LUNG CANCER

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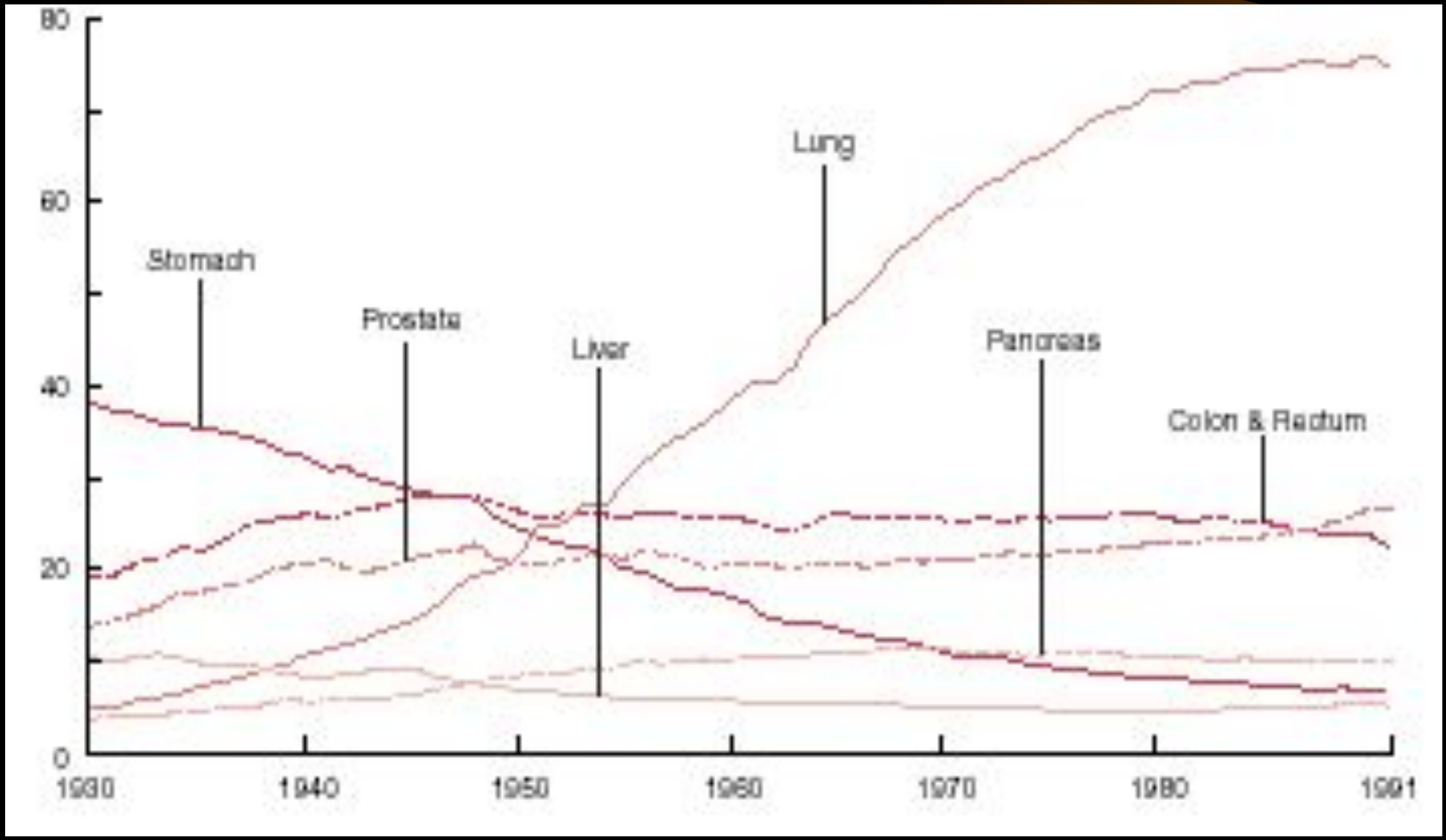
Lung cancer is the second most common malignancy

- Most lung carcinomas are diagnosed at an advanced stage.
- The need to diagnose lung cancer at an early and potentially curable stage is obvious.

EPIDEMIOLOGY
Incidence

- Lung cancer incidence is increased in urban areas
- The highest incidence in male is in Scotland, USA, Poland
- The lowest incidence in male is in Syria, Salvador, Thailand

Now lung cancer is the first most common cause of death in men



EPIDEMIOLOGY

Death rate

- The *highest death rate* in male is in Scotland (105,2), Belgium (104,1), and in Netherlands (103,8).

- The *lowest death rate* is in Peru (7,3), Martinique (12,2), and in Surinam (15,9).

EPIDEMIOLOGY

Sex

- Lung cancer is more common in men than in women.

- The incidence of lung cancer started to decline among males in the early 1980s and has continued to do so over past 20 years.

- By contrast, the incidence in women started to increase in the late 1970s and only recently reached a plateau.

EPIDEMIOLOGY

Age

- The probabilities of developing lung cancer

- among *males*: from birth to 39 years, 0.04%; 40-59 years, 1.24%; 60-79 years, 6.29%.

- among *females*: from birth to 39 years, 0.03%; 40-59 years, 0.92%; 60-79 years, 4.04%.

EPIDEMIOLOGY

Race

- Among *men*, the incidence of lung cancer ranges from 14 per 100,000 Americans, 42-53 for Hispanic and Chinese, 71-89 for Vietnamese, and to 117 among blacks Americans.

