Greater Manchester Cancer

Lung Cancer Clinical Guidelines: Radiotherapy

V1.0 Issued April 2016
V1.1 Updated May 2017

Scope of guidelines

All Trusts within Manchester Cancer are expected to follow this guideline.

This guideline is relevant to:

- Adults (18 years and older) with newly diagnosed non-small-cell lung cancer (NSCLC)
- Adults with newly diagnosed small-cell lung cancer (SCLC)
- Adults with relapsed NSCLC
- Adults with relapsed SCLC

This guideline does not cover:

- Adults with mesothelioma
- Adults with lung metastases arising from primary cancers originating outside the lung
- Children (younger than 18) with lung cancer.
- Rare lung tumours (for example, pulmonary blastoma)
- Benign lung tumours (for example, bronchial adenoma)
- Carcinoid (typical or atypical)

Radiotherapy

1. Radiotherapy with curative intent for non-small cell lung cancer

People with lung cancer stage I–III who are unable to undergo surgery are assessed for radiotherapy (or chemo-radiotherapy, concurrent preferred) with curative intent by a clinical oncologist specialising in thoracic oncology.

Radical radiotherapy is indicated for patients with inoperable stage I- III NSCLC with ECOG PS 0-2 whose disease can be encompassed in a radiotherapy treatment volume. Patients should also be considered for radical radiotherapy to the primary/regional lymph nodes if

- ECOG PS 3 should be offered radical radiotherapy if it is considered by the oncologist that they will tolerate and benefit from treatment.
- Stage 4 with oligometastatic disease which can be treated with metastatectomy or radiotherapy (e.g SABR)

If unable to confirm NSCLC histologically, patients can be offered radiotherapy if MDT consensus of lung cancer diagnosis has been documented

All patients should undergo pulmonary function tests (including lung volumes and transfer factor) before having radical radiotherapy for NSCLC. Radiotherapy can be offered to patient with poor lung function (typically FEV1 <40% predicted and KCO <40% predicted) with careful patient consent and consideration of anticipated PTV,V20 and mean lung dose.

Patients with inoperable stage I NSCLC should be considered for SABR

Patients with inoperable stage IIIa-IIIb NSCLC and ECOG PS 0-1 should be offered treatment with concurrent chemoradiotherapy if the disease can be encompassed in a radical radiotherapy volume.

Patients with inoperable stage IIIa-IIIb NSCLC ECOG PS 0-2 not considered fit enough for concurrent chemoradiotherapy should be considered for sequential chemoradiotherapy.

Patients with residual disease after surgery for NSCLC with curative intent (R1 or R2 resection) should be considered for adjuvant (post-operative) radiotherapy.

Patients receiving radiotherapy with curative intent should be part of a national quality assurance programme.

Patients receiving radiotherapy with curative intent should be offered treatments that optimise the dose to the tumour while minimising the risks of normal tissue damage, including stereotactic ablative radiotherapy (SABR), intensity-modulated radiotherapy (IMRT) and image-guided radiotherapy (IGRT). IGRT is mandated in all radically treated patients.

All patients potentially suitable for multimodality treatment (surgery, radiotherapy and chemotherapy in any combination) should be assessed by a thoracic oncologist and by a thoracic surgeon.

2. Treatment for NSCLC based on stage

<table>
<tr><td rowspan="3">Stage I</td><td rowspan="2">Surgery (+/- adjuvant chemotherapy)</td><td>Complete resection</td><td>No radiotherapy</td></tr>
<tr><td>Positive margin (R1, R2)</td><td>Post-operative radiotherapy</td></tr>
<tr><td colspan="2">Inoperable</td><td>SABR

Radical external beam radiotherapy (if not suitable for SABR)

Ablative therapy (if not suitable for radiotherapy)</td></tr>
<tr><td rowspan="3">Stage II</td><td rowspan="2">Surgery (+/- adjuvant chemotherapy)</td><td>Complete resection</td><td>No radiotherapy</td></tr>
<tr><td>Positive margin (R1, R2)</td><td>Post-operative radiotherapy</td></tr>
<tr><td colspan="2">Inoperable</td><td>Radical radiotherapy</td></tr>
<tr><td rowspan="3">Stage IIIA*</td><td rowspan="2">Surgery (+/- adjuvant chemotherapy)</td><td>Complete resection</td><td>No radiotherapy</td></tr>
<tr><td>Positive margin (R1, R2)</td><td>Post-operative radiotherapy</td></tr>
<tr><td>Inoperable</td><td colspan="2">Concurrent chemoradiotherapy

Sequential chemoradiotherapy

Radical radiotherapy alone</td></tr>
<tr><td>Stage IIIB*</td><td colspan="3">Concurrent chemoradiotherapy

