The Royal Australian and New Zealand College of Radiologists®

The Faculty of Radiation Oncology

Candidate Number: _____

FRANZCR Examination

Phase 2 Radiation Oncology

Pathology

27 October 2020

Time Allowed: 3 Hours

INSTRUCTIONS

ALL QUESTIONS are to be attempted.

There are a total of SIX (6) questions.

All questions are of equal value.

The marks allocated to each subpart is indicated in brackets.

Hand **all** papers to the invigilator.

No papers are allowed to be taken from the examination room.

THIS INCLUDES THE QUESTION PAPERS.

Question 1

A previously well 25-year-old female patient presents with bilateral supraclavicular and superior mediastinal adenopathy raising suspicion of her having a lymphoma.

a. What are the key microscopic & immunohistochemical features of nodular sclerosing Hodgkin's lymphoma? **(2 marks)**

b. List the criteria that define favourable early stage Hodgkin's lymphoma. **(1 mark)**

c. In advanced stage Hodgkin's lymphoma (Stage III – IV), the International Prognostic Score (IPS) may be used to stratify risk. **(1 mark)**

- **i.** List the criteria which constitute the International Prognostic Score.
- **ii.** Briefly comment on how the total score may impact on overall survival.

d. Briefly describe the clinical, microscopic & immunohistochemical features of:

- **i.** primary mediastinal B-cell lymphoma (PMBCL) **(2 marks)**
- **ii.** nodular lymphocyte predominant Hodgkin's lymphoma **(2 marks)**

e. Briefly describe the relationship between HIV infection and Hodgkin's lymphoma. **(2 marks)**

Question 2

A 63-year-old male presents with progressive shortness of breath and weight loss. A CT scan of the chest demonstrates a right middle lobe mass measuring 1.5cm in maximal diameter. You suspect malignancy.

a. Describe the various methods of obtaining a diagnosis of this lesion and the advantages and disadvantages of each procedure. **(3 marks)**

b. What immunohistochemical features allow you to distinguish between non small cell lung cancer (NSCLC), small cell lung cancer (SCLC) and mesothelioma. **(1 mark)**

c. For squamous cell carcinoma and adenocarcinoma subtypes of NSCLC compare the following; **(3 marks)**

- **i.** epidemiology & risk factors,
- **ii.** macroscopic features, and
- **iii.** microscopic features.

d. List the targetable mutations in NSCLC. **(1 mark)**

Of these, describe 4 commonly encountered molecular mutations in adenocarcinoma of the lung and their clinical significance. **(2 marks)**

Question 3

A 62-year-old man presents with painless jaundice. A CT scan of the abdomen shows a 4cm mass in the head of the pancreas.

a. List the three broad categories of genetic mutations that are involved in the molecular pathogenesis of pancreatic cancer. **(2 marks)**

For each category name genes that may undergo mutation.

b. For the development of exocrine pancreatic cancer, what are the **(3 marks)**

i. risk factors, and

ii. inherited cancer syndromes and their associated genes.

c. List the poor prognostic factors for survival in a patient who has undergone a pancreaticoduodenectomy for pancreatic ductal adenocarcinoma. **(3 marks)**

d. For pancreatic ductal adenocarcinoma describe **(2 marks)**

a. the macroscopic features,

b. the microscopic features, and

c. the biological behaviour of the tumour.

