

Objective Structured Practical Examination in Clinical Biochemistry

The question sheet taken from the Objective Structured Practical Examination in Clinical Biochemistry of November 2002 is reproduced below. The data files contain the data that is provided at each station. Due to the limitations of the website large files cannot be accommodated so the data for questions 3, 7,8, 13 and 14 is not shown. Specimen answers are provided in the accompanying file.

Question 1

You are given a list of drugs numbered 1 to 6

Indicate which drugs can cause the following biochemical abnormalities in therapeutic use (the side-effects listed may apply to more than one drug on the list):

a Hyponatraemia

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b Hyperkalaemia

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c Hyperprolactinaemia

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d Increased CK

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e Hypocalcaemia

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f Increased creatinine

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Question 2

You are provided with scans of a serum protein electrophoresis gel and the immunofixation gel for the sample in lane 1, and the urine protein electrophoresis of a urine sample from the same patient (lane 6) and the corresponding urine immunofixation. This sample comes from a patient with hypercalcaemia.

- a. Write a report on the serum sample (lane 1 on the serum electrophoresis gel and immunofixation) from this patient.

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- b. Report the urine electrophoresis (lane 6) and immunofixation.

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- c. Comment on the significance of this result and indicate further useful investigations.

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Question 3

You are provided with the UK NEQAS report for urinary 5HIAA, distribution 72 for August 2002.

- a) What technique is used for Urinary 5HIAA analysis in the laboratory to which this report refers ?

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- b) Comment on what the EQA report shows of the assay in question

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- c) Suggest possible causes for this.

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- d) What remediable action is required to improve quantitation of this analyte ?

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Question 4

- a) What do the plots show about the performance of analyser B compared to analyser A ?

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- b) Give possible reasons for the changes observed for hCG values above and below 1000 IU/L

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- c) What experiments would you do to confirm your reasoning ?

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Question 5

You are provided with three clinical scenarios. Assume that you have been telephoned asking about the appropriate samples that need to be collected and the tests that should be requested. Give the above in each case and indicate the correct sample container and any special precautions that have to be observed such as when the sample should be taken or precautions to be observed during sample collection.

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b)

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c)

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Question 6

A method is being set up for the assay of enzyme activity on a batch analyser. The enzyme catalyses the oxidation of a substrate with reduction of NAD to NADH. Initial plots are provided for the reaction utilising varying volumes of serum to start the reaction as indicated on the right of the graph. The serum is added between points 2 and 3. The absorbances measured at 340 nm for 31 points during each of the reactions are provided on the accompanying data sheet and the resulting data plotted on the accompanying graph.

DO NOT MARK THE GRAPH, USE THE DATA PROVIDED.

- a) Choosing the curve which provides the optimum conditions, calculate the activity of the enzyme.

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- b) Give an explanation for the shape of the curve when 20 μ L serum is used.

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Question 7

- a) Describe the MTHFR genotype of subjects in

Lane 1

Lane 2

Lane 5

- b) Comment on the relationship between the patient's plasma homocysteine concentration and MTHFR genotype (lane 7).

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- c) Comment on and suggest an explanation for the change in plasma homocysteine concentration in the patient.

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Question 8

You are provided with the UK NEQAS report for Sex Hormone Binding Globulin for distribution 275.

- a) The A score is given as 108. Comment on this value and what this score represents ?

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- b) What does the B score represent ?

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- c) What does the C score represent ?

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- d) The specimen used in distribution 275D was sent round before. What was the result achieved by the laboratory on that occasion ?

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- e) Describe the trend shown for the B score since distribution 264 (sheet 4). What might be causing this pattern of results ?

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Question 9

You are provided with brief clinical histories and the results of urine analyses on 3 patients. Give possible diagnoses and list useful further investigations for each patient.

a) Possible diagnoses.....

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Further investigations.....

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b) Possible diagnoses.....

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Further investigations.....

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c) Possible diagnoses.....

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Further investigations.....

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Question 10

- a) Indicate the test(s) you would undertake on sample A to answer the question posed on the form.

[illegible]

- b) Indicate the test(s) you would undertake on sample B to answer the question posed on the form.

This image shows a full page of white paper with ten horizontal dashed lines, typical of primary school handwriting practice paper. The lines are evenly spaced and extend across the entire width of the page. There is no text or other markings on the paper.

Question 11

You are provided with the abnormal results from 3 samples which have been forwarded to the authorising bench before reporting. Indicate what you would check on these samples prior to reporting.

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b)

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c)

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Question 12

You are provided with the data for a batch of samples for which the growth hormone concentrations have been determined. The analyst for this batch wants to know which samples if any can be authorised.

- a) Indicate, giving your reasons, which samples if any can be authorised and how you would deal with the remaining samples.

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- b) What would you want to know to optimise quality control in this assay ?

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- c) Comment on the results from patient C (assuming the assay was performing correctly).

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Question 13

- a) Indicate how the concentrations of X and Y can be determined by spectroscopy in a plasma extract containing both X and Y.

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- b) Suggest other techniques which could possibly be used to assay X and Y.

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Question 14

- a) Measure the heights of retinol and internal standard peaks in the patient and standard samples.

[illegible]

- b) Calculate the concentration of free retinol in the plasma sample.

[illegible]