Sequential chemoradiotherapy

Radical radiotherapy alone

Palliative radiotherapy</td></tr>
<tr><td rowspan="2">Stage IV*</td><td>Oligometastatic disease</td><td colspan="2">Consider suitability for SABR trial (CORE, SARON) or SABR through Commissioning through Evaluation (CtE)[$]</td></tr>
<tr><td>Focal symptoms</td><td colspan="2">Palliative radiotherapy

Palliative systemic therapy</td></tr>
</table>

	No focal symptoms	No radiotherapy Palliative systemic therapy

* Consider early referral to palliative care for all stage III/IV patients

$ Oligometastatic disease defined as 1-3 metastases. See clinical trial and SABR CtE protocols (Christie)

3. Timing of radiotherapy

Radiotherapy with curative intent (excluding SABR) to start ≤ 14 days from time of decision to treat. At Christie, all lung cancer radical treatments are considered RCR Category 1

4. Information for patients

Christie "Lung Cancer Radiotherapy" information leaflets and Radiotherapy DVD to be given to patients booked for radiotherapy in the oncology clinic

5. Clinical trials

All patients should be considered for a radiotherapy clinical trial. Clinical Oncologists with an interest in lung cancer should be aware of the current lung cancer radiotherapy trial portfolio, and refer patients to the Monday afternoon lung radiotherapy trials clinic at Christie where appropriate.

6. Radiotherapy treatment planning for external beam: radical with curative intent

6.1. Essential Investigations and Information Required

- Pathology/Cytology confirmed diagnosis of NSCLC (MDT consensus of NSCLC diagnosis if not able to confirm histologically)
- Stage of disease determined and documented
    - CT Abdomen/thorax
    - Bronchoscopy if appropriate
    - PETCT within 3 months of planned radiotherapy
    - Mediastinal staging (EBUS/EUS/mediastinoscopy if appropriate)
    - Biopsy of supraclavicular lymph node if radiologically suspicious of malignancy
    - For stage III – MRI brain pre radical radiotherapy.
- Clinical assessment and documentation of current disease related symptoms
- Performance status recorded

- Co-morbidities recorded
- Smoking status recorded
- Concomitant medications recorded and stopped if necessary
- Lung function test
- Patient consented for aims, practicalities and toxicity of radical external-beam radiotherapy
- Plan confirmed with consultant oncologist if first seen by junior colleague
- Consent obtained by a clinician/healthcare professional with appropriate competency (as listed in Christie radiotherapy consent competency records)

6.2. Positioning / immobilisation

- Supine
- Normal breathing
- Arms above head using external immobilisation device, unless limited arm movement or apical tumours, where arms by sides with 5-pint immobilisation shell

6.3. Image acquisition

- 4DCT should be considered the default scanning technique for all lung cancer radical treatments with the exception of
    - post-operative adjuvant radiotherapy
    - limited-stage small cell lung cancer treated with sequential chemoradiotherapy and with a good response

  when a 3DCT scan should be requested (see "4DCT Planning for Lung Cancers: Patient Selection and Target Delineation Guidelines for Clinicians" on the Christie radiotherapy quality assurance intranet page)
- The planning CT scan should be performed in the treatment position, whilst the patient undertakes a normal respiration, using 2 - 3 mm slices through the entire target volume and at least 5 cm margins in the superior/inferior direction.
- The whole lung (cricoid to L2) should be covered scanned to allow dose-volume histograms to be calculated.
- Intravenous contrast should be used unless contraindicated.

6.4. Volume delineation and nomenclature

- Gross Tumour Volume (GTV) is defined as the primary tumour and positive lymph node(s):
    - 4DCT: a motion-adapted GTV is contoured using the MIP. The clinician is responsible for ensuring the motion-adapted GTV is outlined on the MIP. It should then be visually confirmed that the motion-adapted GTV lies within the boundaries of the MIP-delineated target volume on all respiratory phases on axial, coronal and sagittal views
- Clinical Target Volume (CTV): The CTV is the GTV or motion-adapted GTV with a standard isotropic margin of 5mm for microscopic disease extension.
- Planning Target Volume (PTV):
    - 4DCT: Expansion from CTV to PTV will be with a 7mm margin to the anterior-posterior and lateral axis, and a 9mm margin to the superior-inferior axis to account for setup tolerance.
    - 3DCT: Expansion from CTV to PTV will be with a 10mm margin to the anterior-posterior and lateral axis, and a 13mm margin to the superior-inferior axis to account for setup tolerance.

6.5. Organs at Risk (OAR)

The spinal canal, lungs, heart and oesophagus should be outlined.

The following organs at risk are delineated on the 'average' CT dataset (the OARs must be contoured to the adequate length, from the superior to the inferior extent):

- Spinal cord: The spinal canal will be contoured at least 10 cm superiorly and inferiorly to the extent of the PTV and taken to represent the cord.

