

UNIVERSITI SAINS MALAYSIA

**PROGRAM SARJANA FARMASI
SEMESTER II 1993/94**

APRIL 1994

FCP 557 : FARMAKOTERAPEUTIK V

(2 HOURS)

This examination consists of **two sections**.

Section A consists of 50 multiple choice questions.

Section B consists of **two (2)** long questions.

Answer **ALL** question.

Answers to section A must be entered into the scripts provided.

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Section A

Mark (/) the answers on the opposite space corresponding to a correct or most appropriate answer for each question. Each question has only one correct or most appropriate answer or statement.

1. Which of the following is/are compatible with the histology of Hodgkin's disease ?

- (i) Lymphocyte predominance.
- (ii) Nodular sclerosis.
- (iii) Mixed cellularity.
- (iv) Lymphocyte depletion.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

2. Which of the following statements regarding nausea and vomiting in a cancer patient is not true ?

- (a) It is more common in patients treated with intravenous rather than oral chemotherapy.
- (b) It is more severe in a patient treated with combination of radiotherapy and chemotherapy.
- (c) Its severity is influenced by the type of anticancer agents.
- (d) Mesna^R is reserved only for nausea and vomiting resistant to other antiemetic agents.

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3. Which of the following statements regarding heparin is true ?

- (a) It is not recommended to be used for more than 24 hours.
- (b) It has no effect on the intrinsic coagulation system.
- (c) It is not safe to administer by intermittent subcutaneous injection.
- (d) It requires only a small dose to prevent thrombin formation.

4. Which of the following statements regarding leukemia is/are true?

- (i) Acute lymphocytic leukemia occurs mainly in children.
 - (ii) Chronic leukemia occurs mainly in adult above 40 years of age.
 - (iii) Chronic lymphocytic leukemia is twice as common as chronic granulocytic leukemia.
 - (iv) Chronic leukemia affects women more than it does man.
-
- (a) (i) and (ii) only are true.
 - (b) (i), (ii) and (iii) only are true.
 - (c) (i), (ii), (iii) and (iv) are true.
 - (d) (iv) only is true.

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5. Which of the following statements regarding acute myeloblastic leukemia as compared to acute lymphoblastic leukemia is/are true?

- (i) It requires central nervous system (CNS) prophylaxis.
- (ii) The prognosis is worse for boys.
- (iii) It has a worse prognosis.
- (iv) Only 10% who goes into remission are "cured".

- (a) (i) and (ii) only are true.
- (b) (i), (ii) and (iii) only are true.
- (c) (i), (ii), (iii) and (iv) are true.
- (d) (iv) only is true.

6. Which of the following is/are clinical feature(s) of chronic granulocytic leukemia ?

- (i) Fever.
- (ii) Haemorrhage.
- (iii) Gout.
- (iv) Priapism.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

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7. Which of the following problems is/are associated with factor VIII replacement therapy ?

- (i) Development of antibody to factor VIII.
- (ii) Development of antibody to factor IX.
- (iii) Acute hepatitis.
- (iv) Allergic reaction.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

8. Which of the following clotting factors is/are involved with intrinsic clotting mechanism?

- (i) XI.
- (ii) XII.
- (iii) IX.
- (iv) VII.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

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9. Which of the following abnormalities is/are found in DIC ?

- (i) Prolonged prothrombin time.
- (ii) Prolonged PTT.
- (iii) Low platelets.
- (iv) Low fibrinogen degradation products (FDP).

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

10. Which of the following conditions occur(s) in myeloma ?

- (i) Pathological fracture of the vertebrae.
- (ii) Hypocalcemia.
- (iii) Amyloidosis.
- (iv) Thrombocytosis.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

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11. Which of the following is/are diagnostic feature(s) of myeloma ?