- Among *women*, the incidence of lung cancer ranges from 15 among Japanese, 16-25 among Hispanics and Chinese, 31-44 among Vietnamese and blacks Americans to 51 among Alaskan natives.

There are two more common different morphological and clinical forms of lung cancer:

1) Non-Small-Cellular **Lang Cancer (NSCLC)**

from squamous or glandular cells

2) Small Cellular **Lung Cancer (SCLC)**

from Kulchitzky cells

Small Cellular Lung Cancer (SCLC)

Features:

- SCLC exhibits aggressive behavior,
- rapid growth,
- early spread to distant sites,
- exquisite sensitivity to chemotherapy and radiation,
- frequent association with distinct paraneoplastic syndromes
- **SCLC** account for approximately ***20-25%*** of all lung cancers

Non–small cell lung cancer (NSCLC)

Features:

- accounts for approximately ***75-80%*** of all lung cancers.
- non–small cell lung cancer requires meticulous staging, because the treatment and prognosis vary widely depending on the stage.
- in non–small cell lung cancer, surgical resection offers patients the best chance for survival.

ETIOLOGY

1. Smoking

✔ The cause of lung cancer (LC) is tobacco smoking in as many as 90% of patients (78% in men, 90% in women).

✔ The risk of developing lung cancer in smoking human is 13.3 times

ETIOLOGY

2. History of interstitial lung disease

- ✔ Concomitant chronic obstructive bronchitis, tuberculosis, pneumosclerosis and pneumoconiosis are a risk factor for LC.

3. Asbestos

- ✔ Asbestos exposure increases the risk of developing LC by as much as 5 times. The silicate type of asbestos fiber is an important carcinogen.
- ✔ Tobacco smoke and asbestos exposure act synergistically.

ETIOLOGY

4. Radon

- ✔ Approximately 2-3% of lung cancers annually are estimated to be caused by radon exposure.

5. HIV (human immunodeficciency virus) infection

- ✔ It is a 6.5-fold increase in lung cancer in patients infected with HIV.

ETIOLOGY

6. Other environmental agents

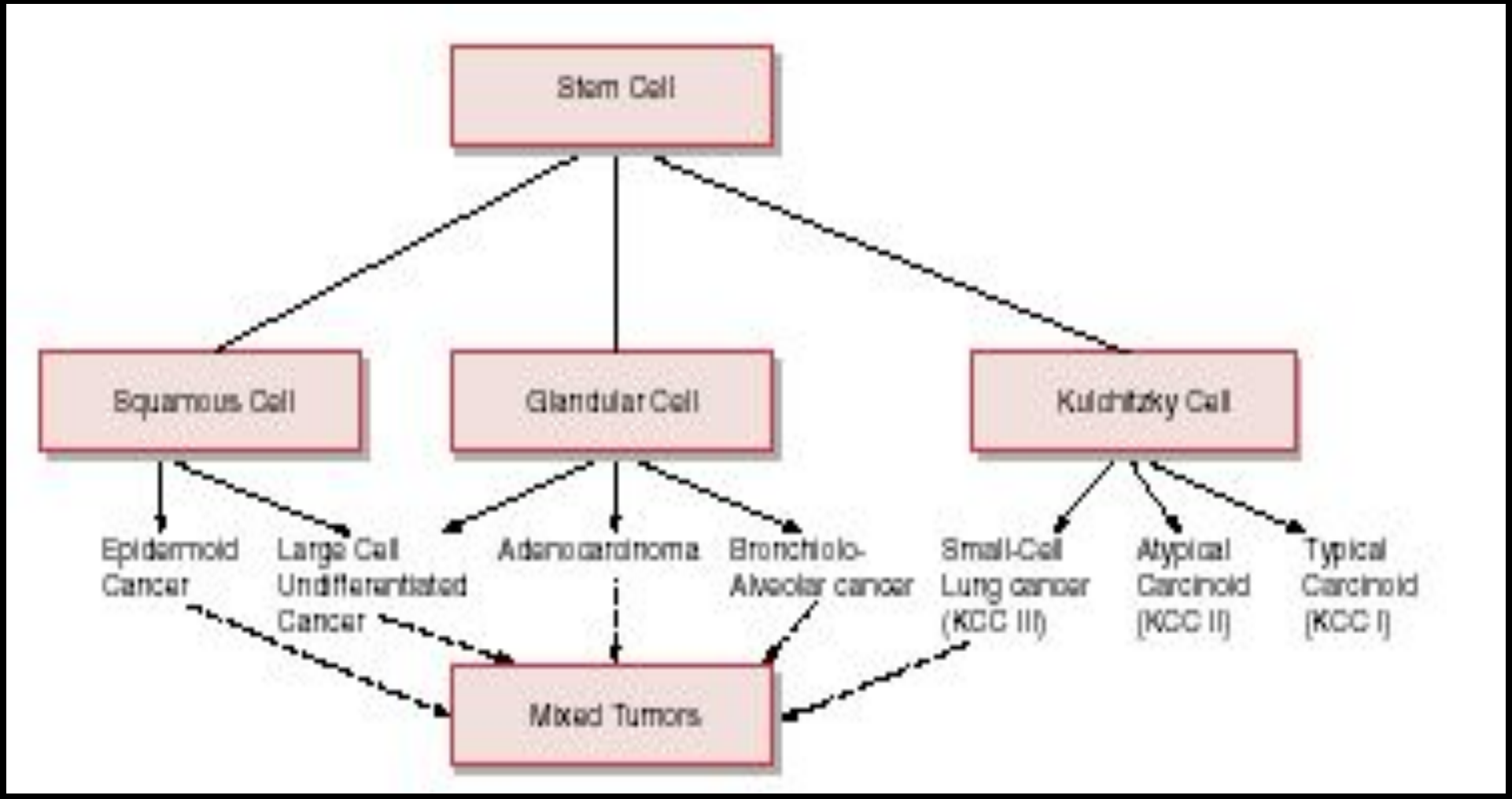
- ✔ Aromatic polycyclic hydrocarbons, chromium, and diesel exhaust all have been implicated in causing LC.

