Diagnostic Imaging Pathways - Non-Small Cell Lung Cancer (Staging)

Population Covered By The Guidance

This pathway provides guidance on imaging patients with confirmed non-small cell lung carcinoma on histology. This staging process will determine further definitive treatment.

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Quick User Guide

Move the mouse cursor over the PINK text boxes inside the flow chart to bring up a pop up box with salient points.
Clicking on the PINK text box will bring up the full text.
The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

SYMBOL	RRL	EFFECTIVE DOSE RANGE
	None	0
	Minimal	< 1 millisieverts
	Low	1-5 mSv
	Medium	5-10 mSv
	High	>10 mSv

Pathway Diagram

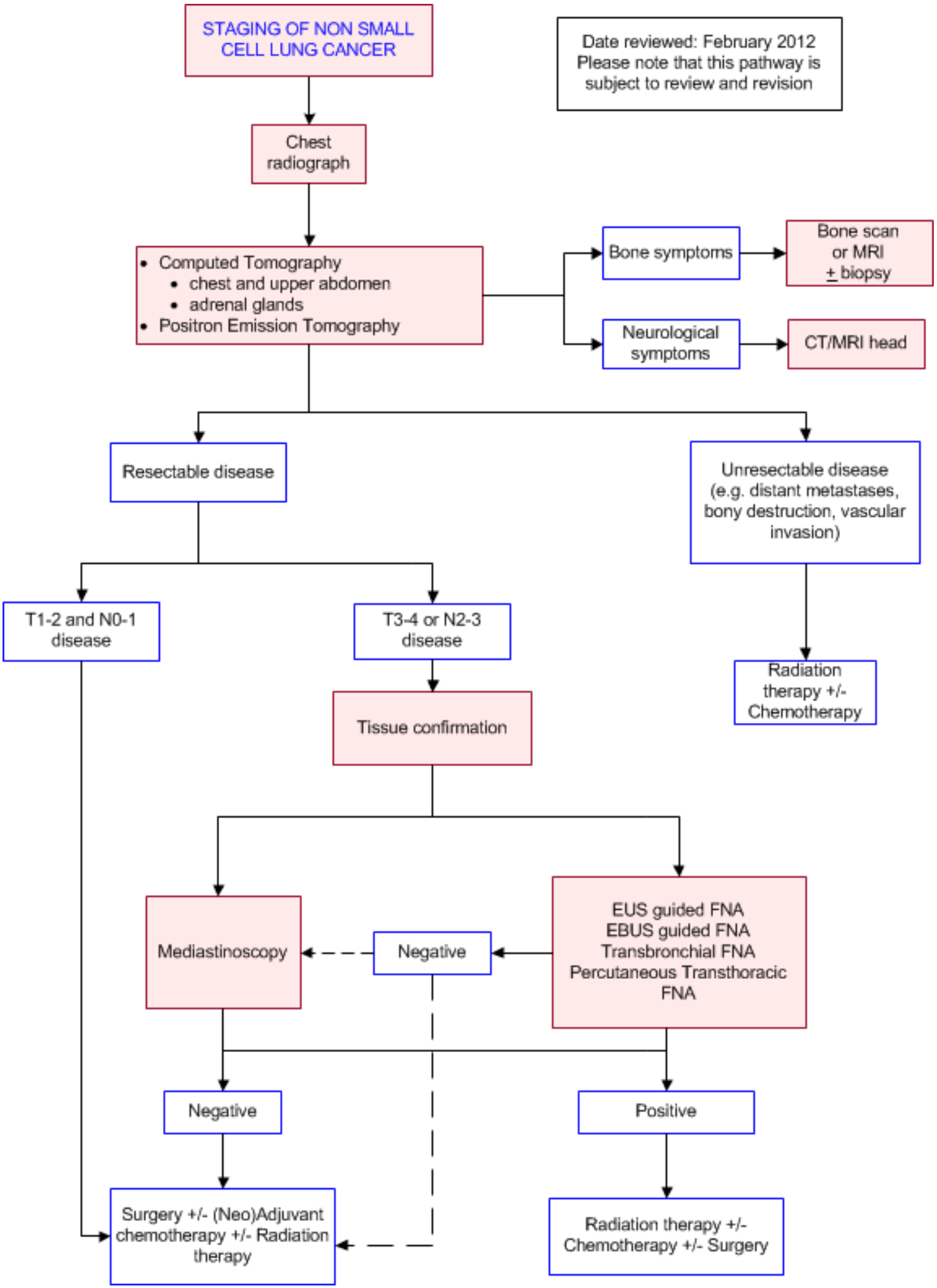
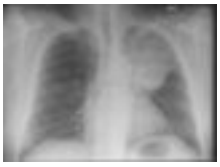


Image Gallery

Note: These images open in a new page

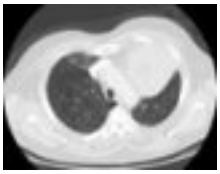
1a



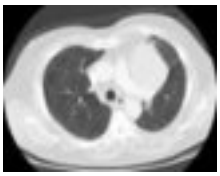
Lung Carcinoma

Image 1a (Chest radiograph: Left hilar mass causing collapse of the left upper lobe and elevation of the left main bronchus.

