



The Royal College of Pathologists

Pathology: the science behind the cure

## OSPACE 1 EXAMPLE

OSPACE section 1 (~90 minutes)

Fifteen compulsory questions, typically 6 minutes per question (more complex questions can be allowed more time up to 10 minutes)

Few example questions are listed below

1. Examine this Quality Control Chart (6 min)
  - a. What abnormality is shown in this quality control chart?
  - b. Which rule has been violated and how?
  - c. Give two possible scenarios which may account for this abnormality.
  
2. Examine these electron-micrographs (6 min)
  - a. In which clinical specimen type can you find all these viruses?
  - b. Name the viruses labelled A to G.
  - c. Which of these viruses belong to the same viral family? Name the family.
  - d. Which of these viruses have effective vaccines? What is the nature of this vaccine?
  
3. Examine this phylogenetic tree (6 min)
  - a. Does this phylogenetic tree support transmission of hepatitis C in the dialysis unit? Why do you say so and which patients were involved?
  - b. Can you determine which patient is the index case from this tree? Why do you say so?
  - c. What is the meaning of the number at the node of each branch?
  
4. Examine this set of laboratory data (6 min)
  - a. Interpret this set of laboratory data.
  - b. Give three possible explanations to account for this set of result?
  
5. These pictures are from different patients suffering different complications of the same viral infection (6 min)
  - a. Which virus caused these complications?
  - b. Name each complication.
  - c. Name four other possible complications of this viral infection?

6. This is the histological examination of brain tissue of a man died of an unexplained encephalopathy (6 min)

- a. What is the diagnosis? b. What is the pathognomonic feature found in the histology slide?
- c. How do you diagnose this condition before death?

7. This is the brain MRI of a patient from sub-Saharan Africa who presented with a two week history of headache and admitted with generalised seizures (6 min)

- a. What is the most likely diagnosis?
- b. Name one possible alternative diagnosis.
- c. What is the most likely underlying condition?
- d. What is the management of this condition?

8. Examine these clinical pictures (6 min)

- a. Which two viral infections were demonstrated in these clinical pictures?
- b. Name the signs found in the oral cavity and match each one to its corresponding clinical picture.
- c. What laboratory methods are available to diagnose these two infections?

9. Examine these monolayer cell culture inoculated with respiratory sample from a patient (6 min)

- a. Describe the morphology of the cells.
- b. Describe the cytopathic effect observed
- c. What viruses could be growing in this cell monolayer with this cytopathic effect?

10. Examine this HIV protease and reverse transcriptase sequence and the report? (10 min)

- a. What mutations are shown?
- b. What are the clinical significances?
- c. Recommend a suitable treatment regimen for this patient.

11. A nucleic acid amplification test for *Chlamydia trachomatis* has a claimed sensitivity of 99.9% and a specificity of 99.9% for self-taken vulvo-vaginal swab in women (7 minutes)

It is applied to two different populations, screening 10,000 individuals in each group:

Population A: Sexually active female teenagers (prevalence 1 in 100)  
 Population B: Asymptomatic women > 40 years old (prevalence 1 in 1000)

A 2x2 table has been completed for population A.

Population A:

	True positive	True negative	Total
Test positive	100	1	101
Test negative	0	899	899
Total	100	900	10000

11.1. What is the positive predictive value of the test in population A?

11.2 Complete the same table for Population B and calculate the positive predictive value.

	True positive	True negative	Total
Test positive			
Test negative			
Total			10000

11.3 What is the positive predictive value of the test in population B?

11.4 Explain the difference in positive predictive values between population A and B.

**OSPACE section 2 – written practical questions (total duration = 120 minutes)**

Four compulsory questions – 30 minutes per question

**Two** examples are shown below:

**Question 1**

Question 1.1 to 1.3 for 5 minutes

You are asked to set up a multiplex real time PCR for influenza viruses.

- 1.1. List the basic reagents required in a real time PCR reaction.
- 1.2. Explain the mechanism of action of a dual-labelled probe in real time PCR.
- 1.3. What is SYBR Green and how can it be used in a PCR designed to detect two viral variants?

Handover your answer sheet now before proceeding to Part 2

Questions 1.4 to 1.6 for 25 minutes

A multiplex real time PCR run for influenza A and influenza B matrix targets and an internal control target is performed and the amplification curves are provided.

The run include throat/nasal swabs from the following 4 patients:

Patient A/Sample A – 52 year old man with lymphoma who has just completed chemotherapy and found to be in remission. Admitted to hospital with fever, cough and shortness of breath. Chest x-ray showed patchy consolidation.

Patient B/Sample B – 20 year old international student returned from China 2 days ago. Admitted to hospital with fever and flu like symptoms. ? atypical pneumonia.

Patient C/Sample C – 63 year old woman returned 2 days ago from a pilgrimage to Saudi Arabia. Developed high fever and was admitted to ITU with respiratory distress.

Patient D/Sample D – 4 year old boy previously healthy. Attended GP because of coryzal symptoms. Up to date with immunisation.

Amplification Plots:

- 1.4 Analyse the results and provide a report for each sample. Please explain any anomalies.
- 1.5 What further tests would you recommend on each sample?
- 1.6 Provide management advice to the clinical team in each case.