PATHOPHYSIOLOGY

- *The base of pathogenesis of central lung cancer is the metaplasia of bronchial epithelium due to irritant actions by smoke, and chronic inflammatory processes.*

- *The base of peripheral lung cancer is the scars on the lung parenchyma by tuberculosis, and fibrosis.*

Tumors arise from a common mucosal, pleuripotential stem cell.



HISTOPATHOLOGY

HISTOPATHOLOGY

- **SCLC** classified into 3 subcategories: *1)* oat cell carcinoma, *2)* intermediate cell type, and *3)* combined cell carcinoma.

- **NSCLC** includes: *1)* squamous cell carcinoma, *2)* adenocar-cinoma, and *3)* large cell carcinoma. Sometimes, lung cancers can exhibit 2 or more histologic patterns.

Site

- **SCLC** typically are centrally located, arising in peribronchial locations. In other words, SCLC is most frequently considered to be central lung cancer.
- **NSCLC**: Squamous cell carcinomas occur predominantly in a central location, whereas adenocarcinoma presents as a peripheral lesion.

Stage grouping for lung cancer

Stage	TNM
IA	T1N0M0
IB	T2N0M0
IIA	T1N1M0
IIB	T2N1M0 or T3N0M0
IIIA	T1-3N2M0 or T3N1M0
IIIB	T4 or T any N3M0
IV	Any T any N M1

CLINICAL MANIFESTATION

Symptoms include the following:

1. Constitutional symptoms: fatigue, anorexia, weight loss.

2. Symptoms due to primary tumor

3. Symptoms due to intrathoracic spread

4. Symptoms due to distant spread (distant metastasis)

The symptoms and sighs depend on its <u>location:</u>

(1) central form

(2) peripheral

(3) Pancoast cancer - superior sulcus tumors

*1. **Central** tumors diagnosed in 70-85% of all LC.*

Symptoms: cough, dyspnea, atelectasis, postobstructive pneumonia, wheezing, and hemoptysis.

*2. **Peripheral** tumors diagnosed in 15-30% of all NSCLC.*

Symptoms: pleural effusion and severe pain.

Pleural effusions symptoms: dullness and decreased breath sounds

3. ***A Pancoast tumor*** is a rare form *1%* that arises in the superior sulcus of the lung apex and producing shoulder pain.

Involvement of the lower roots of brachial plexus cause arm pain and paresthesias in ulnar nerve distribution.

The tumor may spread to the symptomatic ganglion, leading to Horner syndrome: ipsilateral enophthalmos, miosis, partial ptosis, and anhidrosis.

CLINICAL MANIFESTATION

Symptoms due to intrathoracic spread:

- superior vena cava obstruction,
- hoarseness (ie, palsy of the recurrent laryngeal nerve),
- phrenic nerve palsy,
- dysphagia (ie, compression of esophagus),
- stridor (ie, compression of the trachea mainstem bronchus).

CLINICAL MANIFESTATION

Symptoms due to distant spread:

- neurological dysfunction (ie, brain metastasis, spinal cord compression),
- bone pain (bone metastasis),
- abdominal/right upper quadrant pain (ie, liver metastasis).

4) Paraneoplastic syndromes by ectopic hormone production

- ✔ Squamous cell carcinomas are more likely to be associated with hypercalcemia due to parathyroidlike hormone production.

- ✔ Clubbing and hypertrophic pulmonary osteoarthropathy and the Trousseau syndrome of hypercoagulability are caused more frequently by adenocarcinomas.

DIAGNOSTICS

Diagnostic strategy:

In the presence of a long history of smoking or other risk factors for lung cancer, the presence of persistent respiratory symptoms should prompt:

(1) chest X-Ray.

(2) histologic confirmation is necessary:

