

الطب والجراحة  
لجنة

# Lung cancer

Dr. Mohd Asim

Done by:  
Daniah Awwad  
Roaa Farajah

# Epidemiology

- **Most common cause of cancer-related deaths 3 in both M & F. (30%)**
- **kills more people than the next three most common cancers combined (breast, prostate, and colon).**
- **M : F = 2:1**
- **The overall 5-year survival rate for lung cancer is only 18%, primarily because the disease is usually advanced at presentation;**
- **diagnosis and treatment at an early stage makes \ the 5-year survival rate approaches 60%.**

## Risk factors:

### 1. Cigarette smoking.

- **primary cause of more than 80% of lung cancers.**

### 2. Radon exposure.

- **second most common cause of lung cancer**
- **the main source of indoor radon is radon gas infiltration from soil into buildings. Rock and soil produce radon gas. Building materials, the water supply, and natural gas can all be sources of radon in the home.**

### 3. Passive (secondhand) smoking

- **Third most common cause**
- **increases the risk of lung cancer by 30%.**

**Despite the strong association between lung cancer and smoking, lung cancers develop in only 15% of heavy smokers.**

### 4. Urban air pollution.

### 5. Industrial exposure (asbestos, uranium, arsenic)

### 6. Family history / somatic denovo mutations

## Types of lung cancers :

### 1. Benign.

### 2. Malignant:

- Primary
- Metastatic

### . Primary malignant lung cancers :

- **Non-small** cell lung carcinoma (NSCLC) (adenocarcinoma, squamous cell carcinoma, and large cell carcinoma )
- small cell lung carcinoma (SCLC).

NSCLC is often managed with surgery when the tumor is localized, whereas SCLC is almost always managed with chemotherapy with or without radiation therapy

## Malignant primary LC

### I. Non-small cell lung cancer (N.S.C.L).

#### 1. Adenocarcinoma 40-50% :

most common lung cancer found in nonsmokers and women.

Hematogenous- Usually peripheral, more likely to develop systemic metastases by hematogenous

#### a. Bronchioalveolar CA.

- tumor cells proliferating along the surface of intact alveolar walls
- Can be single/multiple nodules, indolent/aggressive course

#### b. Acinar adenocarcinoma.

#### c. Papillary adenocarcinoma.

#### d. Solid carcinoma with mucus formation

## I. Non-small cell lung cancer (N.S.C.L).

### 2. Squamous cell carcinoma 25% :

- (not peripheral Adenocarcinoma) 65% as central lesions +/- cavitation.
- Unlike adenocarcinoma, (localized, spread within the pulmonary lobe/ regional lymph nodes
- invasion of the chest wall, mediastinum, or other intrathoracic organs is also known to occur.

### 3. Undifferentiated large cell carcinoma 7%:

- . aggressive, with early metastases to the regional nodes in the mediastinum and distant sites such as the **brain**.

### 4. Adenosquamouscarcinoma 1%.

## II. Small cell lung carcinoma (S.C.L.C) 20%.(15 - 30%).

- Classified under neuroendocrine tumors because of structural similarities.
- **well-differentiated, benign/typical carcinoid tumor,**
  - . Central, main bronchus, secrete the hormone, and treatment mainly surgery.
  - . Express (NSE, Chromogranin, Synaptophysin) tumor markers.
- **intermediate less differentiated atypical carcinoids** or neuroendocrine carcinomas.
  - more aggressive than typical carcinoids, surgery mainly depends on stage.
- **undifferentiated malignant small cell carcinomas.** any symptom can found in this cancer

## II. Small cell lung carcinoma (S.C.L.C) 20%.(15-30%).

- **Highly malignant**
- **Rapid growth**
- **Early mets and invasion**
- **Production of peptides.**

1. **Dopa decarboxylase.**
2. **Adenocorticotrophichormone ACTH.**
3. **Gastrin releasing peptide.**
4. **Creatinine kinase.**

TABLE

7.1

Frequency of Histologic Subtypes of Primary Lung Cancer

Cell Type	Estimated Frequency (%)
<b>Non-Small Cell Lung Cancer <i>more common</i></b>	
Adenocarcinoma	40
Bronchoalveolar	2
Squamous cell carcinoma	25
Large cell carcinoma	7
<b>Small Cell Lung Cancer</b>	
Small cell carcinoma	20
Neuroendocrine, well differentiated	1
Carcinoids	5

# Clinical Presentation

- **Asymptomatic 5%. (discovered incidentally on CXR/CT )**

## **I. Bronchopulmonary symptoms:**

- cough 75%-
- hemoptysis 57%-
- chest pain
- dyspnea
- febrile respiratory symptoms, (infection in obstructed bronchus)
- fever , wheezing , stridor.

