Pathology Revision

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Common cold (Acute coryza)

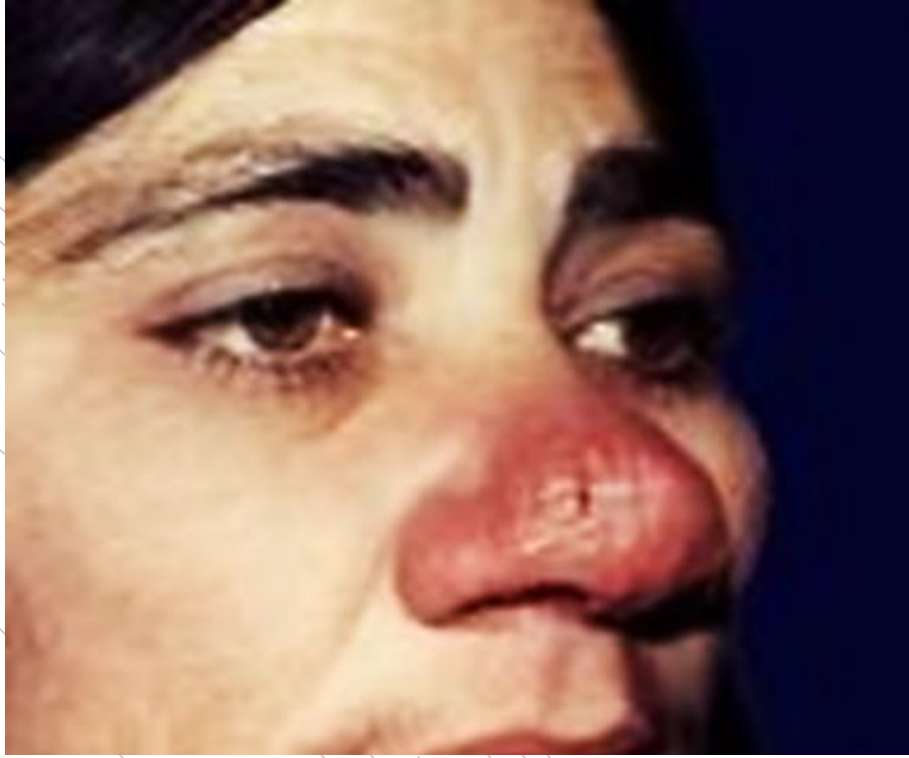
Acute catarrhal inflammation of nose or nasal sinses caused by rhinovirus.

Fate:

1. Subsides after few days with regeneration of the damaged epithelium.
2. Secondary bacterial infection --- suppurative inflammation (increase number of neutrophils).
3. Spread of infection to:
   a- middle ear (otitis media).
   b- lower respiratory tract (bronchitis, bronchopneumonia).
4. Chronicity especially in maxillary sinus

Due to upward direction of drainage --- easy for secretion to retain

Rhinoscleroma



Destructive infective granuloma caused by Klebsiella Rhinoscleromatis.

N/E: The primary site is the nose:

- Enlarged and hard.
- Its mucous membrane is thickened granular --- progresses to a hard large mass filling the nasal cavity.
- Inflammation may extend to paranasal sinuses, nasopharynx, oropharynx, larynx and trachea.
- It destructs the soft tissue but bony structures limit its spread.

Rhinoscleroma

M/E:

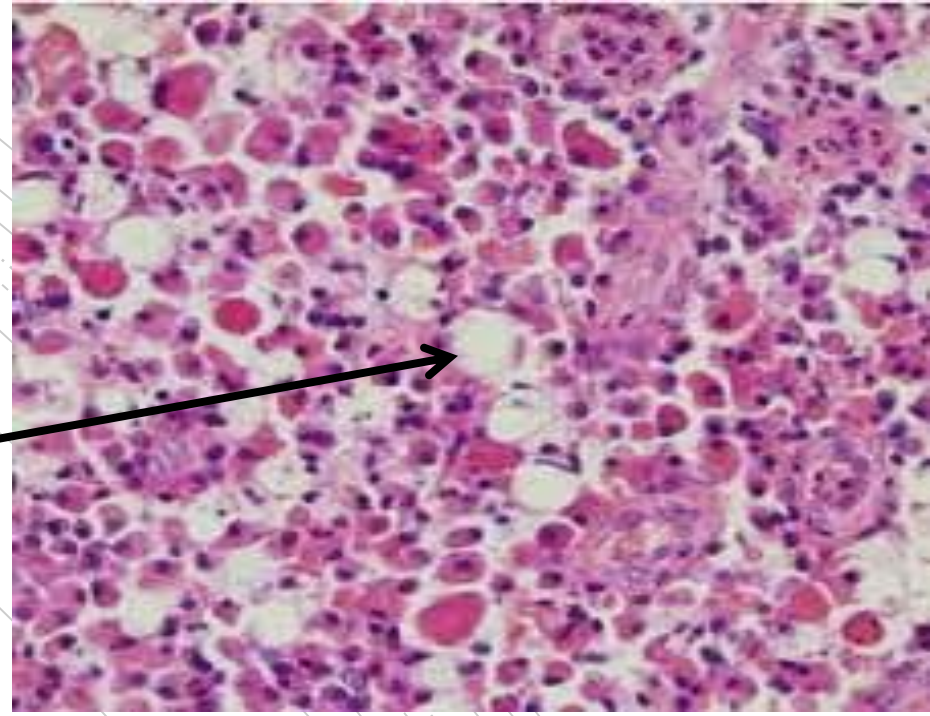
1.Surface epithelium shows areas of hyperplasia or squamous metaplasia.

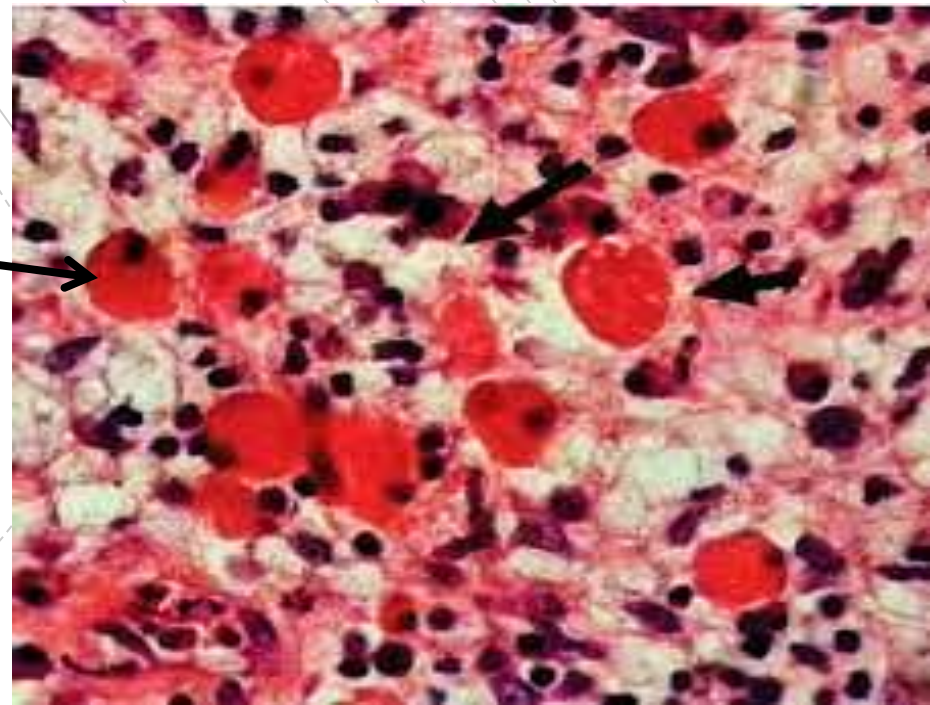
2. Subepithelial tissue shows:

a- **Mickulicz cells** (hydropic degeneration of macrophages). They are large rounded cells having well defined borders, abundant clear or foamy cytoplasm. The nucleus is small flattened, deeply stained and eccentric.

b- **Russel bodies** (hyaline change of plasma cells). These are ovoid or rounded eosinophilic bodies, sometimes having pyknotic eccentric nuclei.

c- Granulation tissue & fibrosis.

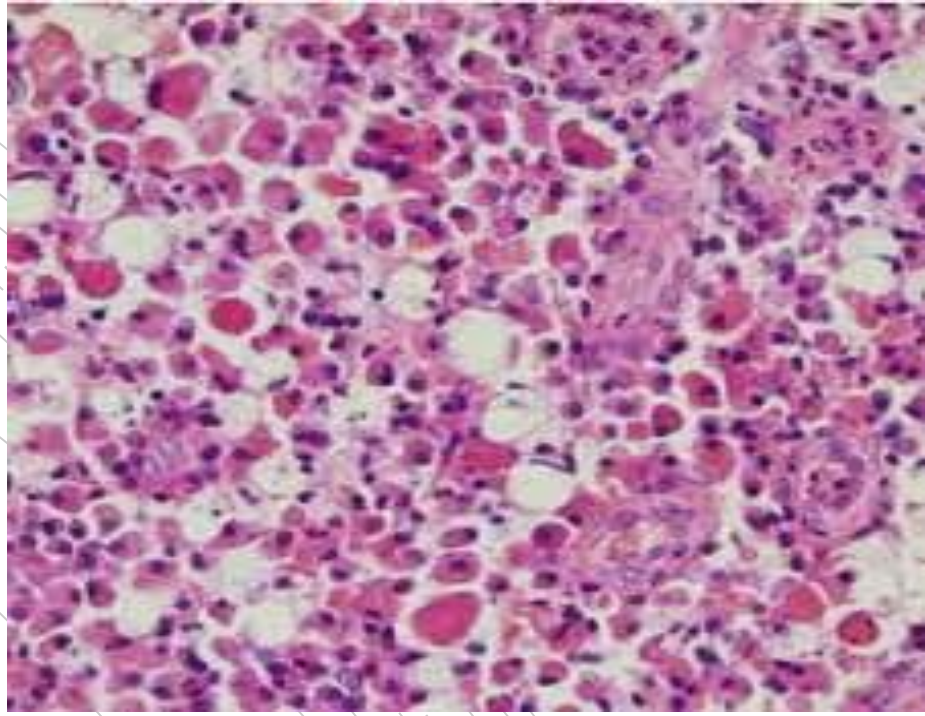


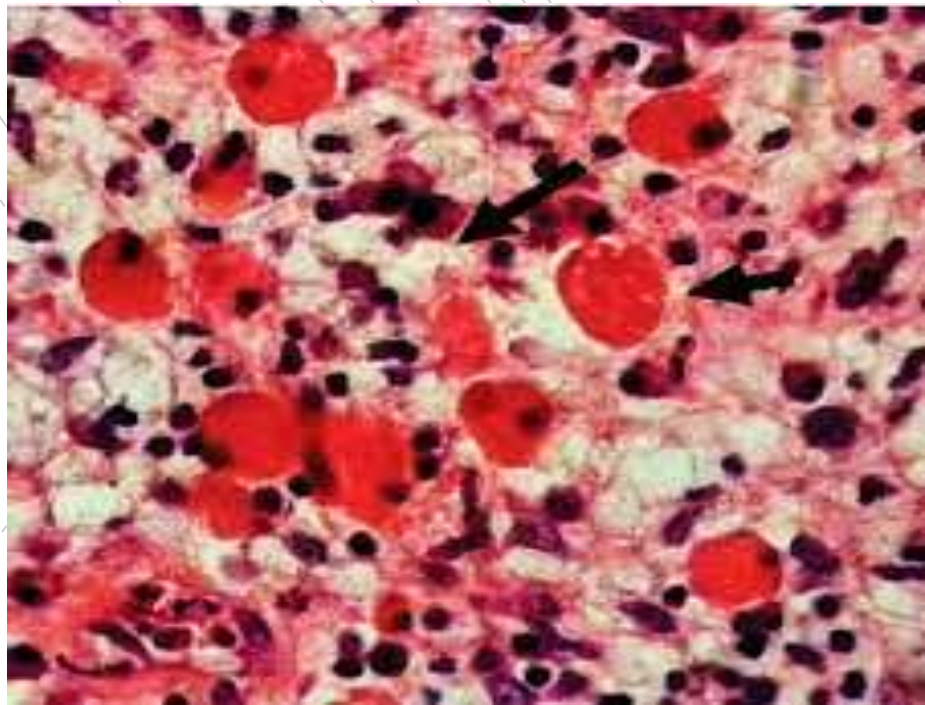


Rhinoscleroma

Complications:

1. Nasal obstruction.
2. Nasal deformity
3. Spread of inflammation to paranasal sinuses, nasopharynx, oropharynx, larynx and trachea.
4. Epistaxis.
5. Squamous cell carcinoma (on top of squamous metaplasia).





Diphtheria

It is an acute infectious disease caused by corynebacterium diphtheriae, occurs in non-immunized children between 2-5 years of age but may occur in adult.

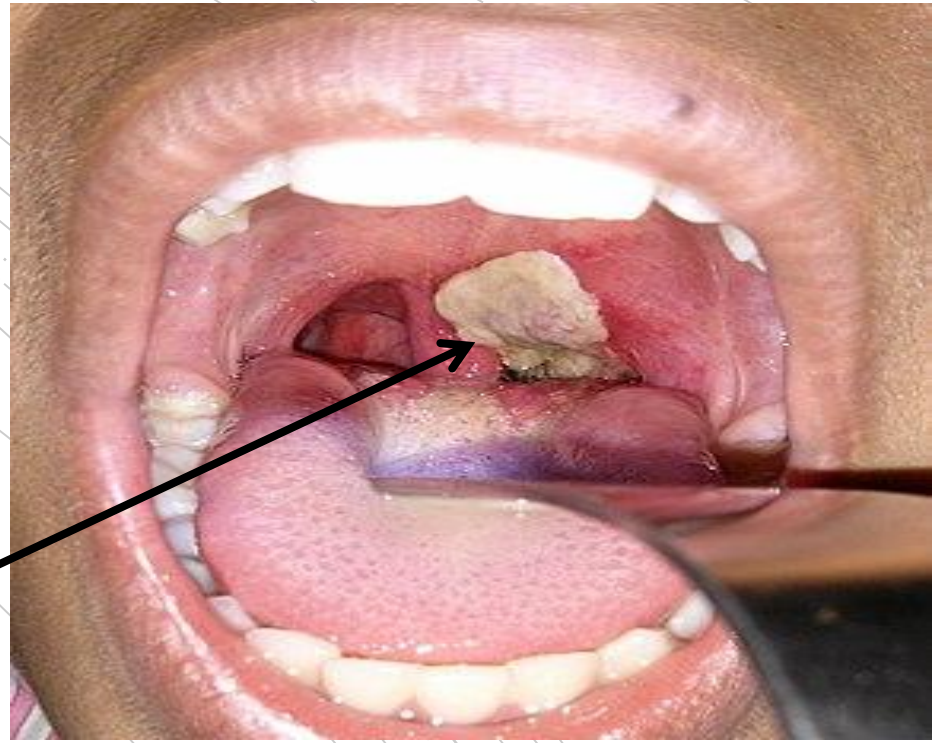
Method of infection: droplet infection.

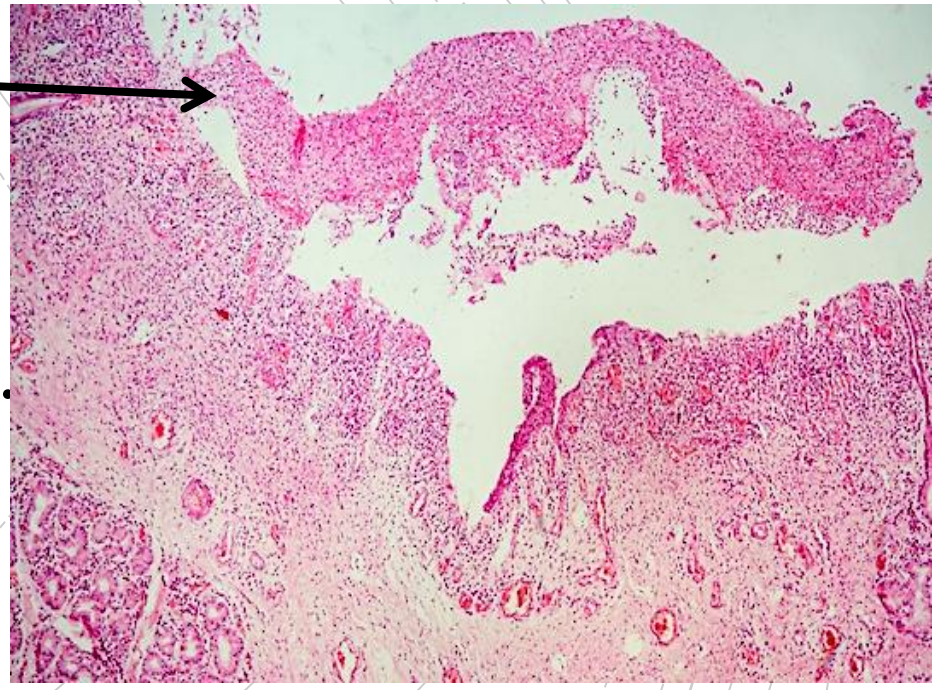
Pathology: Exotoxin production causes:

1 - Locally: pseudomembranous inflammation.

2- Reach distant organs via blood leading to degeneration of parenchymatous organs.

3- The draining cervical lymph nodes show lymphoid hyperplasia.





