

- **Pathology of Tumors of Lung**
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  - Classify lung tumors.
  - ○ Classify bronchogenic carcinoma.
  - ○ Discuss etiopathogenesis of bronchogenic ca.
  - ○ Discuss morphological features of squamous cell carcinoma, adenocarcinoma, bronchiolo-alveolar carcinoma (BAC), and small cell carcinoma.

- o Enlist clinical features, spread, and complications of lung malignancies .
- **Lung tumors**
- **Is the commonest fatal tumor in men.**
- **> 1970 a lot of biological data produced (IHC, EM, PCR)**
  
- **Incidence rises with Age, between 40 – 70 yrs.**
  
- **Associated with cigarette smoking.**
  
- **Many Histologic types with varying degrees of malignancy, ranging from: Entirely benign to extremely malignant.**
  
- **{Central OR peripheral} { Bronchial OR Bronchio-alveolar}**

- **Histologic Classification of Lung and Pleural Tumors**

- Benign
- Mucinous (“colloid”) adenocarcinoma
- **Classification of Bronchogenic carcinoma**
- **Four major Histologic subtype:**

- **Bronchoalveolar ca (BACs) is subtype of Adenocarcinoma.**
- **All NSCLC are genetically distinct & surgery is curative, if limited to the lung. SCLC needs chemotherapy.**
- **Etio-pathogenesis.**
- **well-known lung carcinogens:**
- **1. Genetic abnormalities:**
- Accumulation of genetic abnormalities that transform benign bronchial epithelium to neoplastic tissue- **NSCLC**

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- **2. Tobacco-cigarette Smoking. 87% of lung ca. (tenfold risk)**

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### **3. Industrial & occupational Hazards**

**exposures:** a) Ionizing radiation , b) Hiroshima and Nagasaki atomic bomb blasts. c) uranium miners. d) Asbestos.

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**4. Air Pollution:** a) Atmospheric pollutants. b) Indoor air pollution (GAS). c) Radioactive decay products

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**5. Precursor Lesions:** a)-Squamous metaplasia, b) Squamous dysplasia and carcinoma in situ, c) Atypical adenomatous hyperplasia, d) Diffuse idiopathic pulmonary neuroendocrine cell hyperplasia.

- **1. Tobacco Smoking.**
- **Environmental tobacco smoke induced risk of mutation.**
- **Well known carcinogen- depend on:**
  - **(1) The amount of daily smoking, 25 cig\day**
  - **(2) The tendency to inhale,**
  - **(3) The duration of the smoking habit.**
- **Histologic Outcome** of smoking changes in the lining epithelium of the respiratory tract. These sequential changes have been best documented for **SCC & other type.**
- **Other type of cancer (mouth, pharynx, cervix, etc..)**
- **Nonsmoking spouses of cigarette smoker (passive smoking).**

- **Morphologic of Lung ca.**
- **Types:**
- ADC , SCC, LCLC, SCLC
- **Gross appearance:**
- Grayish\whitish.
- **Start small – intra-luminal mucosa firm nodule.**
- **Large mass develop central necrosis& cavity.**
- **Central (SCC, SCLC) or peripheral (ADC,LCLC)**
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- **Pattern of local spread:**
- **Invade adjacent structures (Lung tissue, vessels, lymphatic, nerves)→ extended to:**
- **a)Pleural cavity. b) chest wall ,c) Intar-thoracic structures.**

- **Mode of distal metastasis:** →  
Adrenal, liver, brain, bone
- (1) Haematogenous (2) Lymphatic
- **Morphologic features**
- **1. Adenocarcinoma**  
**(ADC): “common type”**
- Commonly peripheral lesion, appears as scar.
- >> Non-smoker + >> in female:
- **Common features**
- No precursor- Genetic mutations(EGFR, KRAS)
- Smaller in size than other type
- Grayish\whitish
- Early metastasis.
- Respond to treatment targeting epithelial growth factor receptor (EGFR).
- **Histologic types:**
- (a) Acinar, (b) Papillary, (c) Solid. (d) Mucinous



## Bronchoalveolar ca

### (BACs):

- “sub-type” of adenocarcinoma.-  
good prognosis
- **Location:** Commonly **peripheral** lesion or **Multiple**.
- Single nodule or multiple gives pneumonia-like feature
- **Grows along per-existing structure & preserve alveolar architecture. No destruction of alveolar structure.**
- **Histologic types:**(1)Mucinous  
(2)Non-mucinous type.

