

Radiation Therapy Past Examination Papers

1999 – 2009

**There are a total of six (6) questions per Radiation Therapy I paper
Time allowed: 3 hours**

**There are a total of four (4) questions per Radiation Therapy II paper
Time allowed: 2 hours**

JULY 2009

RADIATION THERAPY 1

Question 1

You have been invited by your gynaecological oncology colleague to participate in an examination under anaesthesia of a patient with localised cervical cancer.

- a) What factors would influence your decision to recommend to the patient either chemo-Radiation Therapy or surgery as primary management?
- b) The patient had a radical hysterectomy and pelvic lymph node dissection. The histopathology report revealed that two right obturator lymph nodes contained metastatic squamous cell carcinoma. The remaining fifteen pelvic nodes were free from disease.
Describe and justify your plan for her further management.

Question 2

A 75 year old woman presented with a 10 mm diameter, node negative, grade 1, infiltrating ductal cancer of her right breast after undergoing a wide local excision and sentinel lymph node biopsy. The tumour was ER +, PR+ and Her2 – with widely clear margins. She has been referred to you for an opinion regarding adjuvant Radiation Therapy.

- a) Describe and justify her subsequent treatment options.
- b) She opted for adjuvant Radiation Therapy. Describe a suitable dose prescription and treatment technique.

Question 3

A 60 year old man presented with right proptosis. An MRI demonstrated an enhancing retro-orbital mass. Biopsy confirmed a marginal zone non-Hodgkin Lymphoma.

- a) What would be your management plan for this patient?
- b) His clinical stage is IAE. The MDT has recommended Radiation Therapy as primary treatment. Describe a suitable dose prescription and treatment technique. What would be the outcome of this treatment?

Question 4

A fit 73 year old man was referred to you following a prostate biopsy which showed an adenocarcinoma, Gleason score 7 (3+4) with extensive tumour involvement of both lobes. He had a PSA of 17.0 ng/ml and a malignant feeling prostate with clinical evidence of extraprostatic extension (T3a). The rest of his examination and investigations showed no evidence of metastatic disease.

- a) What treatment options would you discuss with this patient?
- b) Assuming that he opted for neo-adjuvant hormones and external beam Radiation Therapy, describe in detail a suitable Radiation Therapy treatment technique and dose prescription.
- c) Describe the measures that you could adopt to improve target localisation and minimise random errors during his

Radiation Therapy course.

Question 5

A 53 year old woman underwent a near-total thyroidectomy and modified right neck dissection for a differentiated thyroid cancer arising from the right lobe. The histopathology review confirmed a 50 mm well-differentiated papillary thyroid carcinoma with tumour extending beyond the thyroid capsule and invading soft tissue close to the trachea. There was a positive resection margin (T4a). Two right paratracheal lymph nodes contained metastatic deposits.

- a) Describe and justify a postoperative management plan for this patient.
- b) The MDM recommended that external beam Radiation Therapy be part of her post operative management. Describe in detail a suitable treatment technique and dose prescription. What would be the outcome of this treatment?

Question 6

A 44 year old woman with a history of a Clark level IV melanoma excised from her left arm 4 years ago presented with left axillary lymphadenopathy. FNA confirmed metastatic melanoma. Examination and investigations showed no other sites of disease. She underwent a level 3 left axillary dissection.

- a) What information from her pathology report would assist you in deciding whether to recommend post operative Radiation Therapy? What evidence can you give to justify your recommendation?
Assuming that you decided to offer her post operative Radiation Therapy, describe in detail a suitable treatment technique and dose prescription. What would be the expected outcome of this treatment?
- b) Describe in detail a suitable treatment technique and dose prescription. What would be the expected outcome of this treatment?

RADIATION THERAPY 2

Question 1

A 52 year old female presented with left sided abdominal pain and sciatica. A CT scan of her abdomen and pelvis revealed a left retroperitoneal mass measuring 90 mm X 10 mm (axial) X 150 mm (cranio-caudal). It extended from the inferior border of the kidney to S2, and the appearance was highly suggestive of a soft tissue sarcoma. The mass encased the lower pole of the left kidney and was intimately related to the left psoas muscle.

- a) How would you investigate this patient?
- b) The patient was found to have a high grade liposarcoma with no evidence of metastatic disease. The MDT recommended treatment with a potentially curative outcome.
What treatment options are available for this patient, and what factors would influence your recommendation?
Describe a suitable technique and dose prescription for preoperative Radiation Therapy for this patient. In your answer, include a description of potential late toxicities and the expected outcome of your treatment.
- c) Describe in detail a suitable treatment technique and dose prescription for preoperative Radiation Therapy for this patient. In your answer, include a description of potential late toxicities and the expected outcome of your treatment.

Question 2

A 61 year old female presented with a 2 month history of increasing dyspnoea and mild haemoptysis. CT scan of the chest showed a 75 mm X 55 mm X 50 mm mass in the upper lobe of his left lung extending to the hilum. A 10 mm pre-carinal lymph node was also seen. Bronchoscopic biopsy confirmed small cell lung carcinoma. A PET scan showed an FDG avid mass in the left upper lobe without evidence of nodal or distant metastatic disease. The patient was otherwise well, ECOG 1, and had no weight loss.

- a) Describe how you would manage this patient. Include in your answer the rationale, indications and use of Radiation Therapy.
Describe a suitable treatment technique and dose prescription for thoracic irradiation including the expected outcome of this treatment.
- b) Describe in detail a suitable treatment technique and dose prescription for thoracic irradiation including the expected outcome of this treatment.

Question 3

A 33 year old male presented with rectal pain, PR bleeding and moderate obstructive symptoms. Colonoscopy revealed a large anterior rectal tumour situated 40 mm from the anal verge. Biopsy confirmed the tumour to be an adenocarcinoma and the local stage was assigned as T3N1 according to an MRI study. A CT scan showed a solitary 15 mm metastasis in the right lobe of the liver which was deemed to be resectable. There was no other evidence of metastatic disease.

- a) What would be your management plan for this patient? **(4 marks)**
- b) Describe a suitable technique and dose prescription for preoperative irradiation. In your answer, include a description of the regions that need to be included in the CTV. **(4 marks)**
- c) Three years following initial treatment, the patient developed a rising CEA. Investigations revealed an isolated local recurrence on the left pelvic side wall measuring 20 mm. There were no other sites of disease and the patient was well and asymptomatic, ECOG 0. Briefly describe your approach to further management. **(2 marks)**

Question 4

A 65 yr old woman was diagnosed with a loco-regionally advanced right oropharyngeal squamous cell carcinoma. The primary tumour measured 25mm, located in the vallecula. There were two 20mm level II lymph nodes in her right neck. Her performance status was ECOG 0 and she had no co-morbidities. The MDT recommended definitive radiation therapy with weekly cisplatin.

- a) Describe and justify your planning target volumes, treatment technique and dose prescription that you would use in the delivery of radiation therapy.
- b) How would you minimise the potential impact of xerostomia on this patient?
- c) Four weeks after the completion of radiation therapy there was a complete response of the primary tumour and a persistent 15mm right level II lymph node. What would be your management plan?

FEBRUARY 2009

RADIATION THERAPY 1

Question 1

A 40 year old male presents with a 4 week history of worsening dyspnoea on exertion and mild headache. Clinical examination reveals upper limb oedema and distended superficial veins over the neck, chest and upper abdomen. A contrast-enhanced CT scan demonstrates a mediastinal mass measuring 6cm and occluding the SVC by extrinsic compression.

- a) What is the differential diagnosis in this situation?
- b) What would be your initial management and investigation of this patient?

A CT-guided biopsy reveals malignant thymoma. Staging investigations show no distant metastases.

- c) Describe a suitable technique and dose prescription for the management of inoperable malignant thymoma using radiation therapy with curative intent.

Question 2

A previously fit and well 52 year old woman presents with diarrhoea and weight loss. Imaging reveals a mass in the head of the pancreas. Biopsy confirms adenocarcinoma.

- a) Describe and justify your initial management plan for this patient. Discuss the use of radiation therapy in the management of patients with pancreatic cancer in general.
- b)

The above patient is considered to have unresectable disease. CT and PET scans reveal no distant metastases. She elects to have 'high dose' radiation therapy.

- c) Describe a suitable radiation therapy technique and dose prescription for her treatment.

Question 3

A fit 65 year old man presents with a 2 month history of sore throat and progressive hoarseness. Clinical examination reveals a 4cm left-sided neck node (level II). FNA biopsy of the node confirms squamous cell carcinoma. Laryngoscopy demonstrates

an ulcerated exophytic lesion arising from the epiglottis. The tumour extends inferiorly with fixation of the left vocal cord (T3N2).

- a) What further information do you require before making a decision about this patient's treatment?

A decision is made in the multidisciplinary team meeting to treat this man without surgery.