Question 4

A 37-year-old man presents with the incidental finding of a sellar lesion on an MRI Brain performed to investigate headache.

a. Give a differential diagnosis of a lesion arising in the sellar region. **(2 marks)**

b. In regards to secretory pituitary adenomas, explain how laboratory tests may help you to establish a subtype? **(2 marks)**

c. How does the WHO classify intracranial germ cell tumours? **(1 mark)**

d. In what locations do extra-gondal germ cell tumours arise? **(1 mark)**

e. Debulking of the sellar lesion is undertaken, confirming a germinoma. **(4 marks)**

Outline:

- **i.** the histologic features, **(1 mark**)
- **ii.** the immunohistochemical findings, **(1 mark)**
- **iii.** the clinical implication of an elevated serum bHCG in this setting, and **(1 mark)**
- **iv.** the clinical implication of an elevated serum AFP in this setting. **(1 mark)**

Question 5

a. Discuss the pros and cons of fine needle aspiration in the diagnosis of epithelial parotid neoplasms and how it can guide surgical management. **(2 marks)**

b. With regards to the following primary parotid neoplasms, compare and contrast their relative frequency, biological behaviour and how that behaviour influences treatment: **(5 marks)**

1. Warthin tumour.

2. Pleomorphic adenoma.

3. Adenoid cystic carcinoma.

c. The presence of perineural spread is recorded as part of structured pathology reporting for salivary gland malignancies.

i. List the specific histological characteristics of the perineural spread that may guide the decision for adjuvant radiotherapy. **(1 mark)**

ii. Apart from perineural spread, list the other adverse pathological features that can imply an increased risk of locoregional recurrence in salivary gland malignancies. **(2 marks)**

Question 6

a. Regarding prostate cancer, briefly describe;

i. the disadvantages associated with Trans-rectal ultrasound guided biopsies in the detection of prostate cancer. **(1 mark)**

ii. The role of; **(1.5 marks)**

a. saturation Biopsies,

b. trans urethral resection of the prostate (TURP) & biopsy, and

c. MRI targeted biopsies. List the techniques that may be used.

b. Regarding grading of Prostate cancer on a biopsy specimen, describe:

i. the issues associated with the Gleason score grading system, and **(1 mark)**

ii. the Criteria used in the International Society of Urological Pathology (ISUP) grading system to grade Prostate cancer **(2 marks)**

c. In a patient with Prostate cancer undergoing a radical prostatectomy, list & briefly comment on all the core elements that should be included in the synoptic histopathology reporting of the surgical specimen. **(3 marks)**

d. Describe the role of Prostate specific antigen (PSA) in monitoring a patient following a radical prostatectomy. **(1.5 marks)**

The Royal Australian and New Zealand College of Radiologists®

The Faculty of Radiation Oncology

Candidate Number: _____

FRANZCR Examination

Phase 2 Radiation Oncology

Clinical Oncology

27 October 2020

Time Allowed: 3 Hours

INSTRUCTIONS

ALL QUESTIONS are to be attempted.

There are a total of SIX (6) questions.

All questions are of equal value.

The marks allocated to each subpart is indicated in brackets.

Hand **all** papers to the invigilator.

No papers are allowed to be taken from the examination room.

THIS INCLUDES THE QUESTION PAPERS.

Question 1

a. A 76-year-old woman with metastatic ovarian cancer presents with severe flank pain and a large paraspinal, soft tissue metastasis involving the psoas muscle and vertebral bodies of L2 and L3. **5 marks**

Discuss the pharmacological pain management options for this woman. Include in your answer the rationale, advantages and disadvantages for each class of drug.

b. She receives palliative radiation for the paraspinal mass with good effect. Six months later she presents with progressive intra-abdominal and peritoneal disease, generalised abdominal pain and vomiting. **2 marks**

Discuss the management of recurrent, malignant small bowel obstruction in this setting.

c. With no further systemic therapy options and deteriorating performance status she is admitted to the palliative care unit. In general, discuss the strategies involved in a holistic approach to end of life care. **3 marks**

Question 2

Considering survivorship clinics:

a. In general, what factors must be considered in the long term follow up of patients in Paediatric Cancer Survivorship clinics. How would you address these factors? **6 marks**

b. In Oestrogen Receptor positive Breast Cancer survivors, improvements in overall survival are dependent on long term administration of endocrine therapy. What are the barriers to compliance to long term endocrine therapy and how would you address them? **4 marks**

