UNIVERSITI SAINS MALAYSIA

PEPERIKSAAN KEDUA
PROGRAM SARJANA FARMASI
SEMESTER II 1992/93

APRIL 1993

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.

...2/-

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SECTION A

1. Which of the following supportive measures are required for cis-platinum therapy?

(i) I.V. metoclopramide.

(ii) I.V. dextrose 4% and 0.145% normal saline.

(iii) I.V. mannitol.

(iv) I.V. frusemide.

..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

2. Which of the following are characteristics of drugs used in combination chemotherapy?

(i) Each has individual activity against the treated tumour.

(ii) Each has similar mechanisms of action.

(iii) Each has dissimilar dose-limiting toxicity.

(iv) Each has similar metabolic pathways.

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..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

3. Which of the following is a specific adverse drug reaction of cyclophosphamide?

..... (a) Pulmonary fibrosis.

..... (b) Nephrotoxicity.

..... (c) Hepatotoxicity.

..... (d) Haemorrhagic cystitis.

4. Which of the following steps should be taken to prevent the development of fever in patients receiving bleomycin and cytosine arabinoside?

..... (a) Administer each drug separately at intervals of 12 hours.

..... (b) Add antihistamine into the bleomycin injection.

..... (c) Add metoclopramide into the cytosine arabinoside injection.

..... (d) Add metoclopramide and antihistamine into both the bleomycin and cytosine arabinoside injections.

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5. Which of the following is the main reason for cyclic cancer chemotherapy?

..... (a) To reduce the risk of adverse drug reaction.

..... (b) To allow for adequate recovery time of host tissue.

..... (c) To allow for regrowth of the cancer cells to make them more sensitive to chemotherapy.

..... (d) To prevent the development of resistance.

6. For which of the following groups of chemotherapeutic agents is cyclic chemotherapy important?

..... (a) Hormones.

..... (b) Oral agents.

..... (c) Phase-specific agents.

..... (d) Non cell-cycle specific agents.

7. Which of the following statements is/are true?

(i) Erythropoietin levels are elevated in hyperoxic state.

(ii) A sustained increase in erythropoietin production leads to an increase in red blood cell mass.

(iii) 50% of erythropoietin is produced in the kidney.

(iv) Hepatic tumors can cause erythrocytosis.

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..... (a) (i) and (iii) only.

..... (b) (ii) and (iv) only.

..... (c) (i), (ii) and (iii) only.

..... (d) (iv) only.

8. Which of the following measurements provided by an electronic particle counter is calculated rather than derived directly?

..... (a) Red blood cell count.

..... (b) Hemoglobin.

..... (c) Hematocrit.

..... (d) MCV.

9. Which of the following is/are mechanism(s) available to compensate for the decrease in oxygen transport associated with anemia?

(i) An increase in cardiac output.

(ii) An increase in oxygen extraction.

(iii) A reduction in peripheral vascular resistance.

(iv) An increase in hemoglobin - oxygen affinity.

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..... (a) (i) and (iii) only.

..... (b) (ii) and (iv) only.

..... (c) (i), (ii) and (iii) only.

..... (d) (iv) only.

10. Which of the following compensatory mechanisms is relatively ineffective in increasing oxygen delivery to the tissue in severe anemia?

..... (a) Increased respiratory rate.

..... (b) Increased stroke volume.

..... (c) Increased heart-rate.

..... (d) Increased erythropoietin secretion.

11. Which of the following statements regarding the treatment of iron deficiency anemia is/are true?

(i) Tetracycline chelates iron and prevents its absorption.

(ii) Parenteral iron therapy is superior to oral iron even in compliant patients.

(iii) Plasma ferritin does not become normal until marrow iron stores are replaced.

(iv) Oral iron should be given as a single daily dose.

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..... (a) (i) and (iii) only.

..... (b) (ii) and (iv) only.

..... (c) (i), (ii) and (iii) only.

..... (d) (iv) only.

12. Which of the following regimens is/are equivalent to ferrous sulphate 1 tablet t.d.s?

(i) Ferrous gluconate 2 tablet t.d.s.