- b) Describe and justify your management plan. Include details of an appropriate radiation technique and dose prescription.

At 6 weeks post-treatment, the cervical lymph node is still palpable and measures 1.5cm.

- c) What would your approach be to his further management?

Question 4

A 72 year old man presents with a rapidly growing squamous cell carcinoma on the vertex of his scalp. This measures 3cm in diameter and is 1cm thick. There are no palpable lymph nodes. He also has advanced myelofibrosis and his current platelet count is $15 \times 10^9/L$. He is not deemed a surgical candidate.

- a) Discuss the factors that impact on the decision regarding his treatment.
- b) Describe a suitable technique for treatment with radiation, including a dose prescription.
- c) What is the likely response and late toxicity of this treatment?

Question 5

A 5 year old child is to receive craniospinal radiation therapy for a subtotally-resected medulloblastoma of the posterior fossa. There is no evidence of spread beyond the posterior fossa on MRI.

- a) Describe a suitable technique for craniospinal radiation therapy.
- b) Discuss the challenges in ensuring that the dose distribution is adequate for this treatment. Give examples of how the dose distribution may be optimised.
- c) Describe how multidisciplinary care may improve paediatric oncology patient outcomes during the process of treatment and follow up.

Question 6

A 42 year old woman presents with rectal bleeding. Examination under anaesthesia shows a 4cm pedunculated tumour arising from the lower anal canal. Excision biopsy of this lesion confirms basaloid carcinoma with a 1mm clear excision margin. Physical examination is otherwise normal. A staging CT scan shows a 2cm right inguinal node. There are no other radiological abnormalities. FNA of the right inguinal node confirms basaloid carcinoma.

- a) Outline your management plan for this patient.
- b) Describe a suitable radiation therapy technique in detail, including a dose prescription.
- c) What acute toxicities is this patient likely to experience and how would you manage these?
- d) What is this woman's likely outcome?

RADIATION THERAPY 2

Question 1

A 28 year old man presents with a painless mass in the right inguino-femoral region. He has no other symptoms. Examination is otherwise unremarkable. A core biopsy of the 2.5 x 4cm mass reveals nodular sclerosing Hodgkin's disease. A staging CT scan shows no disease elsewhere.

- a) What treatment options are available for this patient, assuming that there are no adverse prognostic features?

A decision is made to treat this patient with combined chemo-radiation therapy.

- b) Describe in detail a suitable radiation therapy technique and dose prescription.
c) How would you counsel this patient regarding fertility?

Question 2

A fit 57 year old man is referred to you for an opinion regarding brachytherapy. His prostate feels normal and measures 35cc on ultrasound. The biopsy report showed Gleason score 3+3=6 adenocarcinoma in 3/12 cores from the right base and midzone. A recent PSA was 8.4 ng/ml.

- a) What would you tell this man about his suitability for low dose rate 'seed' brachytherapy?
Would you do any more tests and why?
b) List the steps in planning and treatment (in general terms) that are involved with this procedure.
c) Outline how you might assess the quality of a low dose rate prostate brachytherapy implant.
d)

Question 3

A 79 year old woman presents with anaemia and post-menopausal bleeding. Examination in the clinic reveals a bulky uterus. Cervical cytology is consistent with a serous papillary carcinoma of the uterus. A CT scan of the abdomen and pelvis demonstrates no metastatic disease.

- a) Describe your management plan for this woman and justify your recommendations.

She recovers well after hysterectomy and bilateral salpingo-oophorectomy (TAHBSO). Pathology confirms serous papillary carcinoma extending to the serosa but otherwise confined to the uterus.

- b) Describe a suitable technique and dose prescription for post-operative radiation therapy in this woman.
c) Describe the circumstances in which you would either allow a break in, or cease altogether, this woman's radiation treatment.

Question 4

Bone metastases are treated with a variety of commonly-employed radiation schedules.

- a) What are these fractionation schedules and how effective are they? Include in your answer any evidence for the comparative efficacy of these schedules.
b) Discuss specific clinical situations (involving bone metastases) in which you would prescribe one schedule in preference to another. Justify your answer.

JULY 2008

RADIATION THERAPY 1

Question 1

A 38 year old female presented with PV bleeding. Her haemoglobin was 60 g/L and a blood transfusion was initiated. At EUA she was noted to be bleeding profusely from an ulcerated cervical tumour measuring 5.0X6.0cm with extension into the left parametrium (FIGO Stage IIB). A cervical biopsy confirmed squamous cell carcinoma.

- a) Describe your initial management.
b) Her staging investigations showed no evidence of nodal or distant metastases. Describe the treatment you recommend and the rationale and evidence supporting this.

- c) Describe in detail a suitable Radiation Therapy treatment technique and dose prescription.

Question 2

- a) What are the management options for patients who develop brain metastases (solitary or multiple) following treatment of their original cancer?
- b) A 55 year old male, who had surgery for non-small cell lung cancer a year ago, developed an inoperable solitary brain metastasis measuring 2.0X2.0cm. His performance status is good (ECOG 0). Staging investigations, including a PET scan showed no other disease. Describe in detail a suitable Radiation Therapy technique and dose prescription to treat this man.

Question 3

A 64 year old man presented with right shoulder pain radiating down his right forearm and hand. CT and PET scan revealed a large metabolically active mass involving the apex of the right lung with a metabolically active lymph node in the right hilum, but no other evidence of metastatic disease. CT-guided biopsy confirmed squamous cell carcinoma. The patient was fit (ECOG 1) and had no weight loss.

- a) A decision is made to treat this patient with preoperative chemoradiation and surgery. What is the rationale for preoperative chemoradiation? Describe in detail a suitable radiation technique and dose prescription.
- b) If the patient had unresectable disease due to chest wall invasion, describe in detail a suitable technique and dose prescription for treatment with radical chemoradiation, including a description of potential toxicities and normal tissue dose constraints.

Question 4

A 53 year old man was diagnosed with carcinoma of the oesophagus. Endoscopy and CT scan demonstrated a 4 cm long adenocarcinoma in the lower third of the oesophagus extending from 29-33 cm. Endoscopic ultrasound demonstrated a T3N0 tumour and PET scan showed no metastases. He had mild dysphagia and minimal weight loss, but was otherwise fit and well.

- a) Describe the curative treatment options available for this patient and the evidence supporting each approach.
- b) Describe in detail a suitable Radiation Therapy technique and dose prescription for treating this patient with radical chemoradiation. In your answer, include your dose constraints for organs at risk.
- c) What is the expected outcome of your treatment described in (b)?

Question 5

A 45 year old female has been referred to you with a large mass in the posterior aspect of her left thigh. An ultrasound revealed a large complex mass measuring 18 X 8 X 8 cm in the posterior compartment of the thigh, which was highly suggestive of a soft tissue sarcoma.

- a) Describe your initial management of this patient.
- Investigations show a high grade liposarcoma with no evidence of metastatic disease, and the patient is to be treated with curative intent.
- b) What are the curative treatment options for this patient?
- c) Describe in detail a suitable Radiation Therapy technique and dose prescription for preoperative Radiation Therapy.
- d) What are the potential late toxicities of the radiation treatment described in (c)?

Question 6

A fit 54 year old man presented with epistaxis and bilateral neck nodes. Examination and investigations confirmed non-keratinising squamous cell carcinoma (WHO type II) of the nasopharynx, stage T3 N2 M0 (tumour invades into sphenoid sinus and bilateral level II & III nodes, all less than 6 cm).

- a) Describe your management plan for this man and justify your recommendations with supportive evidence.
- b) Describe in detail a suitable Radiation Therapy technique and dose prescription for this man.
- c) What are the potential long term side effects and what is the expected outcome from your recommended treatment?

FEBRUARY 2008

RADIATION THERAPY 1

Question 1

A fit 64 year old woman was diagnosed with a grade 1 endometrioid adenocarcinoma of the endometrium, extending 4mm through the myometrial wall of 19mm thickness (FIGO 1b). She did not receive any adjuvant therapy.

Eighteen months later, she now presents with post menopausal bleeding. At examination under anaesthesia, a 4cm diameter ulcerated mobile mass is seen at the vaginal vault. Punch biopsies of the mass confirm a grade 2 adenocarcinoma. CT scan of the thorax, abdomen and pelvis demonstrates a well circumscribed mass at the level of the vaginal vault and no evidence of metastatic disease.

- a. Describe your management plan for this woman and justify your recommendations.
- b. Describe a suitable Radiation Therapy technique and dose prescription for treating this woman. What is the expected outcome?

Question 2

A fit 60 year old woman presented with a mammography-detected lesion in the lower outer quadrant of her right breast. She had a hookwire localisation, wide local excision and axillary sentinel lymph node biopsy. The pathology report described a 12mm ductal carcinoma grade 1 with definite clear margins, no ductal carcinoma in situ, and no lympho-vascular invasion. None of two sampled sentinel lymph nodes had metastatic disease. The cancer was strongly oestrogen and progesterone receptor positive and Her2 negative.

