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DEPARTMENT : MLT 2ND SEMESTER

SECTION:B

PAPER: HEMATOLOGY

INSTRUCTOR: ADNAN AHMAD

Q:1Discus developmental stages of erythropoiesis

Ans:

: Hemocytoblast, which is a pluripotent hematopoietic stem cell.

- Common myeloid progenitor, a multipotent stem cell.
- Unipotent stem cell.
- Pronormoblast.
- Basophilic normoblast also called an erythroblast.
- Polychromatophilic normoblast.
- Orthochromatic normoblast.
- Reticulocyte.

In normal state, the balance of production and destruction is maintained at remarkably constant rate Both endocrine and exocrine hormones make important contributions to this dynamic well balanced mechanism...The earliest recognizable erythroid precursor seen in the bone marrow is large basophilic staining cell,15-20 um Contains a single large well defined, rounded nucleus,ribosomes, mitochondria and Golgi apparatus .

As the early precursor cell matures, its nucleus increases in size. As maturation goes on cell becomes smaller and more eosinophilic

indicating hemoglobin.During intermediate stages of maturation, cytoplasm becomes polychromatic indicating mixture of basophilic proteins and eosinophilic hemoglobin.

Further maturation, hemoglobin synthesis continue and cytoplasm becomes entirely eosinophillic. Late stages of maturation, hemoglobin is abundant. few mitochondria and ribosome's are present., nucleus is small dense and well circumscribed.

Number is constant normally as their life span is 120 days approximately.1-2 days of further maturation in systemic circulation and spleen reticulocytes loose membrane coated transferrin.Differentiation and maturation from a basophilic erythroblast occurs in 5 to 7 days.10-15% of erythroid precursors never mature and are destroyed.

Q:2 Enlist common causes of poor blood filam(blood smear).

Ans:

Their are many types of poor blood filam:

1: Drop of blood too large or too small.

2: spreader slide pushed across the slide in jerky manner.

3:failure in keep the entire edge of the spreader slide against the slide while making the smear.

4: failure in keep the spreader slide at a 30° angel with the slide .

5: failure to pushed the spreader slide completely across the slide.

6: irregular spread with ridges and long tail : edge of spreader dirty or chipped: dust slides.

7: Holes in film_ slide contaminated with fat or grease and air bubbles.

8: cellular degenarative changes: delay in fixing inadequate fixing or methanol contaminated with water.

Q:3.Briefly explain Granulupoiesis in detail:

Ans:

Granulopoiesis (or granulocytopoiesis) is a part of haematopoiesis, that leads to the production of granulocytes. A granulocyte, also referred to as polymorphonuclear lymphocyte (PMN), is a type of white blood cell that has multi lobed nuclei, usually containing three lobes, and has a significant amount of cytoplasmic granules within the cell Granulopoiesis takes place in the bone marrow. It leads to the production of three types of mature granulocytes: neutrophils (most abundant, making up to 60% of all white blood cells), eosinophils (up to 4%) and basophils (up to 1%)Even though haematopoiesis is usually presented in a form of hierarchically organized haematopoietic tree, it is becoming evident, that the cells are gradually progressing from one type to another, while remaining flexible and forming complex landscapes

Granulopoiesis is often divided into two parts - granulocyte lineage determination, involving the early maturation steps that are common for all myeloid cells and committed granulopoiesis, the irreversible commitment of a myeloid cell to become a granulocyte.

Granulopoiesis, as well as the rest of haematopoiesis, begins from a haematopoietic stem cells. These are multipotent cells that reside

in the bone marrow niche and have the ability to give rise to all heamatopoetic cells, as well as the ability of self renewal. They give rise to either a common lymphoid progenitor (CLP, a progenitor for all lymphoid cells) or a common myeloid progenitor, CMP, an oligopotent progenitor cell, that gives rise to the myeloid part of the heamatopoetic tree. The first stage of the myeloid lineage is a granulocyte - monocyte progenitor (GMP), still an oligopotent progenitor, which then develops into unipotent cells that will later on form a population of granulocytes, as well as a population of monocytes. The first unipotent cell in granulopoiesis is a myeloblast.