Question 3

a. Discuss the role of systemic therapy in the management of metastatic prostate cancer. Include in your answer the class of agents used, duration of therapy and justification for use. **5 marks**

b. Androgen deprivation therapy is associated with a number of potential side effects. Discuss the management of these potential side effects including preventative strategies that are used to minimise toxicity. **3 marks**

c. Discuss the role of intermittent androgen deprivation therapy (ADT). Include in your discussion the expected testosterone and Prostate Specific Antigen (PSA) dynamics following cessation of ADT and a threshold for restarting ADT. **2 marks**

Question 4

a. Most oncology clinical trials include collection of quality of life data.

i. In general, what are the methodological problems associated with collecting and evaluating quality of life data? **2 marks**

ii. What specific problems may be encountered in assessing quality of life in patients with brain metastases? **2 marks**

b. A Forest plot is often used to represent data in a meta-analysis. **2 marks**

Describe the main components of a Forest plot when used in this setting. You may use a diagram to help illustrate your answer

c. What is the definition of a surrogate end point? **4 marks**

Give three examples of surrogate endpoints.

What are the advantages and disadvantages of using surrogate end points in oncology clinical trials?

Question 5

a. In general, what are the components of a comprehensive geriatric assessment? Discuss the advantages and disadvantages of using such a tool. **4 marks**

b. In general, what advances in treatments for head and neck cancer may benefit elderly patients? Discuss how these advances might benefit the elderly. **3 marks**

c. An 80-year-old man with a past history of prostatectomy presents with an elevated PSA. Restaging with PSMA PET shows 2 asymptomatic bone metastases with no visceral disease. **3 marks**

List the treatment options and then discuss factors that you would take into account when deciding on the optimal treatment for this patient.

Question 6

a. Prostate cancer treatments may be associated with sexual dysfunction. For each of the major treatment modalities discuss the potential sexual dysfunction symptoms which may occur including aetiology and expected time course. **4 marks**

b. What are the pharmacological and non-pharmacological management options for erectile dysfunction? Provide two examples of pharmacological treatment, briefly describe their mode of action and list important side effects. **3 marks**

c. A 50-year-old woman presents with worsening dyspareunia 12 months after completing curative intent chemoradiotherapy for SCC of the anal canal. Discuss your management. **3 marks**

The Royal Australian and New Zealand College of Radiologists®

The Faculty of Radiation Oncology

Candidate Number: _____

FRANZCR Examination

Phase 2 Radiation Oncology

Radiation Therapy 1

26 October 2020

Time Allowed: 2.5 Hours

INSTRUCTIONS

ALL QUESTIONS are to be attempted.

There are a total of FIVE (5) questions.

All questions are of equal value.

The marks allocated to each subpart is indicated in brackets.

On completion, hand **all** papers to the invigilator.

No papers are allowed to be taken from the examination room.

THIS INCLUDES THE QUESTION PAPERS.

Question 1

A fit 44-year-old male presents with gait disturbance, headache and nausea. He is found to have a mass in the posterior fossa with imaging features suggestive of a medulloblastoma.

a. Describe your initial management. **(3 marks)**

b. Staging investigations reveal an isolated mass in the left cerebellar hemisphere. A gross total resection is performed. The histology is large cell medulloblastoma. **(3 marks)**

Describe the post-operative management of this patient.

c. A decision has been made to treat the patient with post-operative radiation. Describe a suitable radiation therapy technique and dose fractionation schedule. Discussion of organs at risk is not required. **(4 marks)**

Question 2

A 75-year-old female presents with postmenopausal bleeding. Biopsy confirms endometrial cancer and she proceeds to surgery.

a. Discuss the prognostic factors for recurrence following surgery. **(2 marks)**

b.

i. What are the indications for vaginal brachytherapy in the post-operative setting? **(2 marks)**

ii. It is decided to proceed with adjuvant high dose rate vaginal brachytherapy in this patient. **(3 marks)**