- a. Describe and justify any adjuvant therapy that you would offer this woman.
- b. Describe a suitable radiotherapeutic technique and dose prescription for this woman.
- c. Outline the approaches being evaluated in current clinical trials with respect to:
 - i. altered fractionation schemes for breast Radiation Therapy.
 - ii. partial breast irradiation.

Question 3

A 45 yr old man presents with seizures. MRI scan demonstrates a surgically inoperable 4cm mass in his left frontal lobe extending into the anterior corpus callosum. Stereotactic biopsy confirms a WHO grade 2 oligoastrocytoma.

- a. Outline the management options for this man and the clinical and patient-related factors that would affect the formulation of a management plan.
- b. A decision has been made that he is to be treated with radiation therapy. Describe a suitable radiation therapy technique and dose prescription for this man. Include in your answer the potential toxicities and outcome.

Question 4

Consider the management of limited stage small cell carcinoma of the lung in a patient with excellent performance status.

- a. Give the indications for radiation therapy treatment and justify your answer.
- b. How would you integrate a course of radiation therapy into an overall management plan?
- c. Describe the potential outcomes of Radiation Therapy in this setting.
- d. Describe your management of a patient who presents with oesophagitis during thoracic irradiation.

Question 5

A 65 yr old man had a left hemi-colectomy for a bulky, poorly differentiated adenocarcinoma of the descending colon. The pathology report described a 7.5cm mass extending through the serosa with a positive margin on the left pelvic sidewall. 2/21 lymph nodes were involved with metastatic spread.

- a. What factors do you consider must be discussed by the multi-disciplinary team in order to devise a suitable management plan for this patient?
- b. A decision was made to offer adjuvant radiation therapy. Describe a suitable radiation technique and dose prescription for this man.

Question 6

A 49 year old man is referred to you following a total thyroidectomy and right neck dissection for a medullary carcinoma with metastases in 10 of 22 cervical nodes.

- a. Describe a suitable management plan for this man.
- b. Describe a suitable radiation technique and dose prescription for post-operative Radiation Therapy.
- c. What is his prognosis and what would be your recommendations for follow-up?

RADIOTHERPAY 2

Question 1

A 55 year old man is referred to you following a salvage laryngectomy and left neck dissection. 18 months prior to salvage surgery he had been treated with a radical course of Radiation Therapy for a T2N0M0 squamous cell carcinoma of the left vocal cord.

The pathological features of the surgical specimen confirmed recurrent squamous cell carcinoma of the left vocal cord with 10mm of subglottic extension. There were 6 of 25 nodes from the neck dissection containing metastatic disease associated with extranodal spread.

- a. What are the factors that would be considered if a further course of radiation were to be given? Include in your answer a suitable technique and dose prescription.
- b. Describe the factors that influence the risk of recurrence in the stoma and how this risk can be reduced.
- c. What are the potential morbidities associated with further radiation treatment?

Question 2

A 5 year old boy has an MRI abnormality consistent with a diagnosis of an infiltrative brain stem glioma.

- a. Describe a suitable management plan for this boy.
- b. Describe a suitable Radiation Therapy technique and dose prescription for this boy.
- c. What information would you give the boy and his parents in the pre-treatment consultations regarding his prognosis?

Question 3

A fit 51 year old man has his first 'routine' PSA arranged by his GP. The PSA is 5.6ng/ml. Biopsies of the prostate show Gleason 3 +3=6 adenocarcinoma in 10% or less in 3/12 cores. He has no lower urinary tract symptoms, good flow and has never had a problem with erectile function. The prostate feels normal on rectal exam.

After discussion, you and the patient jointly decide he is to be treated with low dose rate iodine 'seed' brachytherapy.

- a. List the basic steps involved with planning and treatment using a 'pre-planned' approach.
- b. What follow up program you would recommend and why?
- c. What are the likely tumour and morbidity outcomes?

Question 4

A fit 30 year old woman has a histologically confirmed aggressive fibromatosis measuring 6x3x5cm in the trapezius and deltoid muscles over her left shoulder.

- a. Describe your management plan and include in your answer the issues you would discuss with your patient. The tumour was resected with close margins. A decision was made for management by observation only to minimise impairment of shoulder function resulting from further treatment. 18 months later, the tumour recurs at the same site and is re-resected. Margins are again very close. At the multidisciplinary meeting a decision is made to give Radiation Therapy.
- b. Describe a suitable technique and dose prescription for post-operative Radiation Therapy in this situation.
- c. In what clinical situations would you consider giving radiation treatment alone for aggressive fibromatosis? Justify your answer.

JULY 2007

Question 1

A 60 year old man is diagnosed with a T3 N2c M0 squamous cell carcinoma of the supraglottis (locally advanced with fixed vocal cord and bilateral neck nodes, all less than 6 cm.). He is keen to preserve his voice.

- a) What are the organ-sparing management options available for this man? Give supportive evidence for these options.
- b) Describe a Radiation Therapy technique and dose prescription for the curative treatment of this patient.

Question 2

In relation to gynaecological malignancies, write short notes on:

- a) The role of Radiation Therapy in the treatment of uterine sarcomas.

- b) The indications and evidence for the use of extended field Radiation Therapy in the treatment of cervical carcinoma.
- c) The advantages and disadvantages of HDR vs. LDR brachytherapy.

Question 3

A 75 year old man had a partial penile amputation for a T2 (tumour invades corpus spongiosum) squamous cell carcinoma of the penis.

- a) What are the clinical and histological findings which would influence his further management?
- b) How would you assess and manage the regional lymph nodes?
- c) Assuming this patient is found to have isolated right deep inguinal lymph node metastases and he is surgically unfit, how would you treat him with potentially curative Radiation Therapy? Include in your answer a description of your Radiation Therapy technique and dose prescription.

Question 4

A 47 year old peri menopausal woman presents with a 2 cm mass in the upper outer quadrant of her left breast. The histology from wide local excision and axillary dissection confirms a 2 cm invasive ductal carcinoma (grade 3) that is oestrogen and progesterone positive and Her 2 negative.

Five of seven axillary lymph nodes contain metastatic tumour. Full staging investigations show no distant metastases.

- a) What is the rationale and what are the indications for axillary irradiation?
- b) Describe a suitable radiation technique and dose prescription for treatment that includes the breast, axilla and supraclavicular lymph node regions.
- c) Assuming that she has been given adjuvant chemotherapy, what is the probable outcome and what are the acute and long term effects that may result from her radiation treatment as described above?

Question 5

A 27 year-old man presents with a non-productive cough and is confirmed on chest x-ray and CT scan to have a 6 cm. mediastinal mass. Histology confirms nodular sclerosing Hodgkin's Lymphoma. Full staging investigations show no other sites of disease. There are no B symptoms and his ESR is 6.

- a) What are the options for management of this patient? Include the advantages, disadvantages and outcomes of each approach.
- b) Describe a suitable radiation treatment technique including dose prescription for treating this man. Indicate how this treatment might be modified if chemotherapy is also used.

Question 6

Regarding CNS therapy for children with acute lymphoblastic leukaemia:

- a) Describe the various approaches for CNS treatment, including the advantages and disadvantages of each.
- b) What are the indications for CNS irradiation?
- c) Describe a suitable technique and dose prescription for cranial irradiation in a four year old boy who on initial presentation has high risk disease.
- d) Describe the outcome of prophylactic CNS irradiation including the long term adverse effects.

FEBRUARY 2007

1. A 60 year old man presents with shortness of breath and the clinical features of superior vena caval obstruction (SVCO). He has no previous history of cancer.
 - a) Assuming the cause of SVCO is found to be malignancy, what would be your management recommendations?
 - b) Assuming that his management plan is for palliation of non small cell carcinoma of the lung, how would you treat him with Radiation Therapy? Include in your answer a description of your Radiation Therapy technique and dose prescription.
2.
 - a) Discuss the indications for Radiation Therapy in renal cell carcinoma.
 - b) A 60 year old man had a right nephrectomy for renal cell carcinoma. Two years later he is found to have an isolated inoperable local recurrence causing pain. Describe a technique and give with justification your dose prescription for palliative Radiation Therapy for this man.
 - c) Describe a Radiation Therapy technique and give your dose prescription for treating lymph nodes prophylactically for Stage I seminoma of the testis. List toxicities and their frequency.
3. A 30 year old female patient had a primary malignant melanoma widely excised from above her knee two years ago. On follow up she is found to have a palpable recurrence in her ipsilateral inguinal lymph node region. There is no other evidence of metastatic disease on full work-up.