## Question 2

Qu 2.1 – 2.4 for 16 minutes

<p>HIV (human immunodeficiency virus) scenarios for Patient J</p>	<p>HIV 1 &amp; 2 antibody/ HIV-1 p24 antigen enzyme immunoassay #1</p> <p>3.05 (cut off for reactive result: &gt; 0.4)</p>	<p>HIV 1 &amp; 2 antibody/ HIV-1 p24 antigen enzyme immunoassay #2</p> <p>600 (cut off for reactive result: &gt; 1.0)</p>	<p>HIV-1 p24 antigen enzyme immunoassay #3</p> <p>0.04 (cut off for reactive result: &gt; 0.25)</p>																																																																							
	<p>HIV 1 and 2 antibody Immunoblot - line probe assay*</p> <p>POSITIVE CONTROL:</p> <table border="1"> <thead> <tr> <th colspan="12">Line Reactivity:</th> </tr> <tr> <th>Line</th> <th>STREP</th> <th>3+</th> <th>1+</th> <th>+/-</th> <th>sgp120</th> <th>gp41</th> <th>p31</th> <th>p24</th> <th>p17</th> <th>sgp105</th> <th>gp36</th> </tr> </thead> <tbody> <tr> <td>Rating</td> <td>-</td> <td>3+</td> <td>1+</td> <td>+/-</td> <td>2+</td> <td>3+</td> <td>2+</td> <td>3+</td> <td>2+</td> <td>1+</td> <td>2+</td> </tr> </tbody> </table> <p>Patient J:</p> <table border="1"> <thead> <tr> <th colspan="12">Line Reactivity:</th> </tr> <tr> <th>Line</th> <th>STREP</th> <th>3+</th> <th>1+</th> <th>+/-</th> <th>sgp120</th> <th>gp41</th> <th>p31</th> <th>p24</th> <th>p17</th> <th>sgp105</th> <th>gp36</th> </tr> </thead> <tbody> <tr> <td>Rating</td> <td>-</td> <td>3+</td> <td>1+</td> <td>+/-</td> <td>-</td> <td>-</td> <td>2+</td> <td>3+</td> <td>-</td> <td>2+</td> <td>2+</td> </tr> </tbody> </table>			Line Reactivity:												Line	STREP	3+	1+	+/-	sgp120	gp41	p31	p24	p17	sgp105	gp36	Rating	-	3+	1+	+/-	2+	3+	2+	3+	2+	1+	2+	Line Reactivity:												Line	STREP	3+	1+	+/-	sgp120	gp41	p31	p24	p17	sgp105	gp36	Rating	-	3+	1+	+/-	-	-	2+	3+	-	2+
Line Reactivity:																																																																										
Line	STREP	3+	1+	+/-	sgp120	gp41	p31	p24	p17	sgp105	gp36																																																															
Rating	-	3+	1+	+/-	2+	3+	2+	3+	2+	1+	2+																																																															
Line Reactivity:																																																																										
Line	STREP	3+	1+	+/-	sgp120	gp41	p31	p24	p17	sgp105	gp36																																																															
Rating	-	3+	1+	+/-	-	-	2+	3+	-	2+	2+																																																															

There was a valid negative control for the line probe assay

This is the first ever sample received from this patient.

- 2.1 Interpret the serology result of Patient J.
- 2.2 Add comments as if you were reporting in your laboratory Information Management System (LIMS) and explain the rationale for your report.

- 2.3 What further information you would like to know from the requesting clinician and what further specific tests in relation to this pathogen would you advise?
- 2.4 List all the baseline pathogen-based laboratory investigations on blood samples for a patient with a new diagnosis of this infection [use precise pathogen-target scientific terminologies].

HANDOVER YOU ANSWER SHEET for 2.1 to 2.4 NOW.

Q 2.5 to 2.8 for 14 minutes

	Patient J
Clinical presentation	Asymptomatic
CD4 count in $10^6/L$ (430–1690)	50
plasma HIV-1 RNA in copies/ml (lower detection limit - 20)	Not done
plasma HIV-2 RNA in copies/ml (lower detection limit - 200)	10,000

( ) = normal range

- 2.5. Regarding Patient J, which classes of antiviral drugs are contraindicated?
- 2.6 Name three NRTI anti-retroviral drugs where there is evidence of efficacy in the type of HIV infection present in patient J.
- 2.7 Name three classes of antiretroviral drug where there is evidence of efficacy if used with an NRTI in the type of HIV infection present in patient J.

## **OSPACE section 2 verbal questions (Total duration = 60 minutes)**

Four compulsory verbal questions

(One minute to consider the case before examination, 10 minutes of verbal communication, 4 minutes to move to the next question)

Few examples given below:

Verbal Question 1:

A 46-year-old woman with systemic lupus erythematosus presented to her GP with features compatible with ophthalmic shingles. She was on prednisolone and azathioprine and her creatinine clearance was 35 ml/min. GP started oral aciclovir 800mg five times per day. Three days later, she presented to Emergency Department [ED] with confusion and was admitted. The ED registrar called you to discuss.

Verbal Question 2:

An orthopaedic surgeon sustained a penetrative injury from a sharp piece of bone when operating on a patient with multiple fractures following a road traffic accident. The source patient was thought to be an intravenous drug user. He remained unconscious after the operation and not expected to regain consciousness anytime soon. The injured surgeon called you for advice.

Verbal Question 3:

A 32-year-old male sewerage engineer presents with a 1-day history of fever, abdominal pain, headache, myalgia and drowsiness. He had just completed a 3-month assignment in rural Nigeria and returned to UK two days prior to his onset of illness. The Emergency Department registrar has called you to discuss.

Verbal Question 4:

The intensive care unit consultant calls you regarding a 40-year-old female with jaundice, dark urine, encephalopathy and multi-organ failure. The only unusual history is a new sexual partner. Discuss.