- Oesophagus: (mucosal, submucosa, and all muscular layers out to the fatty adventitia, from the cricoid superiorly to the gastro-oesophageal junction inferiorly) using mediastinal windowing.

- Heart: contoured along with the pericardial sac using mediastinal windowing. The superior aspect for the purpose of contouring is defined as the superior aspect of the pulmonary artery (as seen on coronal reconstruction of the CT) and the caudal border should be defined by the lowest part of the left ventricle's inferior wall that is distinguishable from the liver.

- Whole lung: Normal lung will consist of both lungs contoured as one structure (including all inflated and collapsed regions of lung), contoured on lung windows, considered together as one organ, minus the GTV or ITV.

Radiotherapy dose constraints to the OAR are detailed in the Christie Radiotherapy Quality Assurance System

6.6. Planning technique / Treatment dose

When planning lung radiotherapy treatment, 3D-conformal radiotherapy, IMRT or volumetric arc therapy (VMAT) should be used to optimise the dose to the tumour while minimising the risks of normal tissue damage,

The following dose/fractionation regimens are accepted:

- 55 Gy in 20F using 6MV photons once daily over 4 weeks
    - Radical radiotherapy alone for NSCLC
    - Sequential chemoradiotherapy for NSCLC
    - Post-operative adjuvant radiotherapy with R2 resection
- 50-55Gy in 20F using 6MV photons once daily over 4 weeks
    - Post-operative adjuvant radiotherapy with R1 resection
- 66 Gy in 33F using 6MV photons once daily over 6 ½ weeks
    - Radical radiotherapy alone for NSCLC
    - Sequential chemoradiotherapy for NSCLC
    - Concurrent chemoradiotherapy for NSCLC

6.7. Treatment verification

The volume to be treated should be verified according to local policy as set out in The Christie Radiotherapy Quality Assurance System. Typically image-guided radiotherapy (IGRT) using cone-beam CT (CBCT) is employed daily to correct any systematic errors.

6.8. Management of unscheduled gaps/delays

Every effort should be made to deliver the prescribed dose of radiotherapy within the standard timeframe. If unavoidable delays occur, that could increase the overall treatment time beyond the specified period, the regimen should be modified using additional fractions or increased dose per fraction as detailed in The Christie Quality Assurance System.

6.9. On treatment clinical assessments.

i) Weekly clinical assessment by medical team including

- Graded documentation of toxicity
- Assessment of disease related symptoms
- Performance status recorded

ii) Management of treatment related toxicity

CTCAE v4.0 Skin and Subcutaneous Tissue Disorders					
	Grade				
Adverse Event	1	2	3	4	5
Oesophagitis	Asymptomatic; clinical or diagnostic observations only; intervention not indicated	Symptomatic; altered eating/swallowing; oral supplements indicated	Severely altered eating/swallowing; tube feeding, TPN or hospitalization indicated	Life-threatening consequences; urgent operative intervention indicated	Death
Pneumonitis	Asymptomatic; clinical or diagnostic observations only; intervention not indicated	Symptomatic; medical intervention indicated; limiting instrumental ADL	Severe symptoms; limiting self care ADL; oxygen indicated	Life-threatening respiratory compromise; urgent intervention indicated (e.g., tracheotomy or intubation)	Death
Rash: dermatitis associated with radiation	Faint erythema or dry desquamation	Moderate to brisk erythema; patchy moist desquamation, mostly confined to skin folds and creases; moderate	Moist desquamation other than skin folds and creases; bleeding induced by minor trauma	Skin necrosis or ulceration of full thickness dermis; spontaneous bleeding from	Death

		oedema	or abrasion	involved site; skin graft indicated	

Radiation oesophagitis

- Grade 2 oesophagitis – optimise analgesia (consider sucralfate suspension, paracetamol mucilage, codeine phosphate liquid, oramorph, fentanyl patch). Also consider PPI and antifungal treatment as appropriate. Advise soft diet/oral dietary supplements if required
- Grade 3 oesophagitis - requires admission for medical management (as per grade 2 oesophagitis), consider dietician input/parenteral nutrition if required. Every effort should be made to continue radiotherapy. Avoid placement of naso-gastric tubes
- Grade 4 oesophagitis – As for grade 3 oesophagitis but radiotherapy should be stopped.

Radiation Pneumonitis

- Grade 2 pneumonitis - Consider oral steroids/antibiotics/antifungals
- Grade 3 pneumonitis – hospital admission for high dose IV steroids/oxygen/antibiotics/antifungals. Alert critical care team. Consider stopping radiotherapy
- Grade 4 pneumonitis – as for grade 3 but will require admission to critical care and consider ventilatory support if appropriate. Stop radiotherapy.