by sputum cytologic studies

by bronchoscopy

by CT-guided transthoracic needle biopsy

DIAGNOSTICS

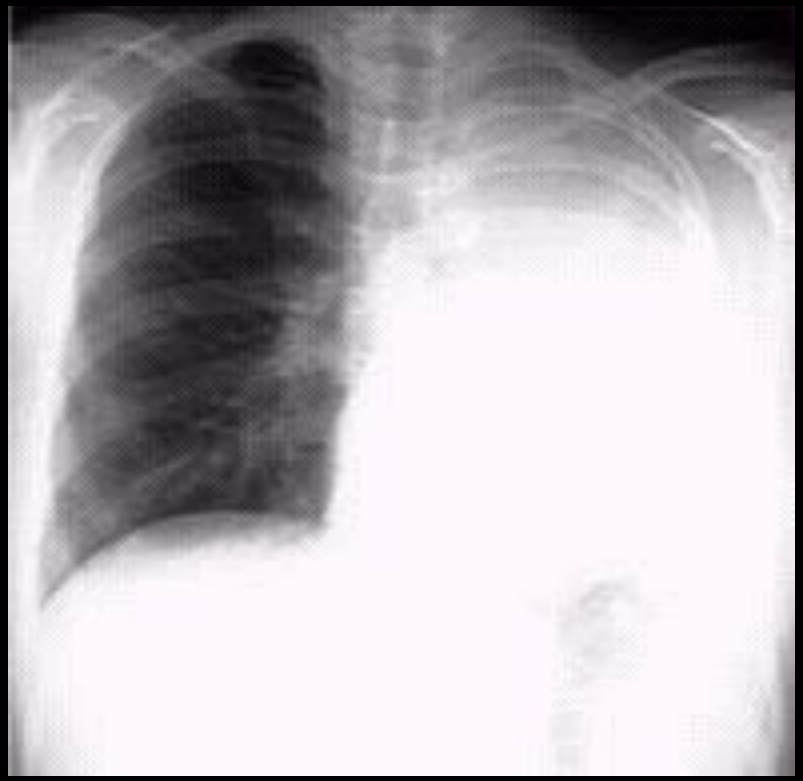
1. Chest X-Ray (CXR)

- ✔ A chest radiograph is usually the first test ordered in patients.
- ✔ On chest radiography, the findings of lung carcinomas are varied and considered in the differential diagnosis of many disorders.

DIAGNOSTICS

1. CXR findings in central form of lung cancer.

1). Bronchial stenosis of lung

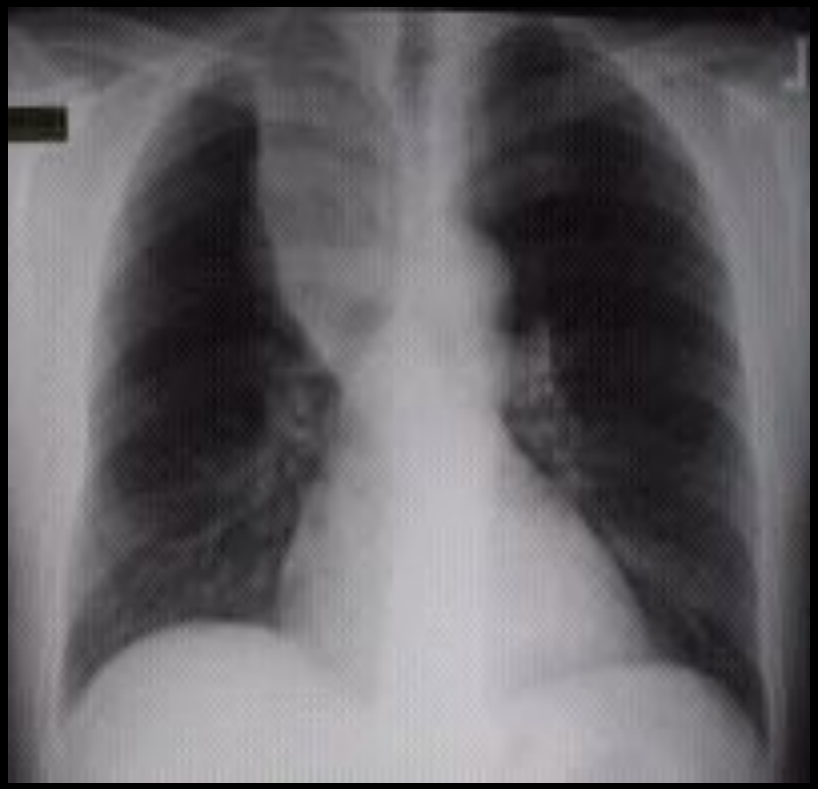


Complete left lung collapse secondary to bronchogenic carcinoma of left mainstem bronchus.

DIAGNOSTICS

1. CXR findings in central form of lung cancer.

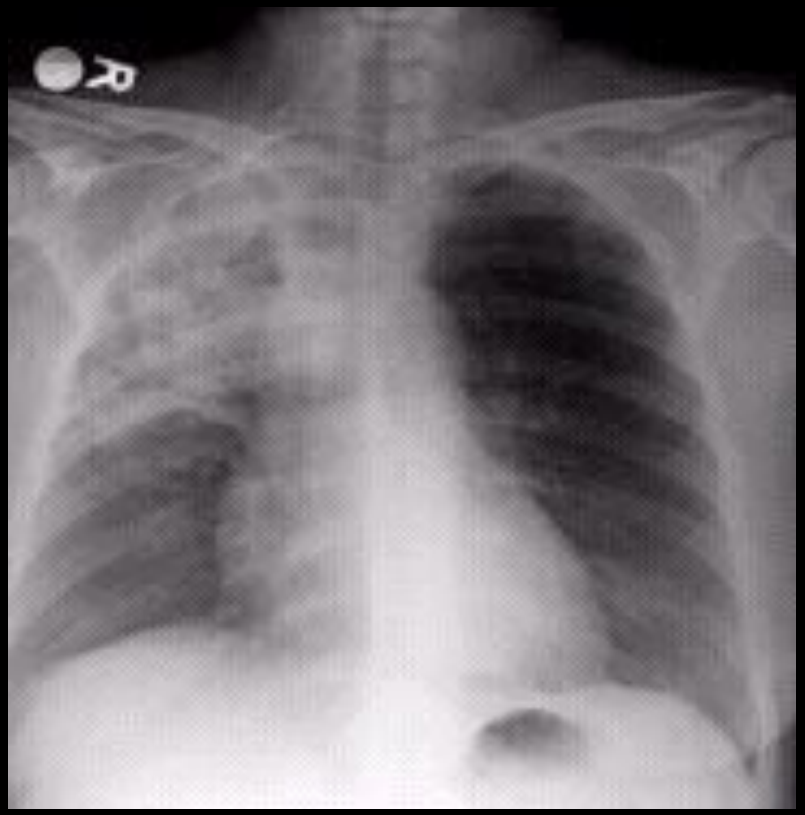
2). Bronchial stenosis of lobe



Bronchial stenosis of upper lobe of the right lung.

