FACULTY OF MEDICINE, UNIVERSITY OF RUHUNA
Second Examination for Medical Degrees –December 2014
Biochemistry Paper II

Tuesday 9th December 2014   2.00 p.m. – 5.00 p.m.

Answer **All Six** Questions.   **(Three hours)**

Answer each question in a **separate** book.

Marks allocated to each part of a question are shown within parenthesis.

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1. A 47 year-old obese woman presented to a clinic with tendon xanthomas on elbows and knees had the following changes in plasma lipids.

Total cholesterol	High
Low-density lipoprotein (LDL)	Markedly elevated
High-density lipoprotein (HDL)	Normal
Triglycerides	Normal

    1.1 Discuss the above findings and state the probable condition.   **(25 Marks)**

    1.2 Mention the investigation that was carried out to obtain above values and explain how a sample of blood should be collected to carry out this assay. **(25 Marks)**

    1.3 What dietary and life style modifications would you recommend to this patient?   **(25 Marks)**

    1.4 Explain the factors that affect the blood cholesterol concentration in an individual.   **(25 Marks)**

2. 2.1 A patient with type I diabetes mellitus presented in a semiconscious state. The results of his investigations on admission are as follows.

Plasma analytes	Test results (mmol/L)	Reference range (mmol/L)
Na^+	120.0	132.0-144.0
K^+	7.0	3.2-4.8
Cl^-	90.0	98.0-108.0
HCO_3^-	10.0	23.0-33.0
Creatinine	0.18	0.06-0.12
Glucose	40.00	3.9-6.1
Urine		
Rothera's test for urine	·.Purple colour	

    Explain each of the above results of plasma/urine analytes in biochemical terms.

    (50 Marks)

    2.2 Explain the biochemical basis of the following.

    2.2.1 Occurance of myoglobinuria in McArdle disease.   **(25 Marks)**
    2.2.2 Severe anaemia and skeletal abnormalities in β-thalassaemia major.

    (25 Marks)

3. 3.1 Explain the importance of the following.

    3.1.1. The activity of the hexose monophosphate pathway in the phagocytosing neutrophil. **(25 Marks)**

    3.1.2 The enzyme guanylyl cyclase in signal transduction. **(25 Marks)**

  3.2 Explain the biochemical significance of the following.

    3.2.1 Estimation of serum C-reactive protein concentration in monitoring an inflammatory disease. **(25 Marks)**

    3.2.2 An increase in the plasma alanine concentration during fasting. **(25 Marks)**

4. Explain the biochemical basis of the following.

  4.1 Use of asparaginase in the treatment of lymphoblastic leukaemia. **(25 Marks)**

  4.2 Estimation of serum α-fetoprotein concentration of a patient undergoing chemotherapy. **(25 Marks)**

  4.3 Administration of dextrose infusion in hyperammonaemia. **(25 Marks)**

  4.4 Administration of frequent small meals in glucose 6-phosphatase deficiency. **(25 Marks)**

5. Explain the following.

  5.2 Analysis of urine urobilinogen and bilirubin in haemolytic jaundice. **(30 marks)**

  5.3 Congenital disorders of purine metabolism could lead to severe combined immune deficiency (SCID). **(35 marks)**

  5.4 The molecular basis of gene therapy. **(35 marks)**

6. 6.1 6.1.1 A healthy adult of 50 kg body weight consumes a diet of 2400 kCal. Assuming that he consumes a mixed diet, calculate the amount of carbohydrates, lipid and protein in his diet by using the information given below.
Digestibility of proteins in a mixed diet = 85%,
Basal metabolic rate (BMR) of the individual = 25 kCal/kg/d,
Safe level of intake of protein for a healthy adult is 0.75 g/kg/d.

    (30 marks)

    6.1.2 Does the amount of protein you calculated above meet the recommended intake of protein? **(20 marks)**

  6.2 Explain the main considerations in planning a diet for the following individuals.

    6.2.1 An adult male with chronic renal failure. **(25 marks)**

    6.2.2 Complementary diet for a six month old infant. **(25 marks)**

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