Diphtheria

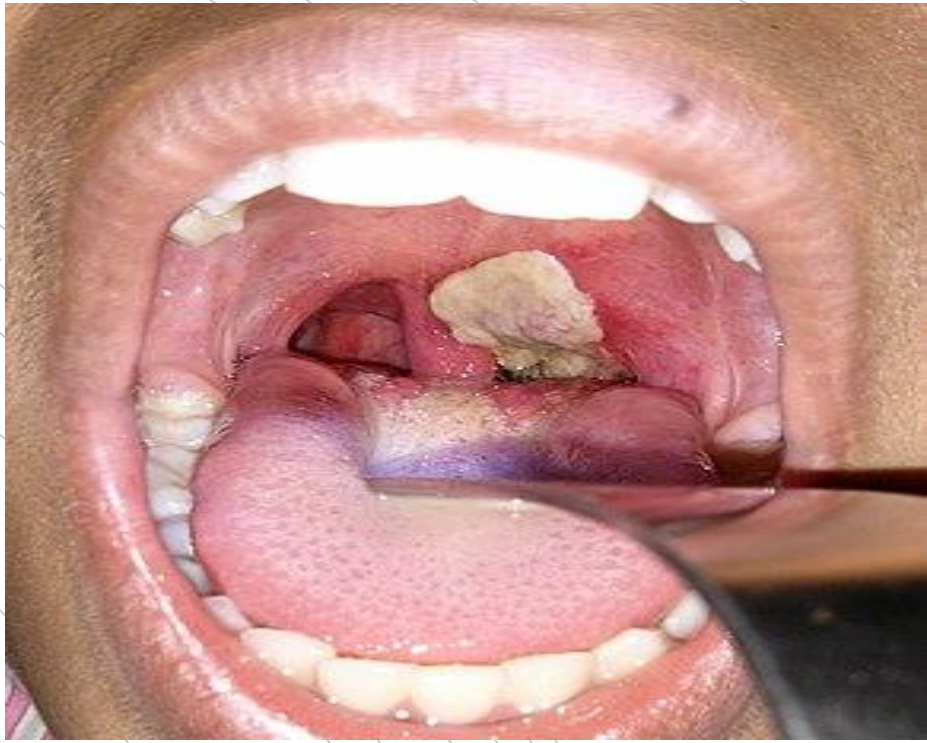
Complications:

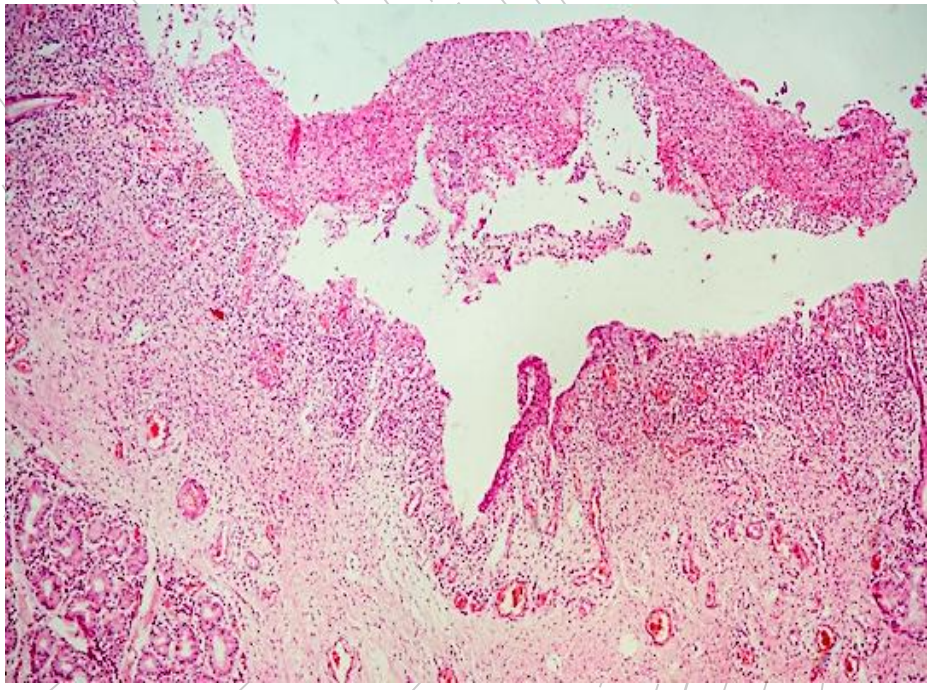
I- Respiratory system --- Asphyxia, Epistaxis & Aspiration bronchopneumonia.

2- Parenchymatous organs --- degeneration (Cloudy swelling, fatty change) and necrosis.

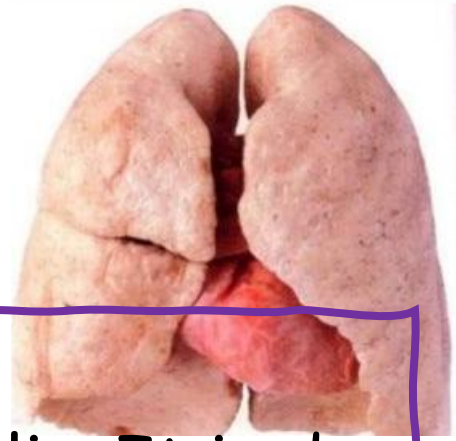
3- C. V.S. --- Acute heart failure.

4- Nervous system --- Temporary nerve paralysis & Peripheral neuritis.





Pneumonia, Def.& Classification



Def.: Inflammation of lung parenchyma.

Classification

Bacterial/ alveolar:

Lobar pneumonia Bronchopneumonia

Primary Atypical Pneumonitis:

Acute interstitial inflammation in alveolar septa without intra-alveolar exudate. Causes:

1-Viruses:as influenza, parainfluenza, measles chicken pox and small pox.

2- Mycoplasma pneumonia.

Loeffler's Pnueumonia:

Pneumonia with eosinophilia. It is due to parasitic infestations as ascaris, Bilharziasis (verminous pneumonia).

Granuloma:

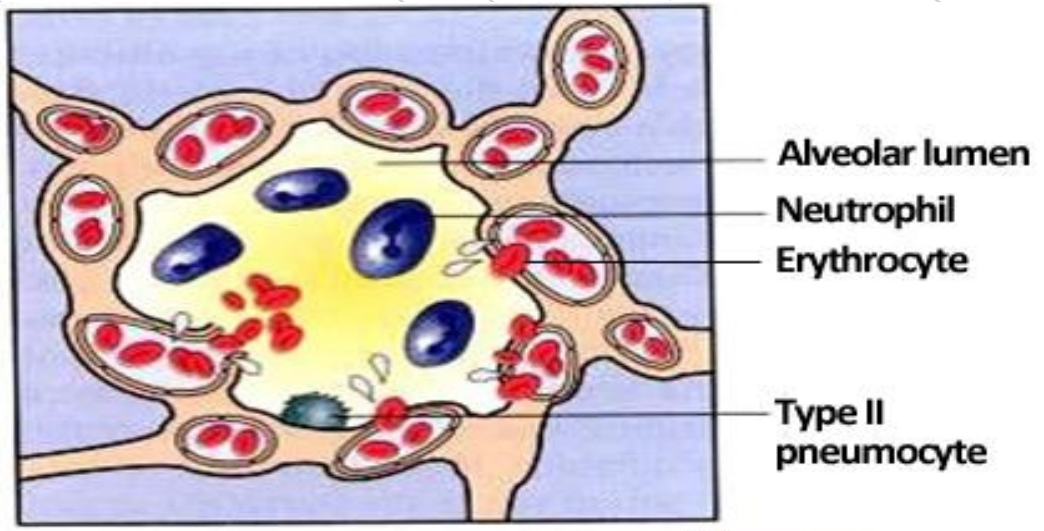
T.B., leprosy, actinomycosis, sarcoidosis.

Pneumonia in immunocompromised:

Viral as Cytomegalovirus

fungal as candidiasis & aspergillosis.

Pneumonia, Classification



Bacterial / Alveolar

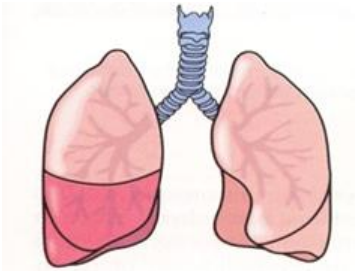
- In alveolar **lumen**
- Purulent exudate of RBCs and PMNs

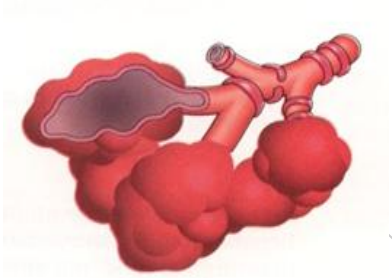
Lobar pneumonia

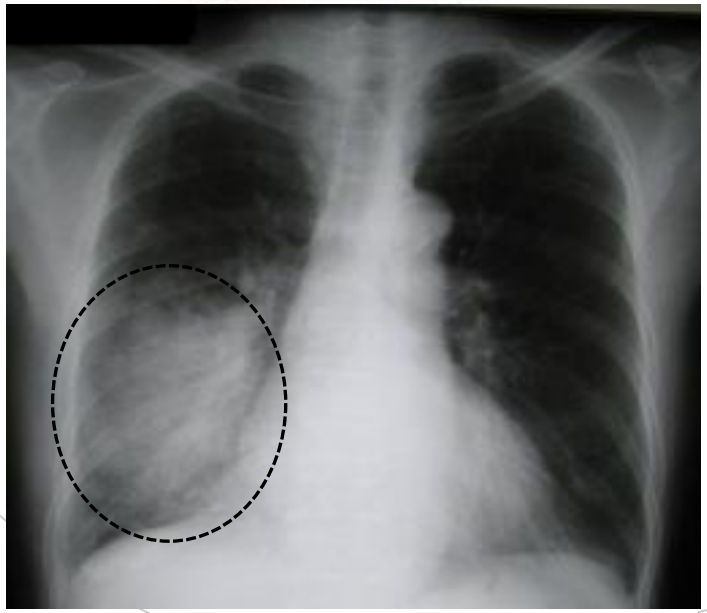
lobar distribution

"typical" CAP

- *S. pneumo,*
- *H. flu.*





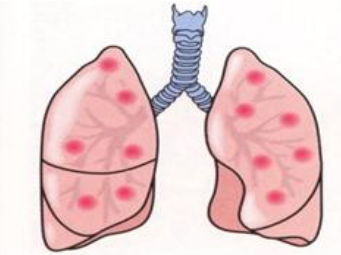


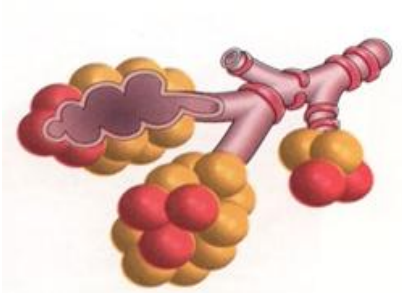
Bronchopneumonia

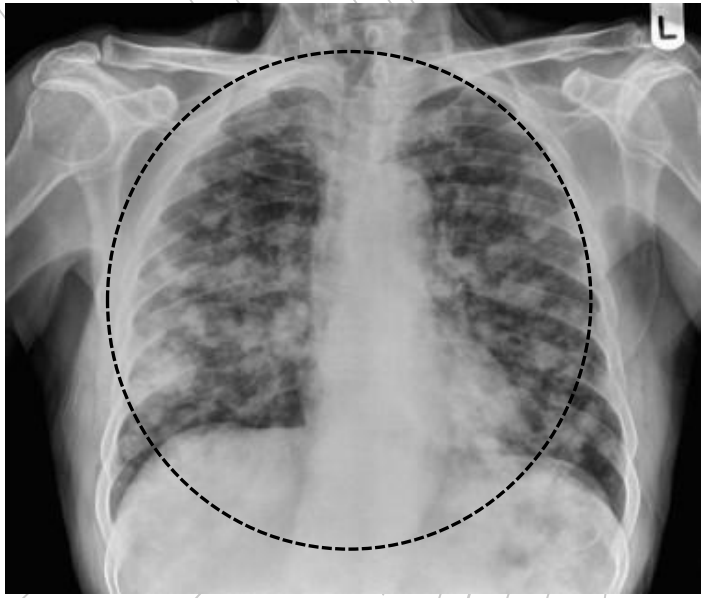
patchy distribution

aspiration, intubation

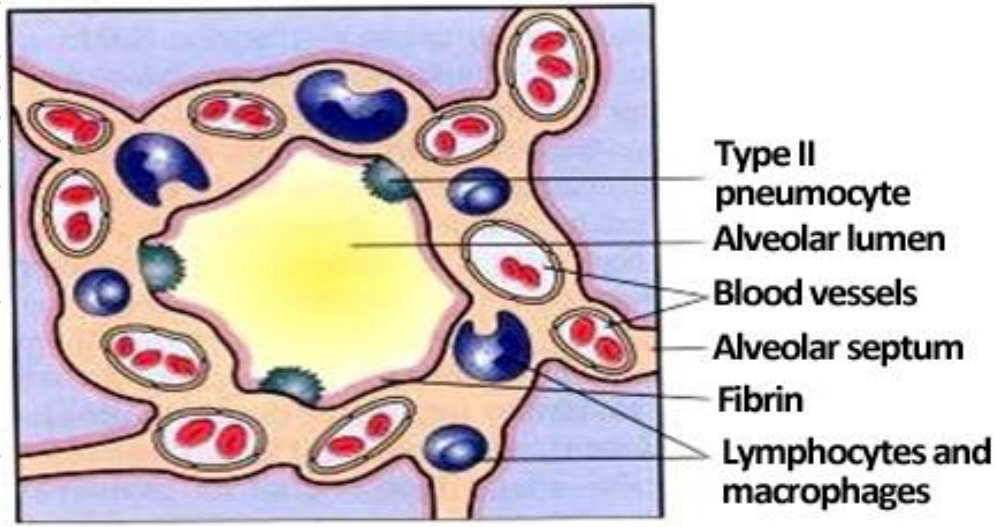
- *Staph,*
- *Pseudomonas*







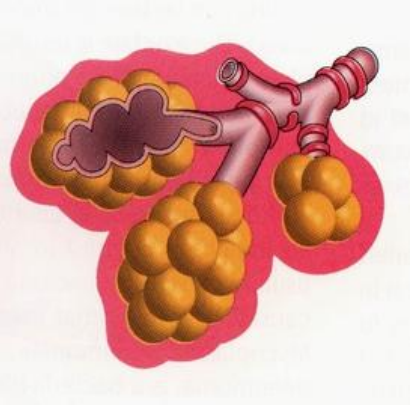
Pneumonia, Classification

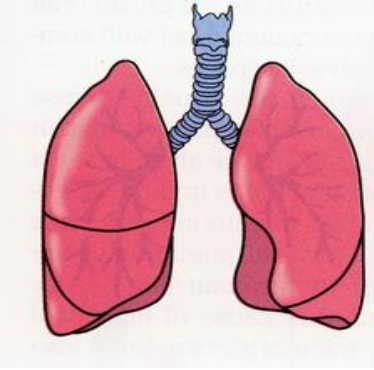


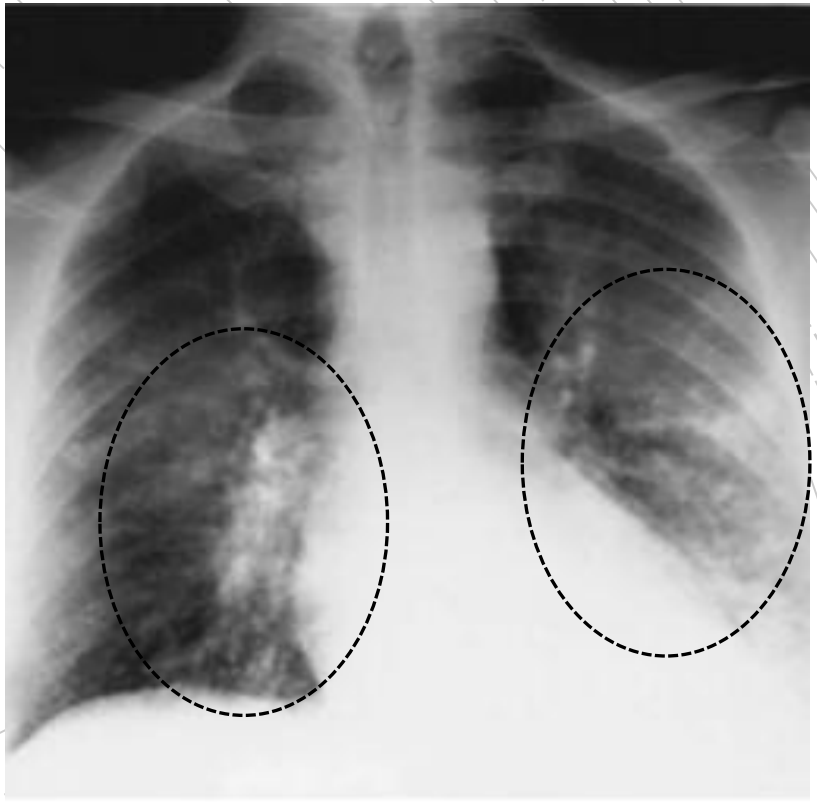
Interstitial / Atypical

Mostly diffuse in **alveolar wall**
Mononuclear WBCs with Fibrinous interalveolar exudate

- Respiratory viruses, as influenza
- Mycoplasma,
- Chlamydophila, Legionella







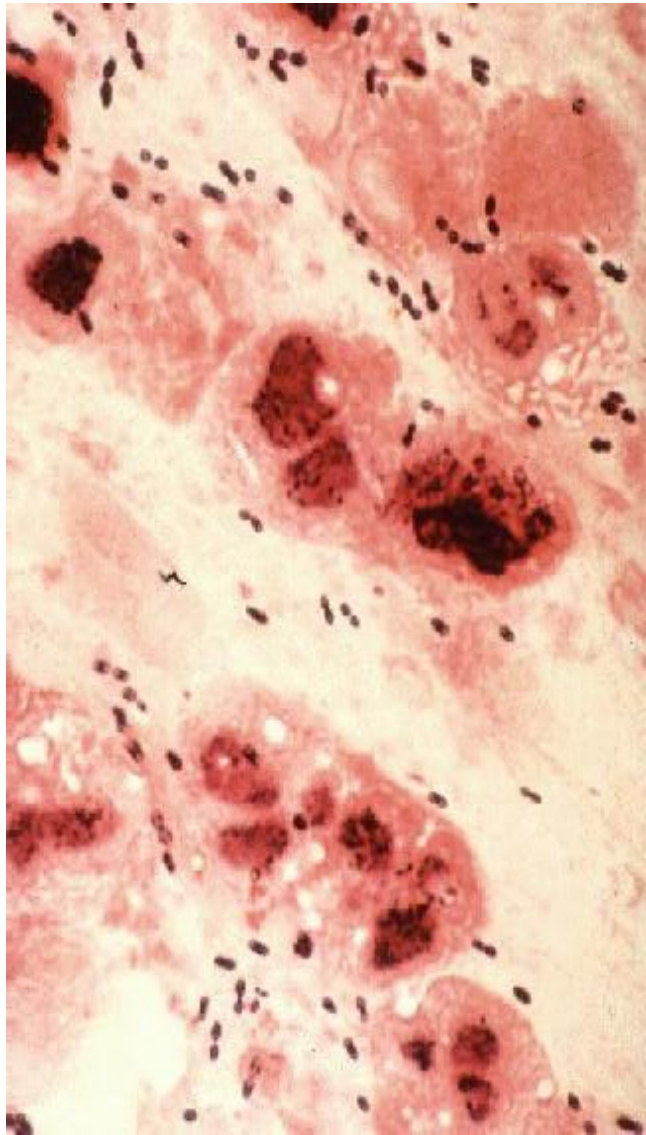
Lobar Pneumonia, Def.& Cause

Def.: Acute bacterial infection involving at least an entire lobe of lung

Incidence: It predominates in middle to old-aged males.