DIAGNOSTICS

1. CXR findings in central form of lung cancer.



3). Patchy irregular or homogeneous opacities in a lobar or segmental distribution.
4). Postobstructive pneumonia in a segmental or lobar distribution.

DIAGNOSTICS

1. CXR findings in central form of lung cancer.

5). Regional hyperlucency.

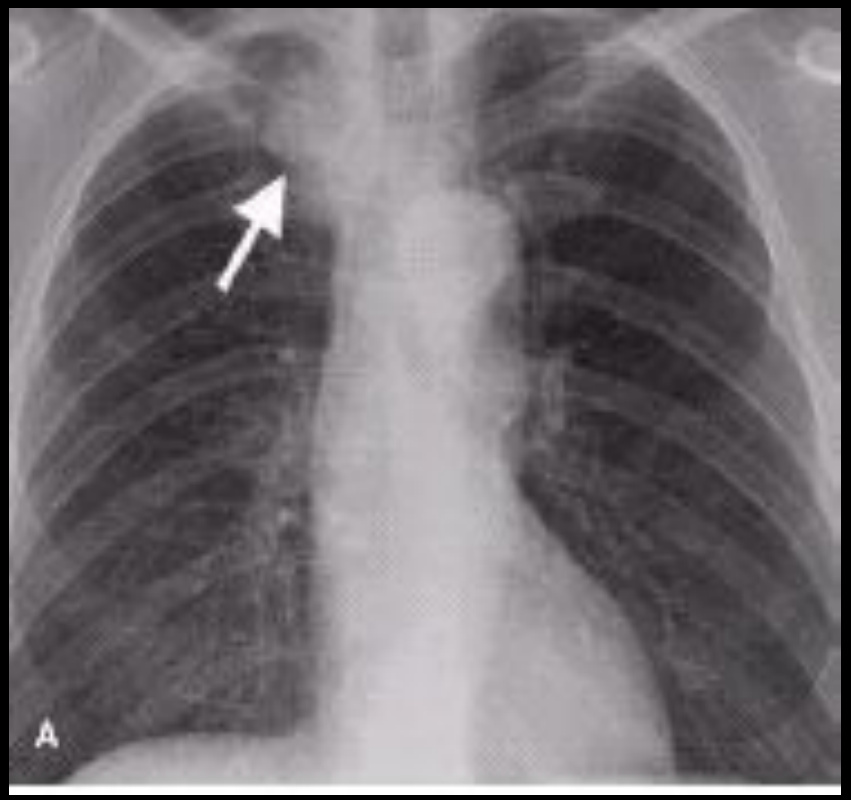
- ✔ *Partial stenosis of segmental bronchus leads to hypoventilation of corresponding lung segment.*

- ✔ *In partially atelectatic areas of the lung, hyperlucency rather than opacity may be evident.*

DIAGNOSTICS

1. CXR findings in central form of lung cancer.

6). Hilar mass.



Infiltration of lymphatics with bronchogenic carcinomas may be demonstrated as linear opacities radiating from the hilar mass into the lung periphery.

DIAGNOSTICS

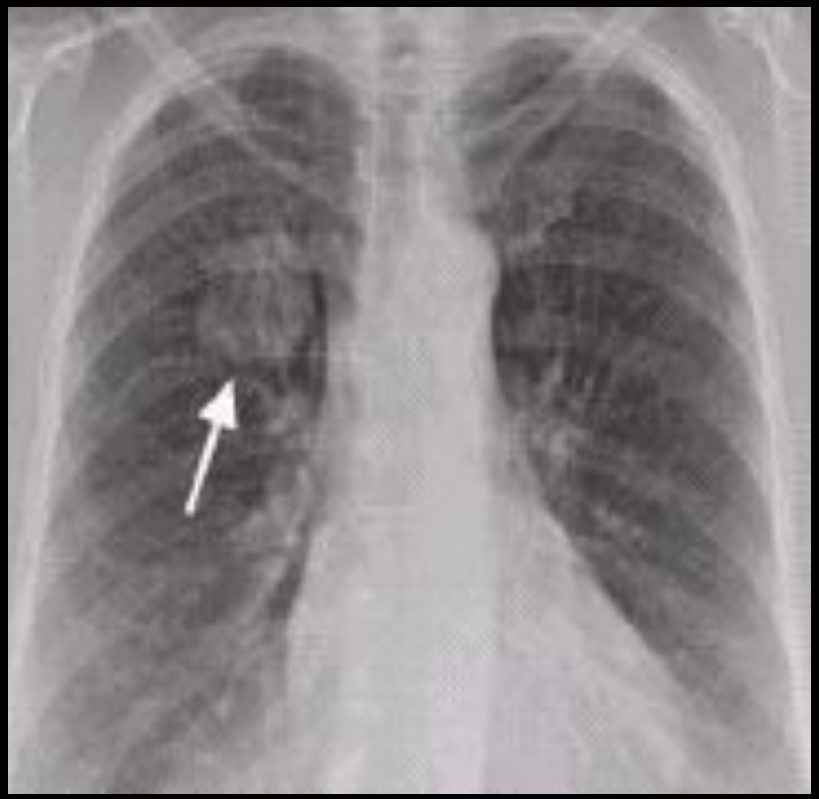
1. CXR findings in peripheral form of lung cancer