Steady state granulopoiesis is a term used to describe the normal daily production of granulocytes. Granulocytes are short lived cells (their lifespan is between 6 and 8 hours) with a high cell turnover. The number of granulocytes produced every day is between 5 and 10 x $10^{..}$ The master regulator of steady state granulopoiesis is C/EBPα. It restricts the cell cycle of immature cells by inhibition of CDK2 and CDK4 and promotes granulocytic differentiation. Steady state production of granulocytes is activated after the engulfment of apoptotic granulocytes by tissue macrophages.

Q:4 What Is iron deficiency Anemia? Also discuss its causes.

Ans:

Overview. Iron deficiency anemia is a common type of anemia a condition in which blood lacks adequate healthy red blood cells. Red blood cells carry oxygen to the body's tissues. As the name implies, iron deficiency anemia is due to insufficient iron.

Iron deficiency anemia is a common type of anemia — a condition in which blood lacks adequate healthy red blood cells. Red blood cells carry oxygen to the body's tissues. As the name implies, iron deficiency anemia is due to insufficient iron. Without enough iron, your body can't produce enough of a substance in red blood cells that enables them to carry oxygen (hemoglobin). As a result, iron deficiency anemia may leave you tired and short of breath.

Causes:

:Blood loss: Blood contains iron within red blood cells. So if you lose blood, you lose some iron. Women with heavy periods are at risk of iron deficiency anemia because they lose blood during menstruation. Slow, chronic blood loss within the body — such as from a peptic ulcer, a hiatal hernia, a colon polyp or colorectal cancer — can cause iron deficiency anemia. Gastrointestinal bleeding can result from regular use of some over-the-counter pain relievers, especially aspirin.

: A lack of iron in your diet : our body regularly gets iron from the foods you eat. If you consume too little iron, over time your body can become iron deficient. Examples of iron-rich foods include meat, eggs, leafy green vegetables and iron-fortified foods. For proper growth and development, infants and children need iron from their diets, too.

:An inability to absorb iron.. Iron from food is absorbed into your bloodstream in your small intestine. An intestinal disorder, such as celiac disease, which affects your intestine's ability to absorb nutrients from digested food, can lead to iron deficiency anemia. If part of your small intestine has been bypassed or removed surgically, that may affect your ability to absorb iron and other nutrients.

:Pregnancy. Without iron supplementation, iron deficiency anemia occurs in many pregnant women because their iron stores need to serve their own increased blood volume as well as be a source of hemoglobin for the growing fetus.

:Chronic blood loss
:Uterine
:Gastrointestinal, e.g. peptic ulcer, oesophageal varices, aspirin (or other non - steroidal anti -infl ammatory drugs) ingestion haemoglobinuria, partial gastrectomy, carcinoma of the stomach, colon or rectum, hookworm,angiodysplasia, colitis, piles, diverticulosis Rarely, haematuria, , pulmonary haemosiderosis, self - inflicted blood loss.

Q:5. Classify anemia on the basis of morphology with examples.

Ans: **Anemia is a condition in which you lack enough healthy red blood cells to carry adequate oxygen to your body's tissues. Having anemia can make you feel tired and weak. There are many forms of anemia, each with its own cause. Anemia can be temporary or long term, and it can range from mild to severe.**

Anemia is classified by morphology or pathophysiology.
The morphological classification is based partly on the size or volume of the red blood cell. Normocytic would indicate a red blood cell of a normal size or volume. Microcytic indicates an abnormally small cell, and macrocytic indicates an abnormally large cell.

Examples :

/ Microcytics anemia (MCV<80 FF) /

: iron deficiency anemia

: thalassaemia

: sideroblastic anemia

: Anaemia of chronic disease

/Macrcytic anemia (MCV>100 FL)/

: Megaloblastic anemia

: Noamegaloblastic anemia

: Liver disease

: Haemolytic anemia

: Alcoholism

: Nyelodysplatie syndrome

: Hypothyroidism

/ Normocytic Anaemia (MCV-100 FL)/

: Reticulocyte production normal

: Recent blood loss

: Haemolytic anaemia

Reticulocyte production deficient

: Alpastic anaemia

: Myelophathisic anaemia

: chronic renal failure

: Anaemia of chronic disease

: Hypothyroidism