Higher Specialist Diploma

Cellular Pathology

September 2024

Short Answer Questions

60 minutes

Attempt all Four Questions

Instructions to Candidates

1. Record your candidate number and HSD discipline on the front sheet of the answer booklet.

2. Record your candidate number, the question number and the page number in the spaces provided on the answer sheets.

3. Begin each new answer on a new page.

4. Each question is worth 25 marks.

1. A pathologist requests that you investigate the presence of HPV in a skin biopsy of a warty lesion. Explain the tests you would perform to determine which HPV subtypes may be present and the subsequent significance of this pathologically.

2. A member of your team is uncertain on the appropriate antibody panel to carry out on a sample being investigated for malignant melanoma. Define the antibody panel that should be employed in this circumstance and state what each antibody recognises.

3. You are training colleagues who are undertaking their specialist portfolio in Cellular Pathology about the factors that can impact on good fixation in tissue processing. Define and explain five factors that you would include in such training.

4. You have been asked to do a presentation that explains the scope and range of internal and external quality control measures undertaken within cellular pathology. Explain what measures you would include in such a presentation.

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Essay Paper

120 minutes

Attempt 2 out of 5 Questions

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1. Record your candidate number and HSD discipline on the front sheet of the answer booklet.

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3. Begin each new answer on a new page.

4. Each question is worth 100 marks.

1. Critically appraise with examples the scope and range of immunocytochemistry based predictive tests performed within a cellular pathology department.

2. Explain and critique the steps we take to ensure specimen integrity and consistency of processing of tissue blocks when grossing tissue samples during histological dissection (cut-up).

3. Explain and define with examples the importance of temperature monitoring within a modern-day cellular pathology laboratory.

4. An antibody clone in use is under-performing. Explain the steps you would take to investigate this and the changes you would propose.

5. 'The cryostat is an obsolete piece of equipment that is no longer required in cellular pathology'. Discuss and critique this statement.

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Case Studies

120 minutes

Attempt all Case Studies

Instructions to Candidates

1. Record your candidate number and HSD discipline on the front sheet of the answer booklet.

2. Record your candidate number, the question number and the page number in the spaces provided on the answer sheets.

3. Begin **each new case study** on a new page.

4. Each case study is worth 100 marks.

5. For these case study questions you are strongly advised to answer the questions as they arise during the case study to avoid later information impacting adversely on your answers to the earlier questions by presuming an "outcome".

SEEN CASE STUDY

1.

A 77 year old male patient with a smoking habit of 30 cigarettes a day for over 50 years presents with haemoptysis and shortness of breath at his GP. A referral is made to the local hospital and at the initial respiratory care team request a bronchial washing and a bronchial brushing sample to be sent for cytology. An initial chest x-ray reveals a small mass close to the main left bronchus.

a. Critically review how the cytology samples should be handled. (10 marks)

An initial biopsy is taken.

b. Critically discuss the benefits the available processing regimes that could allow this specimen to be reported rapidly. (10 marks)

The initial H&E shows a pathological lesion.

