The Royal College of Pathologists
Pathology: the science behind the cure

Part 1 examination

Clinical Biochemistry: First paper

Tuesday 23rd March 2010

Candidates must answer FOUR questions ONLY

Time allowed: 3 hours

1. Outline the factors that contribute to the overall cost of a laboratory test. What do you need to take into account when you attempt to compare test costs between laboratories?

2. Describe the principles of gel electrophoresis and discuss its use in the clinical biochemistry laboratory, giving specific examples of analysis using different physical media.

3. Describe the analytical principles that underlie the determination of arterial blood and venous plasma bicarbonate concentration.

4. Describe the metabolism of HDL cholesterol. Discuss the causes of low serum HDL cholesterol concentration and the principles of its management.

Please turn over for Questions 5 & 6

5. Describe the role of laboratory tests in the diagnosis and management of acquired adrenal cortical hypofuntion.

6. Discuss the causes of severe lactic acidosis in a sick infant.

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Part 1 examination

Clinical Biochemistry: First paper

Tuesday 22nd September 2009

Candidates must answer FOUR questions ONLY

Time allowed: 3 hours

1. Your acute general hospital has recently merged with a neighbouring hospital providing neonatal and paediatric services. You have been asked by your chief executive to produce a plan for centralisation of clinical biochemistry services on the acute general hospital site. Identify the important issues and discuss an appropriate model for provision of services for the neighbouring hospital.

2. Discuss the techniques employed in clinical biochemistry analysers to minimise interference in spectrophotometric assays.

3. Critically discuss the methods that are in routine use for the measurement of albumin in serum and urine

Please turn over for Questions 4, 5 & 6

4. Describe the role of the kidney in hydrogen ion homeostasis and the pathophysiology of acidosis in renal disorders.

5. Outline the pathophysiology and clinical biochemistry of hypothyroidism. Discuss the use of laboratory tests in the diagnosis and management of this condition.

6. Discuss the biochemical and metabolic features of the acute hyperglycaemic complications of diabetes. Outline the principles of their management and the complications that may arise.

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Clinical Biochemistry: First paper

Tuesday 24 March 2009

Candidates must answer FOUR questions ONLY

Time allowed: 3 hours

1. External quality assessment (EQA) data for serum phosphate has demonstrated a positive bias for your laboratory. Outline the steps that you would take to investigate and solve this problem.

2. Define the terms analytical sensitivity and analytical specificity. Discuss how the design of an immunoassay could be optimised to produce the best possible sensitivity and specificity.

3. Describe the methods in current clinical use for determination of plasma and whole blood glucose concentration.

4. Describe the pathophysiology of primary hyperaldosteronism as a cause of hypertension and relate this to a strategy for its investigation.

Please turn over for Questions 5 & 6

5. Discuss the differential diagnosis and investigation of a 70-year old patient with a chronically high serum potassium concentration of around 6 mmol/L.

6. Outline the clinical and biochemical diagnostic criteria for Familial Hypercholesterolaemia. Describe the investigations that should follow the specialist referral of a patient suspected of having this disorder.

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Part 1 examination

Clinical Biochemistry: First paper

Tuesday 23 September 2008

Candidates must answer FOUR questions ONLY

Time allowed: 3 hours

1. Describe the systems available for automation of pre- and post- analytical sample handling in clinical biochemistry laboratories. Discuss critically their advantages and disadvantages, indicating their suitability in particular laboratory settings.

2. Describe the principles of tandem mass spectrometry. Using specific examples in clinical biochemistry outline the advantages and disadvantages of tandem mass spectrometry in comparison with other routinely available methodologies.

3. Outline the methods available for measurement of plasma creatinine concentration. Discuss the problems associated with creatinine assay standardisation.

Please turn over for Questions 4, 5 & 6

4. Outline normal human iron metabolism. Describe the disturbance of iron metabolism in hereditary haemochromatosis and relate this to the biochemical abnormalities and clinical features observed in this condition.

5. Describe the biochemical investigation of a 35-year old woman with hirsutism.

6. Provide a critical discussion of the use of biochemical markers of bone turnover in the management of osteoporosis.

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Part 1 examination

Clinical Biochemistry: First paper

Tuesday 18 March 2008

Candidates must answer FOUR of the following questions ONLY

Time allowed: 3 hours

1. A consultant in Intensive Care wishes to implement a new test by Point of Care Testing (POCT) in the Intensive Care Unit. Describe what process should be put in place to determine whether this test should be made available and whether measurement should be by POCT or in the clinical biochemistry laboratory.

2. Outline the principles of high-performance liquid chromatography (HPLC). Describe the different principles of separation commonly available and the factors that determine chromatographic resolution.

3. Describe the methodologies available for the measurement of plasma calcium concentration. Critically discuss the process of adjustment for albumin concentration.

4. Outline the physiological function of alpha-1 antitrypsin. Describe the alpha-1 antitrypsin deficiency states and relate these to the clinical consequences of deficiency.

Please turn over for questions 5 & 6

5. Describe the use of biochemistry tests in the investigation of the infertile couple.

6. Describe the clinical biochemistry of hypertriglyceridaemia (including mixed dyslipidaemia).

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Part 1 examination

Clinical Biochemistry: First paper

Tuesday 25 September 2007

Candidates must answer FOUR of the following questions ONLY

Time allowed: 3 hours

1 Describe the audit cycle. Discuss how the audit cycle could be applied to laboratory workload demand management.

2 Discuss the use of non-isotopic labels in immunoassays, indicating any advantages these labels have over the use of radioisotopes.

3 Describe the methodologies used for measurement of sodium in clinical biochemistry laboratories.

4 Describe the metabolic effects of chronic renal failure.

5 Outline the biochemical and clinical features of congenital adrenal hyperplasia and describe the role of the laboratory in its diagnosis and management.

6 Describe the metabolic and biochemical complications that may occur during long term Home Parenteral Nutrition, and outline an appropriate strategy for laboratory monitoring of this patient group.

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Part 1 examination

Clinical Biochemistry: First paper

Tuesday 27 March 2007

Candidates must answer FOUR of the following questions ONLY

Time allowed: 3 hours

1. Describe the factors that make up the overall cost of a biochemistry test. Discuss the cost impact of transferring the location of analysis of a single test from the local laboratory to a central referral laboratory in a different hospital.

2. Describe and compare the principles of immunoturbidimetry and immunonephelometry. Discuss their uses and limitations.

3. Outline the different bilirubin fractions present in serum and describe the analytical methods available for their measurement.

4. Describe the factors that may lead to vitamin D deficiency in adults. Discuss the methods available for assessment of vitamin D status, indicating the problems associated with them.

5. Describe the normal physiology of renal potassium ion homeostasis and the pathophysiology of hypokalaemia due to inappropriate renal potassium losses.