- (i) Monoclonal band on serum electrophoresis.
- (ii) Skull X-ray showing multiple punched-out lesions.
- (iii) Bone marrow showing plasma cell infiltration.
- (iv) Pseudohyponatraemia.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

12. Which of the following statements regarding the spread of breast cancer is/are true?

- (i) It is by direct local extension.
- (ii) It occurs by embolization through lymphatics.
- (iii) It occurs by hematogenous spread.
- (iv) It can be prevented by radiotherapy.

- (a) (i) and (ii) only are true.
- (b) (i), (ii) and (iii) only are true.
- (c) (i), (ii), (iii) and (iv) are true.
- (d) (iv) only is true.

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13. Which of the following is/are used to clinically divide breast cancer ?

- (i) Invasive ductal carcinoma.
- (ii) Medullary carcinoma.
- (iii) Paget's disease of the nipple.
- (iv) Breast abscess.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

14. Which of the following is/are treatment modality(ies) for breast carcinoma ?

- (i) Radiotherapy.
- (ii) Ovariectomy.
- (iii) Stilbesterol administration.
- (iv) Flutemide administration.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

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15. Which the following statements regarding bronchial carcinoma is/are true?

- (i) It responds to radiotherapy.
- (ii) It has a better prognosis than small-cell carcinoma of the lung.
- (iii) It presents as chest pain.
- (iv) It rarely causes hemoptysis.

- (a) (i) and (ii) only are true.
- (b) (i), (ii) and (iii) only are true.
- (c) (i), (ii), (iii) and (iv) are true.
- (d) (iv) only is true.

58. Which of the following factors predisposes the patient to thromboembolism ?

- (a) Protein M deficiency.
- (b) Congestive heart failure.
- (c) Diabetes mellitus.
- (d) Thalassemia.

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17. Which of the following is/are true regarding treatment of lung cancer ?

- (i) Chemotherapy is curative.
- (ii) Radiotherapy is useful for Oat-cell carcinoma.
- (iii) Hormonal manipulation is a mode of treatment.
- (iv) Surgical resection is useful for early bronchial carcinoma.

- (a) (i) and (ii) only are true.
- (b) (i), (ii) and (iii) only are true.
- (c) (i), (ii), (iii) and (iv) are true.
- (d) (iv) only is true.

18. Which of the following conditions is an absolute contraindication to thrombolytic therapy ?

- (a) Postpartum period.
- (b) Thoracocentesis.
- (c) Recent serious trauma.
- (d) Active internal bleeding.

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19. Which of the following statements concerning prostate carcinoma is/are true ?

- (i) Bone secondaries can be seen on plain abdominal X-rays.
- (ii) Radiotherapy is a mode of treatment for painful secondaries.
- (iii) Low serum acid phosphatase is diagnostic.
- (iv) Per-rectal examination elicits soft prostate.

- (a) (i) and (ii) only are true.
- (b) (i), (ii) and (iii) only are true.
- (c) (i), (ii), (iii) and (iv) are true.
- (d) (iv) only is true.

20. Which of the following statements regarding treatment of prostate carcinoma is/are true ?

- (i) Transurethral resection of the prostate is to relieve obstruction.
- (ii) Leutenising hormone releasing hormone (LHRH) analogue is used as a treatment.
- (iii) Orchiectomy is useful in some cases.
- (iv) Cytotoxic drugs are effective for secondaries.

- (a) (i) and (ii) only are true.
- (b) (i), (ii) and (iii) only are true.
- (c) (i), (ii), (iii) and (iv) are true.
- (d) (iv) only is true.

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21. Which of the following is/are the treatment(s) for colorectal cancer ?

- (i) Surgical removal.
- (ii) 5-FU and Levamisol.
- (iii) Radiotherapy of the primary tumor.
- (iv) Immunotherapy.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

22. Which of the following is appropriate to minimize local and major hemorrhage in patients receiving thrombolytic therapy ?

- (a) Increased physical handling of patient.
- (b) Use subcutaneous or intramuscular injectons for parenteral medications.
- (c) Avoidance of concurrent use of dextran.
- (d) Avoidance of compression bandages at sites of vessel punture.

