



FACULTY OF MEDICINE, UNIVERSITY OF RUHUNA
Second Examination for Medical Degrees – July 2016
Biochemistry Paper II

21st July 2016

2.00 p.m.- 5.00 p.m.
(Three hours)

Answer All Five Questions.

Answer each question in a separate book.

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

- 1 1.1 A 42 year-old man had the following fasting lipid values on a routine medical examination.

Reference range

| | | |
|-----------------------------------|-----|---------|
| Plasma total cholesterol (mmol/L) | 6.5 | (< 5.0) |
| Plasma triglyceride (mmol/L) | 5.6 | (< 1.7) |

Reduction in dietary fat did not have any effect on the concentration of triglyceride in the patient but reduction in dietary carbohydrate gave rise to a significant decrease in both total cholesterol and triglyceride levels.

- 1.1.1 Identify the lipoprotein fraction that could be elevated in this patient. (10 marks)
- 1.1.2 What are the disadvantages of a long term fat free diet? (25 marks)
- 1.1.3 Name the test that would show the distribution of lipoproteins in blood. (10 marks)
- 1.1.4 Explain how the triglyceride level was improved when the patient was on a low carbohydrate diet but not on a low fat diet. (25 marks)
- 1.2 A full-term neonate born at a peripheral hospital was admitted to an emergency unit with convulsions. An urgent cranial CT scan revealed intracranial bleeding. Family history didn't reveal any haemorrhagic disease but mother informed that the neonate was not given any injection after birth.
- 1.2.1 What is the probable diagnosis? (05 marks)
- 1.2.2 State the biochemical rationale for the intracranial bleeding in the neonate. (10 marks)
- 1.2.3 List the factors that would have contributed to the condition shown in the neonate. (15 marks)

2. Explain the biochemical basis of the following.

- 2.1 Microalbuminuria is used for the early detection of nephropathy in diabetes mellitus. (25 marks)
- 2.2 Hay's test is used in the investigation of hepatobiliary disease. (25 marks)
- 2.3 The cholera toxin induces signal transduction in its target cells. (25 marks)
- 2.4 Immunoelectrophoresis is performed in paraproteinaemia. (25 marks)

Contd....2

3. A 49 year-old male, a heavy smoker was admitted to the emergency unit with a sudden onset constricting central chest pain which was not relieved with routine analgesics. He has hypertension and hypercholesterolaemia and on statin treatment. His father died of a similar condition at the age of 40 years.

The results of his laboratory investigations on-admission are given below.

| Serum analyte | Test results | Reference values |
|----------------------------|--------------|------------------|
| Cardiac troponin I (ng/mL) | 6.21 | < 1.00 |
| Total CK (IU/L) | 800 | 60-400 |
| CK-MB (ng/mL) | 70 | 0 - 4.9 |

- 3.1 State the probable diagnosis with justifications. *(10 marks)*
- 3.2 Identify the risk factors present in the patient for the condition stated in 3.1. *(10 marks)*
- 3.3 Explain the biochemical basis of the above laboratory findings. *(50 marks)*
- 3.4 3.4.1 State the pharmacological treatment for this patient. *(05 marks)*
- 3.4.2 Briefly explain the biochemical basis of the above treatment. *(25 marks)*
4. 4.1 A 40 year-old male with type 2 diabetes mellitus was referred to a nutritionist. His height and weight are 1.3 m and 70 kg respectively. He consumed a mixed diet of 3000 kcal.
- | | | |
|---|---|--------------|
| Digestibility of proteins in a mixed diet | = | 85% |
| Basal metabolic rate of the patient | = | 30 kcal/kg/d |
| Safe level of intake of protein for a healthy adult | = | 0.75 g/kg/d |
- 4.1.1 Calculate his body mass index and comment on his nutritional status. *(15 marks)*
- 4.1.2 Calculate the amount of carbohydrates, lipid and protein in his diet. *(35 marks)*
- 4.1.3 Explain the main considerations in planning a diet for the patient. *(25 marks)*
- 4.2 Explain the biochemical rationale for the requirement of frequent blood transfusions for a child with β thalassaemia major. *(25 marks)*
5. 5.1 Explain the biochemical basis for the occurrence of the following in glucose 6-phosphatase deficiency.
- 5.1.1 Hyperuricaemia *(20 marks)*
- 5.1.2 Hypoglycaemia *(20 marks)*
- 5.2 Briefly explain the following.
- 5.2.1 Administration of carbimazole as a treatment of hyperthyroidism. *(20 marks)*
- 5.2.2 The role of tandem repeats in paternity testing. *(20 marks)*
- 5.2.3 Occurrence of missense mutations by the substitution of amino acids in a protein. *(20 marks)*