Describe a suitable radiation technique and dose fractionation schedule.

c.

i. List the possible toxicities associated with vaginal brachytherapy. **(1 mark)**

ii. Discuss the use of chemotherapy in uterine cancer including in your answer the rationale for its use. **(2 marks)**

Question 3

A 70-year-old male undergoes excision of a 2.0cm skin lesion from the right forehead. Histopathology demonstrates a poorly differentiated squamous cell carcinoma (SCC) with extensive perineural invasion extending beyond the tumour edge but with clear resection margins.

a. How would you further assess this patient? **(3 marks)**

b. He has a 4cm horizontal scar over the right lateral forehead 2cm above the eye with no signs of local recurrence. There is no altered sensation and no lymphadenopathy. **(5 marks)**

Histology shows a 2.0cm x 1cm x 7mm thick poorly differentiated SCC. Peripheral margins are well clear, the deep margin is 0.3mm. There is evidence of perineural spread involving several nerves up to 0.2mm in diameter at the deep margin.

There are no signs of further disease on examination or imaging.

A decision is made to proceed with adjuvant radiation therapy. Describe a suitable radiation therapy technique and dose fractionation schedule.

Your answer should include a detailed description and justification for your choice of target volumes and what potential complications you would discuss with this patient.

c. List factors which increase the risk of nodal involvement in cutaneous SCC of the head and neck region. **(2 marks)**

Question 4

A previously well 45-year-old female presents with chest pain and is found to have an anterior mediastinal mass. A CT guided biopsy confirms thymoma, Type B1. She is discussed at a multidisciplinary meeting and undergoes resection.

a. In general; **(4 marks)**

i. What are the controversies around the utility of adjuvant radiotherapy for thymoma?

ii. What are the indications for radiation therapy in thymoma?

b. The patient undergoes surgery and the surgeon reports that macroscopic disease remains across a broad front at the level of the aortic arch. A decision is made to treat with radiation therapy. Describe the radiation volumes, dose and dose constraints for this patient. **(3 marks)**

c. Twelve months after treatment the patient presents with symptoms of late radiation oesophagitis. Discuss the possible presentation, investigation and management options for late oesophageal toxicity. **(3 marks)**

Question 5

A fit 45-year-old male presents with a 6-month history of rectal bleeding and abdominal pain. Sigmoidoscopy shows a mid-rectal tumour with the inferior margin 6cm from the anal verge. Biopsy confirms an adenocarcinoma.

a. What further investigations would you recommend in order to formulate a treatment plan? **(2 marks)**

Justify your recommendations.

b. The patient is clinically staged as having an adenocarcinoma of the mid rectum with tumour invading the prostate gland. Multiple mesorectal lymph nodes are present. (cT4N2M0). A decision is made to proceed with pre-operative, long course chemo-radiotherapy to the pelvis. **(3 marks)**

Describe a suitable radiation therapy technique and dose fractionation schedule.

c. The patient develops biopsy confirmed oligometastatic liver metastases from rectal cancer. **(5 marks)**

Discuss the options for liver directed treatment for this patient.

Include in your answer, the advantages and disadvantages for each option.

The Royal Australian and New Zealand College of Radiologists®

The Faculty of Radiation Oncology

Candidate Number: _____

FRANZCR Examination

Phase 2 Radiation Oncology

Radiation Therapy 2

26 October 2020

Time Allowed: 2.5 Hours

INSTRUCTIONS

ALL QUESTIONS are to be attempted.

There are a total of FIVE (5) questions.

All questions are of equal value.

The marks allocated to each subpart is indicated in brackets.

On completion, hand **all** papers to the invigilator.

No papers are allowed to be taken from the examination room.

THIS INCLUDES THE QUESTION PAPERS.