(ii) Ferrous glutamate 1 tablet t.d.s.

(iii) Ferrous fumarate 1 tablet t.d.s.

(iv) Ferrous gluconate 1 tablet t.d.s.

..... (a) (i) and (iii) only.

..... (b) (ii) and (iv) only.

..... (c) (i), (ii) and (iii) only.

..... (d) (iv) only.

13. Which of the following pairs is incorrectly matched?

..... (a) Increased iron binding capacity - Iron deficiency anemia.

..... (b) Demonstrable mitochondrial iron - Sideroblastic anemia.

..... (c) Deficiency may be associated with glossitis - Folic acid.

..... (d) Cessation of vitamin B_{12} intake for 5 months - megaloblastic anemia.

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Questions 14 - 15, are based on the following case history.

A 60 year old woman is admitted to the hospital with the complaints of weakness, ataxia and paresthesia. The patient admitted to be taking a multivitamin preparation for a long time. Blood studies showed the following results:

Hematocrit	=	38%
WBC	=	$4,000/mm^3$
Platelet	=	$100,000/mm^3$
MCV	=	110

14. Which of the following statements is/are correct?

(i) Vitamin B_{12} deficiency is unlikely because the patient is not anemic.

(ii) A Schilling test would not be useful in this situation.

(iii) The complaints are typical of folate deficiency anemia.

(iv) The serum vitamin B_{12} level is probably low.

..... (a) (i) and (iii) only.

..... (b) (ii) and (iv) only.

..... (c) (i), (ii) and (iii) only.

..... (d) (iv) only.

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15. Which of the following is the treatment of choice for the above patient?

..... (a) 1 mg folic acid i.m daily x 2/52.

..... (b) 1 mg folic acid p.o daily x 2/52.

..... (c) 100 µg cyanocobalamine i.m. daily x 3/52.

..... (d) 100 µg cyanocobalamine p.o daily x 3/52.

16. Which of the following drugs causes folate deficiency anemia by altering folate metabolism?

..... (a) Methotrexate.

..... (b) Ethanol.

..... (c) Barbiturate.

..... (d) Phenytoin.

17. Which of the following statements regarding Schilling test is/are true?

(i) It can be used to determine the mechanism for vitamin B_{12} malabsorption.

(ii) The amount of vitamin B_{12} administered for the test can convert a megaloblastic marrow due to vitamin B_{12} deficiency to normoblastic marrow.

(iii) Performance of the test requires adequate renal function.

(iv) An abnormal Schilling test in pernicious anemia is corrected by giving vitamin B_{12}.

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..... (a) (i) and (iii) only.

..... (b) (ii) and (iv) only.

..... (c) (i), (ii) and (iii) only.

..... (d) (iv) only.

18. Which of the following is not used in the management of thalassemia major?

..... (a) Folic acid.

..... (b) Iron.

..... (c) Splenectomy.

..... (d) Blood transfusion.

19. Which of the following statements about iron absorption is/are true?

(i) Iron absorbed in the diet serves to replenish daily iron losses.

(ii) Dietary iron content is not linked to caloric intake.

(iii) Heme iron is absorbed more efficiently than non-heme iron.

(iv) It occurs by passive diffusion in the small intestine.

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..... (a) (i) and (iii) only.

..... (b) (ii) and (iv) only.

..... (c) (i), (ii) and (iii) only.

..... (d) (iv) only.

20. Which of the following is the best route for the administration of deferoxamine in the treatment of thalassemia?

..... (a) Intramuscular.

..... (b) Intravenous.

..... (c) Subcutaneous infusion.

..... (d) Oral.

21. Which of the following statements regarding hemolytic anemia is true?

..... (a) There is a shortened red blood cell survival but erythropoiesis is normal.

..... (b) There is a shortened red blood cell survival and ineffective erythropoiesis.

..... (c) There is a shortened red blood cell survival and decreased erythropoiesis.

..... (d) There is a shortened red blood cell survival and increased erythropoiesis.

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22. Which of the following deficiencies occurs with long term megadoses of folic acid?

..... (a) Magnesium.

..... (b) Zinc.

..... (c) Calcium.