- a) How would you manage this woman further?
- b) She had a lymph node dissection of the involved groin. Describe and justify a suitable technique and give your dose prescription for delivering Radiation Therapy post operatively.
- c) What are the potential late morbidities of her treatment and how would you manage them?
4. A 76 yr old woman had a wide local excision and ipsilateral groin dissection for a moderately-differentiated squamous cell carcinoma of the right vulva. The tumour was 2.2 cm. maximal diameter and extended to within 2mm of the deep resection margin. All other margins were well clear of tumour. Metastatic carcinoma with extra capsular spread was identified in one of eleven lymph nodes that were removed.
- a) What are the prognostic factors relevant to her management?
- b) What would be your rationale and goals of treatment?
- c) What Radiation Therapy technique and dose prescription would you use?
5. A previously well 48 year old man presented with seizures and was found to have two metastatic lesions within the left cerebral hemisphere. One was surgically excised and found to contain well-differentiated adenocarcinoma. The remaining metastasis was 1.5 cm. maximal diameter located deep within the dominant parietal lobe and considered inoperable. No other sites of disease were identified following detailed investigations.
- a) What would be your recommendations for his further management?
- b) Give a suitable Radiation Therapy technique and dose prescription for this man.
- c) What is the likely outcome of treatment as given in part b)?
6. In the curative management of rectal carcinoma:
- a) What are the indications, benefits and complications of Radiation Therapy?
- b) What is the evidence that supports the use of pre-operative Radiation Therapy?
- c) What are the commonly recommended Radiation Therapy techniques and dose schedules that are used in the adjuvant setting?

August 2006

1. A fit 70 year old woman presented with post-menopausal bleeding. D&C and endometrial biopsy showed endometrial cancer. She proceeded to total abdominal hysterectomy, bilateral salphingo-oophorectomy and surgical staging with pelvic lymph node sampling and peritoneal washings. Pathology review confirmed an endometrioid adenocarcinoma of the uterine corpus, high grade (3) with deep (more than 50%) myometrial invasion and cervical stromal involvement, but no nodal metastases and negative peritoneal cytology (FIGO-stage IIB).
- a. Discuss your recommendations and rationale for her overall management, including the potential toxicities of treatment and outcome.
- b. Describe in detail and justify a suitable radiation treatment plan for this patient.
2. A 68 year old man with good performance status was investigated for gross haematuria. Cystoscopy showed a solitary tumour confined to the left lateral wall of the bladder, which was maximally debulked by trans-urethral resection. The pathological diagnosis was high grade (3) transitional cell carcinoma with muscle invasion. Staging investigations showed no extra-vesical spread and no metastatic disease. The patient opted for non-surgical treatment.
- a. Discuss your management recommendations for this patient.
- b. Describe in detail a suitable Radiation Therapy plan including rationale, technique, potential toxicities and outcome.
3. A 50 year old woman with no previous medical problems presented with a 5 cm, fixed left supraclavicular lymph node. An incisional biopsy of the node revealed metastatic squamous cell carcinoma.
- a. Discuss your approach towards identifying a potential primary cancer in this patient.
- b. Describe and justify your management plan if physical examination and investigations failed to find a primary or other sites of cancer.
- c. Describe in detail a suitable radiation treatment technique.
4. A 60 year old man was diagnosed with adenocarcinoma of the head of pancreas. His thoracic and abdomino-pelvic CT scan demonstrated a 3cm mass in the uncinate process that was encasing the superior mesenteric artery, with no evidence of regional lymphadenopathy or distant metastases. He had moderate epigastric pain and minimal weight loss.
- a. What is the role of Radiation Therapy in this patient's management?
- b. Describe in detail a suitable plan for radical radiation treatment including technique, potential toxicities and outcome.

- c. What other treatment options are available?
5. A 35 year old female presented with a 5cm mass in the antero-medial aspect of her right proximal thigh. Biopsy confirmed a desmoid tumour (aggressive fibromatosis).
What are her management options in the two clinical scenarios described below? Describe in detail a suitable Radiation Therapy technique for scenario 2, including potential toxicities and outcome.
- Tumour grossly resected, with positive margins.
 - Tumour unresectable due to involvement of neurovascular structures.
6. A 70 year old man presented with a T1N0M0 well differentiated squamous cell carcinoma of the middle third of his left vocal cord.
- What are the curative options available to him?
 - Describe a suitable radiation technique for this man's cancer.
 - A localised recurrence is detected in his left vocal cord at 15 months post radiation treatment. Discuss the available management options.

February 2006

- Discuss the rationale, indications, treatment techniques and outcomes for Radiation Therapy in the management of non-Hodgkin's lymphoma.
- A 52-year old woman had a wide local excision and axillary dissection for a 1.8cm grade 3 invasive ductal carcinoma of the left breast. The tumour was ER and PR positive and Her 2 negative; metastases were identified in 3 out of 10 axillary lymph nodes.
Discuss the rationale, treatment options, risks and benefits of adjuvant post operative Radiation Therapy for this woman. Describe in detail a suitable radiation treatment plan and its likely outcome.
- Discuss the rationale, indications, treatment techniques and outcomes for Radiation Therapy in the management of childhood Ewing's Sarcoma.
- A 57-year old woman presented with a moderately differentiated squamous cell carcinoma of the uterine cervix. At examination under anaesthetic the tumour was found to extend into the left parametrium (FIGO IIB). A staging CT scan showed a 1.5cm para-aortic lymph node.
Discuss your approach to her management including a detailed description of a suitable radiation treatment plan, potential toxicities and outcome.
- A 54-year old woman presented with a biopsy proven squamous cell carcinoma of the anus. On examination the carcinoma was 4.5 cm maximal diameter and there was a 2.5 cm metastatic node in the left groin. The only other evidence of metastatic disease was a 2 cm peri-rectal node on MRI scanning. She is fecally continent and has no medical co-morbidities. Discuss your recommendations for her management and describe in detail a suitable radiation treatment plan. Include in your answer the rationale, potential toxicities and the likely outcome.
- A 62-year old man presented with a cT2a N0 M0 Gleason 4+3= 7 adenocarcinoma prostate; his PSA was 15 ng/ml. He had a radical prostatectomy. Histological review confirmed bilateral involvement with unilateral extracapsular spread and a positive surgical margin. Seminal vesicles were uninvolved. His post operative PSA at 6 weeks was undetectable. List his further management options and discuss the advantages and disadvantages of each. If he chose immediate post operative radiation, describe in detail a suitable radiation treatment plan including technique, potential toxicities and outcome.

August 2005

- Discuss the role and techniques of Radiation Therapy in the management of:
 - Early (stage 1) endometrial carcinoma
 - Pelvic recurrence of endometrial carcinoma
- Discuss the role of adjuvant (pre or post operative) Radiation Therapy in the management of soft tissue sarcomas of the limbs.
- Discuss the role of radiation therapy in the management of tumours of the pituitary gland. Describe a suitable technique for radiation treatment of a post surgical recurrent pituitary adenoma and discuss the potential morbidity of this treatment.
- Write short notes on the role of radiation therapy in the management of carcinomas of the:
 - Oesophagus
 - Anus
 - Stomach
- A fit 42 year old man presents with a generalised seizure. A MRI study of the brain revealed an irregularly enhancing 3cm mass in the left temporal region with marked surrounding oedema and mild midline shift. Complete surgical resection was not possible. The pathology report following partial resection confirmed glioblastoma multiforme.
Discuss your management recommendations and give a detailed description of a suitable radiation therapy plan and technique.

6. A fit 61 year old woman is referred to you following mastectomy and axillary clearance for carcinoma of the left breast. The pathology report described a 25mm, grade 3 infiltrating ductal carcinoma of the breast with associated wide spread high grade ductal carcinoma in situ and lymphovascular space invasion. The tumour was oestrogen and progesterone receptor negative, HER2 positive. 4 of 14 axillary nodes contained metastatic tumour.

Discuss your recommendations for her further management including a description of any Radiation Therapy that you may give.

February 2005

1. A fit 60 yr old man was diagnosed with an adenocarcinoma of the prostate following trans rectal ultrasound guided needle biopsies that yielded Gleason score 3+4=7 in 2 of 4 cores from the left prostate and 1 of 4 cores from the right. He has normal urinary and bowel function. His PSA at diagnosis was 13.5 ng/ml and his prostate volume by ultrasound was 30cc. Discuss your management recommendations.

2. Discuss organ movement in the delivery of Radiation Therapy. Give examples of sites where this is particularly important and methods used to minimise the potential for error.

3. Discuss the concept of accelerated repopulation as a potentially important factor in clinical radiation therapy. What methods have been used in an attempt to overcome this phenomenon?

4. A previously well 52 year old man presents with a sore throat and increasing dysphagia. He is found to have a squamous carcinoma of the cervical oesophagus. Investigations that include a CT scan of the neck, chest and abdomen show a bulky primary tumour without evidence of nodal or haematogenous spread. Describe your management of this man with radiation, including details of the technique used.