✔ *has following clinico-anatomical types:*

✔ *solitary round pulmonary nodule,*

✔ *similar pnumonia type,*

✔ *Pancoast tumor.*



solitary round pulmonary nodule

DIAGNOSTICS

1. The CXR sings of nonresolving pneumonia may be occure both in central and peripheral form of lung cancer.

- ✔ An ill-defined homogeneous or patchy consolidation in a segmental or nonsegmental distribution.
- ✔ Patients with these findings often are treated initially for pneumonia;
- ✔ The lack of response to antibiotic therapy
- ✔ Suggests the diagnosis of a malignancy.

DIAGNOSTICS

1. Chest X-Ray (CXR).

Mediastinal lymph node enlargement:

Metastases to paratracheal, tracheobronchial, peribronchial, aortopulmonary, and subcarinal lymph nodes.

DIAGNOSTICS

2. Sputum cytologic studies.

✔ *Sputum cytology can be a quick and inexpensive diagnostic test.*

✔ *Sputum cytologic studies in the suspection of lung cancer can be performed as obligatory method.*

DIAGNOSTICS

3. Bronchoscopy

Diagnostic material can be obtained with direct biopsy of the visualized tumor, bronchial brushings and washing, and transbronchial biopsies.

DIAGNOSTICS

4. Biopsy.

is preferred for tumors located in the periphery of the lungs.

DIAGNOSTICS

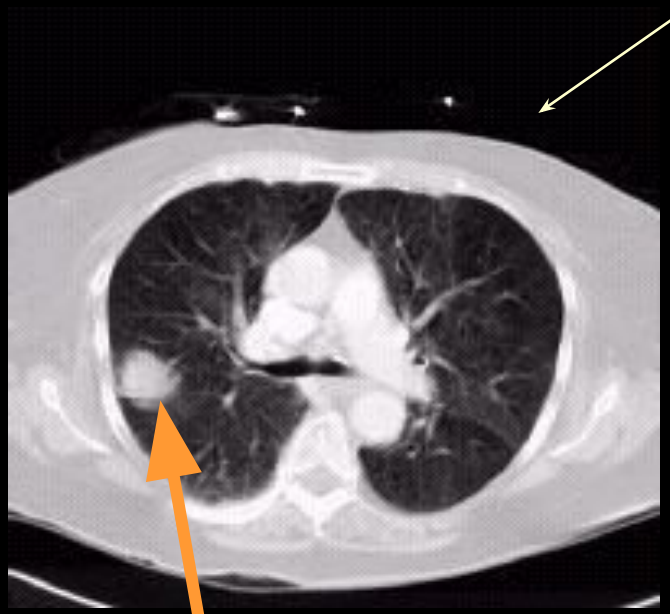
Staging workup

1. Ultrasaund or CT scan of the upper abdomen, including liver and adrenals
2. Liver and kidney functions tests by electrolytes and renal function studies.
3. A CT scan of the brain.
4. Bone scintigraphy.
5. Positron emission tomography.
6. Magnetic resonance imaging (MRI).
7. Mediastinoscopy and Thoracoscopy

DIAGNOSTICS

Staging workup

CT scans of chest (left) and abdomen (right)



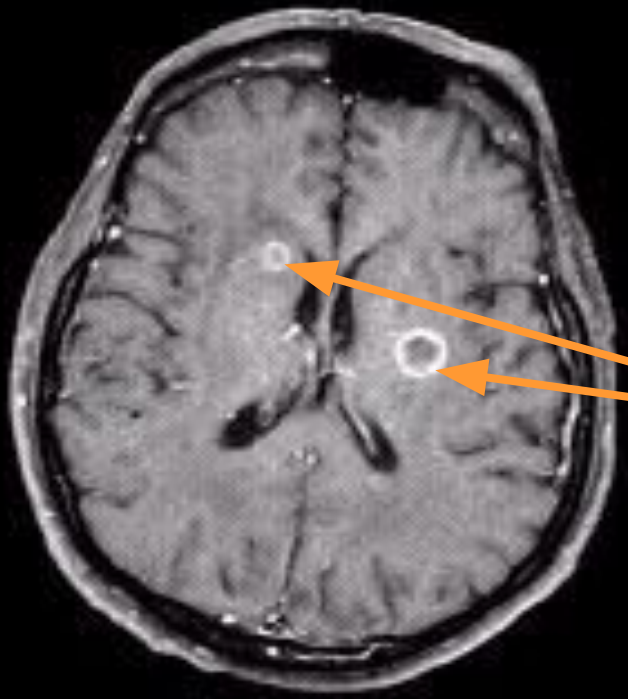
Solitary pulmonary nodule in the peripheral part of the right lung.

The adrenal glands are a common site for metastatic small-cell lung cancer.