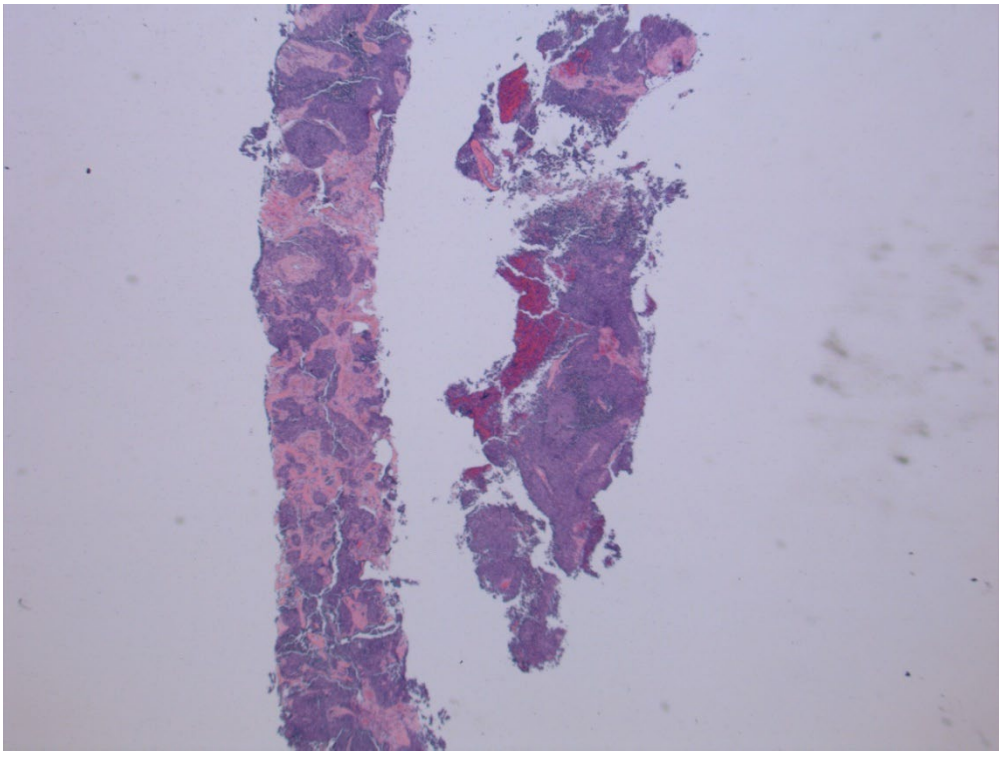

Figure 1 - Low power image of two core biopsies of lung (Mag x10)

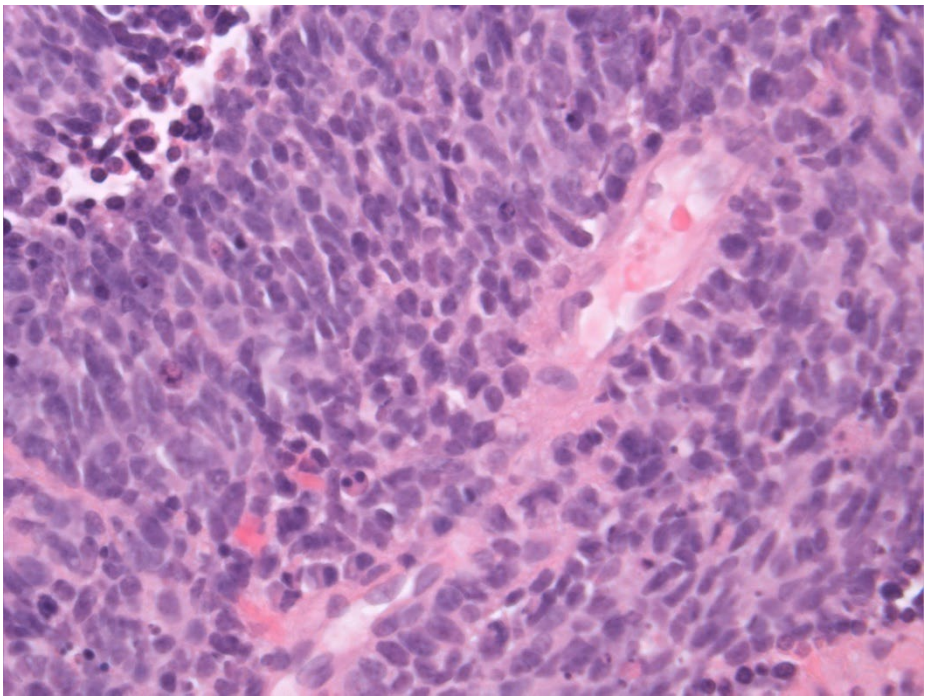

Figure 2 - High power image of the same lung biopsy (Mag X40)

c. Critically describe the histological appearance of the biopsies in terms of how the specimens relate to a sample of normal lung. (20 marks)

To confirm the source of the malignancy immunocytochemistry is requested.

d. Critically review the markers which could be selected to confirm a primary lung malignancy tumour. (20 marks)

e. Explain the potential value and role of immunocytochemistry predictive markers PDL-1 and Braf V600E in the assessment of this tumour (20 marks)

The patient is to be discussed at MDT to plan his treatment.

f. Explain why no further resection sample is removed from this patient. (10 marks)

Following the Respiratory MDT Anaplastic Lymphoma Kinase (ALK) and Epidermal Growth Factor Receptor (EGFR) molecular tests are requested.

g. Critically review the value of assessing ALK and EGFR status for patient treatment. (10 marks)

UNSEEN CASE STUDIES

2.