5. Discuss the role of radiation therapy in the following:

- a) Grave's ophthalmopathy
- b) Acoustic neuroma
- c) Pleomorphic adenoma of the parotid gland

6. A 45 year old woman is referred to you for consideration of adjuvant radiation treatment of an adenocarcinoma of the rectum located 4 cm from the anal verge. Staging investigations demonstrated invasion through the muscularis propria into the serosa, but no nodal or systemic metastases. Discuss your recommendations and describe a suitable radiation plan.

August 2004

1. A 38 year old Chinese man presents with bilateral neck nodes above the supraclavicular fossa. Subsequent investigation reveals poorly differentiated nasopharyngeal carcinoma. Discuss your management of this patient

2. Discuss the role of radiation treatment in patients with solid tumours and metastatic disease in the brain.

3. A fit 71 year old man presents with T2b N0 M0 Gleason 3 + 4 prostatic carcinoma. Neoadjuvant androgen deprivation causes a clinical and PSA response. Describe your subsequent management with radiation therapy.

4. A 45 year old man who two years ago had an anterior resection for an upper rectal carcinoma presents with severe pelvic pain. A CT scan shows a mass in the presacral region. Describe your management.

5. Discuss the role of radiation treatment in endometrial carcinoma

6. How may radiation treatment contribute to the management of patients with small cell lung cancer.

February 2004

1. Discuss the management of a 66 year old man with a 3.5cm poorly differentiated squamous cell carcinoma of the posterior third of the tongue which just crosses midline. He is clinically node negative.

2. A 38 year old woman presents with a grade 3 astrocytoma in the left parietal region which appears on MRI to have been completely resected. Her performance status is zero and she has no neurological defects post operatively. Describe your further management.

3. Discuss your indications for postoperative radiation therapy following mastectomy for breast carcinoma.

4. Discuss the role of radiation therapy in carcinoma of the vulva.

5. Discuss the potential benefits and problems associated with intensity modulated radiation therapy.

6. Evaluate the contribution of radiation treatment to the management of metastatic bone disease.

July 2003

1. Discuss the role of radiation therapy in the curative treatment of non small cell carcinoma of the lung.

2. Discuss the role of radiation therapy in the management of bladder cancer.

3. Discuss the indications for locoregional radiation therapy following mastectomy for breast cancer and describe

techniques that you would use.

- 4 Evaluate the role of radiation therapy in Non Hodgkins Lymphoma.
- 5 Describe the indications for and techniques of radiation therapy in the management of rectal carcinoma.
- 6 Discuss the selection of patients with prostate carcinoma for treatment with high and low dose rate brachytherapy

February 2003

- 1 Discuss the role of radiation therapy in the management of rectal carcinoma.
- 2 A 35 year old man presents with a 3cm lymph node in the posterior triangle of his neck. Fine needle biopsy shows a poorly differentiated squamous cell carcinoma and he is found to have a primary carcinoma of the nasopharynx. Discuss your management.
- 3 Evaluate the current status of radiation therapy in the curative treatment of non-small cell carcinoma of the lung
- 4 Discuss the selection of patients and techniques for treating prostate carcinoma with external beam radiation alone.
- 5 Discuss the role of radiation therapy in the management of malignant melanoma.
- 6 Discuss the principles of elective nodal irradiation giving examples and describe in detail a technique to illustrate its use.

August 2002

- 1 A fit 52 year old man is referred following a partial excision of a 5cm (maximal diameter) deep parietal lobe high grade astrocytoma. Discuss your management of this patient.
- 2 A 38 year old patient presents with a poorly differentiated squamous carcinoma of the uterine cervix extending to the pelvic side wall (FIGO stage 3B). Discuss your management and expected outcome.
- 3 Discuss the role of radiation therapy in the management of muscle invading [T2-T4] nonmetastatic transitional cell carcinoma of the bladder.
- 4 A 65 year old man presents with a mass in the right parotid. He has solar damaged skin and a biopsy of the parotid mass shows moderately differentiated squamous cell carcinoma. It is considered inoperable due to fixity. Describe your management.
- 5 Discuss the adverse effects of therapeutic radiation on the eye and orbital structures. How can these effects be diminished?
- 6 Discuss the principles and use of different radiation fractionation regimens in the treatment of lung cancer.

February 2002

- 1 Discuss the role of radiation therapy in the management of carcinoma of the vulva.
- 2 Discuss the role of radiation therapy in rectal carcinoma.
- 3 What factors influence your choice of radical Radiation Therapy treatment (ie external beam, brachytherapy or combined external beam and brachytherapy) in the management of localized prostate carcinoma.
- 4 A 65 year old man presents with a T2N0M0 poorly differentiated squamous cell carcinoma of the supraglottic larynx. Discuss non surgical management for him.
- 5 Discuss the role of radiation therapy in the palliative management of patients with lung cancer.
- 6 A fit woman of 45 is referred with an inoperable 4cm grade 2 out of 3 parietal glioma. Discuss your management.

August 2001

- 1 Discuss the role of Radiation Therapy in the management of bladder cancer.
- 2 Discuss the role of Radiation Therapy in the management of a 52 year old man with a Stage IIIa non small cell lung cancer.
- 3 Discuss your management of a 36 year old woman who presents with a Stage IIIb moderately differentiated squamous cell carcinoma of the cervix.
- 4 Evaluate the role of Radiation Therapy in non-melanomatous skin cancer.
- 5 How may standard radiation treatment be varied in order to optimise local control?
- 6 Discuss the treatment of cerebral metastases with Radiation Therapy.

February 2001

- 1 Discuss the role of radiation therapy in the management of carcinoma of the tongue.
- 2 A fit 65 year old woman is found to have a 3cms moderately differentiated squamous cell carcinoma of the anal canal. She is continent and wishes to avoid surgery. Discuss her management.
- 3 Discuss the rationale and potential of intensity modulated radiation therapy (IMRT).
- 4 Evaluate the role of radiation therapy in the management of small cell lung cancer.
- 5 Discuss the role of radiation therapy in the management of carcinoma of the body of the uterus.
- 6 A fit 64 year old man had a radical prostatectomy 3 years ago for a T2 Gleason 3+3 prostatic carcinoma. His PSA is

rising and CT scan and bone scan show no evidence of metastatic disease. Evaluate your management options for this man.

August 2000

- 1 Discuss the role of radiation therapy in FIGO stage 2B squamous cell carcinoma of the cervix.
- 2 Discuss the role of radiation therapy in the management of low grade gliomas in adults.
- 3 A man of 42 presents with bilateral cervical lymphadenopathy and is found to have a poorly differentiated squamous cell carcinoma of the nasopharynx. Discuss your management.
- 4 Discuss the rationale, role and toxicities of total body irradiation in malignant disease, including leukaemia.
- 5 Discuss the role of radiation therapy in the curative treatment of non small cell lung cancer.
- 6 Describe in detail your Radiation Therapy technique used for a patient with breast cancer who has had local excision of a carcinoma with breast conservation. How you would optimise the late cosmetic effects?

February 2000

- 1 A 59 year old man presents with a stage T2N0M0 poorly differentiated squamous cell carcinoma of the posterior third of his tongue. Describe your management with particular reference to technique of any proposed radiation therapy.
- 2 Discuss the role of radiation therapy in the management of bladder cancer.
- 3 Discuss the role of radiation therapy in the management of oesophageal cancer.
- 4 Discuss the role of radiation therapy in the management of vulval cancer. Describe a technique for curative treatment for a patient who has a T2 N0 squamous cell carcinoma of the vulva and has declined surgery.
- 5 Evaluate the use of multi-leaf collimators and electronic portal imaging in the delivery of radiation treatment.
- 6 Discuss the problems associated with irradiation of a region that has been previously irradiated.

August 1999

- 1 Discuss the role of radiation therapy in the management of malignant melanoma.
- 2 Discuss the role of radiation therapy in the management of supraglottic larynx carcinoma. Include an example of a radiation technique.
- 3 Discuss the role of Radiation Therapy for the treatment of gliomas in adults. How would you manage patients whom you elect not to irradiate?
- 4 Because of resource shortages at your treatment centre, there is a delay for radiation treatment. Devise and evaluate a policy to manage such delays.
- 5 Write short notes on the use of radiation in: a) Coronary artery restenosis b) Desmoid tumours c) Heterotopic ossification
- 6 Discuss the role of brachytherapy in the treatment of prostate carcinoma.