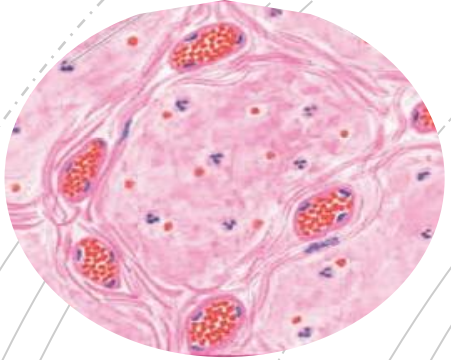
Causes: Pneumococci (strept. pneumoniae) in 95 % of cases, especially type III (most virulent type).

Method of infection: By inhalation. (droplet infection)



Lobar Pneumonia, Pathogenesis

- The inhaled organism reach the alveoli & tend to settle into lower lung lobes and one or both sides are involved.
- Micro-organisms in alveoli produce an inflammatory reaction with sudden excess fluid exudate.
- This fluid exudate pass from one alveolus to another through inter-alveolar pores to involve the whole lobe and the bacteria reach the pleura.
- The fluid together with 'the cellular exudate expel air away from the alveoli producing a firm airless lobe leading to consolidation (hepatisation) of the affected lobe.



Lobar Pneumonia, Pathology

Sero-fibrinous inflammation of lung that passes in the following stages:

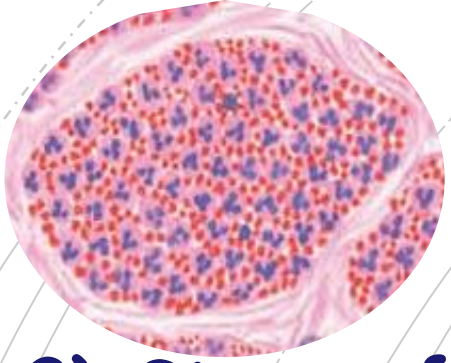
I) Stage of congestion (1-2 days):

N/E: 1- The involved lobe is dark red and heavy (congestion). Wet sponge in consistancy.

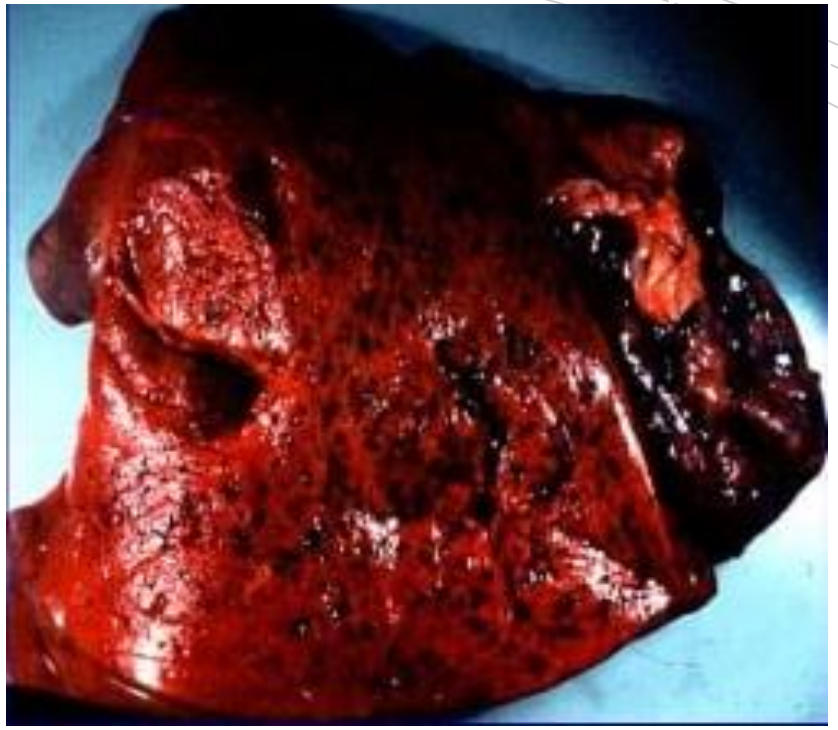
2- Cut surface: exudes a frothy serous fluids

M/E: 1- Inter-alveolar capillaries are congested

2- Alveoli contain oedema, some air, bacteria and scattered neutrophils.



Lobar Pneumonia, Pathology



2) Stage of red hepatization (2-4 days):

N/E: 1-The affected lobe: enlarged, red and heavy. firm and airless (consolidated)

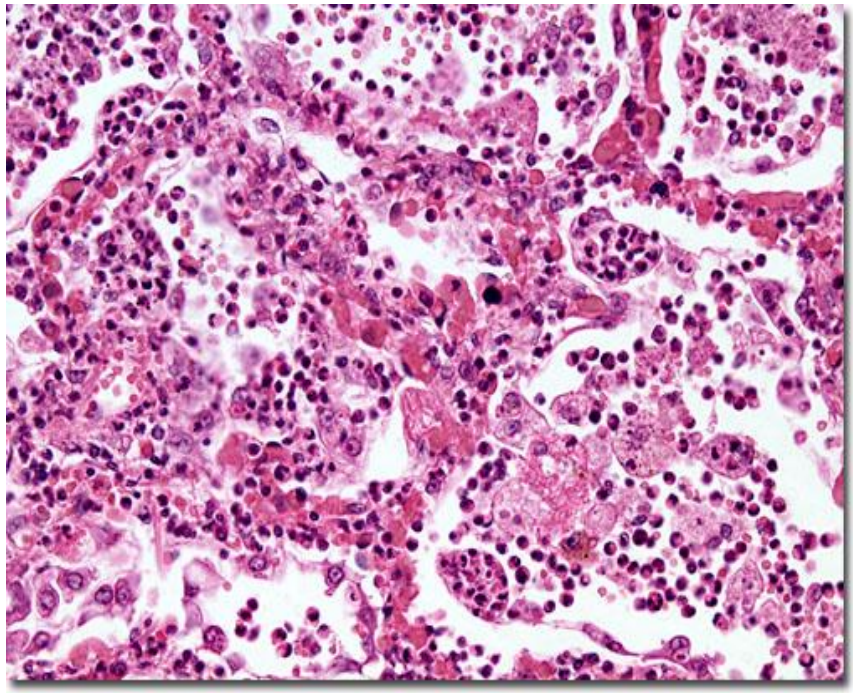
2- The pleural show serofibrinous pleurisy.

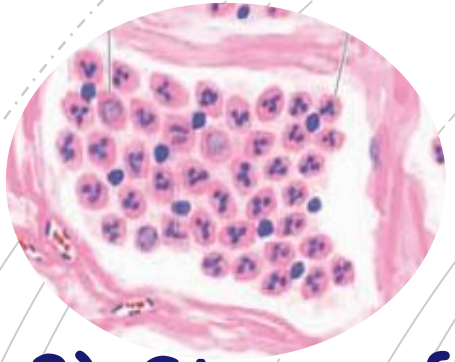
4- Hilar L. N. are enlarged (inflamed).

M/E:1- Inter-alveolar cappillaries still congested.

2- The alveoli are filled with exudate formed of fibrin network with excess neutrophils, R.B.Cs., few macrophages with bacteria.

3- Dry fibrinous pleurisy is seen





Lobar Pneumonia, Pathology

3) Stage of grey Hepatization (4-8 days):

N/E: 1. Affected lobe: enlarged, grey in color, firm and airless consolidated

3. Pleural covering show fibrinous pleurisy.

4. Hilar lymph nodes are enlarged.

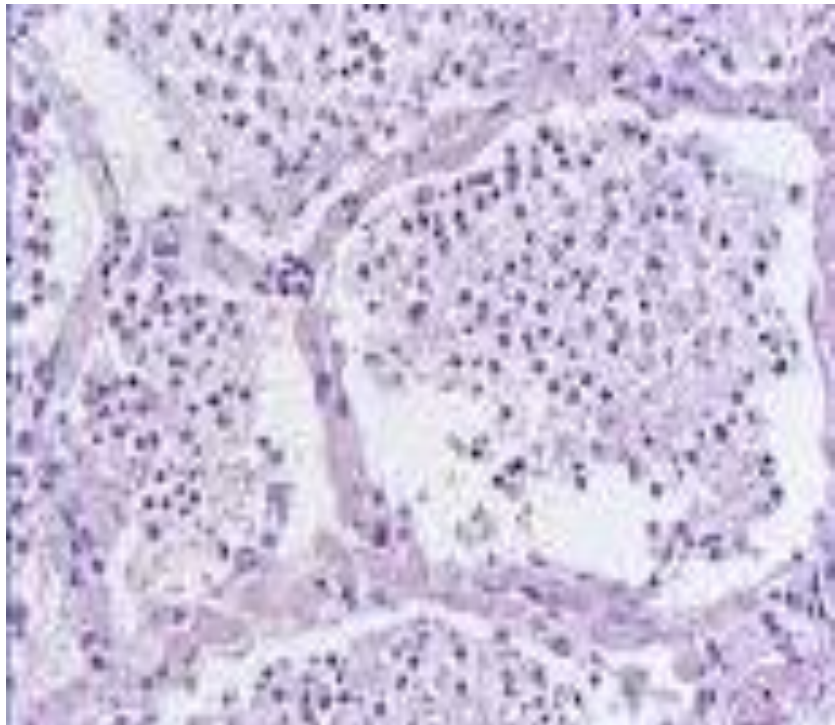
M/E: 1-Inter-alveolar capillaries: less congested.

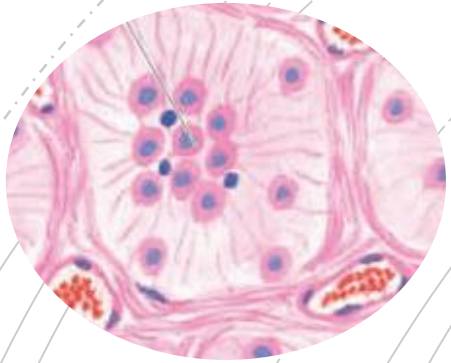
2- Alveoli contain: - more fibrin

-less inflammatory cells & organisms,dead.

-Macrophages increase in number.

3- Fibrinous pleurisy.

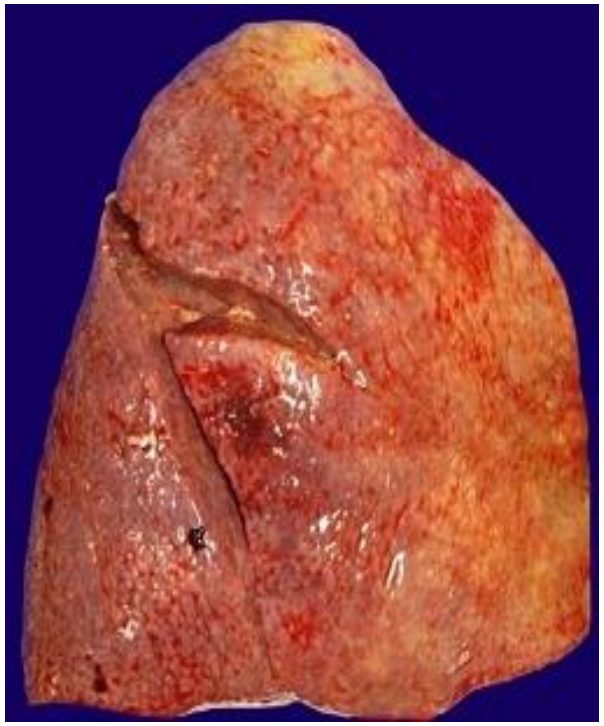




Lobar Pneumonia, Pathology

4) Stage of Resolution (8 - 21 days) in uncomplicated cases:

Exudate within the alveoli is gradually liquified by fibrinolytic enzymes of inflammatory cells. It is reabsorbed through lymphatics or blood vessels or removed by macrophages.



Lobar Pneumonia, Pathology

	Stage of Congestion	Stage of Red Hepatization	Stage of Gray Hepatization	Stage of Resolution
Duration:	1st day	2nd - 4th day	5th - 8th day	9th day till 21
N/E:				
Size & Wt.	**Enlarged**	**Enlarged**	**Enlarged**	Resolution occurs
Color	Red	Red	Gray	
Consistency	**Wet sponge**	**Consolidated (Hepatized)**	**Consolidated (Hepatized)**	Restore the normal aeration & normal lung structure
Cut section	Exudes frothy fluid	Dry, Red, Granular	Dry, Gray, Granular	
Pleura	-	**S.F Pleurisy**	**S.F Pleurisy**	
Hilar L.N	-	Enlarged	Enlarged	

Lobar Pneumonia, Pathology

	Stage of Congestion	Stage of Red Hepatization	Stage of Gray Hepatization	Stage of Resolution
M/E:				
Capillaries	Congested	Congested	Less congested	Resolution occurs
Alveolar wall	Thickened	Thickened	Thinned compressed by the distended alveolar spaces	Restore the normal aeration of alveoli & normal lung structure except pleurisy which organizes to form adhesions.
Alveolar spaces Contain	-Bacteria. -Fluid exudate	-Bacteria -Fibrin -RBCs -Few PMNLs	-Dead bacteria -Shrunken fibrin -Hemolyzed RBCs -Numerous PMNL -Macrophages	

Lobar Pneumonia, Presentation &Complications

- Sudden onset of high fever, shaking chills
- Cough productive of mucopurulent sputum
- When pleura is affected, pleuritic pain

All symptoms decrease 48 to 72 hours after the initiation of antibiotics

Clinical course 7-9 days, terminates by crisis (sudden improvement).
10% of patients with pneumonia may proceed to complications

Complications

pulmonary:

- Delayed resolution.
- Fibrosis, lung abscess and gangrene.

Extrapulmonary:

Spread of infection

- Direct to pleura
- Lymphatic
- Blood spread

Toxemia: toxic myocarditis

Bronchpneumonia, Def.

Acute bacterial infection of the bronchioles and the surrounding alveoli either primary or secondary

Etiology: staph, strept, pneumococcus, haemophilus influenza

Primary:

Occurs in extremes of age (infancy, children and old).

Secondary:

complicate other diseases

a- Post infective: Complicates infection as influenza.

b- Inhalation: Due to inhalation of infected material.

c- Hypostatic: Complicates pulmonary oedema.

d- Terminal: as cancer or coma and is usually fatal.

Bronchpneumonia, Def.

N/E:

*Multiple patches of consolidation ± suppuration centered around the bronchioles & distributed through several lung lobes or one lobe.
*Areas between the patches are normal.
*In severe cases patches fuse together forming large consolidated area called confluent bronchopneumonia.
*Pleurisy is not a marked feature, as the patches do not usually contact the pleura.
*Suppurative patches heal by fibrosis.

Bronchpneumonia, Def.

M/E:

*The affected bronchioles show picture of acute suppurative inflammation:

-The lumen is filled with pus and shedded epithelium.

-Epithelial lining is ulcerated.

-Wall infiltrated by excess neutrophils & pus cells

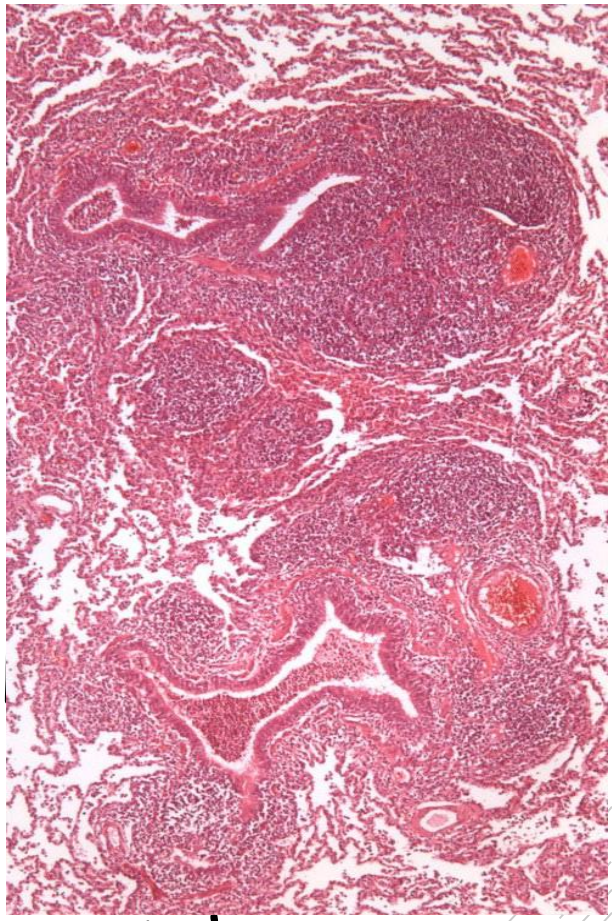
*The surrounding alveoli:

- Alveolar spaces are filled with pus rich in neutrophi

- Inter-alveolar septa are acutely inflamed.

*The patches are variable; either early inflammation patches, late suppurative patches, or healed fibrotic patches.

*Lung Tissue in between the patches appear normal.



Lobar Vs Bronchopneumonia,

	Lobar pneumonia	Bronchopneumonia
Def:	Acute sero-fibrinous inflammation	Acute suppurative inflammation
Age	Middle age.	Extremes of age.
Etiology:	Pneumococci (95%).	Staph, Strept, H influenza.
Pathology:	4 stages.	No stages.
N/E:	Diffuse lesion not related to bronchiole	Patchy lesion related to bronchiole
	No pus on pressure.	pus exudes on pressure.
	Fibrinous pleurisy is marked.	Usually absent.
M/E:		
	Diffuse lesion, no bronchiolitis.	Patchy in & around bronchioles
	Pleurisy.	No pleurisy.
	The whole is affected.	Lung between the lesion is normal.
	Non suppurative inflammation	Suppurative inflammation
Fate:	Resolution is common.	Resolution is rare.
	Fibrosis is rare.	Fibrosis is common.
Course:	7-9 days and ends by crisis.	2-3 weeks and ends by lysis.

Tuberculosis, Def.& cause

Chronic infective granuloma affecting nearly all body systems but mainly the lungs caused by mycobacterium TB.

T.B bacilli are: Aerobic, Non motile, Do not produce toxins, heat sensitive, Carried by macrophages….2 types.

Types & mode of infection

Human type…Pulmonary by droplet infection, Rarely Skin by skin inoculation.

Bovine type ..Oropharyngeal and intestinal By ingestion raw contaminated milk by of bacilli.