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23. Which of the following statements concerning colorectal cancer is/are true ?

- (i) Serum carcino-embryonic antigen is raised in the presence of metastasis.
- (ii) Raised alkaline phosphatase indicates liver or bony secondaries.
- (iii) Colonoscopy is useful for determining a second tumor site.
- (iv) The prognosis is poor if the patient is young.

- (a) (i) and (ii) only are true.
- (b) (i), (ii) and (iii) only are true.
- (c) (i), (ii), (iii) and (iv) are true.
- (d) (iv) only is true.

24. Which of the following conditions may cause hypochromic anaemia ?

- (i) Thalassaemia.
- (ii) Lead poisoning.
- (iii) Pregnancy.
- (iv) Hereditary spherocytosis.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

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25. Which of the following conditions will increase the mean corpuscular volume (MCV)?

- (i) Thalassaemia.
- (ii) Anaemia of chronic renal failure.
- (iii) Haemolysis.
- (iv) Folate deficiency.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

26. Which of the following statements regarding iron absorption is/are true?

- (i) Ferrous compounds is absorbed better than ferric compound.
- (ii) Absorption is enhanced when the pH of the small bowel is low or neutral.
- (iii) Phytate-rich green in vegetables enhances iron absorption.
- (iv) Vitamin C inhibits absorption.

- (a) (i) and (ii) only are true.
- (b) (i), (ii) and (iii) only are true.
- (c) (i), (ii), (iii) and (iv) are true.
- (d) (iv) only is true.

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27. Which of the following conditions cause(s) anaemia with splenomegaly in a child ?

- (i) Thalassaemia.
- (ii) Congenital spherocytosis.
- (iii) B12 deficiency.
- (iv) Folate deficiency.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

28. Which of the following conditions cause(s) folate deficiency ?

- (i) Sustained boiling of food containing folate.
- (ii) Administration of a broad spectrum antibiotic.
- (iii) Rapid cells growth.
- (iv) Methotrexate therapy.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

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29. Which of the following statements regarding heparin is true ?

- (a) It crosses the placenta.
- (b) It can lead to toxicity in a breast fed baby.
- (c) The risk of bleeding complication increases with the length of therapy.
- (d) Protase is the drug of choice for the reversal of heparin effect.

30. Which of the following conditions stimulate erythropoiesis ?

- (i) Anaemia.
 - (ii) Hypoxia.
 - (iii) High altitude.
 - (iv) Reduced erythropoietin in the blood.
-
- (a) (i) and (ii) only.
 - (b) (i), (ii) and (iii) only.
 - (c) (i), (ii), (iii) and (iv).
 - (d) (iv) only.

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31. Which of the following statements regarding heparin therapy is true ?

- (a) It does not cause thrombocytopenia.
- (b) Prolonged treatment can lead to osteoporosis.
- (c) The therapeutic range for APTT test should be 3-4 times control.
- (d) Intravenous therapy for deep vein thrombosis requires 24-48 hours duration.

32. Which of the following drugs increases anticoagulation effect of wafarin ?

- (a) Allopurinol.
- (b) Carbamazepine.
- (c) Colestipol.
- (d) Griseofulvin.

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33. Which of the following is/are feature(s) of sideroblastic anaemia ?

- (i) The anaemia is hypochromic and microcytic.
- (ii) Increased serum ferritin.
- (iii) Bone marrow showing increased sideroblast cells.
- (iv) Very high level of haemoglobin F (HbF).

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

34. Which of the following thrombolytic agents has the highest antigenicity ?

- (a) Streptokinase
- (b) Urokinase
- (c) Tissue plasminogen activator (rtPA)
- (d) Anysoylated plasminogen streptokinase activator complex (APSAC).

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35. Which of the following is/are consistent with iron deficiency anaemia ?