Radiation dermatitis

- Topical treatment (see Radiotherapy Skin Care Guidelines: http://discover/documents/upload/1/Radiotherapy_Skin_Care_Guidelines.pdf)

7. Stereotactic Ablative Radiotherapy (SABR) for stage I NSCLC

For patients with stage I and II lung cancer, anatomically based surgical resection remains the treatment of choice. There is an emerging body of literature to support ablative therapies in node negative patients of which SABR has the most mature evidence base. This is based on a number of retrospective, multi-institutional prospective series and one

randomised controlled trial comparing SABR to conventional RT. Most concentrate on medically inoperable patients who are by definition less well than their surgical counterparts. Published outcomes both in terms of overall survival and disease free survival approach surgical series. 2 year survival has been reported as 70% and 5 year survival 43%. For medically inoperable patients with node negative tumours less than 5cm and located in the periphery of the lung, SABR is the treatment of choice. Best outcomes occur when the tumour receives >100Gy BED. Treatment should be delivered with an interfraction interval of greater than 40 hours but less than 4 days.

Stereotactic Ablative Radiotherapy (SABR) is planned and delivered at The Christie. All patients considered for SABR should be discussed at a Lung Cancer MDT with a thoracic surgeon and clinical oncologist present. Patients suitable for SABR should be referred to a clinical oncologist who should then arrange for the patient to be discussed at the weekly Lung Radiotherapy SABR/Lung Planning Meeting to determine if lesion is technically amenable to treatment with SABR.

7.1 Inclusion Criteria

• MDT diagnosis of NSCLC based on findings of positive histology, positive PET scan or growth on serial CT scan

• Clinical stages of T1 N0 M0 or T2 (≤5cm) N0 M0 or T3 (≤5cm) N0 M0 [radiologically N2 (CT or PET), patients only eligible if possible nodal disease is subsequently confirmed as histologically negative with mediastinoscopy or endoscopic bronchial or oesophageal ultra-sound biopsy]

• Not suitable for surgery because of medical co-morbidity, lesion is technically inoperable or patient declines surgery after surgical assessment (or option of assessment)

• WHO performance status 0-3 (PS3 patients are treated at the discretion of the treating clinician)

• Peripheral lesions outside a 2cm radius of main airways and proximal bronchial tree. This is defined as 2cm from the bifurcation of the second order bronchus e.g. where the right upper lobe bronchus splits.