DIAGNOSTICS

Staging workup

CT/MRI scan of brain

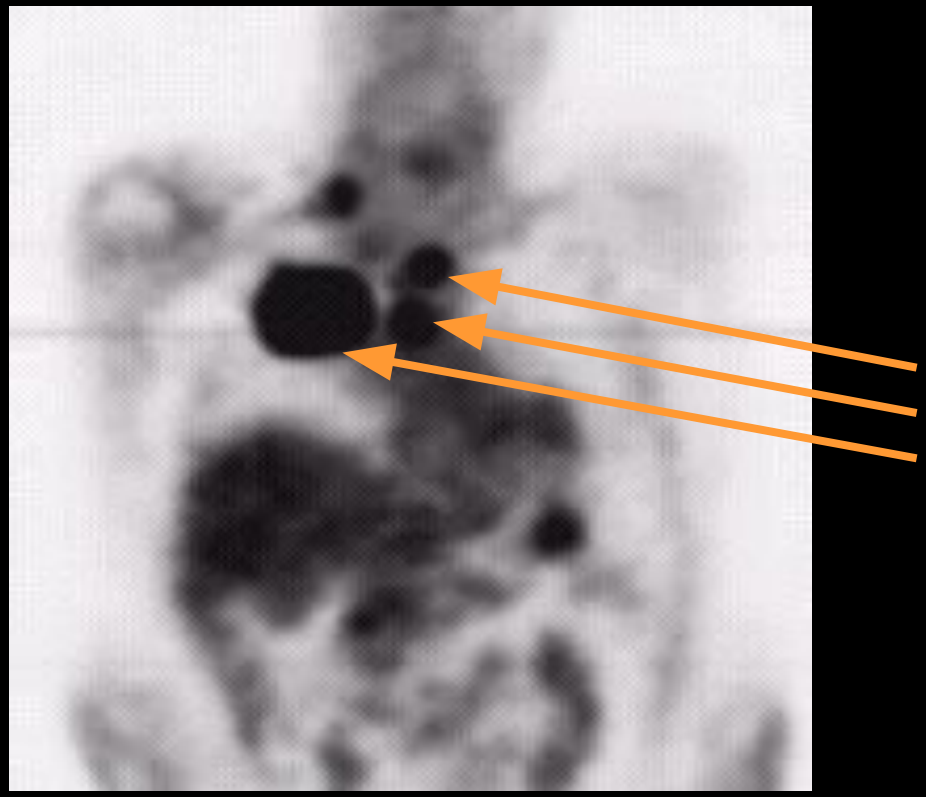


The brain is one of the predominant sites for SCLC metastasis.

DIAGNOSTICS

Staging workup

Positron emission tomography (PET)

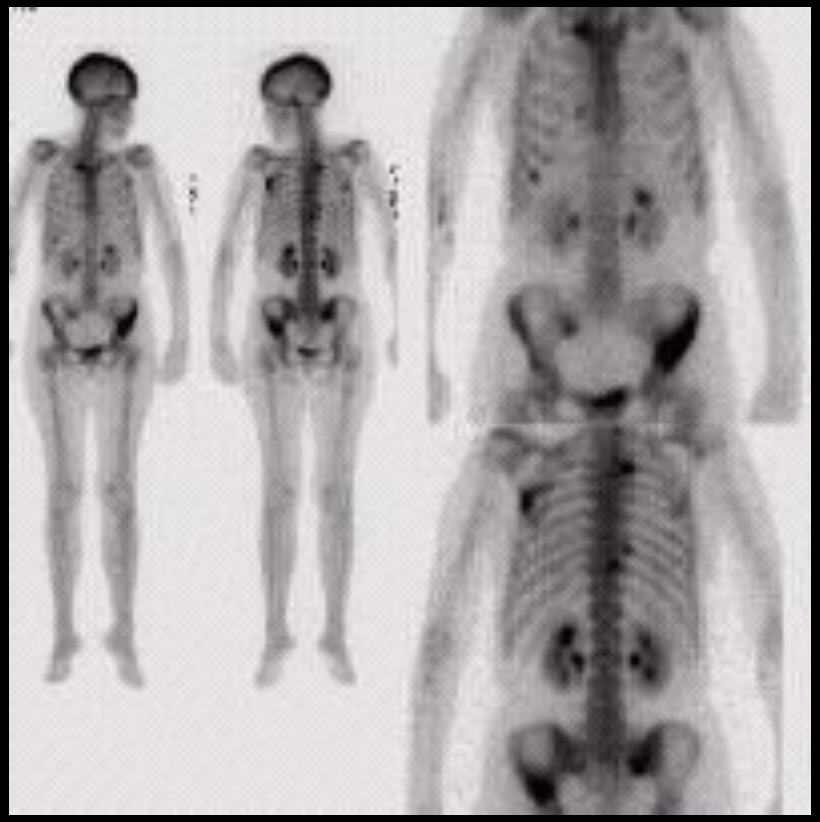


Multiple hypermetabolic areas suggest lymph-node metastatic disease in the chest, abdomen, and right supraclavicular region.

DIAGNOSTICS

Staging workup

Bone scan



Multiple abnormal areas of increased radiotracer activity in the pelvis, spine, ribs, and left scapula.

DIAGNOSTICS

Staging workup

Thoracentesis. Pleural effusions should be aspirated and examined for malignant cells

Bone marrow aspiration is necessary in patients with myelophthisic anemia by metastases.