..... (d) Phosphorus.

23. Which of the following laboratory test results is observed in hemolytic anemia?

..... (a) Hemoglobinuria.

..... (b) Reduced MCHC and MCV.

..... (c) Conjugated hyperbilirubinemia.

..... (d) Low reticulocyte count.

24. A 35 year old hypertensive man on methyldopa for the last 2 years is found to have the following :

- Hematocrit 32%
- WBC 4,000/mm^3
- Platelet count 110,000/mm^3
- positive direct Coombs' test
- MCV 75
- MCHC 29

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Which of the following statements correctly describe(s) the patient?

(i) He has iron-deficiency anemia and iron therapy should be initiated.

(ii) He has hemolytic anemia due to methyldopa and the drug should be discontinued.

(iii) He needs a work-up for gastrointestinal bleeding.

(iv) He has aplastic anemia and treatment should be initiated.

..... (a) (i) and (iii) only.

..... (b) (ii) and (iv) only.

..... (c) (i), (ii) and (iii) only.

..... (d) (iv) only.

25. Which of the following statements are true concerning childhood leukemias?

(i) Acute lymphoblastic leukaemia (ALL) is the most common.

(ii) Leukemia subtype is characterised by nuclear morphology.

(iii) It is the most common cause of death in children less than 15 years.

(iv) The finding of common ALL antigen carries a poor prognosis.

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..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

26. Which of the following statements are true regarding normal hemopoiesis?

(i) All the cells in circulation are derived from pluripotent stem cells.

(ii) Megakaryocytes are platelet precursors.

(iii) The bone marrow is the main site of hemopoiesis *in utero*.

(iv) The development of myelocytes to mature polymorphs takes one month.

..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

27. Which of the following statements regarding the pathogenesis of leukaemias are true?

(i) The role of oncogenes are now thought to be unimportant.

(ii) Epstein-Barr virus is thought to contribute to the development of Burkitts' lymphoma.

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(iii) Children of leukaemic parents have a similar chance of getting leukaemia as the general population.

(iv) Abnormal chromosome breakage is associated with some leukemias.

..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

28. Which of the following statements are true regarding the treatment of leukemias?

(i) Supportive therapy is of minimal value.

(ii) Neutropenia is commonly seen within 10 days of cytotoxic chemotherapy.

(iii) Steroids will produce direct cell-wall damage to the leukaemia cells.

(iv) Methotrexate acts as an antifolate in leukaemic cells.

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..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

29. Which of the following statements regarding leukemia chemotherapy are true?

(i) Intrathecal methotrexate should be avoided in a child who has no sign of central nervous system leukaemia at first presentation.

(ii) Cranial radiotherapy is a prophylaxis for central nervous system relapse.

(iii) Antiemetics are of little value in a leukaemic child.

(iv) Cyclophosphamide is an alkylating agent in leukaemic cells.

..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

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30. Which of the following statements is true regarding a child who has acute lymphoblastic leukaemia?

..... (a) Survival is less than 5% over 5 years.

..... (b) His chromosomes should be studied for abnormal breakage.

..... (c) His siblings should be screened for the same disease.

..... (d) He should be off school for 2 years during chemotherapy.

31. Which of the following statements is true concerning myelomas?

..... (a) It is most commonly seen during aldolescence.

..... (b) It is a disorder of T lymphocytes.

..... (c) It affects mainly the bone marrow.

..... (d) The immunoglobulin produced are functionally normal.

32. Which of the folowing statements is/are true regarding peripheral blood film?

(i) There are more red blood cells than white blood cells.

(ii) Immature white blood cells will be seen if the bone marrow is infiltrated with leukemia.

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(iii) The finding of immature red blood cells is always pathological.

(iv) Blast cells are commonly seen.

..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

33. Which of the following statements is true concerning the immune system?

..... (a) The T cells produce antibodies.

..... (b) The B cells are involved in cell-mediated immunity.

..... (c) More than 50% of lymphocytes in the circulation are T lymphocytes.

..... (d) The B cells mature in the Bursa of Fibricius in human.

34. Which of the following statements is <u>not</u> true regarding Hodgkins Lymphomas?

..... (a) The peak incidence at below 5 years of age.