- (i) Low mean corpuscular haemoglobin (MCH).
- (ii) Hypochromic and microcytic red blood cells.
- (iii) High reticulocytes count.
- (iv) High serum ferritin.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

36. Which of the following disorders is/are associated with hypochromia?

- (i) Thalassaemia.
- (ii) Folate deficient.
- (iii) B12 deficient.
- (iv) Sideroblastic anaemia.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

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37. Which of the following statements regarding haemoglobin in normal children is/are true?

- (i) Haemoglobin F contains alpha-2 delta-2.
- (ii) Haemoglobin contains heme and globin portions.
- (iii) The level of haemoglobin A2 is higher than haemoglobin A1.
- (iv) The level of haemoglobin F is high.

- (a) (i) and (ii) only are true.
- (b) (i), (ii) and (iii) only are true.
- (c) (i), (ii), (iii) and (iv) are true.
- (d) (iv) only is true.

38. Which of the following will decrease production of red blood cells?

- (i) Iron deficiency.
- (ii) Folic acid deficiency.
- (iii) Malnutrition.
- (iv) Aplastic anaemia.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

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39. Which of the following statements regarding beta-thalassaemia is/are true?

- (i) There is a short red blood cell survival.
- (ii) Splenomegaly is a feature.
- (iii) Hypersplenism is a recognised complication.
- (iv) Frequent blood transfusions have no harmful side-effects.

- (a) (i) and (ii) only are true.
- (b) (i), (ii) and (iii) only are true.
- (c) (i), (ii), (iii) and (iv) are true.
- (d) (iv) only is true.

40. Which of the following conditions is/are complication(s) of beta-thalassaemia major ?

- (i) Short stature.
- (ii) Hypersplenism.
- (iii) Diabetes mellitus.
- (iv) Poor school performance.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

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41. Which of the following is/are consistent with the clinical features of thalassaemia ?

- (i) Failure to thrive in early childhood.
- (ii) Massive hepatosplenomegaly.
- (iii) Pallor.
- (iv) Severe jaundice.

- (a) (i) and (ii) only.
- (b) (i), (ii) and (iii) only.
- (c) (i), (ii), (iii) and (iv).
- (d) (iv) only.

42. Which of the following statements regarding the use of anticancer drugs is/are true ?

- (i) Combination of 2 drugs with similar mechanism of action is recommended.
- (ii) Combination of 2 oncovin group is recommended to reduce the dose of each drug.
- (iii) The rationale of combination chemotherapy is to achieve rapid cytotoxic activity.
- (iv) Each drug in a combination therapy must possess activity against the treated cancer.

- (a) (i) and (ii) only are true.
- (b) (i), (ii) and (iii) only are true.
- (c) (i), (ii), (iii) and (iv) are true.
- (d) (iv) only is true.

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43. Which of the following statements regarding the use of hydration therapy in patients treated with anticancer agents is/are true ?

- (i) Pre- and post-hydrations are used to avoid nephrotoxicity.
 - (ii) Pre- and post-hydrations are used to increase the volume of distribution of the drugs.
 - (iii) Pre- and post-hydrations are used to prevent hepatotoxicity.
 - (iv) Pre- and post-hydrations are used to increase the clearance of the drugs.
- (a) (i) and (ii) only are true.
- (b) (i), (ii) and (iii) only are true.
- (c) (i), (ii), (iii) and (iv) are true.
- (d) (iv) only is true.

44. Which of the following statements regarding the use of allopurinol in patients treated with anticancer drugs is/are true ?

- (i) It prevents excessive production of uric acid.
 - (ii) It avoids gouty arthritis.
 - (iii) It improves the clearance of uric acid.
 - (iv) It increases urine output.
- (a) (i) and (ii) only are true.
- (b) (i), (ii) and (iii) only are true.
- (c) (i), (ii), (iii) and (iv) are true.
- (d) (iv) only is true.

