Factors Controlling Erythropoiesis.

A) Hormonal factors.

- Erythropoietin.
- Interleukins & GM-CSF.
- Androgens.
- Estrogens.
- Thyroxine, cortisol, Growth hormone.

B) Dietary factors.

Iron
Vit. B12 & Folic acid.
proteins
Vit C, copper, cobalt.

C) Other factors.

- Intrinsic factor.
- Environmental factors - Hypoxia.

A) Hormonal factors.

Erythropoietin (EPO)

- hormone that regulates process of erythropoiesis.
- Glycoprotein with m.w = 34,000.
- site of production:

  85% - Kidney { Interstitial cells in peritubular capillaries and from JG cells }.

  15% liver.

- stimuli for secretion: Hypoxia or reduced RBC count.

  { Haemorrhage or hemolytic anemia }.

- release of renal erythropoeitic factor.
- converts erythropoeitinogen in liver to erythropoeitin.
- Hypoxia - most potent stimulus for EPO secretion.

Erythropoietin (EPO)

- Mechanism of action.
  - Hematopoietic stem cells → pronormoblast.
  - Increase Hb synthesis.
  - promotes every stage of maturation.
  - stimulates release of RBC from marrow to circulation.

Factors Increasing EPO secretion.

- degree of tissue oxygenation & RBC in circulation.
- Hormones: Androgens, thyroxine, GH, ACTH & adrenocortical steroids, prolactin.
- products of RBC breakdown.
- Nucleotides - cAMP, NAD, NADP.
- vasoconstrictor drugs.

Factors decreasing EPO secretion.

- Estrogen
- renal failure
- Liver cirrhosis.

Other hormonal factors.

Other Leukins & GM-CSF

- Stimulates production of committed stem cells.

Androgens → stimulate erythropoiesis.

Estrogens → Inhibits "

Thyroxine, cortisol, GH

- stimulates erythropoiesis.

(b) Dietary factors.

- Iron.
- Vitamin B_{12} (cyanocobalamin)
- Folic acid.

Iron:

New material for synthesis of heme part of Hb.

Vitamin B12. :- { cyanocobalamin / extrinsic factor }

Sources - milk, meat, animal liver, bacterial flora of intestine.

- Absorption - from terminal ileum using intrinsic factor of castle. Secreted by parietal cells of stomach.

Transported by transcobalamin II

Actions: DNA synthesis, cell & nucleus maturation.

Deficiency - perinicious / megaloblastic anemia.

Folic acid.

Source: leafy vegetables, yeast, pulses, liver.

Actions: DNA synthesis, RBC maturation.

plasma form: methyl tetrahydrofolate.

Deficiency: megaloblastic anemia.

protein: for synthesis of globin part of Hb.

vitamin C: Helps in absorption of iron.

Copper & cobalt - Influence Hb formation.