## **• II. Extrapulmonary intrathoracic symptoms 15%. Outside lung but inside the chest**

- hoarseness of voice. (RLN paralysis)
- superior vena cava syndrome.
- Pancoast apical lung tumor: (pain in the upper extremity, Horner's syndrome).
- chest pain/chest wall invasion
- dysphagia. (esophagus)
- pleural effusion.
- phrenic / vagus nerve paralysis.

## **III. Extrathoracic nonmetastatic symptoms**

- **Paraneoplastic syndromes. (10%)**
- **More with SCLC**
- Cushing's syndrome (ACTH production).
- Excessive Anti-diuretic hormone production (SIADH)
- Hypercalcemia of malignancy
- Hypertrophic pulmonary osteoarthropathy.
- Lambert
- Eaton myasthenic syndrome (LEMS)
- Clubbing of fingers.
- Thrombophlebitis.
- Dermatomyositis , limbic encephalitis, opsoclonus, ....etc

## Clinical Presentation

### IV. Extrathoracic metastatic symptoms.

- Neurologic symptoms.
- Bone pain, pathological fracture.
- Jaundice, ascites, abdominal mass.
- Non-specific symptoms.
  - Wt loss , weakness , anorexia , malaise.

## Metastasis

- Direct extension.
- Lymphatic metastasis.
- Hematogenous spread.
  - brain, liver, lungs, bone, adrenal glands, kidney, pancreas, skin, subcutaneous tissue.
  - bone : ribs, spine, femur, humerus, pelvis.

## Diagnosis

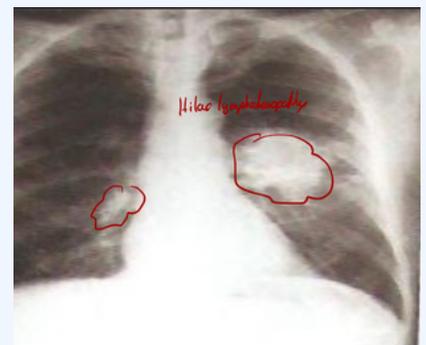
### • Imaging :

- CXR (initial test)
  - Chest CT scan (It doesn't show all the LN in chest.) with IV contrast (including liver and adrenals)
    - confirms dx, assess tumor extension, mediastinal LN, help staging)
  - MRI (adds little to CT , mainly in superior sulcus tumor with spine / neurovascular involvement)
    - PET/ PET-CT scans (most common use/(available in jo)
- : (accuracy 90%)

Performed routinely for diagnosis and staging.

Distinguish Benign vs malignant mass

False-ve in carcinoid and Bronchoalveolar adeno.



## Histological diagnosis:

- Always required to confirm dx
- Sputum cytology +ve 45-90%.
- Bronchial Lavage cytology.

- **Invasive Diagnostic Procedures:**

- Bronchoscopy (if it's central mass) -endobronchial US (EBUS).
- Percutaneous transthoracic needle BX (CT guided FNA/CNB).
- VAT(laproscope to chest).(video-assisted thoracoscopy).
- Supraclavicular lymph node biopsy.
- mediastinoscopy.\*Because there is lymph node(ln)

## Staging of primary lung cancers :

- It is essential to determine the extent of the disease, formulate a proper treatment plan, and predict prognosis/survival.



## **Staging of primary lung cancers :**

- In SCLC, most patients present with metastatic or advanced locoregional disease.
- A simple two-stage system classifies the SCLC as limited or extensive disease. iii its
- Limited disease is confined to one hemithorax, ipsilateral or contralateral hilar or mediastinal nodes, and ipsilateral supraclavicular lymph nodes.
- Extensive disease has spread to the contralateral supraclavicular nodes or distant sites such as the contralateral lung, OR liver, brain, bone marrow.
- Staging for SCLC requires CT scan /PET-CT and brain MRI
- May need mediastinoscopy / EBUS for LN staging

## **Staging of NSCLC :**

- According to the 8thAJCC (TNM) – released in 2016 -
- CXR
- CT scan of the chest and upper abdomen (liver/adrenals) u
- PET-CT (detect occult Mets)
- Brain MRI (for stage II and more)
- May need EBUS, mand mediastinoscopy to confirm mediastinal LN mets(not indicated in early tumors T1N0)

## **Pre- treatment assessment :**

To determine the patient's ability to tolerate various therapeutic modalities

Includes :

- overall medical status (comorbidities, drugs, nutritional status)
- Full cardiovascular assessment (hx, PEx, CXR, ECG, ECHO,
- +/- exercise testing, nuclear cardiac perfusion, cardiac cath)