February 1999

- 1 Discuss the rationale for elective nodal irradiation Mention the tumour types in which it is used and describe a technique for one particular tumour site.
- 2 Discuss methods to obtain the best cosmetic results for patients who require radiation for breast conservation.
- 3 A 68 year old man presents with a 5 x 3 x 2cm right parotid mass. Histology shows poorly differentiated squamous cell carcinoma. A similar 1cm lesion was removed from the right temple 6 months before. The facial nerve is functional, but the mass is inoperable because of skin involvement over 2.5cm. Describe your radiotherapeutic management.
- 4 The radiation oncology centre where you work has developed delays for radiation treatment. Describe a policy to minimise the impact of these delays.
- 5 Describe the integration of chemotherapy and radiation therapy in the treatment of rectal carcinoma.
- 6 Discuss the adverse effects of radiation on the eye and orbital contents, and how these may be minimised.

Radiation Therapy - Second Paper**JULY 2009****2 Hours**

All questions are of equal value unless otherwise indicated in the questions.

Question 1

A 52 year old female presented with left sided abdominal pain and sciatica. A CT scan of her abdomen and pelvis revealed a left retroperitoneal mass measuring 90 mm X 10 mm (axial) X 150 mm (cranio-caudal). It extended from the inferior border of the kidney to S2, and the appearance was highly suggestive of a soft tissue sarcoma. The mass encased the lower pole of the left kidney and was intimately related to the left psoas muscle.

- a) How would you investigate this patient?
- b) The patient was found to have a high grade liposarcoma with no evidence of metastatic disease. The MDT recommended treatment with a potentially curative outcome. What treatment options are available for this patient, and what factors would influence your recommendation?
- c) Describe a suitable technique and dose prescription for preoperative Radiation Therapy for this patient. In your answer, include a description of potential late toxicities and the expected outcome of your treatment.

Question 2

A 61 year old female presented with a 2 month history of increasing dyspnoea and mild haemoptysis. CT scan of the chest showed a 75 mm X 55 mm X 50 mm mass in the upper lobe of his left lung extending to the hilum. A 10 mm pre-carinal lymph node was also seen. Bronchoscopic biopsy confirmed small cell lung carcinoma. A PET scan showed an FDG avid mass in the left upper lobe without evidence of nodal or distant metastatic disease. The patient was otherwise well, ECOG 1, and had no weight loss.

- a) Describe how you would manage this patient. Include in your answer the rationale, indications and use of Radiation Therapy.
- b) Describe a suitable treatment technique and dose prescription for thoracic irradiation including the expected outcome of this treatment.

Question 3

A 33 year old male presented with rectal pain, PR bleeding and moderate obstructive symptoms. Colonoscopy revealed a large anterior rectal tumour situated 40 mm from the anal verge. Biopsy confirmed the tumour to be an adenocarcinoma and the local stage was assigned as T3N1 according to an MRI study. A CT scan showed a solitary 15 mm metastasis in the right lobe of the liver which was deemed to be resectable. There was no other evidence of metastatic disease.

- a) What would be your management plan for this patient? **(4 marks)**
- b) Describe a suitable technique and dose prescription for preoperative irradiation. In your answer, include a description of the regions that need to be included in the CTV. **(4 marks)**
- c) Three years following initial treatment, the patient developed a rising CEA. Investigations revealed an isolated local recurrence on the left pelvic side wall measuring 20 mm. There were no other sites of disease and the patient was well and asymptomatic, ECOG 0. Briefly describe your approach to further management. **(2 marks)**

Question 4

A 65 yr old woman was diagnosed with a loco-regionally advanced right oropharyngeal squamous cell carcinoma. The primary tumour measured 25mm, located in the vallecula. There were two 20mm level II lymph nodes in her right neck. Her performance status was ECOG 0 and she had no co-morbidities. The MDT recommended definitive radiation therapy with weekly cisplatin.

- a) Describe and justify your planning target volumes, treatment technique and dose prescription that you would use in the delivery of radiation therapy.
- b) How would you minimise the potential impact of xerostomia on this patient?
- c) Four weeks after the completion of radiation therapy there was a complete response of the primary tumour and a persistent 15mm right level II lymph node. What would be your management plan?

February 2009

Time allowed: 2 hours

Instructions for this examination:

ALL QUESTIONS are to be attempted. All questions are of equal value.

There are a total of FOUR (4) questions.

Question 1

A 28 year old man presents with a painless mass in the right inguino-femoral region. He has no other symptoms. Examination is otherwise unremarkable. A core biopsy of the 2.5 x 4cm mass reveals nodular sclerosing Hodgkin's disease. A staging CT scan shows no disease elsewhere.

- a) What treatment options are available for this patient, assuming that there are no adverse prognostic features?

A decision is made to treat this patient with combined chemo-radiation therapy.

- b) Describe in detail a suitable radiation therapy technique and dose prescription.
- c) How would you counsel this patient regarding fertility?

Question 2

A fit 57 year old man is referred to you for an opinion regarding brachytherapy. His prostate feels normal and measures 35cc on ultrasound. The biopsy report showed Gleason score 3+3=6 adenocarcinoma in 3/12 cores from the right base and midzone. A recent PSA was 8.4 ng/ml.

- a) What would you tell this man about his suitability for low dose rate 'seed' brachytherapy?

- b) Would you do any more tests and why?
- c) List the steps in planning and treatment (in general terms) that are involved with this procedure.
- d) Outline how you might assess the quality of a low dose rate prostate brachytherapy implant.

Question 3

A 79 year old woman presents with anaemia and post-menopausal bleeding. Examination in the clinic reveals a bulky uterus. Cervical cytology is consistent with a serous papillary carcinoma of the uterus. A CT scan of the abdomen and pelvis demonstrates no metastatic disease.

- a) Describe your management plan for this woman and justify your recommendations.

She recovers well after hysterectomy and bilateral salpingo-oophorectomy (TAHBSO). Pathology confirms serous papillary carcinoma extending to the serosa but otherwise confined to the uterus.

- b) Describe a suitable technique and dose prescription for post-operative radiation therapy in this woman.
- c) Describe the circumstances in which you would either allow a break in, or cease altogether, this woman's radiation treatment.

Question 4

Bone metastases are treated with a variety of commonly-employed radiation schedules.

- a) What are these fractionation schedules and how effective are they? Include in your answer any evidence for the comparative efficacy of these schedules.
- b) Discuss specific clinical situations (involving bone metastases) in which you would prescribe one schedule in preference to another. Justify your answer.

July 2008

Question 1

An 11 year old female presented with a large mass arising from the left sacro-iliac joint, which measured 10cm in maximal diameter. An open core biopsy confirmed Ewing's sarcoma. Staging investigations showed no evidence of metastatic spread.

Her case was discussed at the paediatrics MDT. The tumour was deemed unresectable.

- a) Outline how you would manage this patient.
- b) Describe in detail a suitable radiation treatment technique and dose prescription and justify your answer.
- c) In your discussions with the girl and her parents, what would you discuss regarding the late toxicities and outcome of treatment?

Question 2

A 45 year old woman underwent a wide local excision for a ductal carcinoma in situ (DCIS) in the upper outer quadrant of her left breast. The pathology report described a 2cm high grade DCIS, completely excised with margins more than 10mm.

- a) Describe the potential benefit of post operative Radiation Therapy for this woman with supportive evidence.
- b) Describe in detail a suitable Radiation Therapy technique and dose prescription for this woman.
- c) List the potential long term toxicities and describe any measures that could reduce those side effects.

Question 3

Describe the advantages and disadvantages of Radiation Therapy and your recommendation to the patient in the following clinical settings:

- a) A 60 year old man referred to you following radical prostatectomy with adenocarcinoma Gleason score 3+4=7, unilateral extra capsular spread, a positive surgical margin and seminal vesicles uninvolved. His pre operative PSA was 6 ng/ml and post operative PSA was undetectable at eight weeks.
- b) A 33 year old man referred to you following right radical orchidectomy with a 5 cm classical seminoma with no rete testis involvement. Staging investigations revealed no metastatic disease (stage I).

Question 4

A 45 year old female presented with epigastric pain and abdominal distension. CT scan showed a 10 x 10 x 7cm mass of lymph nodes arising from the coeliac axis, extending from T12 to L2. A core biopsy confirmed a diffuse large cell (B cell) non-Hodgkin's Lymphoma which was CD20 positive. A PET scan did not show any additional uptake outside the mesenteric mass seen on CT. She had no B symptoms. Bone marrow examination was clear. Her case was discussed at the lymphoma multi-disciplinary meeting and the recommendation was that she receive chemotherapy and rituximab, followed by Radiation Therapy.

- a) What is the role of Radiation Therapy in this patient's treatment?
- b) Describe in detail a suitable Radiation Therapy treatment technique and dose prescription and justify your answer.
- c) What are the potential acute and late side-effects of the Radiation Therapy course described in (b)?

February 2008

Question 1

A 55 year old man is referred to you following a salvage laryngectomy and left neck dissection. 18 months prior to salvage surgery he had been treated with a radical course of Radiation Therapy for a T2N0M0 squamous cell carcinoma of the left vocal cord. The pathological features of the surgical specimen confirmed recurrent squamous cell carcinoma of the left vocal cord with 10mm of subglottic extension. There were 6 of 25 nodes from the neck dissection containing metastatic disease associated with extranodal spread.

