UNIVERSITY OF JAFFNA, SRI LANKA

FACULTY OF ALLIED HEALTH SCIENCES

SECOND YEAR FIRST SEMESTER EXAMINATION IN BScHons (MLS) - 2023

MLSHE 2115 HAEMATOLOGY I

PAPER II

Date: 26.11.2024   Time: 2 Hours

ANSWER ALL SIX QUESTIONS.

1. The complete blood count (CBC) is a routine laboratory test performed by automated haematology analyzers.

   1.1. Name the most common anticoagulant of choice and its mechanism of action for the above test and state the reasons why this anticoagulant is better than the previously used anticoagulants.   **(20 marks)**

   1.2. List four (4) specimen collection and handling errors that can lead to spurious results in CBC indicating the reason for the error results generation.   **(20 marks)**

   1.3. Briefly outline four (4) instances where manual tests are useful when troubleshooting automated haematology CBC.   **(20 marks)**

   1.4. Describe the working principle of the following cell counting techniques used in the automated CBC analyzers.

       1.4.1. Light scatter   **(20 marks)**

       1.4.2. Electrical impedance   **(20 marks)**

2. The laboratory report of a 52-year-old male who presented with fatigue, weakness, and a sore mouth at the Teaching Hospital Jaffna OPD clinic is given below.

Haemoglobin concentration	9.5 g/L
Red blood cells	3.1×10^{12} /L
Haematocrit	0.33
White blood cells	3.4×10^{9} /L
Platelet	95×10^{9} /L

   2.1. Calculate the following red cell parameters for the above patients.

       2.1.1. Mean Corpuscular Volume (MCV).   **(10 marks)**

       2.1.2. Mean Corpuscular Haemoglobin (MCH).   **(10 marks)**

       2.1.3. Mean Corpuscular Haemoglobin Concentration (MCHC).   **(10 marks)**
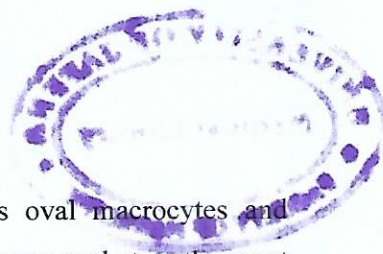
2.2. The peripheral blood smear report of the patient shows oval macrocytes and hypersegmented neutrophils. Interpret the complete haemogram and state the most likely condition giving reasons. **(30 marks)**

2.3. Outline the biochemical basis of the disease/condition mentioned in 2.2.

(40 marks)

3. Haematopoiesis is the production of blood cells from bone marrow.

   3.1. List five (5) characteristics of a haematopoietic stem cell. **(20 marks)**

   3.2. Schematically show the process of erythrocyte development in the bone marrow.

   (30 marks)

   3.3. Briefly describe the morphological features of the following blood cells observed under x100 power objectives.

   3.3.1. Neutrophil **(10 marks)**

   3.3.2. Eosinophil **(10 marks)**

   3.3.3. Monocyte **(10 marks)**

   3.4. Differentiate the "Promyelocyte" and "Myelocyte" based on their cell size and nuclear and cytoplasmic characteristics. **(20 marks)**

4. Iron plays a major role in erythropoiesis.

   4.1. Describe how different forms of dietetic iron are absorbed from the gut in humans.

   (40 marks)

   4.2. Explain how Hepcidin controls Iron homeostasis. **(30 marks)**

   4.3. State the classical complete blood count and serum iron study findings of iron deficiency anaemia. **(30 marks)**

5.

   5.1. Briefly describe mechanisms of recognizing ageing red cells for the breakdown.

   (15 marks)

   5.2. Outline the haemoglobin breakdown and the fate of its products. **(40 marks)**

   5.3. List five (5) laboratory tests useful to diagnose haemolytic anaemia. **(15 marks)**

   5.4. Describe how the presence of antibodies against the Intrinsic Factor leads to megaloblastic anaemia. **(30 marks)**

6.

6.1. Name two (2) stains that can be used for reticulocyte count.   **(20 marks)**

6.2. Outline the principle of reticulocyte count.   **(20 marks)**

6.3. List four (4) causes for reticulocytosis.   **(20 marks)**

6.4. Write a note on "Principle and clinical application of Leishman stain"   **(40 marks)**