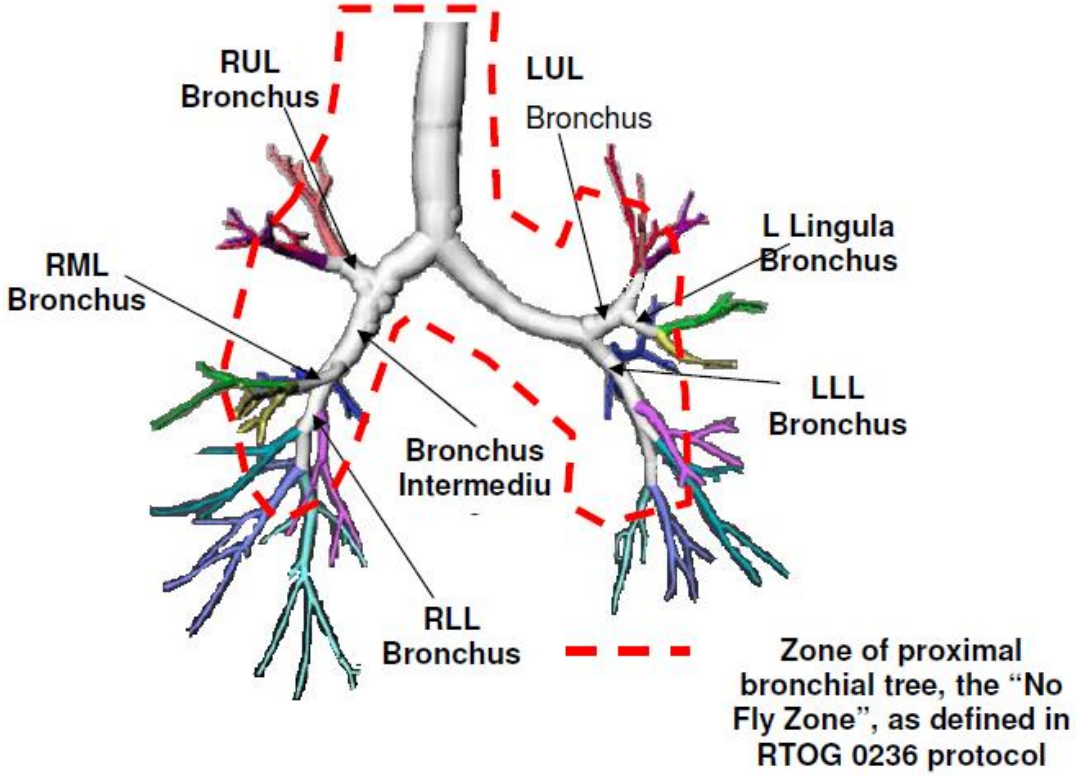
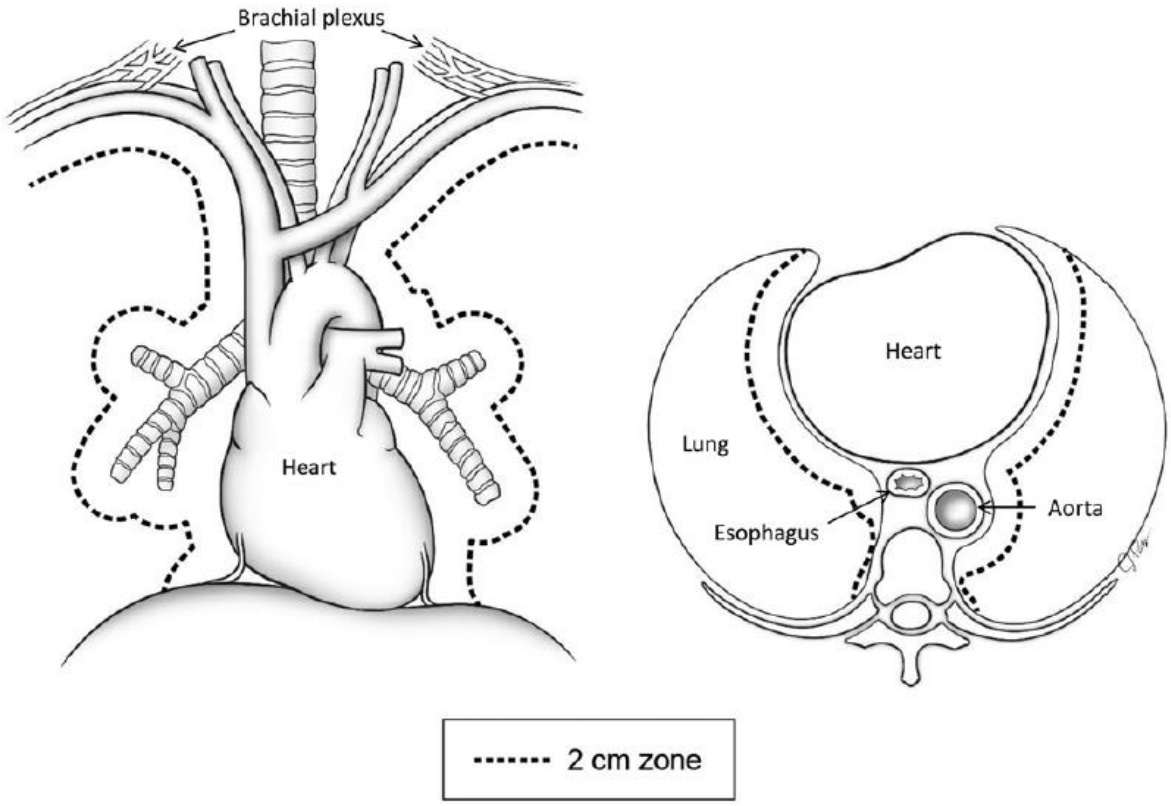


Figure II.1 Proximal bronchial tree as defined by RTOG 0236 protocol

• Peripheral lesions outside a 2cm radius of any mediastinal critical structure, including the bronchial tree, oesophagus, heart, brachial plexus, major vessels, spinal cord, phrenic nerve, and recurrent laryngeal nerve.



- Age ≥ 18 years

7.2. Exclusion Criteria

• NSCLC patients with T2 or T3 primary tumours > 5cm.

• T3 primary NSCLC tumours involving the mediastinal structures or central T3 primary tumours.

• Metastatic lung tumours

• Any tumour that is not clinically definable on the treatment planning CT scan e.g. surrounded by consolidation or atelectasis.

• If tumour has respiratory motion ≥ 1cm despite using techniques to reduce tumour motion, only proceed with treatment if target delineation is reliable and suggested normal tissue and tumour planning constraints can be achieved.

• Tumours within 2cm radius of main airways and proximal bronchial tree (figure II.1).

• Primary NSCLC tumours with clinical evidence of regional or distant metastasis after appropriate staging studies.

• Previous radiotherapy within the planned treatment volume

• Presence of pulmonary fibrosis (unless the increased risk of SABR has been fully considered and the patient has been appropriately consented)

• Chemotherapy administered within 6 weeks prior to study entry or planned for < 6 weeks following SABR.