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45. Which of the following statements regarding the use of antibiotics in febrile neutropenic patients is/are true ?
- (i) The combination of aminoglycoside and cephalosporin combination is the best empiric therapy.
 - (ii) Vancomycin is only added when the patient do not respond to the combination of aminoglycoside and cephalosporin.
 - (iii) The use of bacteriostatic agent should be discouraged.
 - (iv) A combination of imipenem and a cephalosporin is the best alternative for pseudomonas infection.
- (a) (i) and (ii) only are true.
- (b) (i), (ii) and (iii) only are true.
- (c) (i), (ii), (iii) and (iv) are true.
- (d) (iv) only is true.

46. Which of the following statements regarding the use of amphotericin B in febrile neutropenic patient is/are true ?
- (i) It is usually reserved for patient with liver failure.
 - (ii) It is safe in a dehydrated patient.
 - (iii) Its' ease of administration is an advantage over the other antifungal agents.
 - (iv) It should only be started after seven days of persistent fever despite antibiotic therapy.

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- (a) (i) and (ii) only are true.
 - (b) (i), (ii) and (iii) only are true.
 - (c) (i), (ii), (iii) and (iv) are true.
 - (d) (iv) only is true.
47. Which of the following conditions requires treatment with combination of trimethoprim-sulfasoxazole, nystatin and lactacyd bath?
- (a) All neutropenic non-febrile patient.
 - (b) All febrile cancer patients.
 - (c) All neutropenic febrile patients.
 - (d) All non-febrile cancer patients.
48. Which of the following groups of cancer patients are suitable for therapy with vancomycin ?
- (a) All neutropenic febrile patients.
 - (b) Neutropenic febrile patients who do not respond to a combination of aminoglycoside and cephalosporin therapy.
 - (c) Neutropenic febrile patients who do not respond to amphotericin B therapy.
 - (d) Neutropenic febrile patients with severe mucositis.

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49. Which of the following groups of patients are suitable for therapy with Mesna ^R ?

- (a) Pediatric cancer patients treated with IV cyclophosphamide.
- (b) Pediatric cancer patients treated with IV cis-platinum.
- (c) Pediatric cancer patients treated with IV bleomycin.
- (d) Pediatric cancer patients treated with IV methotrexate.

50. Which of the following conditions has its risk reduced by proper hydration ?

- (a) Nephrotoxicity.
- (b) Bladder toxicity.
- (c) Hepatotoxicity.
- (d) Myelosuppression.

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Section B

Question 1

OP is a 6 year old boy diagnosed to have osteosarcoma on the left leg on January 15, 1994. The diagnosis was confirmed by CT scan and biopsy. His doctor plans to administer high dose methotrexate prior to amputation.

12 gm/m² of methotrexate was given weekly for four weeks followed by folinic acid rescue (15 mg IV every 6 hourly for 10 doses) 24 hours after each methotrexate dose. A pre- and post-hydration protocol was also followed during every methotrexate dosing.

- a. Explain why OP required pre- and post-hydration therapy ?

(2.5 marks)

One week after amputation of the affected leg, post operative induction therapy using BCD protocol was initiated as follows:

Bleomycin 15 U/m² on D1 and D2
Cyclophosphamide 600 mg/m², D1 and D2
Actinomycin 600 ugm/m², D1 and D2

During this phase of treatment, 3 l/m²/d of IV fluids were administered.

- b. What is the purpose of hydration therapy in this phase of BCD protocol ?

(2.5 marks)

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On day 2 of the BCD protocol, OP complained of severe pain at the site of infusion. The nurse in-charge noticed a large echymosis at the infusion site.

c. Explain the possible cause of the pain and echymosis ?

(5 marks)

d. Briefly explain the steps that should be taken to treat OP's problems ?

(5 marks)

Five days after the second dose of BCD, OP developed a high grade fever. His full blood picture showed neutropenia with a neutrophil count of 0.

e. Briefly explain how you would manage OP's fever.

(10 marks)

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Question 2

A. MN is a 50 year old Indian male who came to the clinic after he had noted suprapubic pain and burning sensation on urination.

Laboratory investigation revealed a hemoglobin of 14.0 gm/dL, hematocrit of 43.6%, white blood cell count of 7,500 /mm³ and reticulocyte of 0.5%. Serum electrolytes, bilirubin and prothrombin time were all within normal limits.