- a. What are the factors that would be considered if a further course of radiation were to be given? Include in your answer a suitable technique and dose prescription.
- b. Describe the factors that influence the risk of recurrence in the stoma and how this risk can be reduced.
- c. What are the potential morbidities associated with further radiation treatment?

Question 2

A 5 year old boy has an MRI abnormality consistent with a diagnosis of an infiltrative brain stem glioma.

- a. Describe a suitable management plan for this boy.
- b. Describe a suitable Radiation Therapy technique and dose prescription for this boy.
- c. What information would you give the boy and his parents in the pre-treatment consultations regarding his prognosis?

Question 3

A fit 51 year old man has his first 'routine' PSA arranged by his GP. The PSA is 5.6ng/ml. Biopsies of the prostate show Gleason 3 +3=6 adenocarcinoma in 10% or less in 3/12 cores. He has no lower urinary tract symptoms, good flow and has never had a problem with erectile function. The prostate feels normal on rectal exam.

After discussion, you and the patient jointly decide he is to be treated with low dose rate iodine 'seed' brachytherapy.

- a. List the basic steps involved with planning and treatment using a 'pre-planned' approach.
- b. What follow up program you would recommend and why?
- c. What are the likely tumour and morbidity outcomes?

Question 4

A fit 30 year old woman has a histologically confirmed aggressive fibromatosis measuring 6x3x5cm in the trapezius and deltoid muscles over her left shoulder.

- a. Describe your management plan and include in your answer the issues you would discuss with your patient.

The tumour was resected with close margins. A decision was made for management by observation only to

minimise impairment of shoulder function resulting from further treatment. 18 months later, the tumour recurs at the same site and is re-resected. Margins are again very close. At the multidisciplinary meeting a decision is made to give Radiation Therapy.

- b. Describe a suitable technique and dose prescription for post-operative Radiation Therapy in this situation.
- c. In what clinical situations would you consider giving radiation treatment alone for aggressive fibromatosis? Justify your answer.

July 2007

Question 1

A 54 yr old man presents after a second resection of a desmoid tumour (aggressive fibromatosis) arising from the left chest wall in the mid clavicular line, overlying the 4th and 5th ribs. The pathology report states that the resection margins are widely involved and rib periosteum is involved.

- a) Describe your recommendations and rationale for his management.
- b) Describe a suitable technique and dose prescription for post-operative radiation treatment.
- c) What is the expected outcome of the treatment that you have described?

Question 2

A 63 yr old man with a cT2aN0M0 Gleason score 6 adenocarcinoma of the prostate is referred with a PSA taken 6 weeks post-prostatectomy of 0.2ng/ml.

- a) Describe the rationale and indications for post-prostatectomy irradiation.
- b) Describe a suitable radiation treatment technique and dose prescription for this man, including the potential risks and benefits.
- c) What is the expected outcome of the treatment that you have prescribed?

Question 3

A 50 year old man was diagnosed with resectable adenocarcinoma of the stomach. Gastroscopy and CT scan demonstrated a 5 cm mass in the body and antrum of the stomach with a 2 cm lymph node alongside the lesser curve. There was no evidence of distant metastases, and laparoscopy showed no other disease. He had mild epigastric pain and minimal weight loss.

- a) Describe the adjuvant treatments (pre and post operative) that can be employed with surgery for this patient. This patient underwent primary surgical resection consisting of a partial distal gastrectomy, and a D1 (first echelon lymph nodes) lymph node dissection. The pathologist reported a T3 tumour (tumour penetrates the serosa without invasion of the adjacent structures) with metastases in 8 of 20 lymph nodes. Resection margins were free of tumour.
- b) How would you treat this patient with adjuvant postoperative chemoradiation? In your answer, include a description of Radiation Therapy target volumes, dose prescription and organs at risk.
- c) What are the expected acute toxicities and how would you manage them?
- d) What is the expected outcome of treatment?

Question 4

A 43 year old woman presents with a visual field defect. MRI reveals a 3 cm pituitary tumour compressing the optic chiasm. She undergoes decompression trans-sphenoidal surgery; the pathological diagnosis is pituitary adenoma which is non-functioning. There is evidence of residual disease.

- a) What further management options are available for this patient, and what factors would influence your decision?
- b) Describe the use of postoperative Radiation Therapy for this patient including rationale, pre-treatment assessments, treatment techniques and dose prescription.
- c) What is the expected outcome of the treatment described above and how would you follow her progress after treatment?

February 2007

1. Consider the management of Wilms' tumour in childhood.
 - a) Discuss the justification, indications, benefits and complications of Radiation Therapy.
 - b) A 4 year old boy had a left nephrectomy and regional lymph node dissection for a favourable histology Wilms' tumour. The primary tumour and involved left para aortic nodes were completely resected. There was no tumour spillage or peritoneal involvement. Describe a suitable radiation technique and give a dose prescription that you would use to treat this boy.
2. Consider the management of low grade non-Hodgkin's lymphoma in adults.
 - a) What are the justification, indications, dose schedules and outcomes of Radiation Therapy?

- b) A 67 year old woman has a localised (stage 1) low grade non-Hodgkin's lymphoma involving the left parotid gland. Describe a suitable Radiation Therapy technique and give a dose prescription for treating this woman.
3. A 62 year old man presents with an ulcer on the lateral border of his tongue that on clinical examination is 2.0cm maximal diameter. Biopsy confirms a moderately differentiated squamous cell carcinoma. There are no nodes in the neck clinically or radiologically. A partial glossectomy is performed and pathological examination demonstrates that the carcinoma has infiltrated the tongue to a depth of 11mm and is associated with lymphatic permeation and perineural infiltration. Surgical margins are reported to be clear.
- How would you assess this man and what investigations would you recommend prior to further treatment?
 - What are the advantages and disadvantages of neck dissection versus adjuvant neck Radiation Therapy?
 - Describe a suitable technique and give your dose prescription for post operative Radiation Therapy to this man's primary site and neck, where his neck is to be treated with Radiation Therapy alone.
4. A fit 80 year old woman presents with a Merkel cell carcinoma of the middle of the right cheek, 8mm in maximal transverse diameter. The lesion is excised but the surgical margins are involved.
- How would you assess this patient and what investigations would you perform prior to further treatment?
 - What are the indications and justification for Radiation Therapy in this scenario?
 - Describe a suitable radiation technique and give your dose prescription to treat this woman. Include in your answer the expected outcome and toxicity.

August 2006

1. A 42 year old woman is referred to you for consideration of post operative radiation treatment following a wide local excision of a breast lump and sentinel lymph node biopsy. The pathological diagnosis is a 12 mm grade II infiltrating ductal carcinoma with 0/2 nodes involved. The tumour is ER +, PR + and Her 2 negative. What are the factors that would contribute to producing optimal results in this patient?
2. A previously well 58 year-old woman presented with a three month history of cough and one month of haemoptysis. She had no weight loss, and had an ECOG performance status of 1. Her chest X-ray revealed a left hilar shadow, and on CT scan there was a 5 cm. mass in the left mid-zone abutting the left hilum, with enlarged left hilar and subcarinal lymph nodes. Bronchoscopic biopsy revealed small cell carcinoma. She is referred to you for your expert advice on management.
- Describe your further assessment and investigations.
 - Assume your investigations revealed no additional sites of disease. Discuss your management recommendations, with particular emphasis on the role of Radiation Therapy.
 - Describe in detail a suitable technique for thoracic irradiation.
 - What are the common side-effects of Radiation Therapy for this patient, and how would you manage these?
 - What is the likely outcome of treatment, and what follow-up program would you recommend for this patient?
3. A 45 year-old man presented to the Emergency Room following a seizure. MRI scan showed a 3 cm. enhancing mass in the left temporo-parietal region, with surrounding vasogenic oedema but no midline shift. The neurosurgeon undertook a resection of ~90% of the tumour and post-operatively the patient had no residual neurological deficit. The pathology was reported as anaplastic oligoastrocytoma. The patient had been assessed by the multidisciplinary team and radiation recommended.
- Describe in detail a suitable radiation treatment plan for this man.
 - What toxicities do you expect from this treatment and how would you manage these?
 - What is the role for chemotherapy?
 - What is this man's prognosis?
4. A 39 year- old man with a past history of gastric ulcer had a gastroscopy for new epigastric pain not responding to H2-receptor antagonist therapy. A mass lesion was found in his stomach, which was proven to be a MALT lymphoma.
- What investigations would you advise?
 - Investigations showed no additional disease.
 - What treatment options are available?
 - What would be your recommendation to this patient?

iii. Describe a suitable radiation treatment plan.

c. What is the expected outcome following Radiation Therapy, and how would you follow this patient?