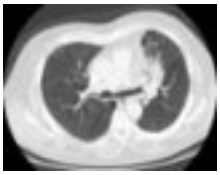
1b



1c

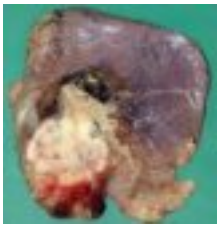


1d



Images 1b, 1c, and 2d (Computed Tomography): CT of the same patient reveals a large, relatively homogenous mass within the left upper lobe measuring 95mm and extending from the apex to the hilum. Central areas of low attenuation are compatible with tissue necrosis. There is also encasement of the left upper lobe bronchus and pulmonary artery with extensive background emphysema.

2a



Lung Carcinoma

Image 2a: Lobectomy showing a large non-small cell lung carcinoma arising from the proximal bronchus and invading into the surrounding parenchyma. Note the patchy central necrosis and punctate areas of haemorrhage.

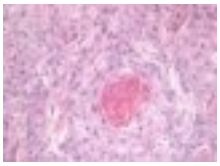
2b

Images 2b and 2c: Post-mortem specimens showing infiltration of lung parenchyma by bronchoalveolar carcinoma.

2c

2d

2e



Images 2d (H&E, x2.5) and 2e (H&E, x20): Histological sections of a moderately well differentiated squamous cell carcinoma of the lung showing infiltrating sheets and tongues of malignant squamous cells with whorls of keratin (blue arrows). At higher power, the malignant cells demonstrate marked nuclear atypia with abundant glassy eosinophilic cytoplasm.

Teaching Points

- It is important to accurately stage NSCLC, as stages I to III are potentially resectable and in some instances curable. Accurately staging NSCLC can result in a higher quality of life in those with the disease as a result of more targeted and appropriate treatment
- Chest radiography is indicated in all patients but has low sensitivity for detecting lesion spread
- A CT of the chest and upper abdomen is indicated in all patients, as it allows for the evaluation of the size and extent of the primary tumour and metastatic spread to the mediastinum/upper abdomen
- A PET scan is indicated in all patients with NSCLC who DO NOT have evidence of greater than stage IIIB disease (non-curative) disease on CT scans
- Increasingly, NSCLC is staged with combined PET-CT
- Tissue confirmation is an important investigation prior to consideration of curative surgery. Tissue may be obtained via mediastinoscopy, endoscopy, endobronchoscopy or percutaneous FNA

Bone Scan or Magnetic Resonance Imaging (MRI)

- Routine skeletal imaging is usually not indicated 13
- Some studies have indicated that bone scintigraphy following PET is of limited use as PET is more sensitive and specific in detecting bone metastases secondary to NSCLC. Some authors have recommended use of MRI when an abnormality on PET has been detected 46,47,48,49

Computed Tomography (CT)

Chest, Upper Abdomen

- CT is the initial investigation of choice in staging of non-small cell lung cancer 2
- The usual CT protocol for NSCLC involves a CT chest with extension into the upper abdomen (adrenals). This allows for evaluation of the size and extent of the primary tumour, and metastatic spread to mediastinum and upper abdomen (particularly liver, adrenal glands) 2
- IV contrast may be administered to help distinguish vascular structures from centrally located tumours & lymph nodes 55
- Limitations
    - Note that currently there is little evidence about the accuracy of modern MDCT for lung cancer staging, and the majority of evidence relates to single detector axial CT 56
    - CT has only moderate T staging accuracy. The sensitivity and specificity of CT for T3/T4 disease is 55% and 89% respectively. The positive predictive value (PPV) of CT for T3 or

T4 disease is only 68% and as such, a positive result should be confirmed histologically before denying patients curative surgery (unless there is overt evidence of non-resectable disease such as bony destruction or vascular invasion). 34,35 Multiplanar reformats using MDCT can improve the accuracy, sensitivity & specificity for detecting local invasion
    - CT has only moderate accuracy for mediastinal lymph node involvement with sensitivity of 51% and specificity of 86%. Despite this, CT provides good anatomic information and can guide the choice of lymph nodes for further invasive biopsy 55
    - CT has limited ability to evaluate superior sulcus tumours due to its axial format and streak artefacts from the shoulders. MRI may be of benefit in this circumstance. 11,12
- More recently, CT has been integrated with PET (PET-CT) to provide combined functional & anatomical imaging in the same sitting. More information is found in the section on PET

Adrenal Glands

- CT is the primary imaging modality for characterisation of adrenal masses 20
- While the majority of adrenal lesions are benign, the risk of malignancy increases with primary tumour stage & the size of the adrenal lesion. Lesions >5cm in size are likely to be malignant and these patients should be referred for surgery 20,21,