Question 6

A 70-year-old male presents with an enlarging anterior neck mass. A CT scan demonstrates a left thyroid mass. Fine needle biopsy shows anaplastic thyroid carcinoma.

a. What further investigations would you recommend in order to formulate a treatment plan? **(2 marks)**

Justify your recommendations.

b. The patient undergoes total thyroidectomy and bilateral levels II-VI neck dissection. Histology shows anaplastic thyroid cancer with clear resection margins at the thyroid bed. 30 lymph nodes removed were negative for tumour. **(3 marks)**

A decision is made to treat with adjuvant radiation therapy.

Describe a suitable radiation therapy technique and dose fractionation schedule.

c. Discuss the role of systemic therapy in anaplastic thyroid cancer? **(2 marks)**

d. In general, describe the role of radioactive iodine in the management of thyroid cancer. **(3 marks)**

Question 7

A fit 60-year-old male is diagnosed with a locally advanced squamous cell carcinoma of the glottic larynx with bilateral cervical lymph nodes. There is no evidence of distant metastatic disease. (Stage T3N2cM0)

a. Discuss the advantages and disadvantages of the different treatment strategies available for locoregionally advanced laryngeal carcinoma (Stages III and IV). **(5 marks)**

b. List the factors which increase the risk of stomal recurrence in patients receiving post-operative radiotherapy after total laryngectomy for laryngeal cancer. **(3 marks)**

c. List the factors which increase the risk of laryngeal necrosis with definitive radiotherapy/chemoradiotherapy for larynx cancer. **(2 marks)**

Question 8

A fit 62-year-old female undergoes a wide local excision and sentinel node biopsy for a left breast cancer. Pathology shows a 12mm grade 1 invasive carcinoma, LVI negative, node negative, ER positive and HER 2 negative. The closest margin is 5mm (T1cN0M0).

a. What is the rationale for, and evidence to support, offering adjuvant whole breast radiation therapy to this patient? **(2 marks)**

b. Hypofractionation has become the standard of care in this setting.

i. What is the evidence to support its use? **(1 mark)**

ii. What is the rationale for its use and why is it regarded as preferable to conventional fractionation? **(1 mark)**

c. Describe a suitable radiation therapy technique and dose fractionation schedule for this patient. **(3 marks)**

d. In general, when treating internal mammary chain nodes (IMC) in node positive breast cancer; **(3 marks)**

i. Describe how you would delineate your CTV and PTV including the relevant anatomical landmarks.

ii. Outline three different treatment techniques that could be used to cover the IMC volume when treating it in conjunction with the chest wall.

iii. State your dose prescription and what target coverage you would accept.

Question 9

A 56-year-old female presents with epigastric pain and weight loss. Gastroscopy demonstrates an ulcerating distal gastric lesion. Biopsy confirms an adenocarcinoma of the stomach.

a. How would you further investigate this patient. Justify your answers. **(2 marks)**

b. Staging Investigations show the patient has a resectable adenocarcinoma of the stomach with no evidence of distant metastatic disease. **(5 marks)**

Discuss the treatment options available and the evidence to support their use.

c. The tumour is in the body of the stomach and invading into subserosal connective tissue (T3) without obvious lymph node enlargement on preoperative staging. **(3 marks)**

The decision has been made to give preoperative radiation therapy.

Describe a suitable radiation technique and dose prescription.

Question 10

A fit 48-year-old male, 18 months after initial radical treatment of non-small cell lung cancer (NSCLC), is found to have 4 asymptomatic brain metastases in the non-eloquent brain. All are less than 1.5cm in size. He has no other sites of disease.

a. What are the radiation therapy options to treat these brain metastases? **(2 marks)**

What would be your preferred approach? Justify your answer.

b. Describe a suitable radiation therapy technique and dose/ fractionation schedule to deliver hippocampal sparing whole brain radiotherapy to a fit patient with 20 small NSCLC brain metastases and controlled systemic disease. Include the dose limits for organs at risk. **(4 marks)**

c. Discuss systemic therapies which may be useful for treating brain metastases in non-small cell lung cancer. **(4 marks)**