



UNIVERSITY OF RUHUNA, FACULTY OF MEDICINE,  
Second Examination for Medical Degrees December 2006  
BIOCHEMISTRY PAPER II

Tuesday 05<sup>th</sup> December 2006

2.00 p.m. – 5.00 p.m.

Answer all six Questions.

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

1. A known diabetic aged 16 years presented with ketoacidosis during an upper respiratory tract infection. During this illness she had neglected her insulin therapy.

Her plasma analytes on admission were as follows,

Plasma analytes			Reference ranges
Na <sup>+</sup>	141	mmol/L	(132 - 144)
K <sup>+</sup>	5.5	mmol/L	(3.1 - 4.8)
Cl <sup>-</sup>	99	mmol/L	(98 - 108)
HCO <sub>3</sub> <sup>-</sup>	8	mmol/L	(21 - 32)
Urea	6.8	mmol/L	(3.0 - 7.0)
Creatinine	0.11	mmol/L	(0.03 - 0.06)
Anion Gap	39	mEq/L	(8 - 16)
Glucose	28	mmol/L	(3.0 - 5.5)
Hydroxybutyrate	9.5	mmol/L	(< 0.30)
Acetoacetate	4.1	mmol/L	(< 0.10)

- 1.1 Explain the above results in biochemical terms. *(60 marks)*
- 1.2 Explain the changes that would occur to the above values if she was treated with insulin and saline infusion. *(40 marks)*
- 2.1 Explain how the following mediate their actions.
- 2.1.1 Drinking sugarless coffee after an overnight fast. *(25 marks)*
- 2.1.2 Diphtheria toxin. *(25 marks)*
- 2.2 Give biochemical basis of the following.
- 2.2.1 The hormone response elements help in regulating gene transcription. *(25 marks)*
- 2.2.2 Puromycin is an inhibitor of protein biosynthesis. *(25 marks)*

Contd....

3. Explain the biochemical basis of the following.
- 3.1 Serum and urine protein analysis by electrophoresis support the diagnosis of multiple myeloma. **(50 marks)**
  - 3.2 Restriction endonucleases are used to make chimeric (recombinant) DNA molecules. **(25 marks)**
  - 3.3  $\alpha$ -Fetoprotein concentration may be increased in adult serum in certain conditions. **(25 marks)**
4. Explain the following statements.
- 4.1 A 37 year old man with pyruvate kinase deficiency has a haemoglobin concentration of 7.5 g/dl. **(25 marks)**
  - 4.2 Abdominal pain and urinary porphobilinogen in uroporphyrinogen synthase deficiency. **(25 marks)**
  - 4.3 The undesirable effects of point mutations are minimized due to the degeneracy of the genetic code. **(25 marks)**
  - 4.4 Feeding arginine is beneficial in arginosuccinate synthase deficiency. **(25 marks)**
- 5.
- 5.1 Explain the mechanisms that take place in the body regarding defense against reactive oxygen species. **(50 marks)**
  - 5.2 Explain the biochemical basis of the following.
    - 5.2.1 Some infants with phenylketonuria show significant neurological deterioration even after implementation of a phenylalanine restricted diet. **(25 marks)**
    - 5.2.2 Infants with carnitine palmitoyl transferase 1 deficiency show non-ketotic fasting hypoglycaemia with muscle pain and myoglobinuria. **(25 marks)**
- 6.
- 6.1 Calculate the recommended protein intake for a woman of body weight 50 kg on a mixed diet. **(35 marks)**
  - 6.2 Explain why nutritional anaemia is common in pregnancy. **(25 marks)**
  - 6.3 Explain the dietary advice you would give to a pregnant mother suffering from microcytic, hypochromic anaemia in the last trimester of her pregnancy. **(30 marks)**

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