ERYTHROPOIESIS

Outline :-

- ☑ SITE
- ☑ STAGES
- ☑ REGULATION

RBC ⇒

- Shape → Circular, Biconcave, Non-nucleated
- Diameter → 7.3 μm (6.5-8.8 μm)
- Count → Birth = 6-7 million/μL
  Adult Male = 5-6 million/μL
  Adult Female = 4.5-5.5 million/μL
- Life span → 120 days
- Site of destruction → Tissue macrophage system [aka RES]
- Source of energy → Glucose metabolism only. [uses cytoplasmic enzymes]

VARIATIONS ⇒

1) Anisocytosis :-
   Variation in size of RBCs
2) Poikilocytosis :-
   Variation in shape of RBCs
3) Spherocytosis :-
   Spherical RBCs
4) Anemia :- ↓RBC / ↓ Hemoglobin
   (< 4 million per μL) (< 12 gm/dl)
5) Polycythemia :- ↑RBC (> 6 million/μL)

Haemopoiesis :- Development of Blood cells (RBC, WBC, platelets)

- Erythropoiesis :- Development of RBC
- Leucopoiesis :- Development of WBC
- Megakaryocytopoiesis :- Development of platelets

ERYTHROPOIESIS

SITE :-

* In Intrauterine life :-
  - Yolk sac (upto 3 months of fetal life)
  - Liver & Spleen (after 3 months of fetal life)
  - Bone marrow (after 6 months of fetal life)

* In children :-
  - All bones with red marrow (mainly)
  - Liver & Spleen

* In adults
  - Ends of long bones → Humerus, Femur
  - Flat bones → Skull, sternum, vertebrae, ribs, pelvis etc...

STAGES of Erythropoiesis [7-9 days]

- Haemocytoblast (Stem cell)
- Proerythroblast
- Early normoblast
- Intermediate normoblast :- Hb starts appearing
- Late normoblast
  - Early :- Mitosis stops, cartwheel appearance
  - Late
- Reticulocyte :- No nucleus
- Erythrocyte :- No nucleus

① Cell size ↓
② Cytoplasm ↑
Nucleus ↓
③ Hemoglobin ↑
④ Mitosis ↓
⑤ Staining reaction of cytoplasm
Deep Basophilic ↓ Polychromatophilic ↓ Acidophilic
(d/t ↓ RNA)

REGULATION of Erythropoiesis

General factors

- Hypoxia
- Hormones

Special Maturation factors

- Dietry factors
- Castle's intrinsic factor
- Extrinsic factor

* **Hypoxia** :- Lack of O_2 at tissue level

↓⊕

Erythropoietin ⊕→ RBC

* **Hormones** :-
  - Thyroxine
  - Androgens
  - Ant. pit. hormones [TSH, AcTH, GH, LH, FSH, prolactin]

→ Stimulates RBC production

- Estrogen ⟶↓ RBC production

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* **Dietary factors** :-
  - Iron & Folic acid
  - Mn, Cu, Co, Ni
  - Calcium
  - Vit C, Vit B_{12}
  - Proteins

  → For maturation of RBC

* **Castles intrinsic factor** :-
  - produced by parietal (oxyntic) cells
  - Helps in Vit. B_{12} absorption

  → For maturation of RBC

* **Extrinsic factor** :- Vit B_{12}, folic acid → For maturation of RBC