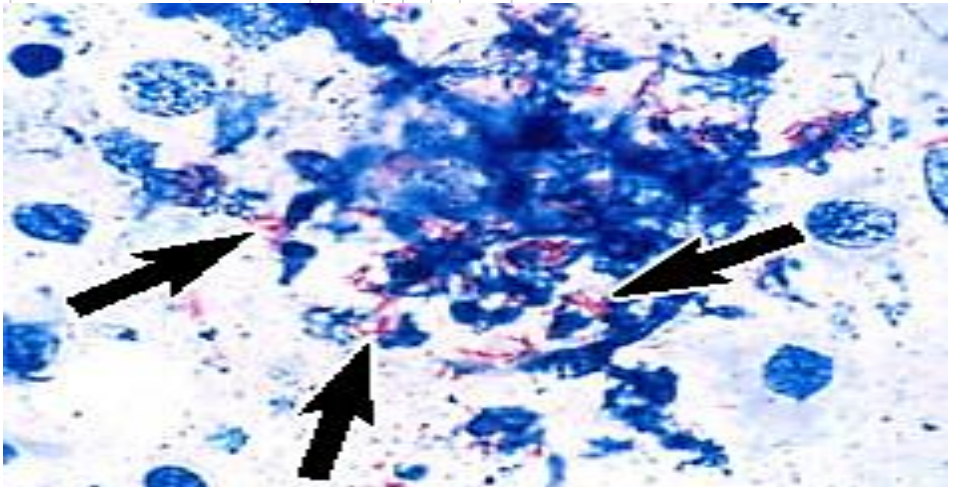
Tuberculosis,
Predisposing Factors

Environmental

- Low socioeconomic standard.
- Bad general hygiene.
- Contact with tuberculous patient.
- Overcrowding.
- Environmental pollution.

Personal factors

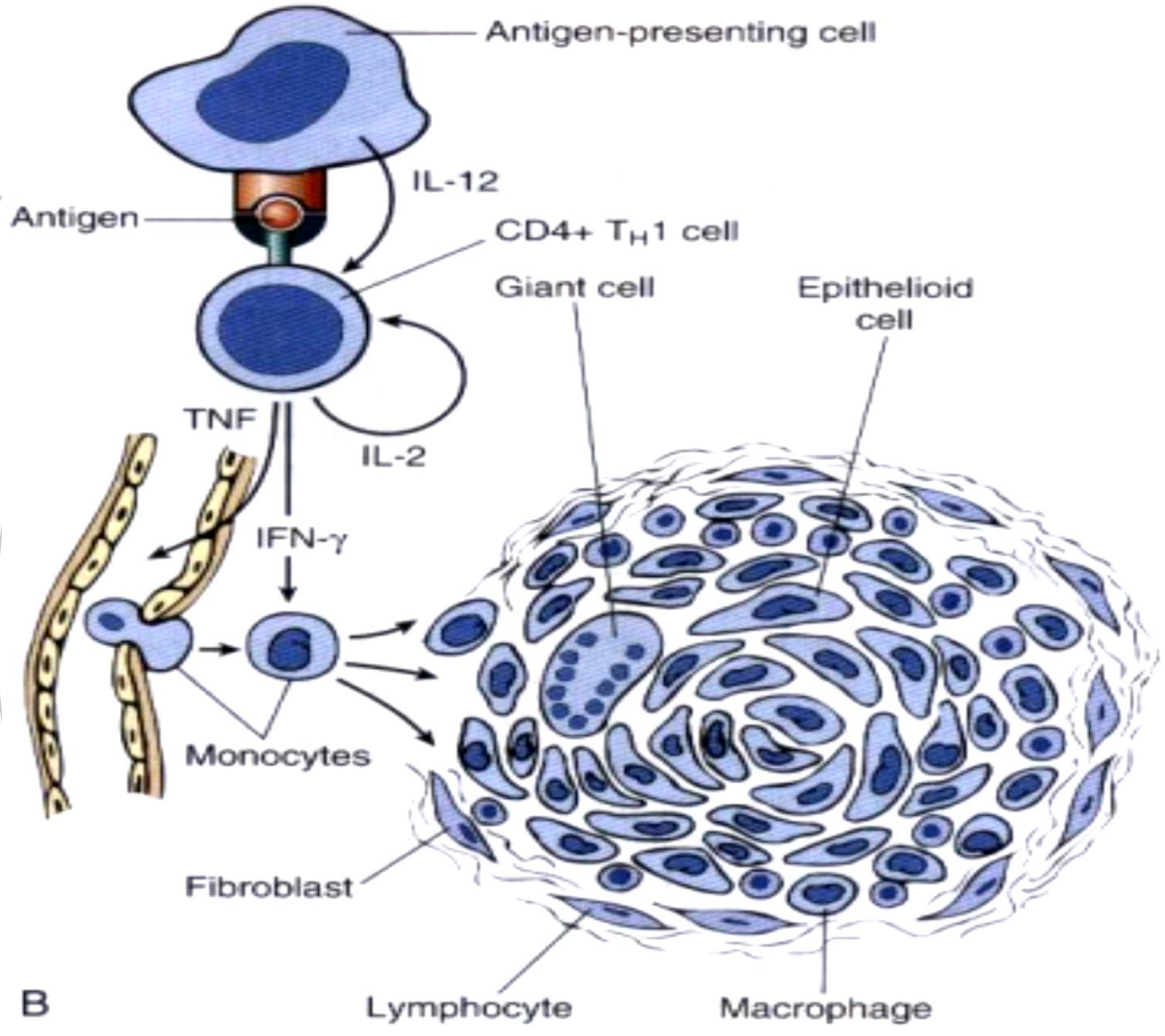
- Negroes (more than white persons)
- Malnutrition
- Debilitating diseases (as D.M)
- Immune deficiency states.

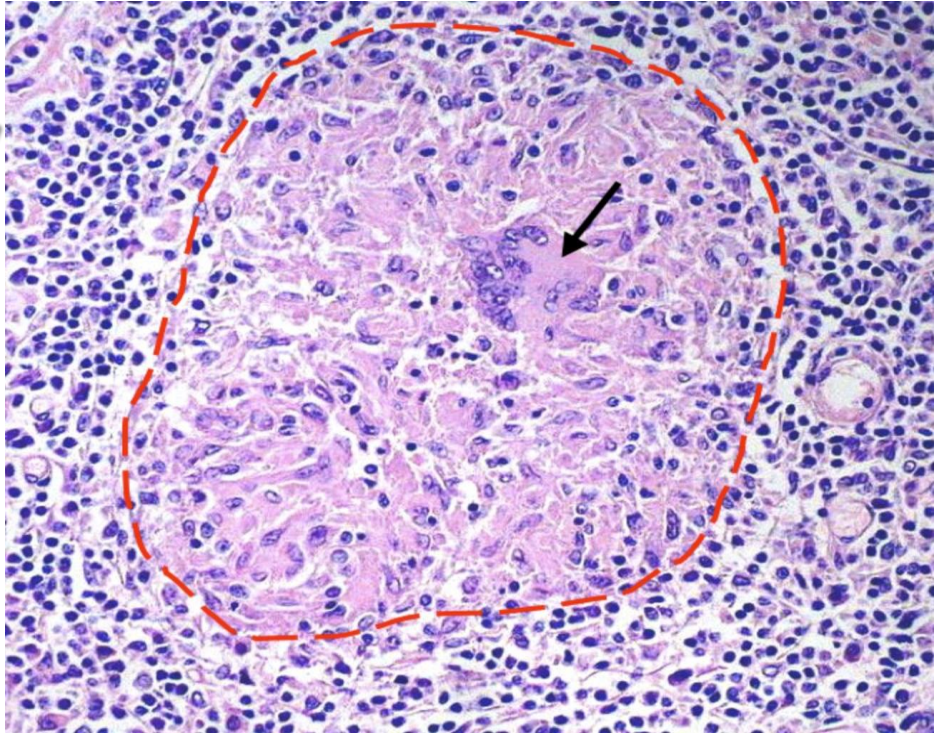


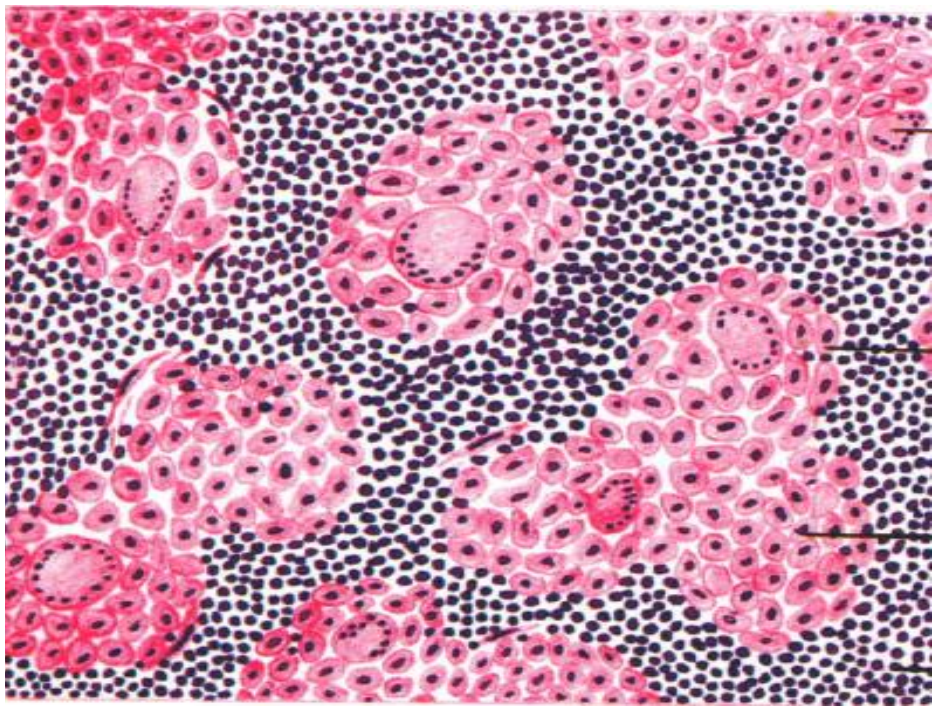
Tuberculosis, Pathogenesis

In 1st 24 hs attraction of neutrophils (acute inflammation) to CH layer of the bacilli, but they can't kill it & rapidly disappear.
From 2nd day, attraction of macrophages & lymphocytes to lipid layer of the bacilli.
Macrophages engulf bacilli but can't kill the organism, multiply inside with release of IL-12, stimulate & ↑T helper lymphocytes.
later : T-lymphocytes are attracted to protein layer of bacilli
Factors released by helper T cells
IL-2: proliferation of lymphocytes.
INFγ : most imp. factor for granuloma formation ++ production of monocytes from BM, ++ production of IL-12 from macrophage
TNFα : Chemotactic for macrophages and other lymphocytes.

Tuberculosis, Pathogenesis





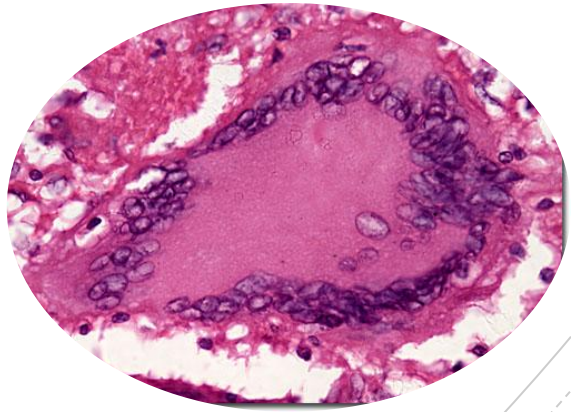


Tuberculosis, Morphology

N/E of tubercle: the tubercle is visible after 3 weeks, 1-3 mm size, with central yellow caseation & grey periphery.

M/E:

Epithelioid cells: The lipid part of the engulfed bacilli changes the characters of macrophages to cell similar to epithelial cells.



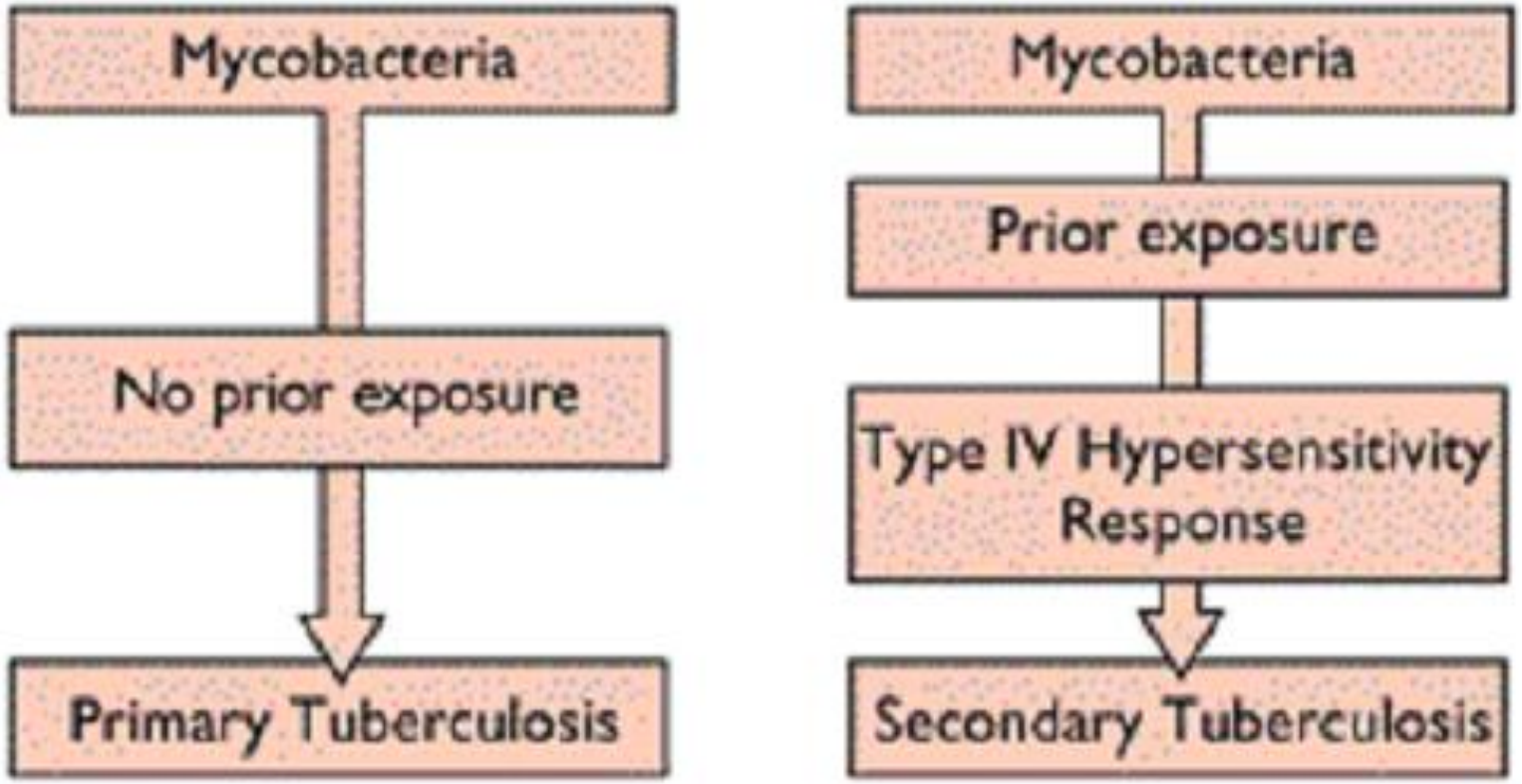
Langhan's giant cells: formed by fusion of epithelioid cells with each other. Classical type: nuclei are arranged in horseshoe or circle at periphery of cell.

lymphocytes surround epithelioid cells.

Fibroblasts encircle the tubercle by fibrous tissue.

Caseation necrosis usually in the centre

Tuberculosis, Classification



Tuberculosis, Primary TB

Develops in an unexposed, unsensitized persons.

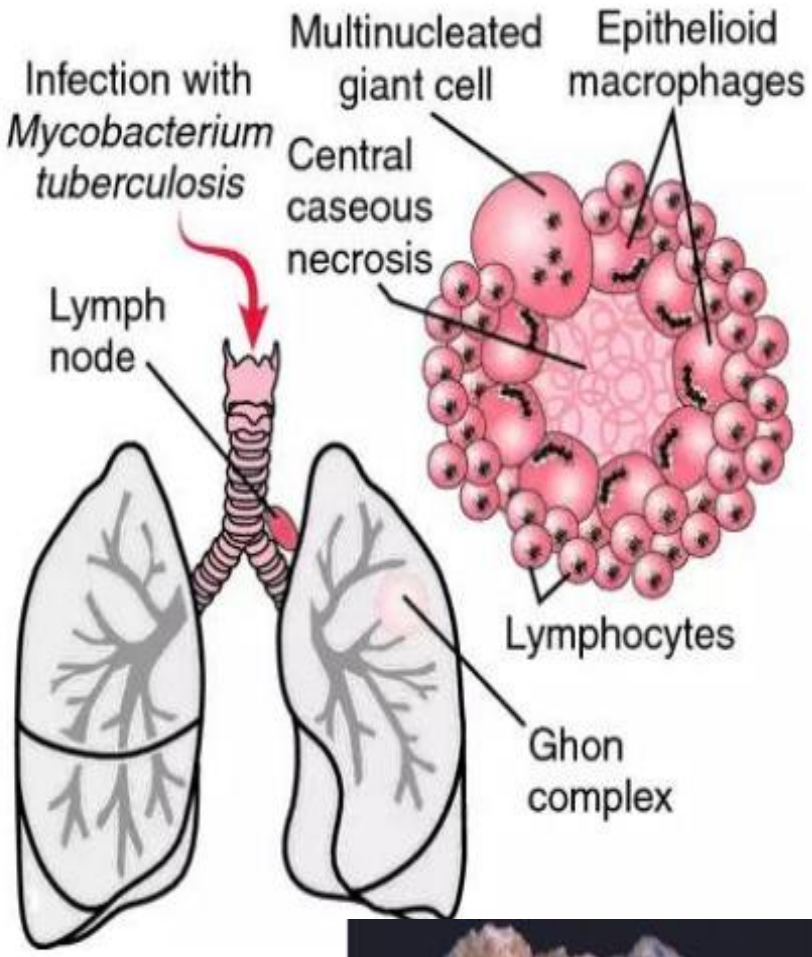
It is more common in children.

