BACHELOR OF MEDICAL LABORATORY SCIENCES HONOURS
MDU5401 – ADVANCED HAEMATOLOGY- LEVEL 05
FINAL EXAMINATION   DURATION: 3 HOURS

DATE: 10th AUGUST 2021   TIME: 9.30 AM – 12.30 PM

Part B: Structured Essay Questions. (40 marks)

1. **Aplastic Anaemia is a bone marrow disorder characterized by peripheral pancytopenia and marrow hypoplasia without any apparent underlying neoplastic process.**

    1.1. What is meant by peripheral pancytopenia?   (02 marks)

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    1.2. What does marrow cellularity indicate?   (01 mark)

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    1.3. How would you differentiate a hypocellular marrow from a normal marrow?
    (02 marks)

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    1.4. Discuss laboratory findings that you would see in a bone marrow smear and peripheral blood smear of a patient with aplastic anaemia.   (05 marks)

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(Total: 10 marks)

2. A 55-year-old man comes to the clinic with malaise and fatigue for the past 3 months. His abdominal exam reveals splenomegaly. There is no history of a chronic medical condition. His laboratory investigations reveal,

- Haematocrit: 33%
- WBC: 110,000/mm³
  - Blast cells: 6%
  - Promyelocytes: 4%
  - Myelocytes: 22%
  - Metamyelocytes: 12%
  - Band forms: 8%
  - Neutrophils: 36%
  - Eosinophils: 7%
  - Basophils: 5%
- Platelets: 575,000/mm³

2.1. What is the most likely neoplastic condition that this patient is having? Give reasons for your answer.   (03 marks)

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2.2. Above laboratory findings can be expected in certain infections or inflammatory conditions. What cytochemical stain is used to differentiate the condition you mentioned in 2.1 from such infectious or inflammatory conditions?

(01 mark)

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2.3. How would you interpret the findings of the stain you mentioned in 2.2 for the above patient?   (06 marks)

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(Total: 10 marks)

3. Monoclonal gammopathy of undetermined significance (MGUS) is a clonal haematopoietic disorder which has a propensity to progress to symptomatic multiple myeloma (MM). MGUS is asymptomatic and does not cause any serious problems as seen in MM.

3.1. Which type of bone marrow cells are affected in MGUS?   (01 mark)

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3.2. Outline serious outcomes that can be seen in MM as a result of abnormal proliferation of the cells you mentioned in 3.1.   (05 marks)

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3.3. Presence of M-proteins is a characteristic feature of MM and MGUS. What are M-proteins?

(01 mark)

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3.4. State two (02) laboratory investigations that are useful in differentiating MGUS and MM. (01 mark)

(i)...

(ii)...

3.5. What are the common subtypes of MM? (02 marks)

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(Total: 10 marks)

4. **Immunophenotyping by flowcytometry is performed to identify abnormal populations of cells whose pattern of expression of cell antigens is typical with specific types of leukaemia. A predetermined panel of immunomarkers is normally used in the diagnosis of certain haematological malignancies.**

A panel of immunomarkers used to diagnose leukaemia follows

CD4, HLA-DR, CD33, CD22, CD3, cCD79a, CD7, CD19, CD14, CD10, cMPO, CD13, CD20, CD34, CD8, CD117, terminal deoxynucleotidyl transferase/TDT

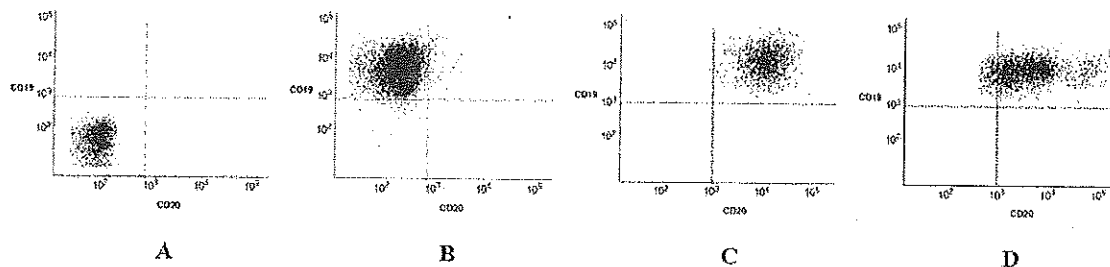4.1. CD 45 initial gating is required before sub gating with CD19 and CD20. State the reason. (02 marks)

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4.2. In what cells are CD19 and CD 20 expressed? (01 mark)

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4.3. Describe the expression patterns of CD19 and CD20 in each of the four (A, B,C,D) bivariate dot·plots given below (not actual patient specimens). (X and Y axis are labelled as CD20 and CD19 respectively)

(03 marks)

| A | B | C | D |

A..,

B..

C..

C..

4.4. A flow cytometric analysis of bone marrow aspirate at diagnosis showed expression of CD10, CD19, CD20, CD22, and cCD79a antigens in a population of blasts. What is the most likely diagnosis? (02 marks)

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4.5. Other than your answer mentioned in 4.4, name another haematological disorder.in which flowcytometry is used for confirmation of the diagnosis. (02 marks)

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(Total: 10 marks)

Part C: Essay Questions (30 marks)

1. Discuss the laboratory diagnosis of von Willebrand disease (vWD).   (15 marks)

2. Discuss the role of the Medical Laboratory Scientist in autologous peripheral blood stem cell transplantation used to treat Myeloma/Lymphoma.

(15 marks)