February 2006

1. A 61-year old ex-smoker presented to his general practitioner with unilateral visual disturbance. He was referred to the head and neck clinic with a CT scan which showed a 5.5cm destructive lesion apparently arising from the ethmoid sinus and invading the maxillary antrum and orbit. There were no palpable regional lymph nodes. A biopsy revealed a moderately well differentiated squamous cell carcinoma.

Discuss your recommendations for his further management. Describe in detail a suitable radiation treatment plan including technique, potential toxicities and outcome.

2. A 30-year old man underwent a left inguinal orchidectomy for a classical seminoma. Investigations confirmed stage I disease (confined to the testis).

Discuss his options for Radiation Therapy including rationale, techniques, potential toxicities and outcomes. Describe in detail a suitable radiation treatment plan. What other management approaches might be used and how do they compare with Radiation Therapy?

3. Write short notes on the physical properties and clinical use of following radioactive isotopes for the given tumours:

- a. Iodine-131 in thyroid cancer.
- b. Iodine-125 in prostate cancer.
- c. Iridium-192 in gynaecological cancers.

4. A previously fit 63-year old woman is referred to you after a maximal resection of an 11cm high-grade liposarcoma of the retroperitoneum. Several resection margins were close (<0.5mm). An MRI showed no residual macroscopic disease. Discuss her further management options. Give a detailed account of a suitable plan for radiation treatment including rationale, technique, potential toxicities and outcome.

August 2005

1. A fit 60 year old man is referred to you following a pharyngotomy and right radical neck dissection for a carcinoma of the right pyriform fossa. The clinical features were of a 5cm tumour with fixation of the hemilarynx and metastases in multiple ipsilateral lymph nodes, none more than 6cm in greatest dimension (T3N2b). The pathology report described a moderately differentiated squamous cell carcinoma with associated perineural spread. The surgical margins were clear. 7 of 22 nodes were involved with malignancy and there was extranodal spread.

Discuss your recommendations for his subsequent management. Include in your answer a consideration of the potential toxicities of this treatment and the factors likely to influence his prognosis.

2. Discuss the role of Radiation Therapy for muscle invasive transitional cell carcinoma of the bladder and the management of local recurrence following a course of radical radiation treatment.

3. A 27 year old woman presents with a cough due to an 8cm mass confined to the anterior mediastinum, confirmed on biopsy to be nodular sclerosing Hodgkin's lymphoma. Staging investigations including CT, PET and bone marrow biopsy have shown no other sites of disease.

- a. Evaluate her treatment options taking into account the risk of complications.
- b. Describe in detail a suitable radiation treatment technique for this patient, as part of combined modality therapy.

4. A fit 65 year old smoker presented with a 6cm tumour in the right upper lobe, confirmed on trans bronchial biopsy to be a small cell carcinoma of the lung. Staging with PET confirmed disease in the right upper lobe, right hilar and paratracheal nodes. CT imaging of the brain and abdomen showed no abnormality. Discuss your management recommendations with particular regard to radiation treatment.

February 2005

1. A fit 53 year old man presents with a mass, 7cm in maximal dimension, in the anterior right thigh. Core biopsies are reported as "high grade liposarcoma". Discuss his further management. Describe, in detail, any Radiation Therapy that you would recommend, assuming there are no metastases.

2. Discuss the role of Radiation Therapy in the management of bone metastases.

3. A 41 year old woman is referred to you with an 18mm, grade 2 infiltrating ductal carcinoma of the breast following wide local excision and axillary 'sampling'. The pathology report states that margins are clear and ER/PR receptors are negative. None of 3 sampled lymph nodes are positive for tumour. Discuss her further management including a description of any Radiation Therapy that you might give.

4. A 40 year old woman is referred with an inoperable squamous cell carcinoma of the left tonsil that has invaded the deep muscle of her tongue with metastatic spread to ipsilateral neck lymph nodes, one of which is 8 cm. in greatest dimension. Discuss your recommended management if she were to be treated with radiation therapy.

August 2004

1. Discuss the role of radiation treatment in Ductal Carcinoma in Situ of the breast.
2. Discuss the role of radiation treatment in childhood neuroblastoma.
3. Evaluate the methods used to try to reduce the impact of hypoxia on the curability of solid tumours.
4. Evaluate the role of radiation treatment in Merkel Cell carcinoma of the skin. Describe a technique to treat a 56 year old man who has had a 1.5cm Merkel Cell carcinoma removed from his Right temple and has no clinical evidence of lymphadenopathy.

February 2004

1. Describe the radiation treatment of a 5 year old boy with a completely excised medulloblastoma. Discuss how you would present the potential unwanted effects to his parents.
2. A reasonably fit 70 year old man presents with a 4cm localised moderately differentiated squamous cell carcinoma of the middle third of the oesophagus. He is considered too high an operative risk for resection. Describe your management.
3. Discuss the role of radiation therapy in soft tissue sarcoma.
4. Discuss and evaluate the quality control mechanisms used to ensure accurate and safe delivery of radiation therapy.

July 2003

1. Discuss the role of radiation therapy in the management of vulval carcinoma.
2. Evaluate the rationale for elective lymph node irradiation in the management of malignant disease, giving examples.
3. Discuss the use of radiation therapy in childhood rhabdomyosarcoma.
4. Evaluate the elements of quality assurance in the planning and delivery of radiation therapy.

February 2003

1. Discuss the use of radiation therapy in the management of metastatic cancer in bone.
2. Discuss the role and side effects of radiation therapy in the management of childhood medulloblastoma.
3. Discuss current best practice techniques for radiation therapy for patients with carcinoma of the breast treated for conservation.
4. Discuss the use of radiation therapy in adult patients with Hodgkin's disease.

August 2002

1. A 42 year woman is found to have a 12cm high grade liposarcoma in the adductor compartment of her left thigh. There is no evidence of metastatic disease. Discuss the role of radiation therapy in her management.
2. Discuss the role of radiation therapy in childhood neuroblastoma.
3. How may dose volume histograms aid in the planning of curative radiation therapy?
4. Discuss the role of radiation therapy in cerebral metastatic disease.

February 2002

1. Discuss the role of radiation therapy in Non-Hodgkin's Lymphoma.
2. Discuss the techniques available for patient positioning and immobilization to facilitate conformal/IMRT planning and treatment techniques.
3. Discuss the role of radiation therapy in the management of childhood rhabdomyosarcoma.
4. Discuss the use of radiation therapy in Merkel cell carcinoma of the skin.

August 2001

1. Discuss the role of Radiation Therapy in soft tissue sarcomas.
2. Discuss the role of Radiation Therapy in the management of brain tumours in children.
3. Discuss the role of Brachytherapy in the management of prostate cancer.
4. Discuss the role of Radiation Therapy in the treatment of adult non Hodgkin's Lymphoma.

February 2001

1. Discuss the role of radiation therapy in the management of childhood neuroblastoma.

- 2 Discuss the role of radiation therapy in the management of Ductal Carcinoma in Situ of the breast.
- 3 Discuss the use and scope of radiation therapy in the control of bone pain due to malignant disease.
- 4 Discuss the risks to and care of the eye during and after high dose radiation to the orbital region.

August 2000

- 1 Discuss the role of radiation therapy in childhood rhabdomyosarcoma.
- 2 Discuss the use of brachytherapy in the management of localised prostate cancer.
- 3 Discuss the use of palliative radiation therapy in the management of bleeding from malignant disease.
- 4 Discuss the role of radiation therapy in Non-Hodgkin's Lymphoma.

February 2000

- 1 Discuss the management of cutaneous lymphoma. Evaluate your selection criteria for treatment by radiation and describe the techniques available.
- 2 A 6 year old girl is referred to you following incomplete resection of a medulloblastoma. Discuss your subsequent management. Indicate how you would present the unwanted effects of treatment to her parents.
- 3 Evaluate the use of prophylactic/elective cranial radiation in lung cancer.
- 4 Local tumour control is an important end point in cancer management. Discuss this statement.

August 1999

- 1 Evaluate the role of radiation therapy following mastectomy for breast carcinoma.
- 2 Discuss the role of radiation therapy in childhood rhabdomyosarcomas.
- 3 A 40 year old man who two years previously had an anterior resection for a rectal adenocarcinoma now presents with severe pelvic pain. A CT scan shows a mass in the pre-sacral region. Describe your management.
- 4 Discuss the use of radiation therapy in the treatment of limited stage small cell lung cancer.

February 1999

- 1 A 6 year old girl presents with an incompletely excised medulloblastoma. Discuss the role of radiation therapy, your technique and give an account of your explanation to her parents.
- 2 Discuss the role of radiation therapy in the treatment of carcinoma of the vulva
- 3 Discuss the role of radiation therapy in the curative management of non-small cell lung carcinoma.
- 4 Evaluate conformal radiation therapy and discuss its application in different tumour types.