plasma proteins

Dietary source

Need high biological value proteins containing at least leucin, isoleucin & methionine

Tissue proteins



Fixed cell proteins (cell protoplasm)

Reserve Proteins (stored in tissues & liver)

Labile proteins (stored in liver)

Functions of plasma proteins

1. Colloidal non diffusible
2. Maintain the colloid osmotic pressure of blood ⟷ hydrostatic blood pressure → prevent edema

Osmotic pressure produced by each fraction is

- Inversely related to molecular weight →
  - Fibrinogen 300000
  - Globulins 180000
  - Albumin 70000

- Directly related to concentration →
  - Fibrinogen 0.2- 0.33 g/dl
  - Globulins 1.5 - 3.3 g/dl
  - Albumin 4- 5.8 g/dl

Albumin

- Synthesized in liver (150-200 mg/ Kg body weight/ day)
- Influenced by
    1. Nutrition
    2. Hormones
    3. General conditions
- Functions:
    A. Maintains osmotic pressure of plasma proteins (25 mmHg)
    B. Transport of substances …….free fatty acids, bile acids, bilirubin, porphyrins, penicillin, aspirin, histamine, calcium, copper & zinc

Hypoalbuminemia

Causes

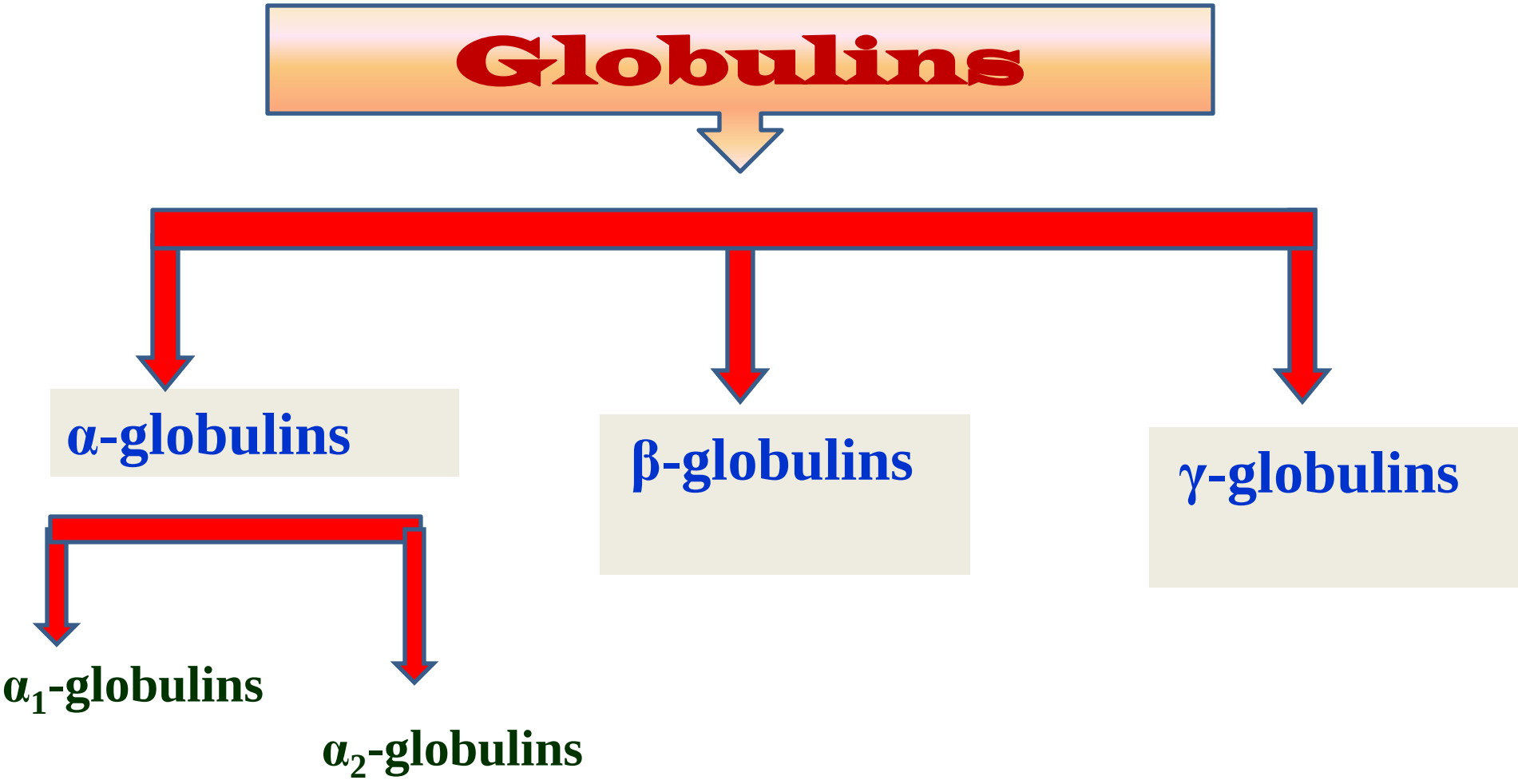
1- Liver cirrhosis

2- Malnutrition

3- Reduced intestinal absorption

4- Increased loss through gut & kidney

5- Increased catabolism(hyperthyroidism)


Globulins
α-globulins
β-globulins
γ-globulins
α1-globulins
α2-globulins

α_1-globulins

α_1- antitrypsin

Synthesized by liver &macrophage

Inhibit trypsin & antithrombine activity

Low level ⟶ tissue destruction

α_1- acid glycoprotein

Unknown function

Increase in inflammation & cancer

α_1- lipoprotein

Lipid transport

α_2-globulins

α_2- macroglobulins

Protease inhibitor

Antithrombine activity in coagulation

Ceruloplasmin

Copper transport

Haptaglobulin

Binds free hemoglobin----hemoglobin haptaglobulin complex

Decrease in hemolytic anemia

β-globulins

1. **Transferrin**

   Glycoprotein

   - Synthesized in liver, lymphatic organs & intestinal mucosa
   - Iron transport

2. **β- Lipoprotein** lipid transport

3. **Hemopexin** binds with hematin forming hematin hemopexin complex

4. **Plasminogen…**…… fibrinolysis

γ-globulins

- They are immunoglobulins or antibodies
- Increase in → chronic inflammation
  → autoimmune disease
- Decrease in → malnutrition
  → nephrotic syndrome
- They classified into: IgM, IgG, IgA, IgD & IgE

Fibrinogen

- Glycoprotein
- Synthesized by hepatic cells
- Functions

1. Mainly hemostasis
2. Wound healing
3. Defense against infection

→ fibrin mesh

↓

Tissue growth
&
barrier

Other functions of plasma proteins

1- Buffering function:

Na proteinate + lactic acid → Na lactate +proteinic acid
(strong acid) (weak acid)

2- Decrease capillary permeability:

By their osmotic pressure & precipitation between cells

3- Give the blood its viscosity

To maintain blood pressure

4- Influence erythrocyte suspension stability

5- Help solubility of

Carbohydrates, lipids and other substances in plasma