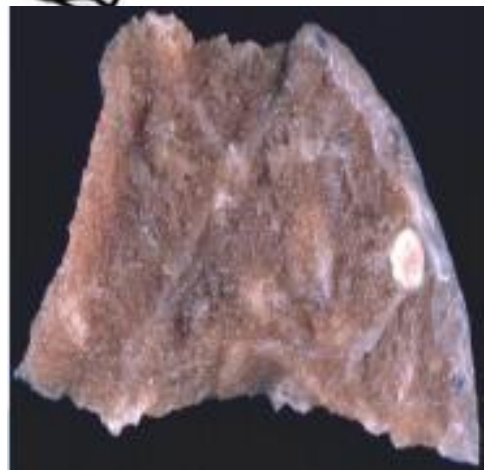
Source of infection is exogenous.

About 5% of infected persons develop significant disease.

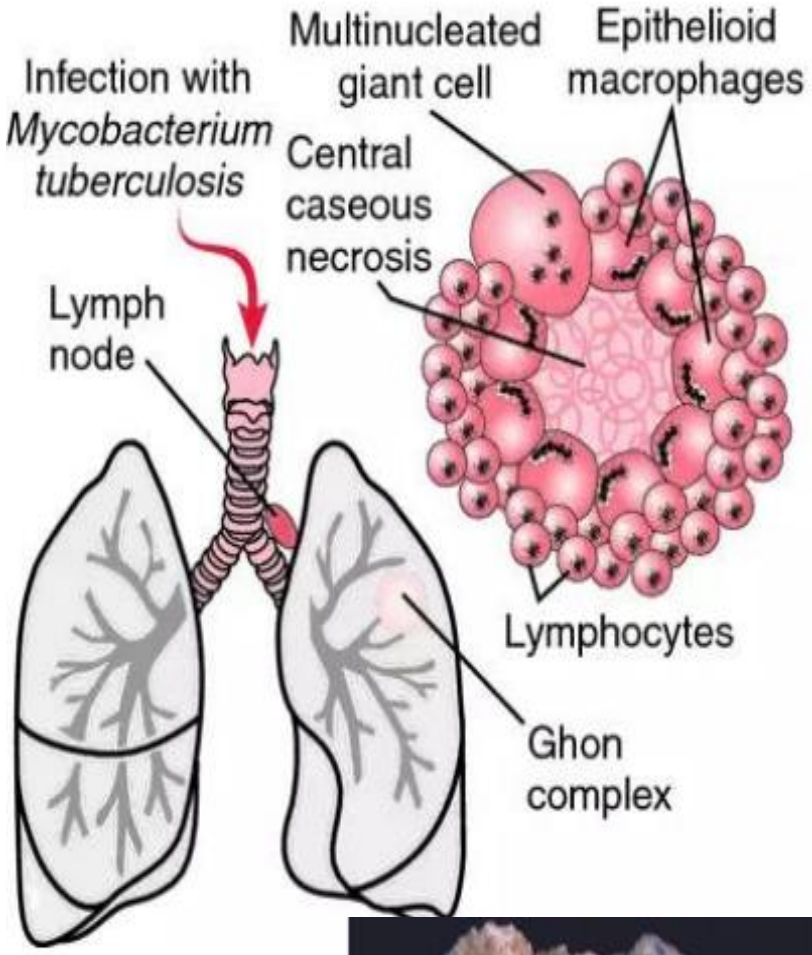
Sites:

Lungs ……Intestine……Tonsils…… Skin …… Nose





Tuberculosis, Primary TB

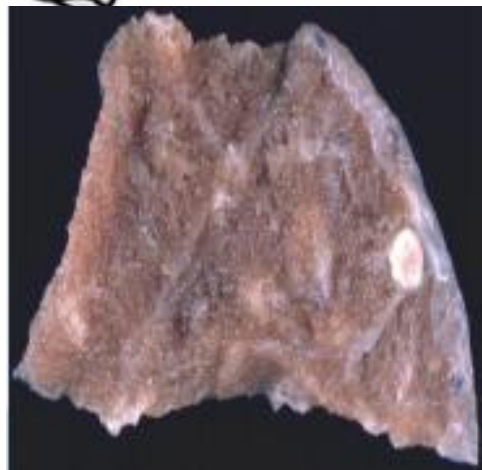


Consists of:-

1-Gohn's focus: Parenchymatous lesion in lung 1-1.5 cm in diameter, grey-white, in the lower part of upper lobe or upper part of lower lobe, close to the pleura.

2-Lymphangitis: (Inflammation of lymphatic vessels)

3-Hilar lymphadenitis:(Inflammation of lymph nodes)



Tuberculosis, Primary TB, Fate

1-Healing by fibrous tissue , dystrophic calcification. These foci can harbor viable organism for years (**latent tuberculosis**) to be activated later if the immunity of the patient is lowered.

2- Uncommonly, the disease may pass into ***progressive primary tuberculosis***. This occurs in immune suppressed patients (HIV infected, malnourished children and elderly patients).

3-**Spread**:

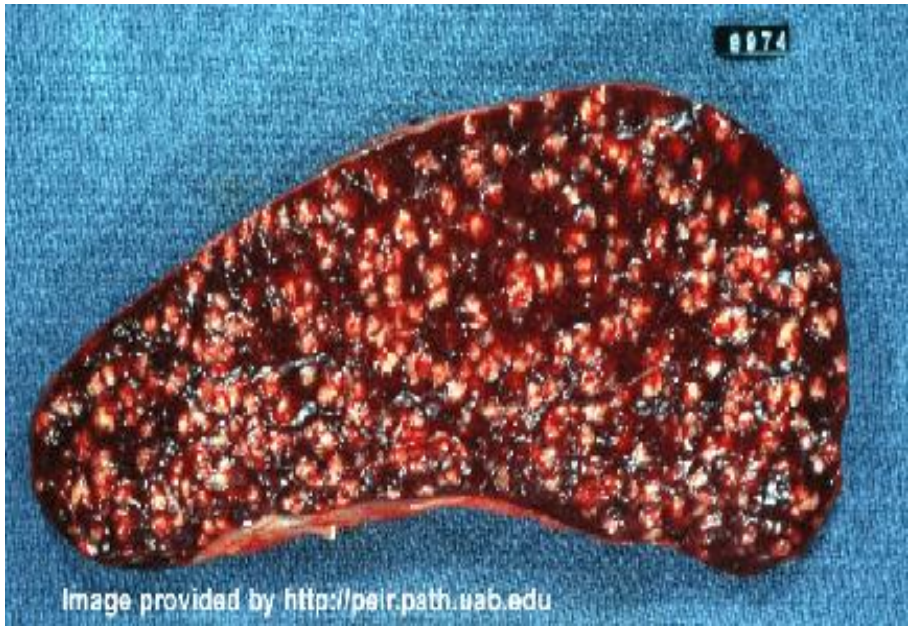
a. Local……pleura & adjacent lung tissue.

b. Blood……more in primary TB it leads to miliary tuberculosis

c. Lymphatic ++leading to tuberculous lymphadenitis.

d. Natural passages….less common than secondary…it leads to the development of tuberculous bronchopneumonia and pneumonia.

Tuberculosis, Miliary TB



Grossly ..

Affected organ shows a large number of

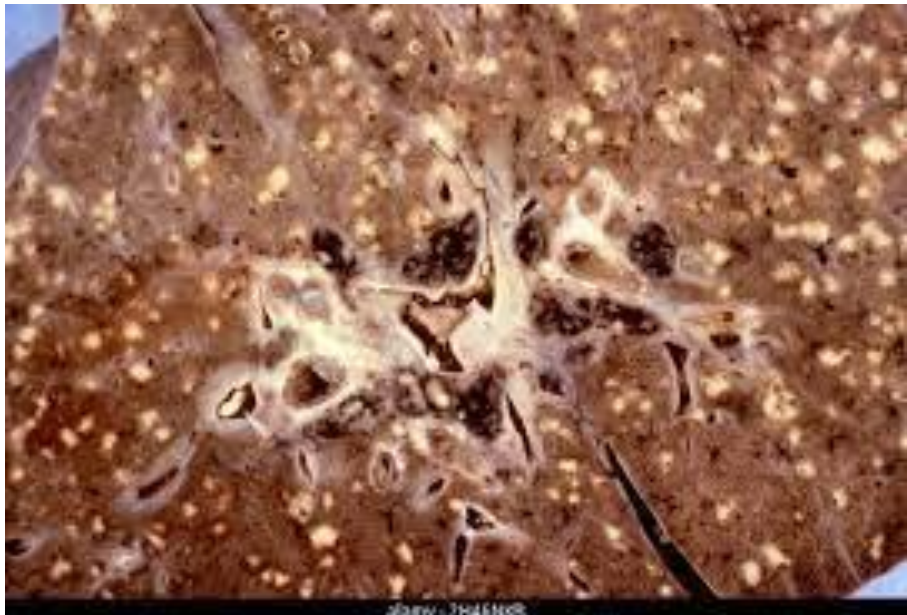
- Small, Uniform
- Grayish – yellow dots
- Near small blood vessels.
- Not surrounded by a zone of hyperemia.

The millet seeds, for which the pattern is named, have a similar size

M/E.....

The affected organ shows large number of

-Small uniform epithelioid granulomas with giant cell but with little caseation and little or no surrounding fibrosis.



Tuberculosis, Secondary TB

In secondary TB the organism may be acquired exogenously or from reactivation of a healed primary complex.

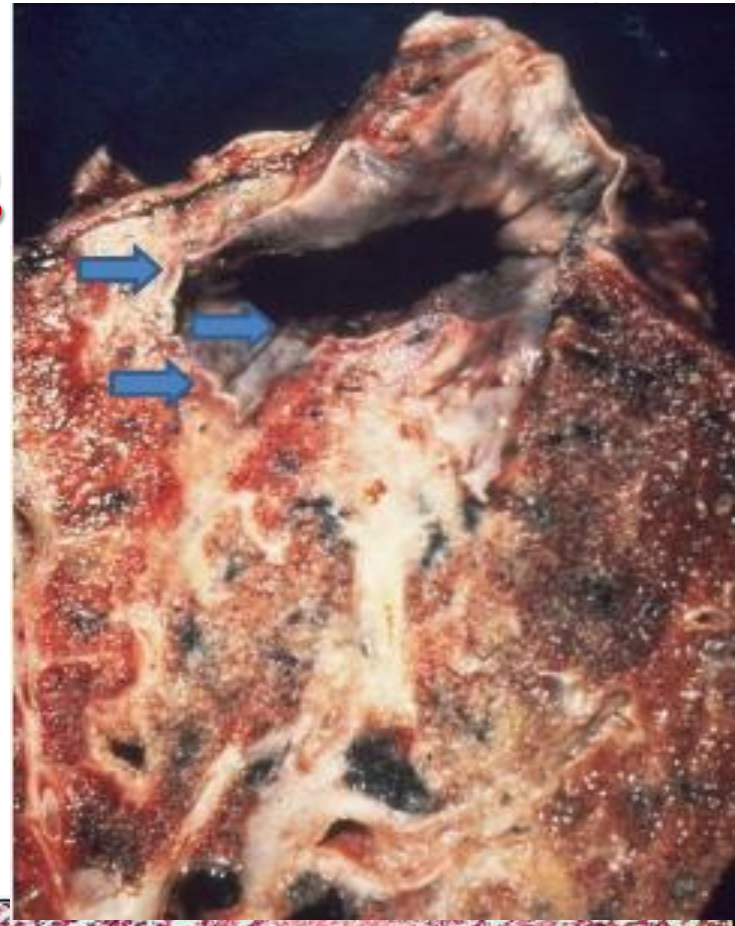
It usually occurs in adults.

Hypersensitivity reaction leads to excessive tissue destruction and extensive caseation.

No nodal affection,the organism is destroyed in the necrotic tissue.

Any site, commonly, Lung-Kidney -Suprarenal gland -Fallopian tube -Epididymis -Brain and meninges-Bone and joints.

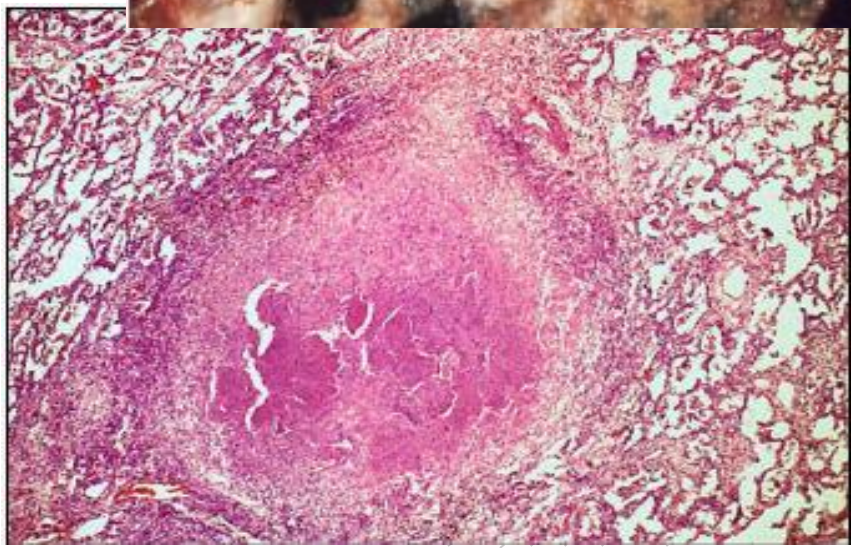
Tuberculosis, Secondary Pulmonary TB



Assmann focus begins as a small caseating granuloma.

Site: Apical or subapical, more in Rt. Lung? because of good ventilation - narrow right pulmonary artery (low blood flow). In most cases, destruction of the lung leads to cavitations.

M/E: There's a central area of caseation surrounded by granulomatous inflammatory reaction.



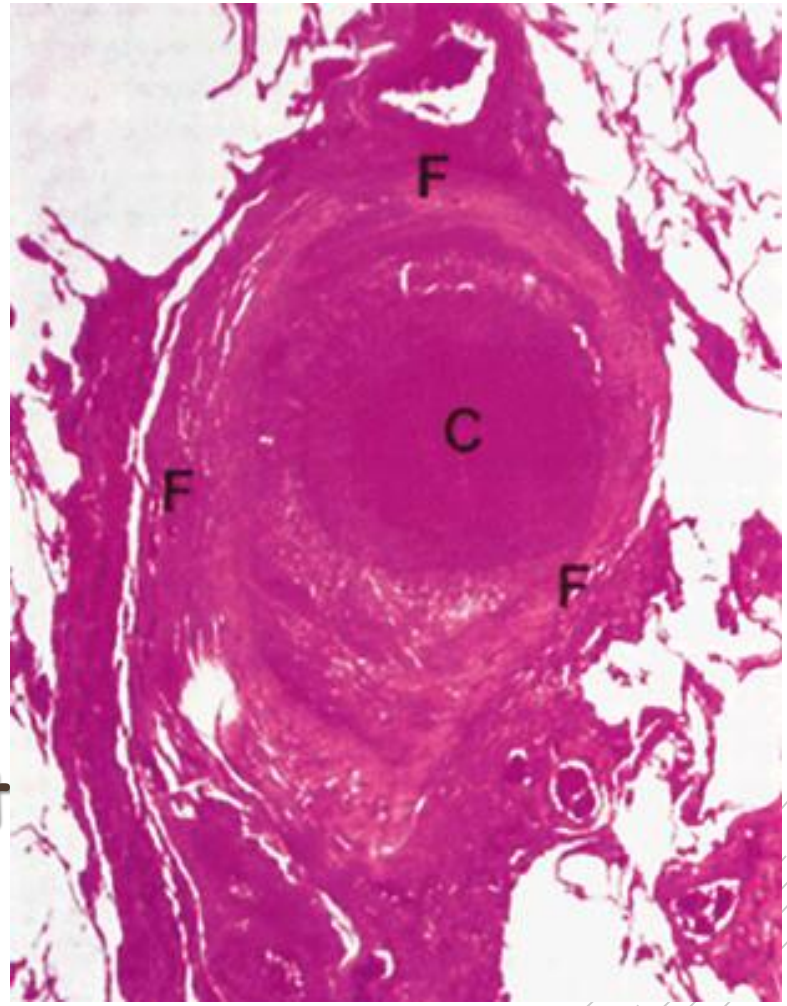
Tuberculosis,
Fate of Secondary Pulmonary TB

Fate depends on the balance between dose and virulence of the organism with the body immunity.

A. Regression (good fate):

With good immunity, healing of the apical lesion occurs and a dense fibrous capsule surrounds a central area of caseation (**Fibrocaseous tuberculosis**).

- Calcification often supervenes, and a (**latent tuberculosis**) develops which can be reactivated if the patient's immunity is lowered.



Tuberculosis,
Secondary Pulmonary TB

B. progressive lesion (Bad Fate)

1-Local tissue destruction….

-Blood vessels…hemorrhage & hemoptysis

-Bronchi..open to the pleura cause pneumothorax, pyopneumothorax.

-Reactive systemic amyloidosis.

2-Pulmonary fibrosis…pulmonary hypertension ..right sided heart failure (core pulmonale).