• Pregnant or lactating females

• Inability to obtain informed consent or comply with treatment requirements

7.3. Tumour Dose schedules

- The dose prescription will be chosen such that 95% of the target volume (PTV) receives at least the nominal fraction dose.
- Radical Radiotherapy doses:
    - 54Gy in 3 fractions
    - 60Gy in 5 fractions
    - 60Gy in 8 fractions.
- It is recommended that the inter-fraction interval be at least 40 hours, with a maximum interval of ideally 4 days between treatment fractions

7.4. Scan acquisition, planning, verification and delivery

See "Lung Stereotactic Ablative Radiotherapy (SABR) Process Document: Procedures and QA Processes for Lung SABR" in the Christie Radiotherapy Quality System.

7.5. Follow-up

Patients are follow-up by the treating clinical oncologist every 3 months for the first 2 years with CT scan at 6, 12 and 24 months post-treatment.

7.6 Alternative treatment for stage I patients not suitable for SABR

Patient with disease included in a 2cm radius of any mediastinal critical structure, including the bronchial tree, oesophagus, heart, brachial plexus, major vessels, spinal cord, phrenic nerve, and recurrent laryngeal nerve can be considered for 60 Gy in 15 fractions as long as constraints to OARs are met.

8. Concurrent Chemo-Radiation (CTRT) for locally advanced NSCLC

Concurrent chemoradiotherapy has been demonstrated in meta-analyses to give superior outcomes when compared with sequential chemoradiotherapy, or radiotherapy alone for stage III NSCLC but the optimum dose fractionation schedule has yet to be defined. Concurrent schedules have an increased incidence of grade 3 oesophageal toxicities. Elderly patients with good performance status and few comorbidities derive as much benefit from concurrent therapy as their younger counterparts. There is no evidence of benefit for chemotherapy delivered either neoadjuvantly or adjuvantly to those receiving concurrent regimes. For those unable to tolerate concurrent chemoradiotherapy, a sequential approach demonstrates survival benefit over radiotherapy alone. Again the optimum therapy

schedule has yet to be defined. Patients unfit for systemic therapy should be treated with radiotherapy alone.

Patients considered for chemoradiotherapy should be reviewed by both clinical and medical oncology prior to starting treatment. Pre-treatment assessment as in 9.6.1. **8.1 Indications**

Concurrent CTRT is indicated if

- Stage III NSCLC not suitable for surgery
- Stage III NSCLC suitable for trimodality therapy (concurrent chemoradiotherapy followed by surgery)
    - Potential suitability for surgery after chemoradiotherapy should be determined up-front by an MDT prior to any treatment
    - Patients should receive a CT scan (+/- MRI scan) within 1 week of completing concurrent chemoradiotherapy
    - Surgeon should be informed of chemoradiotherapy completion date at the start of treatment so the surgery can be scheduled as soon as possible after completing chemoradiotherapy
- Lesion not within a previous radical radiotherapy field
- Any histological subtype of NSCLC
- ECOG PS 0-1
- Patient considered able to tolerate platinum based chemotherapy and radical radiotherapy:
    - Creatinine clearance 50 ml/min. The Cockcroft and Gault formula may be used to estimate GFR, but if <60 ml/min then EDTA clearance should be performed.
    - Adequate bone marrow reserve (i.e. white cell count > 4 x 10^9/l, absolute neutrophil count > 1.5 x 10^9/l, haemoglobin > 10.0 g/dl and platelet count >100 x 10^9/l).
    - Tumour that can be encompassed within a radical radiotherapy treatment volume (V20 expected to be < 35%)
    - FEV1 1.0 L or KCO (transfer factor) 40% of predicted

8.2 Treatment technique and dose/fractionation

Radiotherapy planned and delivered as in section 9.6.

Dose/fractionation regimen for concurrent CTRT for NSCLC is 60-66Gy in 30-33F.

8.3 Treatment verification

See 6.7

8.4 Management of unscheduled gaps/delays

See 6.8

8.5 On treatment clinical assessments

See 6.9

8.6 Concurrent chemotherapy

The chemotherapy regimen used concurrently with radiotherapy should be:

- Etoposide 50 mg/m2 iv: day 1-5 and 29-33
- Cisplatin 50 mg/m2 iv: day 1, 8, 29, 36

The policy should be to delay and give at full dose, rather than reduced dose. The following dose modification schedule should be followed, but clinical judgement should be used in individual cases.