- **2. Squamous cell ca.**

- **Precursor: Squamous metaplasia → Dysplasia → CIS.**
- **Location:** Commonly major bronchi (central).
- **Spread: local\node\ metastasis**
- **Large tumor-** necrosis& cavity.
- **Histologic types:**
- (1) Well (2) Moderate (3) Poor
- **Sputum cytology-**
- **Paraneoplastic syndrome=**
- **Hypercalcaemia (PTH-related protein)**

### **3.Small cell lung carcinoma (SCLC)= (Oat)**

- **Highly malignant,- high grade, a distinctive cell type.**
- **Neuroendocrine nature.**
- **Paraneoplastic syndrome.(++)**

- **No precursor.**
- **Poor prognosis**
- **Location: major bronchi+ Endo-bronchial (central) more > in the periphery.**

- **Tumor cells-** small size, rounded > lymphocyte size.
- **Nuclei** -salt-and-pepper" chromatin **Mitotic figures- Necrosis.**
- **EM** - neurosecretory granules.
- **Spread:** metastasize widely.
- **Never Localized-** No surgical option

- **Paraneoplastic syndrome**

- **4.Large cell lung carcinoma**

- **Undifferentiated heterogenous malignant-originate from** transformed epithelial cells.
- Less likely to produce para-neoplastic syndrome
- **Diagnosis of exclusion.**
- **Location: peripheral zone> central**
- **Tumor cells-** **large** nuclei, prominent nucleoli, and a moderate amount of cytoplasm

- **Pattern: organoid nesting, trabecular, rosette-like, and palisading** patterns.
- **immunohistochemistry or EM-** for neuroendocrine feature.

- **Signs and Symptoms Of Lung Cancer**

- **Complications**

- 1. Local aggressiveness (airway obstruction, dysphagia, pleural effusion, pericardial effusion, hoarseness, vascular obstruction, nerves involvement).
- 2. Distal metastasis (Adrenal-liver-brain and bone).

- 3. Para-neoplastic syndrome
- **Paraneoplastic syndrome**
- is a **clinical syndrome involving non-metastatic effect** or symptoms that is the consequence of cancer in the body but:
  - - Not a mass effect- local presence of cancer.
  - These phenomena are mediated by humoral factors (by hormones or cytokines) excreted by tumor cells or by an immune response against the tumor.

- **Paraneoplastic syndrome**
- **1. Hypercalcaemia – (production of PTH)- SCC**
- **2. Calcitonin production**  
= *hypocalcemia*
- **3. Cushing syndrome.**  
*(Ectopic corticotropin)-ACTH*
- **4. Gonadotropins,**  
*causing gynecomastia*
- **5. SIADH-inducing hyponatremia**  
*vasopressin* **SCLC**
- **6. Mythenia syndrome**
- **7. Clubbing finger**
- **8. Haematologic manifestation**  
**- (ADC)**
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- **Diagnostic Tests**

- CXR
- CT Scans
- MRI
- Sputum cytology
- Fibreoptic bronchoscopy
- Transthoracic fine needle aspiration

- The end

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- Case No.1
- **A 50-year-old man has developed truncal obesity, back pain, and skin that bruises easily over the past 5 months. On physical examination, he is afebrile, and his blood pressure is 160/95 mm Hg. A chest radiograph shows an ill-**

**defined, 4cm mass involving the left hilum of the lung. Cytologic examination Of bronchial washings from bronchoscopy shows round cells that have the appearance of lymphocytes but are larger. The patient is told that, although his disease is apparently localized to one side of the chest cavity, surgical treatment is unlikely to be curative. He also is advised to stop smoking. Which neoplasm is most likely to be present in this patient?**

- Case No.2**
- A 64-year-old man, who is a chain smoker, sees his physician because he had had a cough and a 5-kg weight loss over the past 3 months. Physical examination shows clubbing of the fingers. He is afebrile. A chest radiograph shows no hilar adenopathy, but there is cavitation within a 3-cm**



**lesion near the right hilum. Laboratory studies are unremarkable, except for a calcium level of 12.3 mg/dL, phosphorus concentration of 2.4 mg/dL, and albumin level of 3.9 g/dL. Bronchoscopy shows a lesion almost occluding the right main stem bronchus. A biopsy is performed. What is the diagnosis?**

- Case No.3**
- A 57-year-old woman comes to her physician because she has had a cough and pleuritic chest pain for the past 3 weeks. On physical examination, she is afebrile. Some crackles are audible over the left lower lung on auscultation. A chest radiograph shows an ill-defined area of opacification in the left lower lobe. After 1 month of antibiotic therapy, her condition**

**has not improved, and the lesion is still visible radiographically. CT-guided needle biopsy of the left lower lobe of the lung is performed, and the specimen has the histologic appearance shown thickened alveolar wall with preserve alveolar architecture. Which neoplasms is most likely to be present in this patient?**