..... (b) Laparotomy is needed for staging.

..... (c) Radiation therapy is useful in localised Hodgkins Lymphomas.

..... (d) Procarbazine that is used in its treatment is a mono amine oxidase inhibitor.

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35. Which of the following statements regarding myelomas are true?

(i) The immunoglobulin produced has normal function.

(ii) The hyperviscosity syndrome secondary to myeloma usually leads to renal failure.

(iii) Prednisolone is used to improve appetite.

(iv) Cyclophosphamide used in its management is excreted in the urine.

..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

36. Which of the following statements are true?

(i) Melphalan is an antimetabolite.

(ii) Mesna is used to prevent hemorrhagic cystitis.

(iii) Mercaptopurine is a purine agonist.

(iv) Vincristine is a plant derivative.

..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

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37. Which of the following chemotherapeutic agents are cell-cycle specific?

(i) Etoposide.

(ii) Cytarabine.

(iii) Methotrexate.

(iv) Cyclophosphamide.

..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

38. Which of the following antiemetic drugs is a specific 5-HT inhibitor only at higher doses?

..... (a) Metoclopramide.

..... (b) Ondansetron.

..... (c) Cinnarizine.

..... (d) Lorazepam.

39. Which of the following analgesics is the most suitable in the management of mild pain associated with cancer?

..... (a) Aspirin.

..... (b) Morphine.

..... (c) Codeine.

..... (d) Prednisolone.

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40. Which of the following are useful in preventing haemorrhagic cystitis?

(i) Mesna.

(ii) Adequate hydration.

(iii) Hydrocortisone I.V.

(iv) Ice pack plus Sodium thiosulphate 1N.

..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

41. Which of the following anticancer drugs are vesicants?

(i) Doxorubicin.

(ii) Vincristine.

(iii) Cytosine arabinose.

(iv) 6 mercaptopurine.

..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

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42. Which of the following vesicant anticancer drugs require heat therapy?

(i) Mitomycin C.

(ii) Vidisine.

(iii) Mitramycin.

(iv) Vinblastine.

..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

43. Which of the following steps are important to prevent extravasation?

(i) Ensuring that the drug is given as bolus injection.

(ii) The use of only a single puncture site to insert the catheter.

(iii) The preparation of the drug in as small a volume as possible.

(iv) Frequent withdrawal of small quantities of blood into the syringe during administration.

..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

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44. Which of the following drugs is most frequently associated with pulmonary fibrosis?

..... (a) Cytosine arabinose.

..... (b) Asparaginase.

..... (c) Bleomycin.

..... (d) Busulphan.

45. Which of the following anticancer drugs is associated with delayed nadir for bone marrow suppression?

..... (a) Mitomycin C.

..... (b) Procarbazine.

..... (c) Vinblastin.

..... (d) Methotrexate.

46. Which of the following statements regarding breast cancer are true?

(i) It is very common in Japanese.

(ii) Its incidence increases in monozygotic twins.

(iii) It mainly affects adolescent female.

(iv) It rarely affects females with high parity.

..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

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47. Which of the following statements regarding inflammatory carcinoma of the breast are true?

(i) It is a common condition in breast carcinoma.

(ii) It occurs in pregnancy.

(iii) It is usually painless.

(iv) Its presence is related to a bad prognosis.

..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

48. Which of the following statements regarding lung cancer are true?

(i) It commonly occurs in females.

(ii) It is associated with cigarette smoking.

(iii) Its incidence is decreasing internationally.

(iv) It is also related to the exposure to asbestos.

..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

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49. Which of the following statements regarding squamous cell carcinoma is true?

..... (a) It is found in the small bronchioles.

..... (b) It is not related to cigarette smoking.

..... (c) It rarely metastasises outside the chest.

..... (d) It is the most common type of lung cancer.

50. Which of the following statements regarding cancer of the colon are true?

(i) It may be associated with polyposis diseases of the colon.

(ii) It is rarely diagnosed in early thirties.

(iii) It is common in western societies.

(iv) It is believed to be due to high protein and fat intake.