ANC x 10^9/l		**Platelets x 10^9/l**	**Cisplatin /Etoposide**
> 1.5	and	>100	Full dose
≤ 1.5	or	≤ 100	Delay for 3 days, then reassess using the same criteria
Febrile neutropenia or grade 4 neutropenia > 7 days	or	Grade 4 platelets or ≥ grade 2 bleeding with thrombocytopenia	Consider dose reduction to 75% (Continue radiotherapy if the patient is medically stable)

AST/ALT		**Bilirubin**	**Cisplatin**	**Etoposide**
< 3.0 x ULN	and	< 1.5 x ULN	Full dose	Full dose
>3.0 x ULN	or	>1.5 x ULN	Delay one week then reassess using the same criteria; if delayed for two weeks discontinue.	

Peripheral neuropathy ≥ grade 2	Substitute carboplatin AUC 5 or 50% cisplatin dose after recovery to ≤ grade 1; 100% dose of etoposide
Any grade 3-4 toxicities except mucocitis	75% previous dose of cisplatin, etoposide after recovery to ≤ grade 1; discontinue radiotherapy
Any diarrhoea requiring hospitalisation or Grade 3-4 diarrhoea	75% previous dose of cisplatin, etoposide after recovery to ≤ grade 1; continue radiotherapy if medically stable
Grade 3-4 mucocitis	75% previous dose of etoposide and 100% previous dose of cisplatin after recovery to ≤ grade 1

8.7 Concomitant medication

The following concomitant medication should be administered

- **Anti-emetics**
    - Ondansetron 8mg IV bolus with each dose of cisplatin then 8mg bd orally for 2 days
    - Dexamethasone 8mg IV bolus with each dose of cisplatin then 4mg bd orally for 2 days
    - Metoclopromide (or equivalent) prn
- **Prophylaxis**
    - Levofloxacin 500mg od day 1 cycle 1 and day 1 cycle 2 for 10 days
- **Growth factor support**
    - Consider growth factor support if chemotherapy previously received or deemed particularly high risk for life threatening sepsis. (i.e. prosthetic heart valve)

8.8. Follow-up

Patients with grade II+ toxicity should be seen weekly until toxicity resolves and at least at 6-weeks post-treatment by clinical oncology

Follow-up should be 3-monthly for the first 2-years post-treatment, alternating between clinical and medical oncology.

Post treatment CT scans should be scheduled for 3, 6, and 12 months post-treatment.

Patients treated with cCTRT should be given contact number for the cCTRT lung cancer ANP/CNS.

9. Palliative Radiotherapy

9.1. Indications

Palliative radiotherapy should be considered for symptom control in patients to suitable for radical treatment, Palliative radiotherapy should always be part of a palliative treatment plan, which might also include systemic therapy, and/or specialist palliative/supportive care team intervention. All patients should be given appropriate written patient information, and made aware of the follow-up arrangements after radiotherapy

9.2. Pre-treatment

Patients should be assessed by a clinical oncologist to determine suitability of palliative radiotherapy. Patients should be informed of the intended benefits and side-effects, and written informed consent obtained. A radiotherapy booking form should be completed. Photon therapy should be planned using virtual simulation (Vsim). First fraction of palliative radiotherapy should be delivered within 14 days of decision to treat.

9.3. Palliative Thoracic Radiotherapy

Should be considered for patients not suitable for radical treatment to palliate symptoms of airway obstruction, chest wall pain, metastases, cough control and haemoptysis

Treatment is planned using virtual simulation (Vsim) with the patient lying supine. Typically a parallel opposed pair beam arrangement is used to deliver either 30Gy/10F, 20Gy in 5F, or 10Gy in 1F (the dose/fractionation regimen determined by the clinical oncologist based on clinical indication, treatment field size, and patient factors).

Management of toxicity from palliative thoracic radiotherapy should be as listed in 9.8.9.

9.4. Palliative Radiotherapy for Brain metastases

National Commissioning Criteria for eligibility for Stereotactic Radiosurgery (SRS) are: KP ≥ 70; Life expectancy > 6 months; Controlled or controllable systemic disease; Limited volume intracranial metastases (≤ 20cc). Patients with brain metastases who fulfil this criteria should be referred to the weekly neuro-oncology MDT (https://neurooncology.srft.nhs.uk) for consideration of metastatectomy or (SRS). Whole brain radiotherapy should be given following surgical metastatectomy, but is not routinely indicated following SRS.

For patients not suitable for metastatectomy or SRS, whole brain radiotherapy should only be considered in circumstances when the MDT/clinical oncologist believes it to be in the patients best interests, taking into consideration the findings from the QUARTZ trial which demonstrated no increase in quality adjusted life years(QALY) with whole brain radiotherapy for NSCLC. Circumstances where whole brain radiotherapy might be indicated include controlled extracranial disease and ECOG PS 0-1, or receptor positive NSCLC (e.g.

EGFR, ALK-1). Risk/benefit ratio of WBRT should be considered in light of the results of the QUARTZ trial.

Whole brain radiotherapy is planned using Vsim with the patient supine wearing a thermoplastic immobilisation shell. Typical dose/fractionation regimens are 30Gy/10F and 20Gy/5F.