Urinalysis showed 20 to 50 cells per high power field and moderate bacteria colonization.

A provisional diagnosis of cystitis related to benign prostatic hypertrophy was made.

His urine was sent for culture and sensitivity and Septra DS one tablet BID was instituted.

Four days later MN returned to the clinic complaining of feeling very tired although his original symptoms had resolved. He also noted that his urine had become dark.

Physical examination was unremarkable except for icteric sclera and a mild tachycardia.

Follow up laboratory investigations revealed a hemoglobin of 9.0 gm/dL, hematocrit of 30.5%, white blood cell count of 9,100/mm³, reticulocyte count of 11%, total bilirubin of 3.8 mg/dL, direct bilirubin of 0.7 mg/dL. Urinalysis now revealed no bacteria, a 4+ blood and 0-1 red cells/high power field. The urine was also positive for bilirubin and urobilinogen.

- a. How was the clinical picture of MN compatible with drug-induced hemolysis due to G6PD deficiency ?

(3 Marks)

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- b. How did the clinical presentation of MN differ from autoimmune hemolytic anaemia? Compare and contrast the mechanism involved for both type of hemolytic anaemia ?

(6 Marks)

- c. How can MN's G6PD deficiency be treated ?

(4 Marks)

B. MS is a 38 year old 70 kg Malay male with a five-year history of ulcerative colitis. He developed a swollen left calf which was painful and warm. This swelling gradually increased, affecting the entire left leg up to the groin. Several days later, he noted a right-sided pleuritic chest pain but without shortness of breath or hemoptysis.

His past medical history included a gastric ulcer treated medically without recurrence.

Physical examination:

Obese male with an enlarged left leg and mild to moderate tenderness in the entire leg. Chest examination revealed a loud pulmonary heart sound.

BP: 150/85 mmHg, PR: 100/min, RR: 28/min.

Laboratory data:

Hct: 26.7, ESR: 91 mm/hr.

ABG: pH : 7.48

pO₂ : 72 mmHg.

pCO₂ : 35 mmHg.

Chest X-ray, lung scan and VQ scans were highly suggestive of pulmonary embolism.

ECG shows sinus tachycardia. Venogram was positive for the presence of a defect in the ileo-femoral artery.

Coagulation tests:

PT 11.2 sec.

aPTT 28 sec.

Platelet 248,000/mm³

- a. What subjective and objective evidence in MS was compatible with pulmonary embolism ?

(4 marks)

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b. How do you initiate heparin regimen in MS ?

(4 marks)

c. Describe how would you monitor MS's heparin therapy ?

(4 marks)

...32/-

Appendix

Normal Laboratory Values

1.	Ammonia	80-110 mcg/dl or	47-65 umol/L
2.	Amilase	4-25 IU/ml	
3.	Billirubin		
-	Direct	0-0.2 mg/gl	0-3 umol/L
-	Indirect	0.2-0.8 mg/dl	30-14 umol/L
-	Total	0.2-1 mg/dl	30-17 umol/L
4.	CO ₂	20-30 mEq/L	24-30 mMol/L
5.	pCO ₂	35-45 mmHg	
6.	Cl	100-106 mEq/L	100-106 mMol/L
7.	Cpk	50-170 U/L	
8.	Creatinine (SCr)	0.6-1.5 mg/dl	60-130 umol/L
9.	Random blood sugar	70-110 mg/dl	3-10 umol/L
10.	Iron	50-150 mcg/dl	9.0-26.9 umol/L
11.	Lactic dehydrogenase	70-210 IU/L	
12.	Magnesium	1.5-2.0 mEq/L	0.8-1.3 mMol/L
13.	pO ₂	75-100 mmHg	
14.	pH	7.35-7.45	
15.	Acid phosphatase		
	Male	0.13-0.63 IU/ml	36-176 nmol s ⁻¹ /L
	Female	0.101-0.65 IU/ml	2.8-156 nmol s ⁻¹ /L
16.	Alkaline phosphatase	39-117 IU/L	
17.	Phosphorous	3.0-4.5 mg/dl	1.0-1.5 mMol/L
18.	Potassium (K ⁺)	3.5-5.0 mEq/L	3.5-5.0 mMol/L
19.	Calcium (Ca ²⁺)	8.5-10.5 mg/dl	2.1-2.6 mMol/L
20.	Sodium (Na ⁺)	135-145 mEq/L	135-145 mMol/L
21.	Bicarbonate (HCO ₃ ⁻)	24-38 mEq/L	24-28 mMol/L

