

UNIVERSITY OF JAFFNA, SRI LANKA
FIRST EXAMINATION FOR MEDICAL DEGREES - OCTOBER 2022
ACADEMIC YEAR 2019/2020
BIOCHEMISTRY PAPER II (43RD BATCH)

07.10.2022

Time: 3 Hours

Answer all 10 questions.

Marks allotted to each part are indicated in brackets.

Answer Each Question on Separate Answer Book.

1. A 55 year old male of 1.8m height with 110kg body weight had the following biochemical levels.

| | Patient | Normal |
|-------------------------------|----------------|---------------|
| Serum triacylglycerol (mg/dl) | 928.0 | 200 |
| Total Cholesterol (mg/dL) | 397.0 | <200 |
| HDL Cholesterol (mg/dL) | 30.0 | >60 |

The patient was advised to take the hypolipidemic drug (fibrate- gemfibrozid-600mg) twice a day and advised to control his diet and to perform regular exercise.

- 1.1 How triacylglycerol is transported in blood? **(10 Marks)**
- 1.2 List the probable causes for elevated triacylglycerol level in a patient. **(10 Marks)**
- 1.3 Give the biochemical explanation for the elevation in triacylglycerol level under the conditions listed in **Question 1.2**. **(30 Marks)**
- 1.4 Give the probable problem in the above mentioned patient. **(10 Marks)**
- 1.5 Give reasons for the elevated total cholesterol level in this patient. **(20 Marks)**
- 1.6 Give the biochemical basis of the use of fibrates to a patient with elevated triacylglycerol level. **(20 Marks)**

2. Two years later the patient mentioned in **Question 1** was presented with polyuria, polydipsia and 'feeling dry' for the past two months. On investigation, the following results were observed.

| | |
|----------------------------|-------|
| Serum triglyceride (mg/dl) | 570.0 |
| Total Cholesterol (mg/dL) | 250.0 |
| HDL Cholesterol (mg/dL) | 60.0 |
| Serum Glucose (mg/dL) | 397.0 |

In addition to the hypolipidemic drug he was advised to take regular insulin. Further he was directed to a dietician and to perform regular exercise.

- 2.1 Name the additional condition that has developed in the patient after two years. (10 Marks)
- 2.2 Name the main cause of the condition developed in the patient after two years. (10 Marks)
- 2.3 Explain the biochemical basis for the development of the condition mentioned in **Question 2.1**. (25 Marks)
- 2.4 2.4.1 Name a test that could be performed to confirm the condition developed in the patient after two years. (10 Marks)
- 2.4.2 Give the expected results of the test mentioned in **Question 2.4.1**. (15 Marks)
- 2.5 Give the biochemical basis for the reduction in the total cholesterol level of this patient after the
- 2.5.1 diet modification. (15 Marks)
- 2.5.2 fibrate intake (15 Marks)

3. Answer this question based on **Questions 1 and 2**.

- 3.1 Calculate the Body Mass Index of the male patient mentioned in **Question 1**. (15 Marks)
- 3.2 What would be the expected ideal weight for the height of the patient?(10 Marks)
- 3.3 Calculate a day's Total Energy Expenditure of this male patient. (20 Marks)
- 3.4 What would have been the dietary advice given by the dietician to reduce the body weight and lipid profile while maintaining zero nitrogen balance. (40 Marks)
- 3.5 Explain the expected nitrogen balance of the patient when he was investigated after two years. (15 Marks)

4. 4.1 Explain the biochemical basis for prescribing sulphonylurea to a patient with diabetes mellitus Type II. (25 Marks)
- 4.2 Explain why glutamate dehydrogenase is important for the
- 4.2.1 synthesis of non-essential amino acids. (35 Marks)
- 4.2.2 synthesis of urea. (20 Marks)
- 4.3 Explain how the proteins are catabolised with the help of ubiquitin/proteasome pathway. (20 Marks)
5. 5.1 Explain how the serum calcium level is maintained in a normal adult. (40 Marks)
- 5.2 Copper is essential for wound healing. Explain (20 Marks)
- 5.3 Fluoride prevents dental caries. Explain (20 Marks)
- 5.4 Explain the biochemical basis of lactose intolerance and give the problems faced by a patient having this condition. (20 Marks)
6. 6.1 Explain the molecular basis of β -thalassemia. (30 Marks)
- 6.2 Explain the biochemical basis for the altered laboratory findings on serum bilirubin and urinary bilirubin & urobilinogen levels of a β -thalassemia patient. (40 Marks)
- 6.3 Explain the expected changes in the serum ferritin and Total Iron Binding Capacity (TIBC) levels of a β -thalassemia patient. (30 Marks)
7. 7.1 List the different forms of vitamin A. (15 Marks)
- 7.2 Explain how the vitamin A is absorbed, transported and stored. (30 Marks)
- 7.3 Explain the biochemical basis of developing night blindness in vitamin A deficiency. (30 Marks)
- 7.4 Thiamine deficiency leads to neurological symptoms. Explain. (25 Marks)

8. 8.1 8.1.1 Give the biochemical basis of multiple myeloma. (30 Marks)
- 8.1.2 Give the serum electrophoretic pattern of a patient with multiple myeloma comparing with that of a normal person. (20 Marks)
- 8.2 Explain how the thermogenin helps to maintain the body temperature. (20 Marks)
- 8.3 Explain how the structure of tRNA is suited for its function. (30 Marks)
9. Explain the biochemical basis of the followings.
- 9.1 Cancer patients administered with methotrexate, (20 Marks)
- 9.2 von Gierke disease causes hyperuricemia, lactic acidosis and ketonemia. (30 Marks)
- 9.3 Glucose-6-phosphate dehydrogenase deficient patients are protected from *falciparum* malaria. (25 Marks)
- 9.4 Asthma patients treated with steroidal anti-inflammatory drug develop abnormal glucose tolerance. (25 Marks)
10. 10.1 Explain how the anaemic conditions caused by the deficiencies of iron and vitamin B₆ can be differentiated. (20 Marks)
- 10.2 Give the Benedict's test and its uses. (25 Marks)
- 10.3 Snake bite may cause haemolysis. Explain. (25 Marks)
- 10.4 Vitamin D deficiency is one of the main reasons for the development of atherosclerosis in vegetarians. Explain. (30 Marks)