DIFFERENTIAL DIAGNOSES

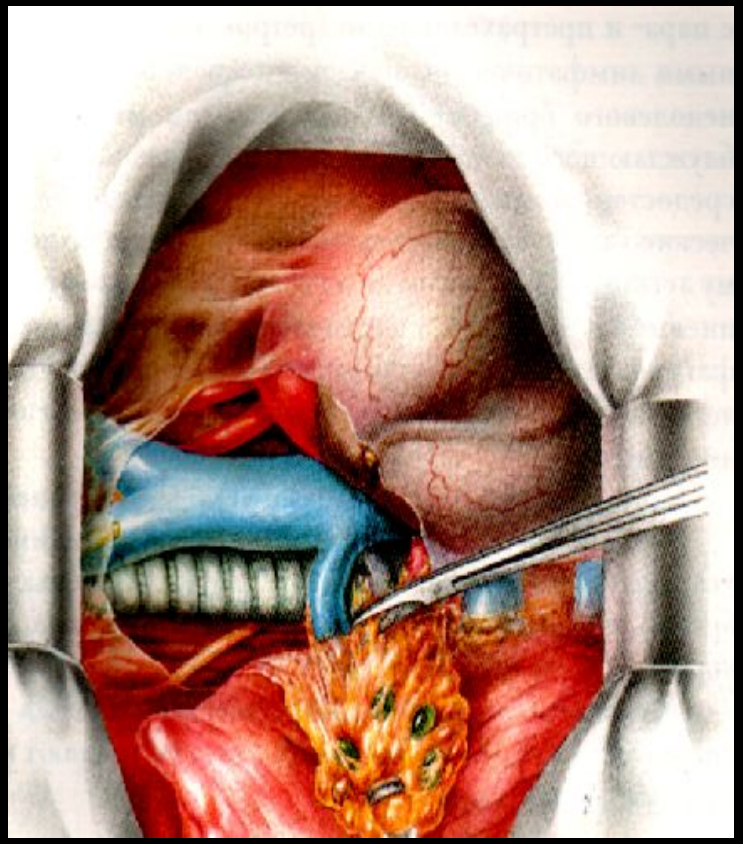
- Bronchogenic cyst
- Neurogenic tumors
- Teratodermoid tumor
- Thymoma
- Vascular aneurysm
- Esophageal lesions
- Lymphadenopathy from other malignant or benign lesions

SURGICAL CARE

- ✔ Surgical resection provides the best chance of long-term disease-free survival and possibility of a cure.
- ✔ The standard surgical procedures :

1. lobectomy (*in peripheral tumors without lymph node metastases)*
2. lobectomy with mediastinal lymph nodes dissection (*in peripheral tumors with lymph node metastases)*

SURGICAL CARE



3. pneumonectomy (*in central lung cancer)*.

Wedge resections are associated with an increased risk of local recurrence and a poorer outcome.

CHEMOTHERAPY

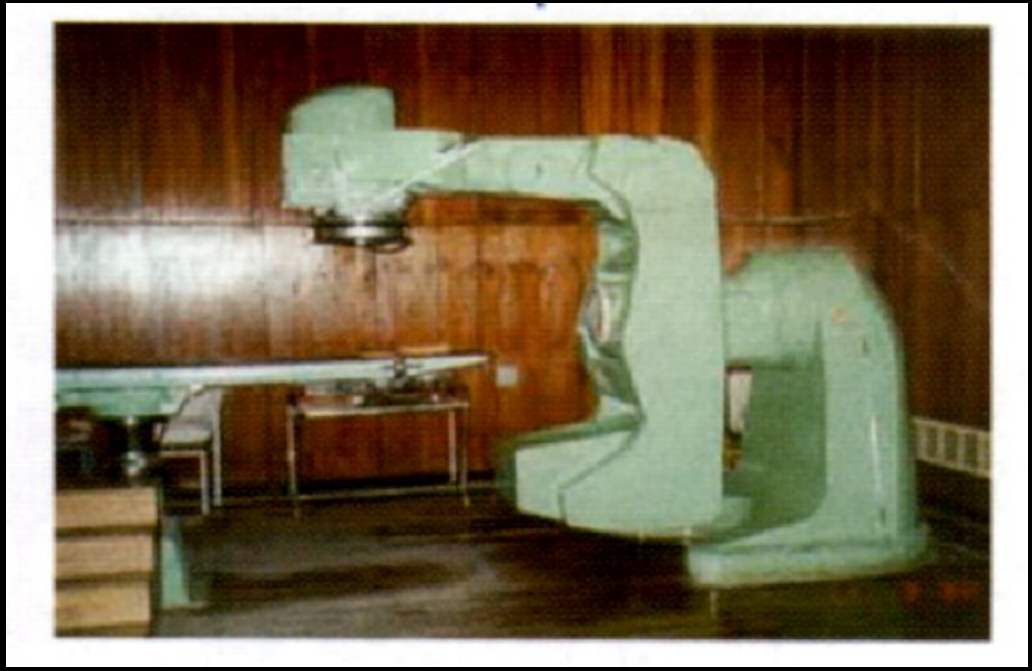
✔ Alone has no role in potentially curative therapy.

✔ Is used alone in the palliative treatment of stage IIIB NSCLC and stage IV.

- carboplatin-paclitaxel
- cisplatin-gemcitabine
- cisplatin-vinorelbine.

RADIATION THERAPY

- ✔ Reduces local failures in completely resected stages (II and IIIA) NSCLC
- ✔ But has not been shown to improve overall survival rates.



PROGNOSIS

Estimated 5-year survival rates are as follows:

Stage IA - 75%; Stage IB - 55%;

Stage IIA - 50%; Stage IIB - 40%;

Stage IIIA - 10-35%; Stage IIIB - Less than 5%;

Stage IV - Less than 5%.

The main cause of death for patients after radical treatment at long-term period is distant metastases.

Thank you