3-Spread…..*Local to the pleura (pleurisy)

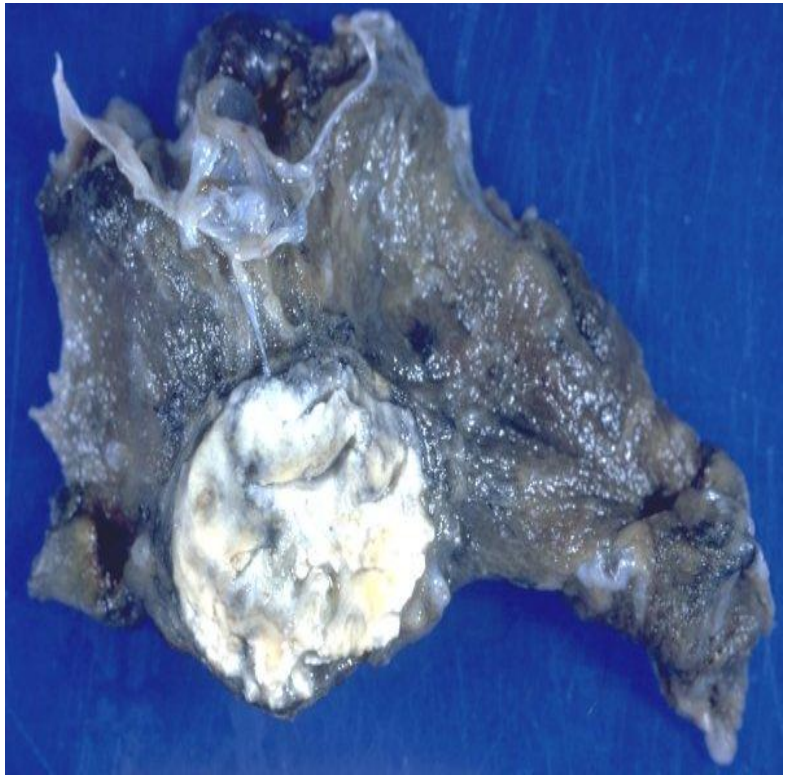
*Bronchial…TB pneumonia and TB bronchopneumonia

*Blood…..isolated organ TB or miliaryTB (rare in secondary)

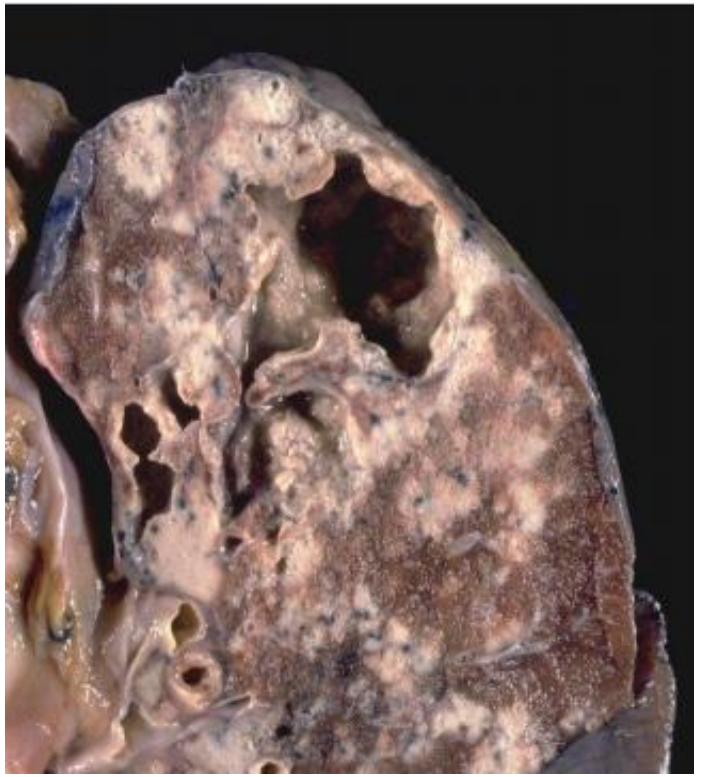
Tuberculosis, Tuberculoma

Tuberculoma

- It is a localized mass of caseating tuberculous reaction surrounded by fibrous tissue.
- It may reach a large size (to be mistaken for a tumor)
- It can occur at any organ (lung, kidney, brain…)



Tuberculoma



2ry TB cavity + TB bronchpneumonia

Tumors of Lung

I- Benign tumors:

1. Epithelial: Squamous cell papilloma.
2. Mesenchymal: lipoma (subpleural), fibroma and leiomyoma.

I- Locally malignant tumors:

1. Carcinoid tumor:

I- Malignant tumors:

1. Primary:
   - Epithelial: Bronchogenic carcinoma.
   - Mesenchymal: liposarcoma, …
2. Secondary

More common than 1ry

Tumors of Lung

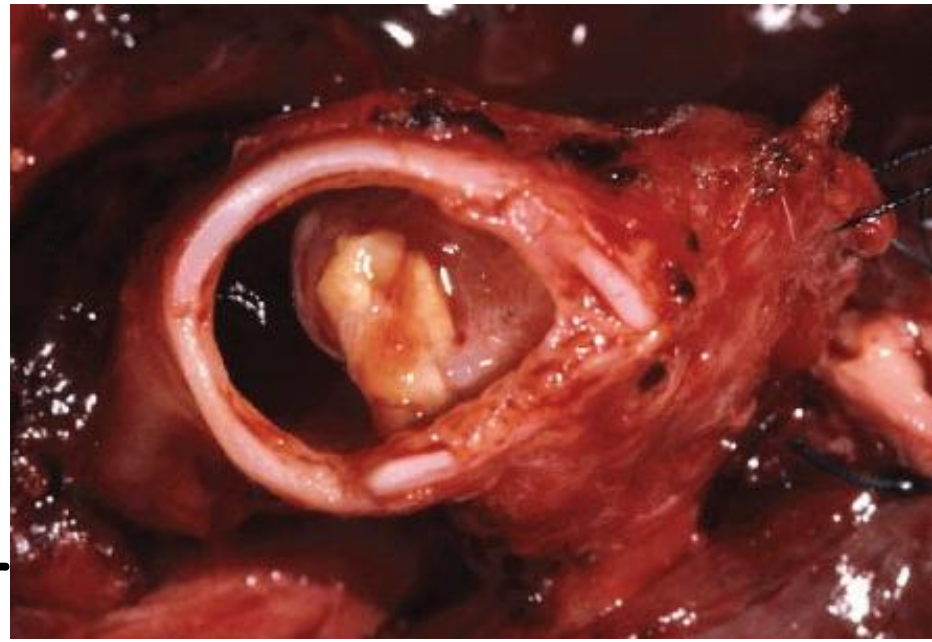
I- Benign tumors & tumor like masses:

1. **Epithelial:** Squamous cell papilloma.
2. **Mesenchymal:** lipoma (subpleural), fibroma and leiomyoma.
3. **Lung hamartoma:** a hamartoma consists of mixture of mature cartilage with cleft-like spaces lined by flat or respiratory epithelium, fat, fibrous tissue and blood vessels.

Tumors of Lung

II- Locally malignant tumors:

Bronchial carcinoid



Origin: from neuro-endocrine cells of bronchial mucosa (Apudoma), locally malignant or slowly growing malignant tumor that rarely metastasize.

Incidence: F>M - 40 y - 1-5% of lung t

N/E:

1. Usually, it grows inside the bronchus as a polypoid mass.
2. It may grow outside the bronchus in both directions (dumbbell shaped).
3. 30% metastasize to hilar L.N or hematogenous

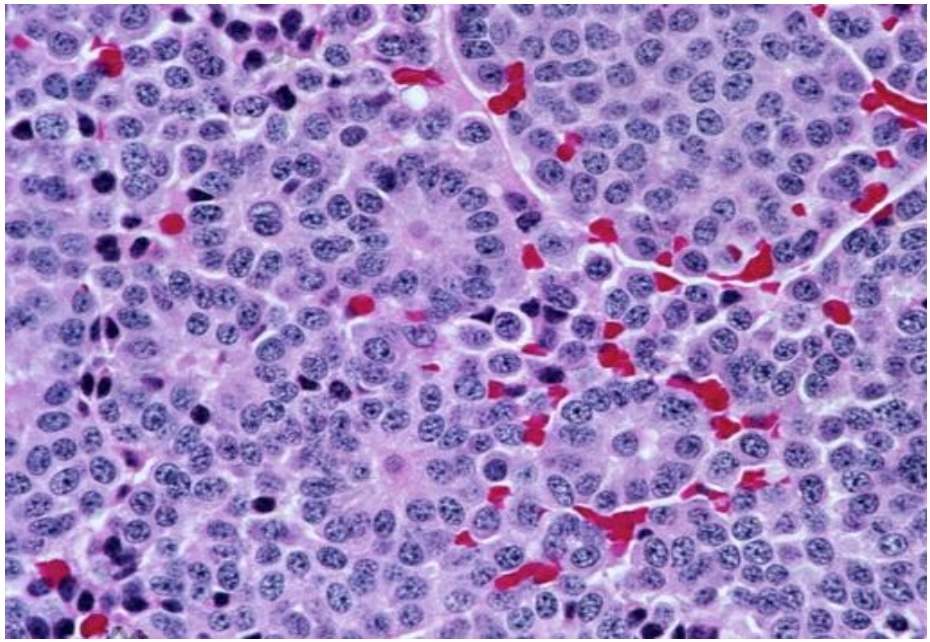
Tumors of Lung

II- Locally malignant tumors:

Bronchial carcinoid

M/E:

It consists of groups of small uniform rounded cells having deeply stained nuclei with few mitosis. These groups are separated by delicate stroma.



Tumors of Lung

II- Locally malignant tumors:

Bronchial carcinoid

Complications:

1. Hemoptysis.
2. Bronchial obstruction leading to bronchiectasis, collapse
3. Malignant transformation.
4. Carcinaid syndrome: secrete serotonin (5 HT) and histamine, which passes to the circulation leading to :
    a- Flushing of the face (V.D effect).
    b- Diarrhea and Bronchospasm (smooth muscles spasm).
    c- tricuspid and pulmonary valve stenosis (Fibroblastic proliferation).

Tumors of Lung

III- Malignant tumors:

Primary tumors

Bronchogenic carcinoma

Incidence: The commonest (90-95%) 1ry lung tumors.

Age and sex: predominate in males above 45 years.

Etiology:

1. Cigarette smoking
2. Atmospheric pollution e.g.
   a- Ionizing radiation & atmospheric pollution.
   b- Industries of: arsenic, silica, asbestos, Nickel, Uranium..
   c- Hydrocarbons related to motor car and tan fumes
   d- Hereditary (genetic) factor….
3. Premalignant lesions??

Tumors of Lung

III- Malignant tumors:

Primary tumors

Bronchogenic carcinoma

N/E:

The right lung in more affected. The tumor is greyish white and hard.

*Central (hilar) type (75-95%): arises from the main bronchus as fungating, infiltrating or ulcerating mass.

*Peripheral type (5-25%): arises from the peripheral bronchus as single or multiple nodules.

*Diffuse type rare: multifocal and shows massive infiltration of a lobe or whole lung

Tumors of Lung

III- Malignant tumors:

Primary tumors

Bronchogenic carcinoma

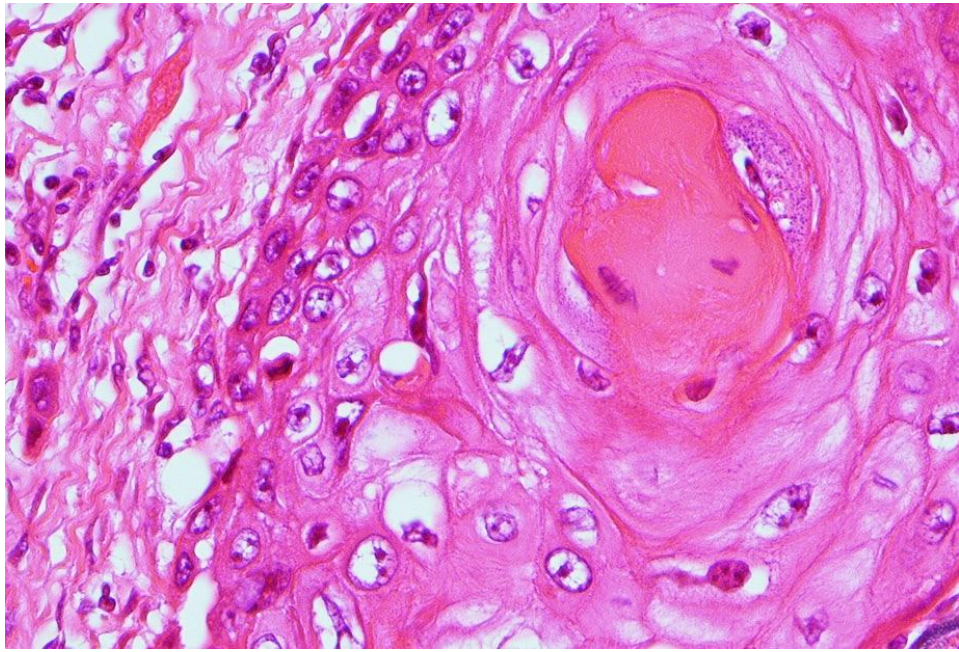
M/E:

A) Non-small cell lung cancer (NSCLC)

1. Squamous Cell carcinoma:
2. Adenocarcinoma:
3. Large cell carcinoma:

B) Small cell lung cancer (SCLC)

Tumors of Lung



III- Malignant tumors:

Primary tumors

Bronchogenic carcinoma

M/E:

A) Non-small cell lung cancer (NSCLC)

1. Squamous Cell carcinoma:

- Usually seen in cigarette smokes
- It is of central locality.
- Associated with mutation in P53, EGFR genes
- It is well, moderate or poorly differentiated and it may secrete parathormone.

Tumors of Lung

III- Malignant tumors:

Primary tumors

Bronchogenic carcinoma

M/E:

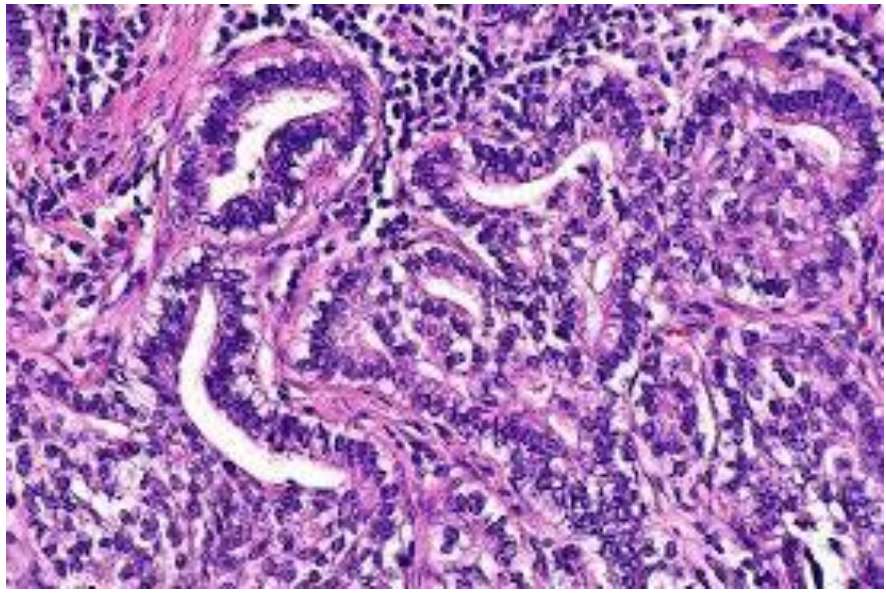
A) Non-small cell lung cancer (NSCLC)

2. Adenocarcinoma:

Small, peripheral tumors related to previous scars.

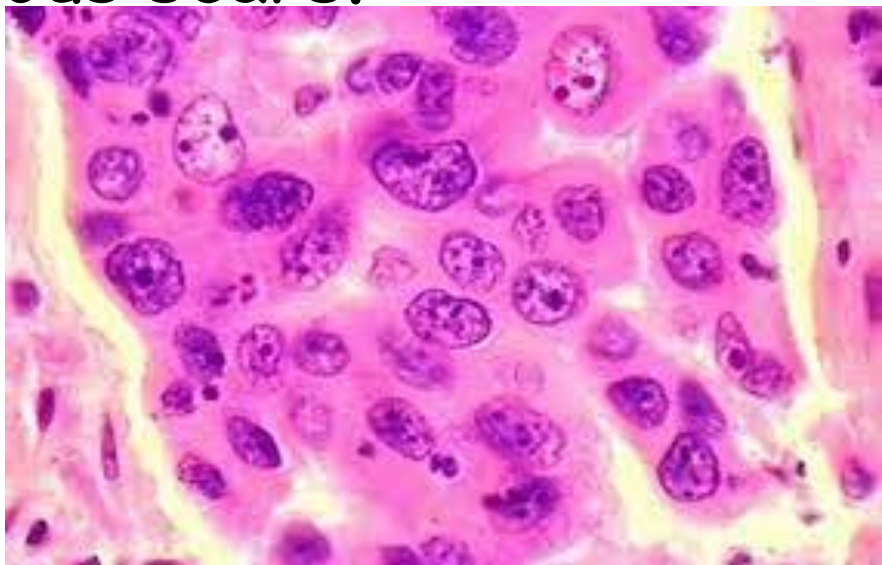
Not related to smoking.

Associated with mutation in KRAS, EGFR

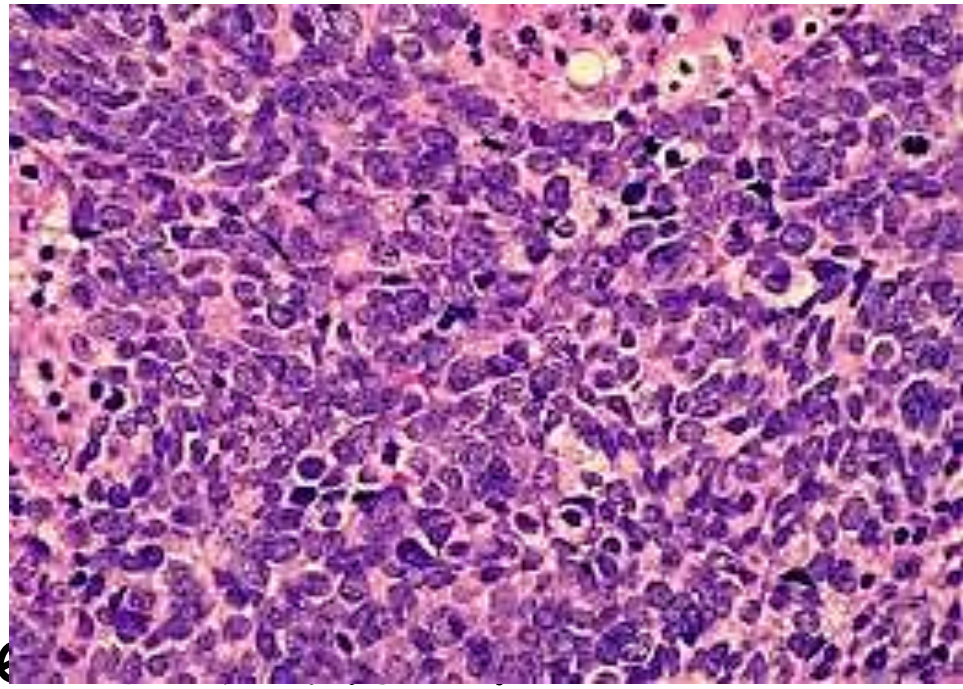


3. Large cell carcinoma:

It is undifferentiated carcinoma composed of large cells.



Tumors of Lung



III- Malignant tumors:

Primary tumors

Bronchogenic carcinoma

M/E:

B) Small cell lung cancer (SCLC)

formed of small, uniform oval cells

with scanty cytoplasm and darkly staine

Associated with mutation in P53 & RB1

It produces ACTH and ADH. (paraneoplastic syndrome)

Tumors of Lung

III- Malignant tumors:

Primary tumors

Bronchogenic carcinoma

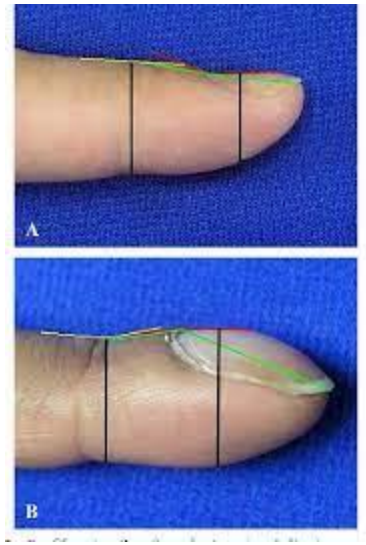
Spread:

1. Direct spread: to the surrounding structures.
2. Lymphatic spread:to hilar and Mediastinal L.N.
   To suprarenal glands due to direct lymphatic connection.
3. blood spread:

Through pulmonary veins to liver, brain, suprarenal, bone, kidneys.