A 35 year old male, reports to his GP with painless swellings in his neck and axillae. He has pronounced fatigue and a fever with accompanying night sweats, and he has lost 3kg in weight over the past two months despite no alterations to his diet or increased exercise.

The GP arranges an X-ray, CT, and PET scan. In addition, blood tests are carried out and include assessments of red blood cell and white blood cell counts and liver and kidney function tests. A swollen lymph node from the axilla is first aspirated for cytological assessment and then removed for confirmatory histological evaluation.

a. Describe the process for fine needle aspiration and subsequent cytological preparation of the swollen lymph node. (15 marks)

b. Describe the macroscopic histological dissection procedure that would be carried out on the removed lymph node. (15 marks)

Following a review of the blood tests and subsequent HE stained slides from the lymph node. Large cells are seen in the lymph node with an 'owl's eye' appearance and these cells contain inclusion-like nucleoli. There are also the presence of abundant neutrophils and eosinophils forming small micro-abscesses. (See figure 1)

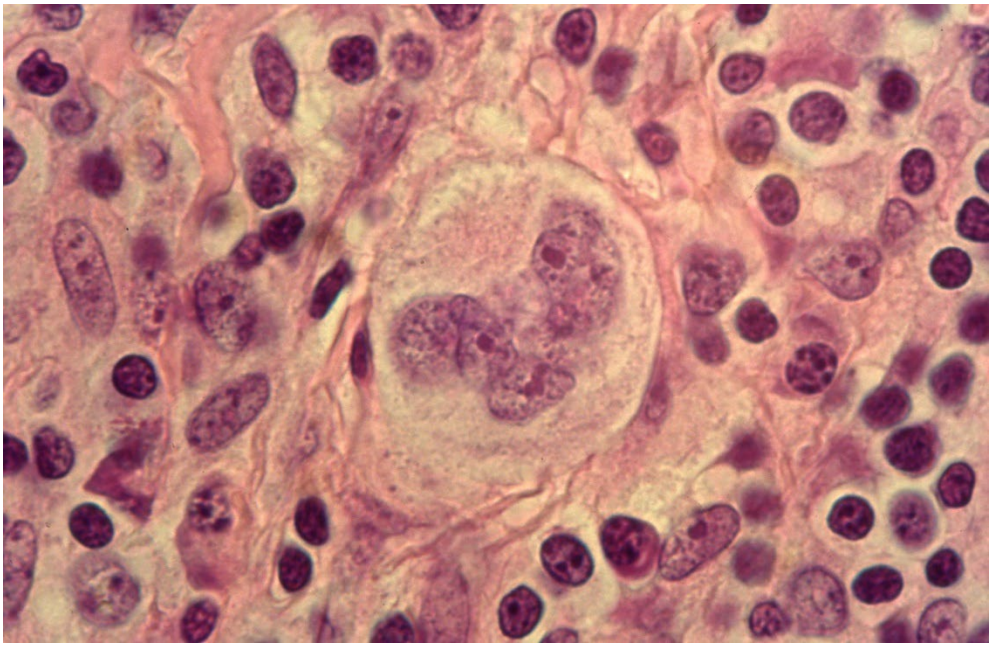

Figure 1

c. Based on the histological and cytological features described what is the likely diagnosis here and briefly describe the histological classification of this tumour. (20 marks)

d. What immunohistochemical markers should be employed to delineate the immunological profile of this tumour and support the diagnosis? (20 marks)

e. What *in-situ* hybridisation probe could be employed on histological sections from such a node? Explain the principles of in-situ hybridisation? (20 marks)

f. What is the lineage of the cell population causing this disease described above? Explain your answer in terms of the aetiology of the condition? (10 marks)

3.

