Lung Cancer

- lung cancer aka bronchogenic carcinoma refers to malignancies that originate in the airways or pulmonary parenchyma
- Lung cancers are classified as either small cell lung cancer SCLC or non small cell lung cancer NSCLC (and there are a few other types)
- Lung cancer is the leading cause of cancer deaths worldwide in both men and women
- NSCLC accounts for the majority 85% of lung cancers
- Risk Factors
    - Smoking
        - Factors that increase the risk of developing lung cancer in smokers include the extent of smoking and exposure to other carcinogenic factors such as asbestos
        - Individuals who do quit smoking, the risk of developing lung cancer falls compared with those who continue to smoke (the benefit is greatest in those who stop by age 30)
    - Radiation therapy
    - Environmental toxins : secondhand smoke, asbestos, radon, metals (arsenic, chromium, nickel)
    - Pulmonary fibrosis : Sevenfold in patients with pulmonary fibrosis and This increased risk appears to be independent of smoking
    - HIV infection
    - Genetic factors
    - Alcohol
- Screening high risk patients decrease mortality rates (it is done by CT scanning not by CXR or sputum cytology)
- Symptoms and signs from the tumor itself (both local and systemic symptoms and signs)
    - cough (acute or chronic) : central tumors like SCLC
    - weight loss : related to TNF
    - Dyspnea
    - chest pain
    - bone pain
    - hoarseness (recurrent laryngeal nerve injury)
    - diaphragmatic paralysis (phrenic nerve injury) in central tumors
    - Pancoast syndrome : pancoast tumor : pain in the shoulder, Horner syndrome, bony destruction and atrophy of hand muscles
    - upper limb weakness (brachial plexus injury)
    - bronchiectasis

    - Superior vena cava syndrome : dilated neck veins / right hilar masses / more in SCLC / maybe altered mental status
    - anything involving the pleura is a stage 4 cancer
- Symptoms and signs from metastasis (most common sites : adrenal glands / brain / bones)
    - Bone : Pain in the back, chest or extremities / elevated levels of serum alkaline phosphatase and calcium / most common sites of involvement are the vertebral bodies
    - Adrenal : asymptomatic
    - Brain : signs of increased intracranial pressure like headache, vomiting, visual field deficit, cranial nerves deficits, seizures / focal deficits like speech or motor / mainly in adenocarcinoma of NSCLC and in SCLC
    - Liver : uncommon / asymptomatic / liver enzymes abnormalities / detected by CT and PET
- Symptoms and signs from paraneoplastic syndromes
    - Hypercalcemia
        - due to tumor secretion of a parathyroid hormone related protein PTHrP
        - More in SCLC
        - Patients with hypercalcemia have advanced disease (stage 3 or 4) and a median survival of a few months
        - Symptoms : anorexia, nausea, vomiting, confusion, constipation, lethargy, polyuria, polydipsia and dehydration
        - Treatment : hydration, calcitonin & bisphosphonate
    - Syndrome of inappropriate ADH secretion SIADH
        - occurs in all cancers and different lung diseases
        - mainly in SCLC
        - symptoms : hyponatremia / anorexia / nausea and vomiting / Cerebral edema with irritability, confusion, restlessness, personality changes, coma, seizures, and respiratory arrest
    - Neurologic symptoms
        - associated with SCLC
        - Lambert Eaton myasthenic syndrome LEMS : mimicking myasthenia gravis
        - cerebellar ataxia, sensory neuropathy, limbic encephalitis, encephalomyelitis, autonomic neuropathy, retinopathy and opsomyoclonus
    - Hematologic manifestations
        - Anemia
        - Leukocytosis : due to overproduction of granulocyte colony stimulating

        - factor / associated with a poor prognosis and associated with hypercalcemia
        - Thrombocytosis
        - Eosinophilia in large cell carcinoma
    - Hypercoagulable disorders
        - Trousseau syndrome (migratory superficial thrombophlebitis)
        - Deep venous thrombosis and thromboembolism
        - Disseminated intravascular coagulopathy
        - Thrombotic microangiopathy
        - Nonthrombotic microangiopathy
    - Dermatomyositis and polymyositis
    - Cushing syndrome : common in SCLC and carcinoid
    - Hypertrophic osteoarthropathy HPO
        - the presence of clubbing and periosteal proliferation of the tubular bones associated with lung cancer or other lung disease
        - characterized by a symmetrical, painful arthropathy that usually involves the ankles, knees, wrists and elbows
        - The metacarpal, metatarsal, and phalangeal bones may also be involved
        - A radiograph of the long bones (tibia and fibula) shows characteristic periosteal new bone formation
- Laboratory tests for diagnosis
    - Complete blood count
    - Electrolytes
    - Calcium
    - Alkaline phosphatase
    - ALT and AST
    - total bilirubin Creatinine
    - Albumin and lactate dehydrogenase
    - Chest xrays
    - CT scan
    - PET Scan : hot nodules appear (not effective in brain)
- Staging
    - NSCLC : TNM system
        - T : tumor size
        - N : lymph nodes involvement
        - M : metastasis
    - SCLC : limited versus extensive system
        - limited : can be put in one radiological port

- Treatment : based on stage, genetic and immmunohistochemical staining of tumors
  - Surgical : early stages
  - Chemotherapy
  - Radiotherapy
  - Molecularly targeted therapy
  - Immunotherapy