Side effects from whole brain radiotherapy include fatigue/somnolence, hair loss, radiation dermatitis, nauseas and vomiting, headaches, seizures, symptoms of raised intracranial pressure. Consider dexamethasone and PPI cover until completion of radiotherapy with a subsequent dose reduction with a view to discontinuation as quickly as symptoms allow.

9.5. Metastatic Spinal Cord Compression (MSCC)

All information on the management of metastatic spinal cord compression can be found at http://www.christie.nhs.uk/MSCC. Lung cancer patients requiring radiotherapy for spinal cord compression should be treated following the MSCC radiotherapy guidelines http://www.christie.nhs.uk/media/1205/mscc-service_info-for-professionals_guidelines_guidelines-for-radiotherapy.pdf

9.6. Other sites

Other indications for palliative radiotherapy and dose/fractionation regimes are listed in The Christie radiotherapy quality system.

9.7. Follow-up of patients after treatment with palliative intent

Follow-up should be individualised to anticipate treatment-related toxicity and potential changes in symptoms or quality of life. Referrals to community palliative care teams should be made early.

10. Small Cell Lung Cancer

Patients with small-cell lung cancer should start treatment within 2 weeks of diagnosis. First line treatment for SCLC is typically chemotherapy. Therefore, patients suitable for treatment should be referred to medical oncology immediately and before discussion at the MDT.

10.1 Concurrent Chemoradiotherapy (Stage I–III)

For patients with T1 – 4 and N0 – 3 SCLC there is clear evidence of benefit for concurrent chemoradiotherapy with radiotherapy starting no later than day 1 cycle 3 of chemotherapy. The optimal dose schedule is 45Gy in 30 # treating twice daily as per CONVERT trial.

Radiotherapy should be delivered and toxicity managed as described in section 9.6, using 45Gy in 30F twice daily (minimum 6 hour gap) starting no later than day 1 cycle 3 of chemotherapy (ideally cycle 2 day 1). PCI must not be given concurrently with chemoradiotherapy.

10.2 Sequential Chemoradiotherapy (Stage I – III)

For those patients who, due to tumour size or comorbidities, cannot be treated with concurrent chemoradiotherapy, sequential chemoradiotherapy is the best alternative. There is no definitive evidence to indicate the optimal schedule in this patient group.

Radiotherapy should be delivered and toxicity managed as described in section 9.6, using 50-55Gy in 20F once daily 2-6 weeks after completion of chemotherapy. PCI may be given concurrently.

10.3 Palliative Thoracic Radiotherapy

Commonly, in metastatic SCLC, palliative thoracic radiotherapy in the context of persistent and / or symptomatic thoracic disease following primary chemotherapy has often been delivered without a strong evidence base. An EORTC trial randomised 498 patients with metastatic SCLC, who had not progressed during primary chemotherapy to PCI with or without thoracic radiotherapy with 30Gy in 10 daily fractions in addition. The trial did not meet its primary endpoint of improved OS at one year, but OS at 2 years was in favour of mediastinal consolidation and toxicity was minimal. Further data analysis has confirmed the OS and DFS are limited to those with persistent intrathoracic disease after chemotherapy.

Those patients with metastatic SCLC who respond to primary chemotherapy and are to receive PCI should be considered for thoracic consolidation radiotherapy with 30Gy in 10 fractions of there is evidence of residual disease on a post-chemotherapy CT scan.

10.4 Prophylactic Cranial Irradiation (PCI)

Meta-analysis of patients with stages I – III SCLC in complete or near complete thoracic remission following primary chemoradiotherapy have an increased OS and decreased incidence of intracerebral relapse when PCI is delivered. 25Gy in 10 fractions over 14 days carries the same disease relapse rate but lower mortality when compared with 36Gy in 18 fractions over 24 days.

For selected patients with SCLC (WHO PS 0-2, no history of CVA or epilepsy), prophylactic cranial radiotherapy 25Gy in 10 daily fractions is recommended for those achieving good partial or complete response.

In a EORTC phase III randomised trial patients with stage IV SCLC who had any response to primary chemotherapy were randomised to either PCI with one of five schedules (20 – 30Gy in 5 – 10 daily fractions) or no PCI. The treatment arm had an increased OS and reduced symptomatic incidence of brain metastases. The trial excluded patients above 75 years of age.

Selected patients with metastatic SCLC(WHO PS 0-2, age ≤ 75 years, no history of CVA or epilepsy) who respond to primary chemotherapy should be offered PCI with 20Gy in 5 fractions, 25Gy in 10 fractions, or 30Gy in 10 fractions.

PCI should be delivered to the whole brain using the technique outlined in 9.4.

Side effects of PCI are as listed in 9.4.