A 23-year-old female, former biomedical scientist who had been working on a Kibbutz in the middle east burned herself on her left leg. She had been unwell for some weeks prior to the burn injury, complaining of tiredness and night sweats and was off her food and coughing bouts. She returned home to the UK with macules and papules and along with a characteristic plaque on the site of the burn injury. The pustules gave off a purulent discharge. A full blood count was undertaken and an ellipse biopsy was taken from the ulcerated lesion half was sent fresh to microbiology and the other half was sent for routine histological investigations. The provisional diagnosis suggested cutaneous infection of unknown aetiology.

a. Describe the histological cut up and subsequent tissue processing for such a sample. (20 marks)

The tissue block was embedded and an HE for routine morphology and the panel of special stains requested at cut up. The HE revealed a chronic granulomatous reaction (Figures 1, 2 and 3 below).

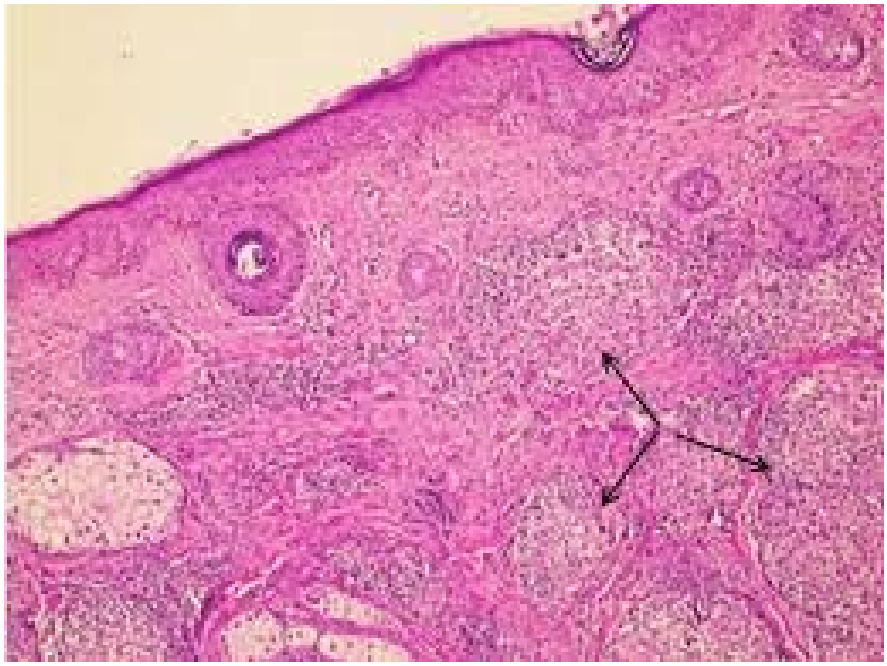

Figure 1 – Low Power Image (Mag x10)