Through pulmonary artery to lungs.

Tumors of Lung



III- Malignant tumors:

Primary tumors

Bronchogenic carcinoma

Coarse & Prognosis:

1- Most lung cancers are silent until they've become inoperable.

2- Gradual onset present with cough, chest pain, shortness of breath &/or weight loss.

3- Hoarseness of voice , chest pain, effusion

4- 3-10% of patients present with para-neoplastic syndrome which include: -Clubbing of the fingers

-ACTH & ADH….. by small cell carcinoma.

-Parathormone….by squamous cell carcinoma

Tumors of Lung

III- Malignant tumors:

Secondary tumors

More common than primary tumors

N/E:

a- multiple discrete nodules of varying size scattered in the lung mostly sub-pleural.

b- Hypernephroma produce cannon ball appearance in X- ray.

M/E:

Resemble their primary

Paraneoplastic Syndrome

Definition: Symptoms that appear in cancer patient that cannot be explained by local or distant spread of tumor.

Due to hormones or hormone-like factors elaborated by cancer cells. In lung cancer:

- Small cell carcinoma secretes:
  - Antidiuretic hormone (ADH causing hyponatremia)
  - Adrenocorticotropic hormone (ACTH causing Cushing syndrome)
- Squamous cell carcinoma secretes parathormone related peptide leads to hypercalcemia.
- Carcinoid tumor secrete serotonin and bradykinin
- Calcitonin, causing hypocalcemia
- Gonadotropins, causing gynecomastia

Tumors of Pleura

Primary tumors

rare

Benign tumors

Solitary fibrous Tumor

Malignant tumors

Mesothelioma

Lymphoma

SecondaryTumors

More common

Lung

Breast

Ovaries

GIT

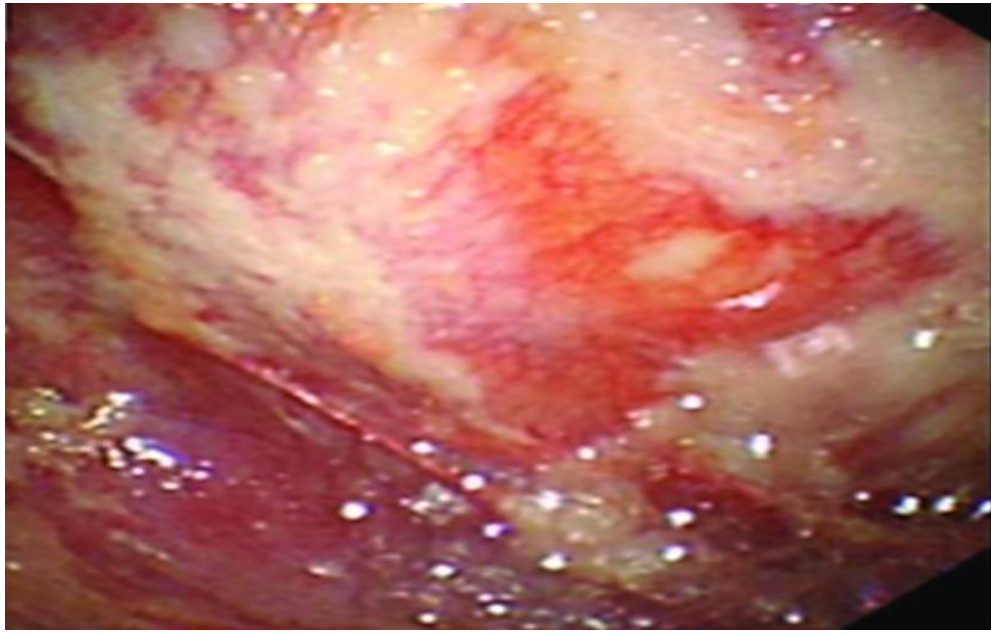
Tumors of Pleura

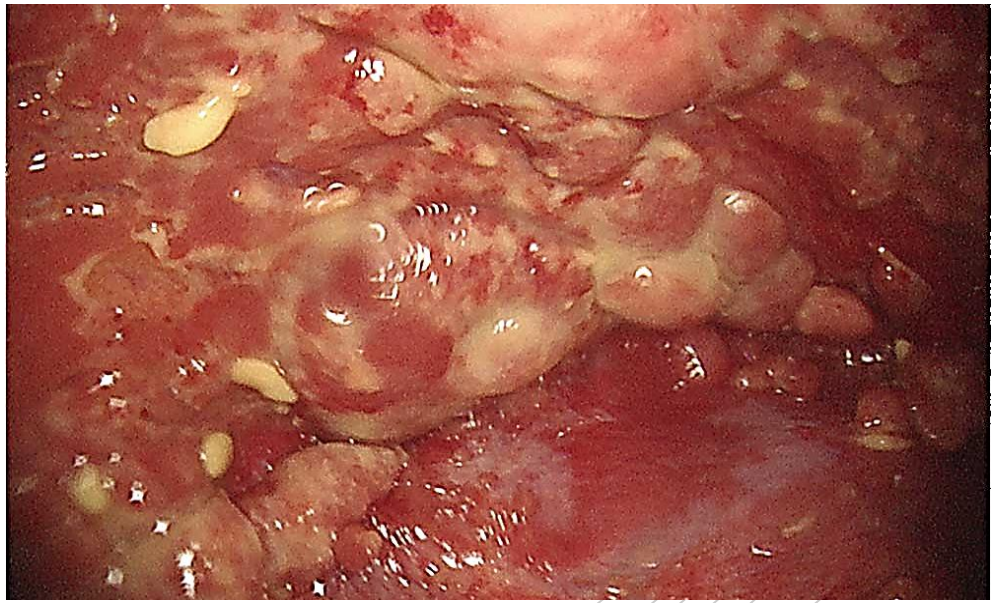
Mesothelioma:

Uncommon tumor.
Asbestos exposure in 90% of cases, tumors appears (25-45Y) after exposure.

N/E:

*Diffuse thickened pleura.
*Nodules or plaque-like masses may extend to adjacent chest wall



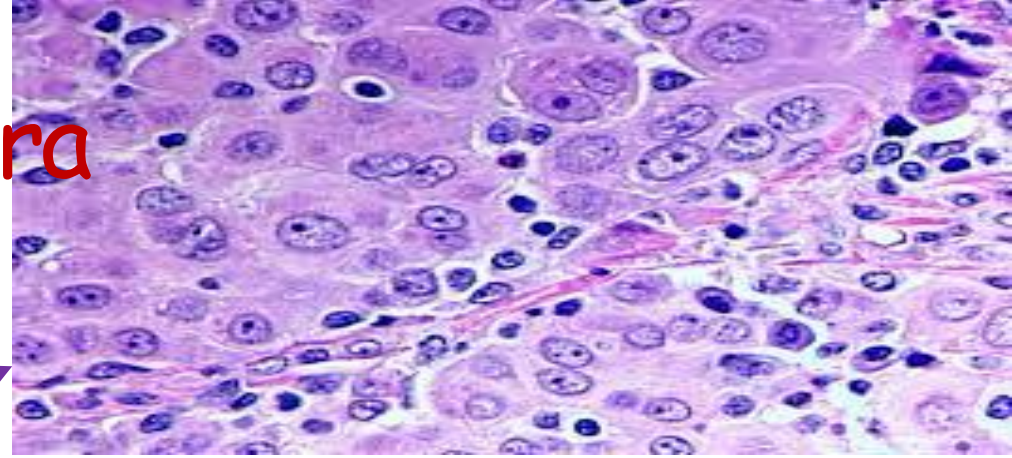


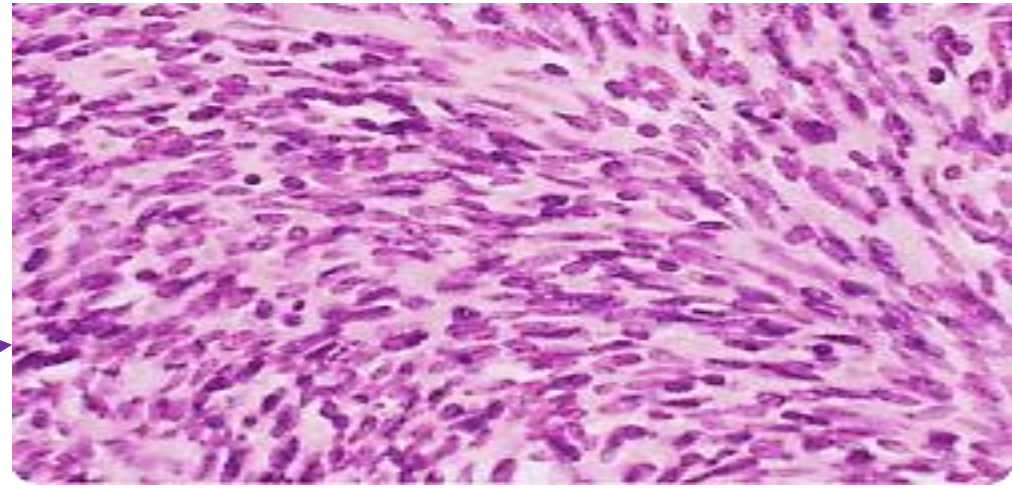
Tumors of Pleura

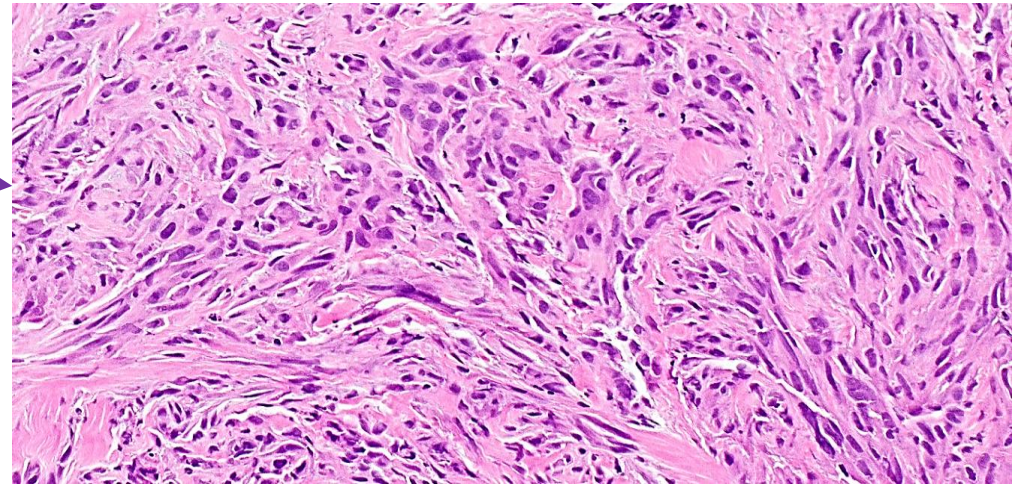
Mesothelioma:

M/E:

- **Epithelioid**: cells resemble mesothelial cells arranged sheets or papillae.
- **Sarcomatoid**: spindle-shaped cells arranged in fascicles, resembling sarcomas.
- **Biphasic**: Contains both epithelioid and sarcomatoid components.



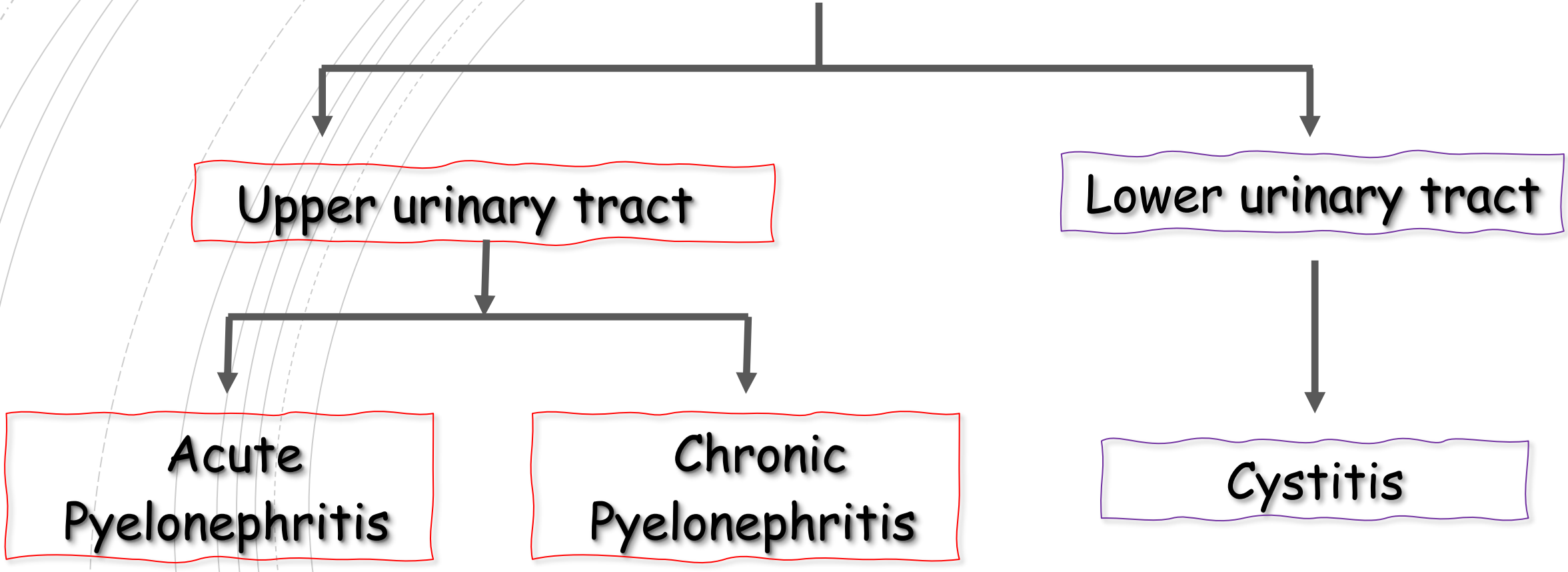




Prognosis:

poor prognosis, 50% die within 12 months of diagnosis.

Urinary Tract Infections



Pyelonephritis

Definition: It is a suppurative bacterial infection of renal tubules and interstitium.

Microorganisms: Mostly **E-coli** or mixed with other bacteria.

Predisposing Factors:

1. **Female Gender** because of:
   a. Short urethra.
   b. Urethra is close to the anus (source of gram negative bacilli like E.Coli) as well as vagina.
   c. Female hormones (like estrogen and progesterone) relax the smooth muscles in the urethra causing stasis which allows bacterial overgrowth.
   d. In pregnancy the uterus compresses the bladder.

Pyelonephritis

Predisposing Factors:

2. Obstruction of urinary flow such as:
(Obstruction → Stasis → bacterial growth)
   a. Urethral obstruction in benign prostatic hyperplasia
(most common cause in men especially those >50 years)
   b. Stones
   c. Tumors
3. Instrumentalization : Mainly catheters
inserted into the bladder which introduce infection
4. Surgery in the kidney or urinary tract
5. Diabetes mellitus
6. Immunosuppression and Immunodeficiency

Pyelonephritis

Routes of Infections:

1. Ascending: by external entry of organisms through the urethra into the bladder then ureters (vesicoureteral reflux) (VUR) then kidney (which is the most common cause of urinary tract infections in children) .
2. Hematogenous: (very dangerous) from another focus of infection (e.g: endocarditis)through the blood the bacteria will reach the kidney. Usually by Staphylococcus Aureus
3-Lymphatic spread From the neighbouring organs.

Pyelonephritis

Clinical Manifestations :

1- Urinary frequency: void small amounts of urine at frequent intervals.
2- Dysuria: Painful, burning sensation on urination
3- Pyuria: large numbers of neutrophils in the urine
4- Haematuria: blood in the urine
5- Bacteriuria: presence of bacteria in urine. It must be distinguished from contamination of urine specimen by external flora.

**The presence of pus cells in urine (pyuria) can result from infection any where in the urinary tract. However, the presence of neutrophils casts indicates Pyelonephritis. (Casts = tubular origin).

Pyelonephritis

N/E	Acute Pyelonephritis	Chronic pyelonephritis
Size	Normal or Increased	Decreased
Capsule	Strips easily	Adherent with decortication
Outer	Suppurative patchy foci surrounded by hyperemia.	Irregular coarsely granular (scarring).
Cut surface - Cortex and medulla	Radial lines radiating from tips of papillae pelvis to cortex	Narrow cortex and medulla, opaque scarred areas.
Calyces and pelvis • Out lines • Mucosa • Contents	 Distorted. Hyperemic Full of pus	 Deformed by scarring Rough thick and mildly hyperemic with pus

Pyelonephritis

M/E	Acute Pyelonephritis	Chronic pyelonephritis
Glomeruli	NAD	Periglomerular fibrosis. Some totally sclerotic glomeruli.
Tubules	Neutrophil casts.	Groups of atrophic tubules thyriodization (dilated and lined by flattened epithelium and contain hyaline casts picture simulating thyroid follicles) Some tubules contain neutrophil casts.
Interstitium	Focal infiltration with acute inflammatory cells.	Focal fibrosis and chronic suppurative inflammation.
Blood vessels	Dilated, hyperemic	Hypertensive changes

Pyelonephritis

	Acute Pyelonephritis	Chronic pyelonephritis
Fate	*Recovery *Acute renal failure *Chronic pyelonephritis	*Secondary hypertension *Chronic renal failure

Cystitis

Definition: Inflammation of urinary bladder

Predisposing factors: Obstruction, diabetes mellitus, local lesions (stones, Bilharsiasis and tumors)

Organisms: E-Coli, pyogenic cocci and specific organism as TB.

