IQRA NATIONAL UNIVERSITY

DEPARTMENT OF ALLIED HEALTH SCIENCES

Final -Term Examination (Spring-202)

Course Title: Hematology (MLT 2nd semester)​

Instructor: Adnan Ahmad

Time: 6 hours

​​​​​​Max Marks: 50

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**Section A**

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**Q1. Discuss developmental stages of erythropoiesis.**

**Answer:**

**Stages of erythropoiesis**

* **Proeeythroblast:**
* It is the earlier erythroid element.
* In this stage basophilic cytoplasm with a perinuclear halo.
* Cytoplasm bulges to form ear shape process.
* Nuclear chromatin is not homogeneous and nucleulus is seen.
* **Basophilic erythroblast:**
* In this stage the cell smaller than pro erythroblast.
* Nuclear chromatin show sharp contrast between light and dark areas.
* Cytoplasm is basophilic reflecting protein and RNA content.
* **Polychromatophilic:**
* Polychomasia means having many colours.
* In this stage nucleus is mature and condensed.
* And cytoplasm has a grey hue derived from hemoglobin.
* **Orthochromatic erythroblast:**
* The acidophilic erythroblast which is the last precursor with a nucleus.
* Nucleus is compact and situated near the membrane.
* Cytoplasm is like mature red cell, reflecting a high henoglobin content.
* **Reticulocyte:**
* Young erythrocytes with granular or reticular filamentous structure.
* Makes up 0.5- 2% of all erythrocytes.
* Vital staining required to make this visible.
* Reticulocytosis seen following hemolysis or acute blood loss.
* **Mature non-nucleated erythrocytes:**
* These are reddish, circular and biconcave cells.
* Their size is 7-8 micrometer.
* In these there is no visible internal structure.
* In these cells high hemoglobin content.
* These are bright at center due to biconcave shape.

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**Q2. Enlist common causes of poor blood filam(blood smear).**

**Answer:**

**Causes of blood smear:**

* As soon as the blood drop placed ob glass slide, there should be no delay in the making of smear. In any delay the result is abnormal distribution of the white cell with many of other white cell accumulating at the thin edge of smear. Rouleaux of the red cell and clumping of the platelets may occurs.
* Drop of blood too large or too small.
* Failure to keep the entire edge of spreader slide against the horizontal slide while making the smear.
* Spreader slide pushed across the horizontal slide in a jerky manner.
* Failure in using the appropriate angle of the spreader slide.
* Failure to push the spreader slide across complete horizontal slide.
* Exposure of slide to formalin interferes with stain quality of smear.

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**Q3. Briefly explain granulopoiesis in detail.**

**Answer:**

**Granulopoiesis:**

Granulopoiesis is the production of neutrophils, eosinophils, and basophils.

The main purpose of granulocytes is to migrate to sites of tissue inflammation and function in host defence. Briefly, these cells have key immunologic functions, including phagocytosis and microbicidal activity (neutrophils and monocyte-derived macrophages), parasitical activity and participation in allergic reactions, antigen processing and presentation, and cytokine production( macrophages).

**Stages of granulopoiesis:**

Granulopoiesis is divided into two stages;

* **Granulocyte lineage determination:**

Granulopoiesis, as well as the rest of haematopoiesis, begins from a haematopoietic stem cells. These are multi-potent 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.

* **Committed granulopoiesis:**

Committed granulopoiesis consists of maturation stages of unipotent cells. The first cell that starts to resemble a granulocyte is a myeloblast. It is characterised by large oval nucleus that takes up most of the space in the cell and very little cytoplasm.

**Types of granulopoiesis:**

* **Steady state granulopoiesis:**

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 ‘10’.

* **Emergency granulopoiesis:**

Steady state granulopoiesis is switched to a program termed emergency granulopoiesis after a major insult to the organism, usually a bacterial infection.

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**Q4. What is iron deficiency Anemia? Also discuss its causes.**

**Answer:**

**Anemia:**

* A decrease in haemoglobin level for the age and sex of a person is known as anemia.

(or)

* Anemia is a condition in which you lack enough healthy red blood cells to carry adequate oxygen to your body's tissues.

**Explanation:**

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. If you suspect that you have anemia. It can be a warning sign of serious illness.

**Causes of anemia:**

* Your body doesn't make enough red blood cells.
* Bleeding causes you to lose red blood cells more quickly than they can be replaced.
* Your body destroys red blood cells.
* Chronic blood loss.
* Uterine.
* Gastrointestinal, e.g. peptic ulcer, oesophageal varices, aspirin (or other non - steroidal anti -inflammatory drugs) ingestion, partial gastrectomy, carcinoma of the stomach, colon or rectum, hookworm, angiodysplasia, colitis, piles, diverticulosis Rarely, haematuria, haemoglobinuria, pulmonary haemosiderosis, self - inflicted blood loss.

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**Q5. Classify anemia on the basis of morphology with examples.**

**Answer:**

**Classification of anemia:**

* **Microcytic hypochromic anaemia:**

In this type of anaemia individual RBCs are smaller

in size than normal and contain a subnormal

amount of haemoglobin. All absolute values (MCV, MCH, and MCHC) are below normal.

Example:

• Iron deficiency

•Thalassaemia

•Sideroblastic anaemia

•Anaemia of chronic disorders

* **Macrocytic anaemia:**

In this type of anaemia individual RBCs are larger than normal, but the amount of haemoglobin in each cell is usually below normal. Absolute values show increased MCV with usually normal MCH/MCHC.

Example:

•Megaloblastic anaemia

•Aplastic anaemia

•Haemolytic anaemia

•Liver disease

•Myxoedema

•Hypopituitarism

•Pregnancy

•Alcoholism

* **Normocytic normochromic anaemia:**

In this type of anaemia, although the haemoglobin concentration in the blood is reduced, the individual RBCs appear normal and absolute values are also within normal limits.

Example:

•Acute blood loss

•Leukaemia

•Bone marrow infiltration

•Chronic renal failure

•Chronic infections (chronic disorders

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