...33/-

22.	Protein		
-	Total	6.0-8.5 g/dl	60-85 g/L
-	Albumin	3.5-5.0 g/dl	35-50 g/L
-	Globulin	2.3-3.5 g/dl	23-35 g/L
-	Transferrin	200-400 mg/dl	2.0-9.0 g/L
23.	Transaminase (SGOT)	0-40 IU/L	0-0.32 $\mu\text{mol s}^{-1}/\text{L}$
24.	BUN	8-25 mg/dl	2.9-8.9 mMol/L
25.	Uric Acid	3-7 mg/dl	0.18-0.42 mMol/L
26.	Blood Pictures		
	Red blood cell (RBC)		
	Male	4.8-6.4 x 10 ⁶ /mm ³	
	Female	4.2-5.4 x 10 ⁶ /mm ³	
	White blood cell (WBC)	4.0-11.0 x 10 ³ /mm ³	
	P	60-75%	
	L	20-40%	
	M	4-8%	
	B	0-1%	
	E	1-3%	
	Platelate (Plt)	200-400 x 10 ³ /mm ³	
27.	ESR Male	0-10 mm/jam (Wintrobe)	
	Female	0-15 mm/jam (Wintrobe)	
28.	Hematocrit		
	Male	45-52%	
	Female	37-48%	
29.	Hemoglobine (Hgb)		
	Male	13-18 g/dl	
	Female	12-16 g/dl	
30.	Prothrombin time (PT)	75-100% nilai asas	
31.	APTT	25-37 saat	
32.	Creatinine Clearance (CrCl)	105-150 ml/min/1.73 m ²	
33.	TT ₄	3.0-7.5 mcg/dl	
34.	RT ₃ U	25-35%	
35.	FTI	1.3-4.2	

NORMAL HEMODYNAMIC VALUES AND DERIVED INDICES

Normal Value Units			
BP S/D/M	Blood Pressure Systolic/Diastolic/Mean	120/80/93	mm Hg
CO	Cardiac Output	4-6	Liters/min.
RAP	Right Atrial Pressure (Mean)	2-6	mm Hg
PAP S/D/M	Pulmonary Artery Pressure Systolic/Diastolic/Mean	25/12/16	mm Hg
PCWP	Pulmonary Capillary Wedge Pressure (mean)	5-12	mm Hg
CI	Cardiac Index	2.5-3.5	Liters/min/m ²
	$CI = \frac{CO}{\text{Body Surface Area}}$		
SV	Stroke Volume	60 - 80	ml/beat
	$SV = \frac{CO}{\text{Heart Rate}}$		
SVI	Stroke Volume Index	30 - 50	ml/beat/m ²
	$SVI = \frac{SVI}{\text{Body Surface Area}}$		
PVR	Pulmonary Vascular Resistance	< 200	dynes.sec.cm ⁻⁵
	$PVR = \frac{MPAP - PCWP}{CO} \times 80$		
TPVR	Total Peripheral Vascular Resistance	900-1400	dynes.sec.cm ⁻⁵
	$TPVR = \frac{MBP - RAP}{CO} \times 80$		
LVSWI	Left Ventricular Stroke Work Index	35-80	gm-m/m ² /beat
	$LVSWI = (MBP-PCWP)(SVI)(.0136)$		