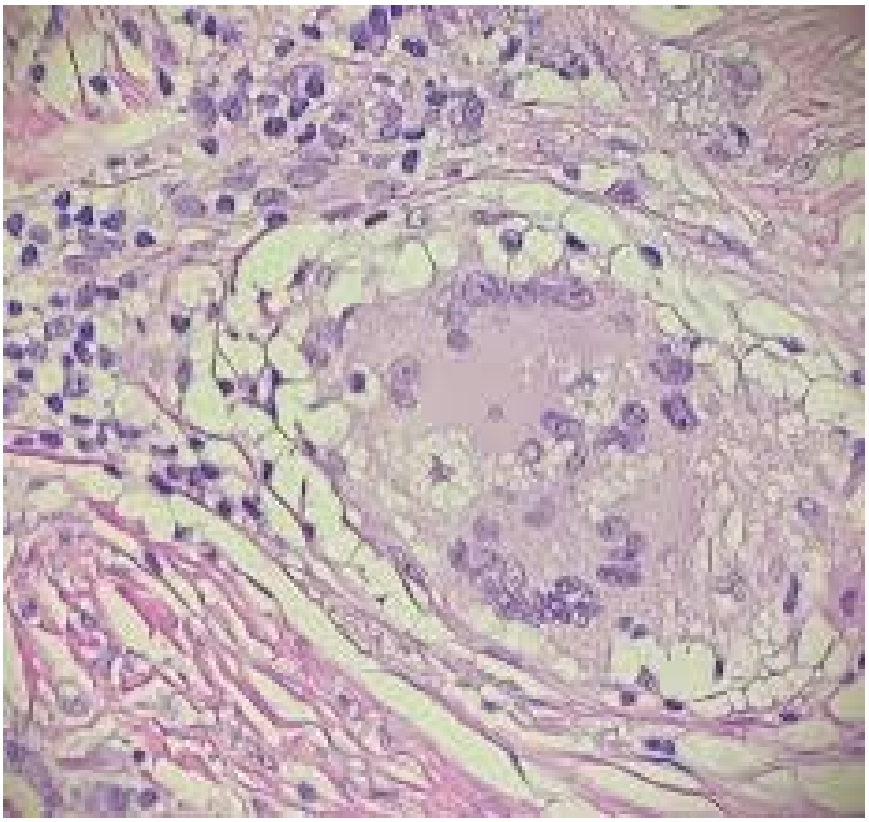

Figure 2 – High Power Image (Mag x40)

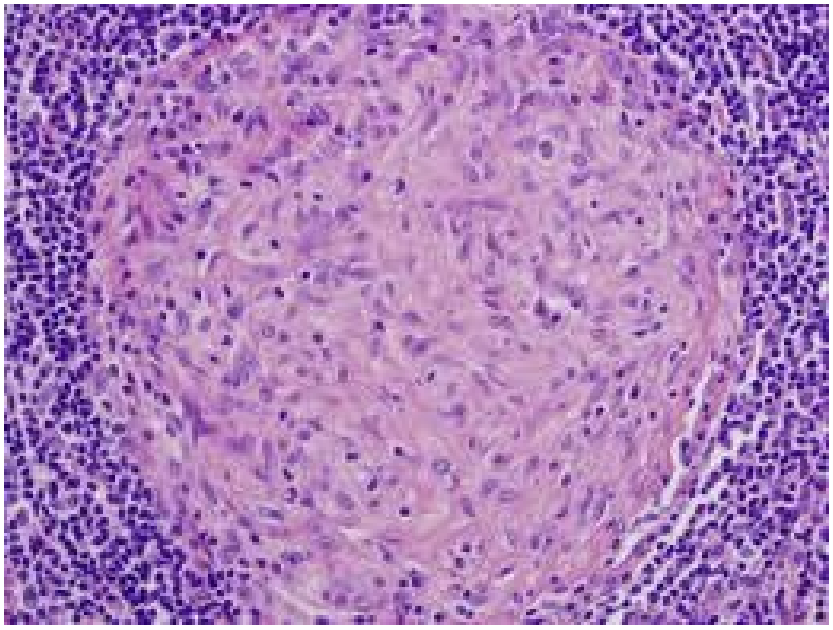

Figure 3 – High Power Image (Mag x40)

b. Describe and explain the cell types seen in a chronic granulomatous tissue reaction (20 marks)

c. Special stains revealed no evidence of bacteria, including atypical mycobacteria subtypes. What do these findings confirm about the possible aetiology of this patient's condition? (10 marks)

PAS and Grocott stains revealed evidence of branching hyphae, many appearing as right-angle branching hyphae. However, no obvious spores were seen.

d. What does this finding inform us about the suspected aetiology of this patient's skin lesion? (10 marks)

The other half of the biopsy was sent for culture in the microbiology department. After one week and subsequent plating and based on colony morphology, colour and the sporulation findings a diagnosis of cutaneous aspergillosis was made. Further investigations to determine whether this infection was a primary infection or one that represented a secondary dissemination from another site.

e. Based on the case information where would further investigations to determine another site now focus? (10 marks)

f. Explain what cytological procedures and tests may be appropriate in such an investigation? (20 marks)

g. In light of the findings in this case what does it tell you about the immune status of this patient? What possible other factors may become apparent on further subsequent investigations? (10 marks)