## **Pre- treatment assessment :**

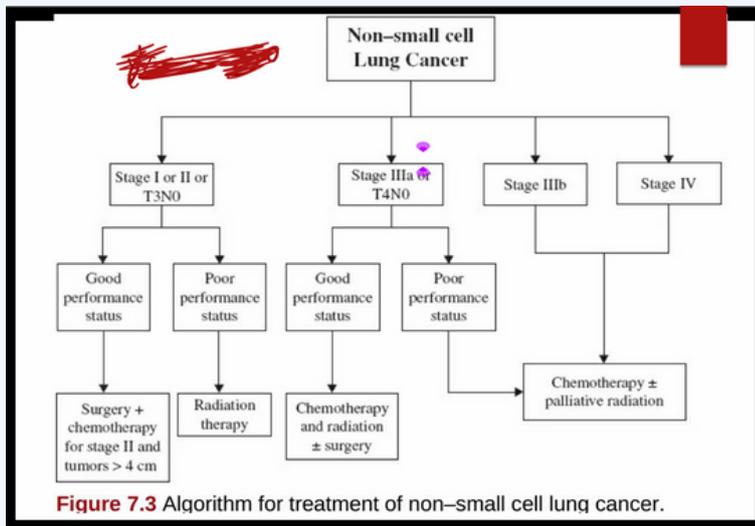
- **[Full pulmonary evaluation]: \*The most important one**
  - Especially when going for pulmonary resection as the lung reserve is usually less in those patients due to smoking/COPD and the cancer itself.
  - spirometry, PFT, and VQ scan.
  - Majorly impaired pulmonary reserve might be a contraindication to lung resection
- **[-Preoperative incentive spirometer training]**
- **[initiation of bronchodilators]**
- **[weight reduction]**
- **[ good nutrition]**
- **[cessation of smoking for at least 2 weeks before surgery ]**
- **[All can help minimize complications and improve performance on spirometry for patients with marginal pulmonary reserve**

## **Available Treatment modalities :**

- **Surgery.**
- **Chemotherapy.**
- **Radiotherapy.**
- **immunotherapy**

## **Treatment of NSCLC**

- **Stage I, II ( mainly surgery) if they can tolerate.**
- **Stage I,II not fit for surgery – (less resection or radiation-SBRT)**
- **Stage I (60-70% 5-year survival), Stage II 40%**
- **Stage IIB (chest wall invasion with NO) surgery+ chemo or definitive radiation + chemo if they can't tolerate**
- **Stage IIIA – induction chemoradiation +/-surgery**
- **Stage IIIB – definitive chemoradiation**
- **Stage IV – induction chemo + palliative radiotherapy**
- **Surgery for stage IV only in patients with resected primary and less than 3 metsto lung/brain**



## Surgical treatment includes :

- **Pneumonectomy (the whole lung) :**

as very commonly performed, now only 20% of surgeries-- Higher mortality 4-10% and morbidity Advances in surgical techniques reduced the need for pneumonectomy

- **Lobectomy : (tumor + lobe + lymphatic pathway)**

-The standard and most common surgery performed is yes

-Mortality <2%

- **Segmentectomy and non-anatomical wedge resections :**

-Higher recurrence rate & SPRI is & Only in patients who can't tolerate lobectomy Still under investigation for early small lung cancers (no evidence on their efficacy for early lung cancer) The procedure of choice for metastatic lung cancer from another primary cancer but not for primary lung cancers

### **Video Assisted Thoracoscopic Surgery (VATS):-**

Ports inserted and resected under camera visualization-

- similar outcome to open thoracotomy surgery (tumor resection) but less morbidity and pain

- **Robotic VATS**

- **Mediastinal Lymph Node Dissection:**

Decrease recurrence

Improve survival ??? (not conclusive)

More staging accuracy

- **Stereotactic body radiation (SBRT) can be an alternative for resectable tumors not fit for surgery with inferior results**

## Metastatic Secondary Neoplasms To The Lung

- Any malignant tumor can have metsto lungs
- Mostly from colorectal, breast, thyroid .... etc
- Secondary lung mets are Less common than primary lung cancer (unlike liver)
- Usually multiple , peripheral
- 95% asymptomatic (discovered during follow up of the primary cancer)
- New multiple pulmonary nodules in a patient with known other cancers is highly suggestive (100%)
- New single nodule is more likely to be a new primary lung cancer (not secondary mets)
- Prognosis depend on resectability, disease free interval and number of mets

### treatment

- Surgery (metastasectomy/wedge resection) **primary treatment. (Just we remove involved part )**
  - Can improve survival in some cancers
  - require
- Ability to remove all mets
- control of the primary tumor Not lottery adequate predicted postoperative pulmonary reserve no other organ metastases
- follow the treatment guidelines for the primary tumor (some benefit resection e.g.colorectal, some not – e.g gastric)
  - Chemotherapy, radiotherapy (palliative)

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اجعل السكينة المتدفقة على فؤادي  
من حُسن الظنّ بك  
تبدد الخوف المحتشد فيه  
من نقصان أسبابي  
بشري خليلي -