..... (a) (i) and (ii) only.

..... (b) (i), (ii) and (iii) only.

..... (c) (i), (ii), (iii) and (iv).

..... (d) (ii) and (iv) only.

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Section B.

Question 1.

A 3 year old boy was admitted to the pediatric ward HUSM with the following complaints:

i. Epistaxis for 2 weeks.
ii. Easy bruising for 1 month.
iii. High fever and cough for 1 week.
iv. Lethargy for 1 month.

Both of his parents work in a local power station. He has a cousin who died at the age of 4 years with acute lymphoblastic leukemia.

Past medical history

Previously well and has never been hospitalised.

Medication history

i. Pediatric Co-trimoxazole 2 tab. b.d. for the past 10 days.

ii. Multivitamin tablet 1 daily for 1 month.

Physical examination

General appearance : pale and dehydrated.
BP 90/60 mmHg., Pulse 120/min., Temperature 39^{o}C.
Multiple old and new bruises throughout the body.
Enlarged cervical lymph nodes.
Enlarged liver and spleen.
Reduced air entry with crepitation in the lower lobe of the left lung.

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Assessment

i. Left lower lobe pneumonia.
ii. Anemia, thrombocytopenia with lymphadenopathy - most likely acute leukemia.

Plan

i. IV. ampicillin and gentamicin.
ii. Blood transfusions.
iii. Intravenous hydration.
iv. Antileukaemic treatment when the diagnosis is confirmed.

i. Discuss the importance of adequate fluid therapy before and during antileukemic treatment.

(10 marks)

ii. Describe the principles of antileukemic therapy and give examples of antileukemic agents used in the treatment of acute lymphoblastic leukemia in childhood.

(10 marks)

iii. List the necessary precautions with cyclophosphamide to avoid its complications.

(5 marks)

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Question 2

A. A 65 year old male (weight = 60 kg) came to the hospital with the chief complaints of black stools and progressive weakness over the last two months.

Medical history	:	Regional enteritis x 30 years	
	:	Osteoarthritis x 1 year	
Drug history	:	Ketoprofen for the last 1 year.	
Laboratory results	:	Hemoglobin	9.5 gm/dl
		Hematocrit	26%
		Serum iron	Reduced
		TIBC	Increased
		MCV	Reduced
		MCHC	Reduced
		Guiac stools	3+
		Reticulocyte count	1%
Diagnosis	:	Iron deficiency anemia	
Treatment.	:	Ferrous sulphate 325 mg t.d.s x 1/12	

One month later, the patient returned to the hospital and complained of severe epigastric pain. The laboratory results remained unchanged from previous values.

(i) What factors were present in this patient which could contribute to the failure of oral iron therapy? Recommend the total dose of parenteral iron dextran in order to restore the hemoglobin to normal and to replenish iron stores.

(4 marks)

(ii) A decision was made to administer the entire dose of parenteral iron dextrans via infusion. Which iron dextran preparation should be employed and recommend a suitable regimen for this patient. Also state the precautions that should be taken.

(5 marks)

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(iii) Discuss the hematological monitoring you would employed and describe the predicted response.

(4 marks)

B. BB is a 48 year old, 80 kg female with a history of rheumatic heart disease referred from a district hospital for further evaluation and management of her atrial fibrillation. On examination, she was found to have a rapid heart rate and she complained of a general feeling of tiredness. Elective cardioversion was planned.

(i) During the grand rounds, a question was raised as to whether to anticoagulate BB prior to elective cardioversion. Discuss.

(4 marks)

(ii) If the patient is to be anticoagulated, suggest an approach that could be adopted. How long would the duration for anticoagulation be for?

(4 marks)

(iii) In the monitoring plans, PT/INR was recommended. Explain why the INR is a better indicator for the degree of anticoagulation compared to PT?

(4 marks)

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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.	CI	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.	Magnessium	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

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 μmol s^{-1}/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_3U	25-35%	
35.	FTI	1.3-4.2	

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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
	$SV = \frac{CO}{\text{Heat Rate}}$		
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
	$LVSWI = (MBP-PCWP)(SVI)(.0136)$		