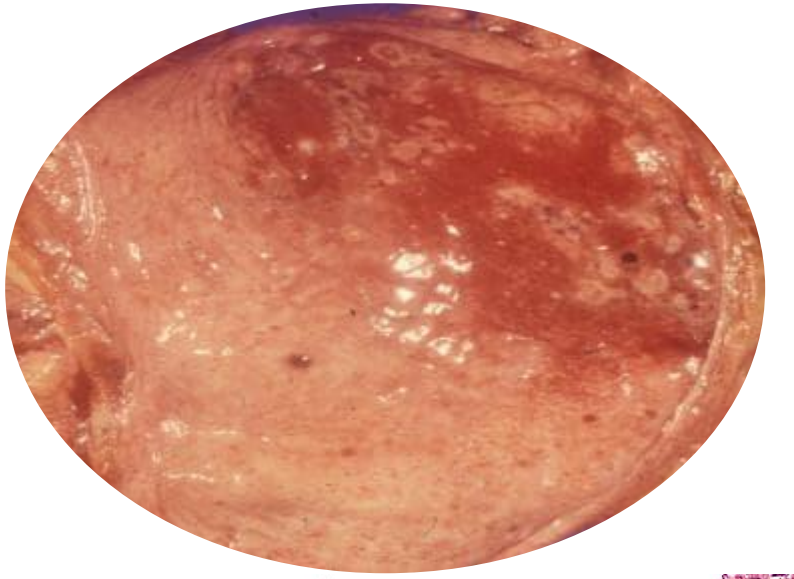
Mode of infection: Ascending, descending, hematogenous, lymphatics or nearby infection.

Cystitis

Acute cystitis

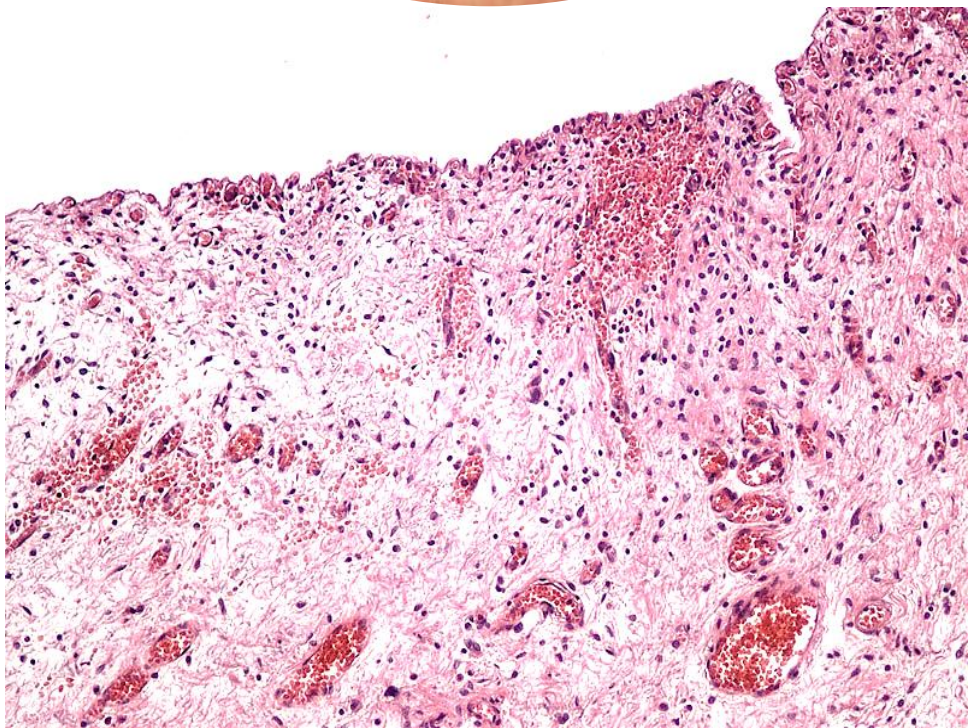
N/E:

Thick wall due to edema, red color due to hyperemia and soft. The mucosa may show focal ulceration



M/E:

The mucosa show focal ulceration, The wall show edema, acute inflammatory cells and hyperemic blood vessels (NO urinary white cell casts)



Cystitis

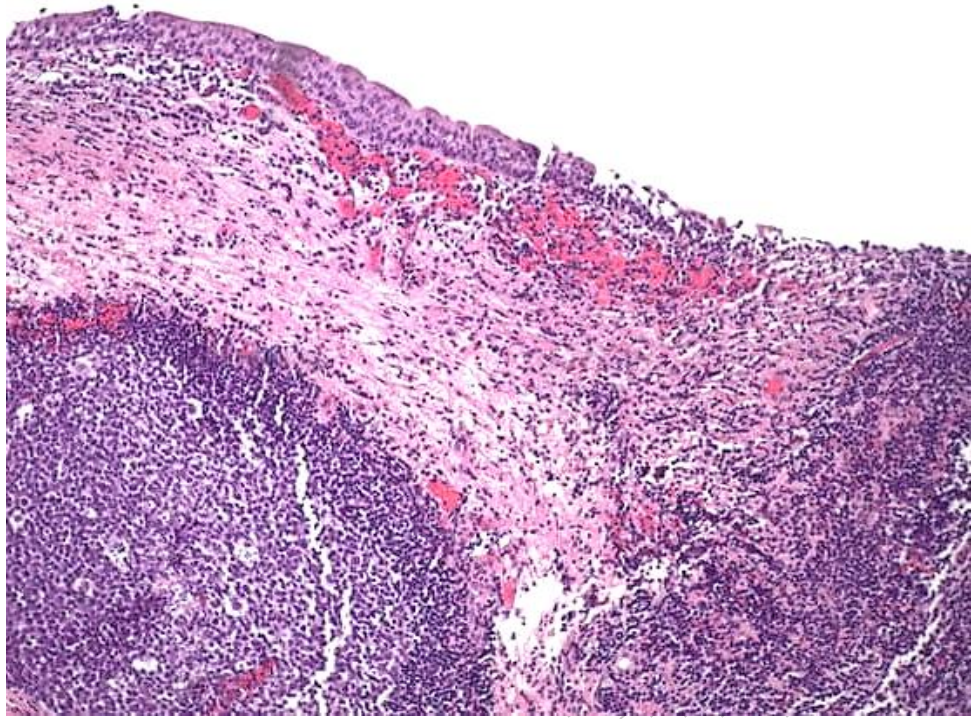
Chronic non specific cystitis

N/E:

Thick wall, whitish color and firm due to fibrosis. The mucosa is thin

M/E:

The mucosa show atrophy, hyperplasia or metaplasia. The wall show fibrosis, chronic inflammatory cells and thick walled blood vessels (end arteritis obliterans).



Cystitis

Chronic specific cystitis

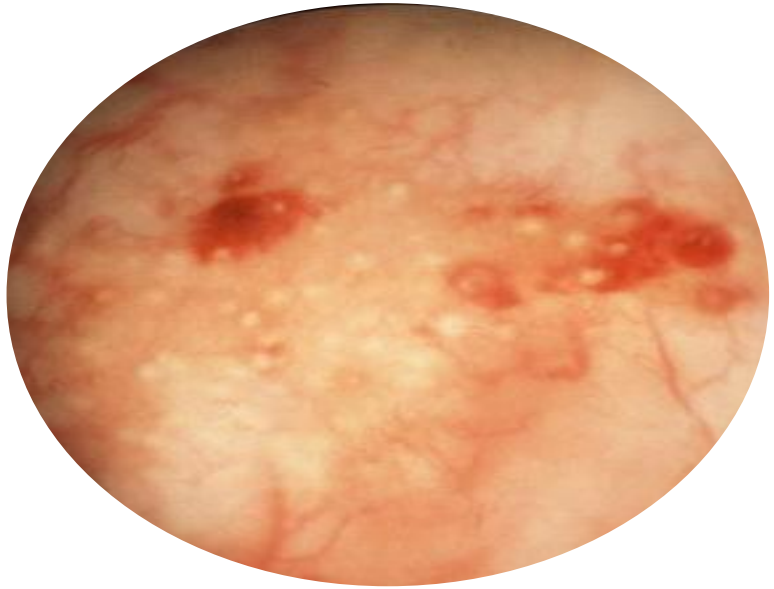
As Bilharziasis

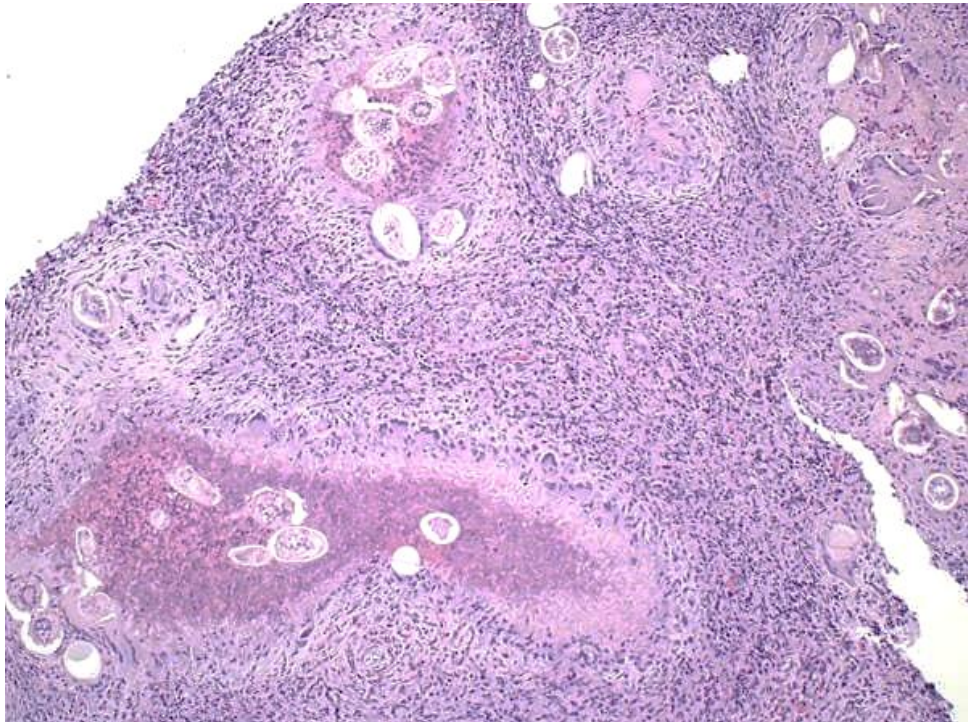
Show specific features to the cause

Complications:

1-Ascending infection leading to Ureteritis and Pyelonephritis.

2- Local effects: Stones and leukoplakia (whitish patches in the mucosa due to squamous metaplasia)





Urinary Tract Obstruction
Causes

I. Urethral obstruction:

- Congenital:

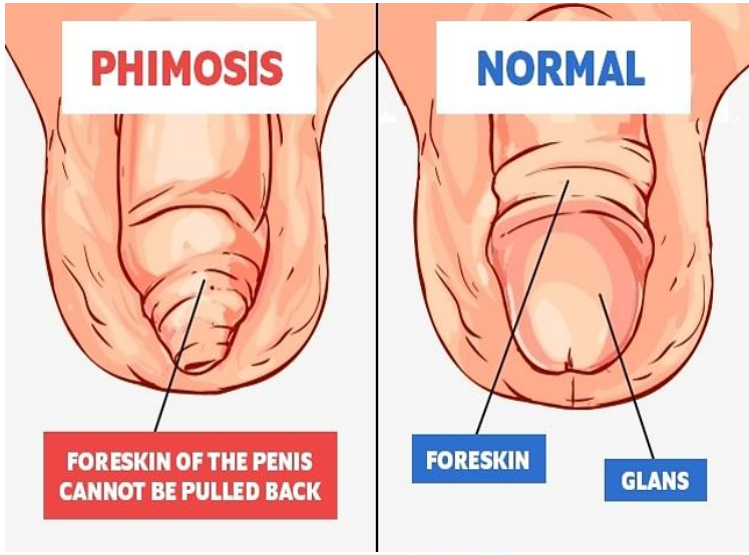
-Phymosis (Congenital stenosis of prepuce opening),

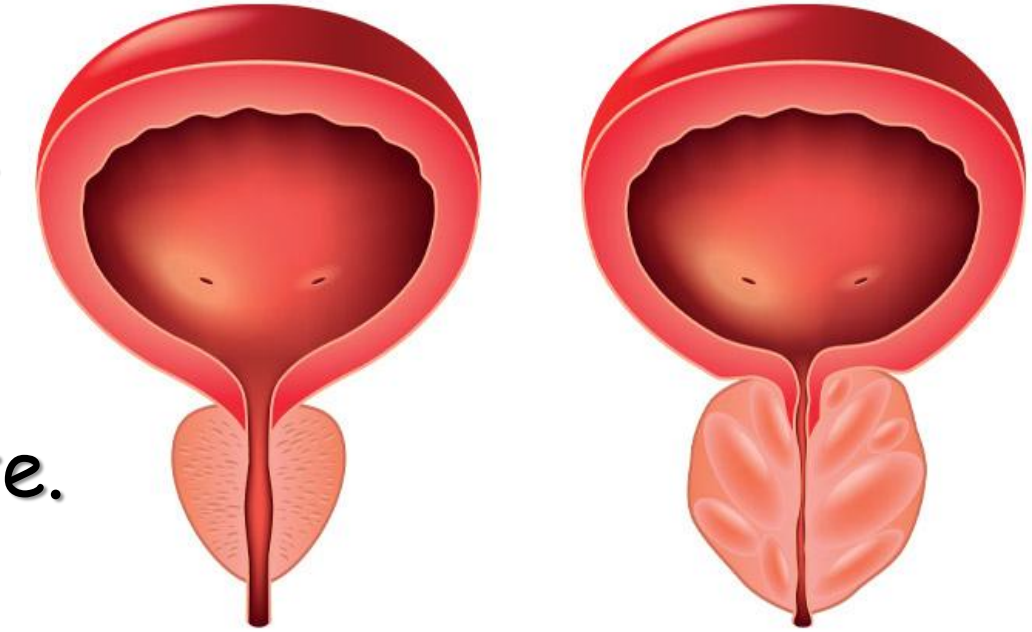
- Acquired:

l- In the wall: Stricture (post traumatic instrumentation or post inflammatory).

2- In the lumen: Calculi.

3- From outside: Enlarged prostate.



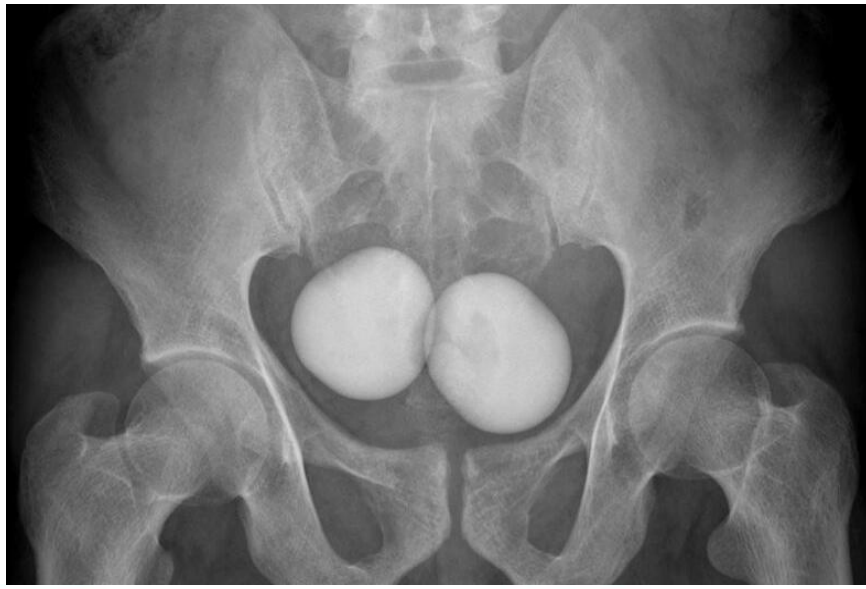


Normal prostate

Enlarged prostate

Urinary Tract Obstruction

Causes



II. Urinary bladder obstruction:

- Organic:

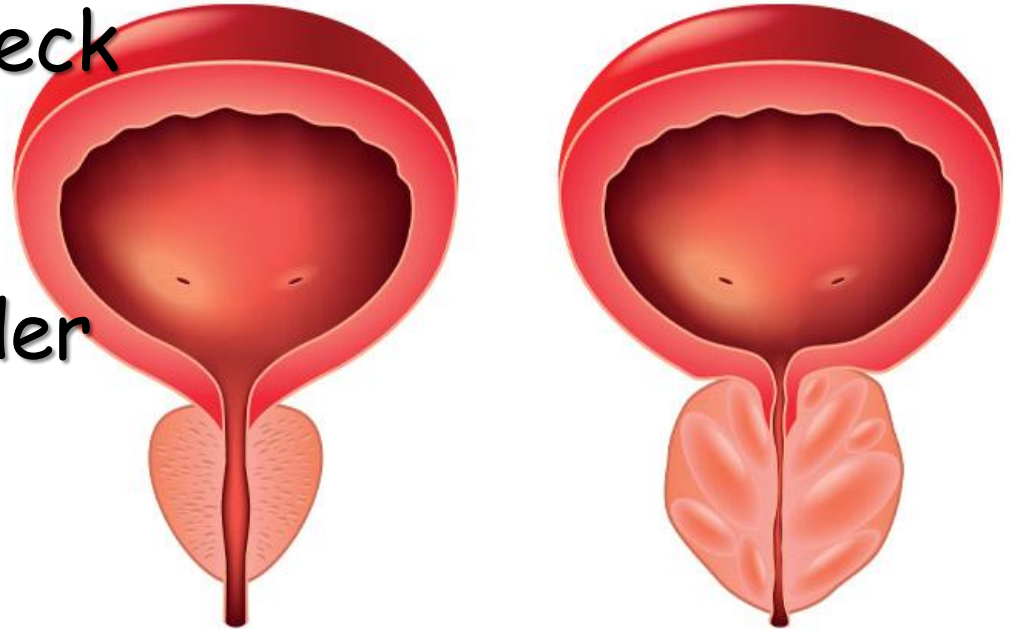
-Stones

-Bladder neck obstruction as due to fibrosis , prostatic hyperplasia….

-Tumors obstructing the bladder neck or ureteric orifices .

- Functional:

-Neurogenic disturbances of bladder control due to spinal cord lesion.



Normal prostate

Enlarged prostate

Urinary Tract Obstruction
Causes

III. Ureteric obstruction:

1- From outside:

- Tumors, enlarged nodes, hematoma or fibrous bands.
-Periureteral inflammation as appendicitis.

2- In the wall:

- Ptosed kidney or floating kidney due to exhaustion of supporting fat leading to kink the ureter.
-Tumors. - Fibrosis.

3- In the lumen:

-Stones

IV Renal Pelvis obstruction:

Stones and tumors in the renal pelvis

Urinary Tract Obstruction
Effects

- Sudden acute obstruction cause reflex anuria.
- Incomplete gradual obstruction or complete intermittent obstruction leading to:

A- Dilatation of urinary tract above the obstruction:

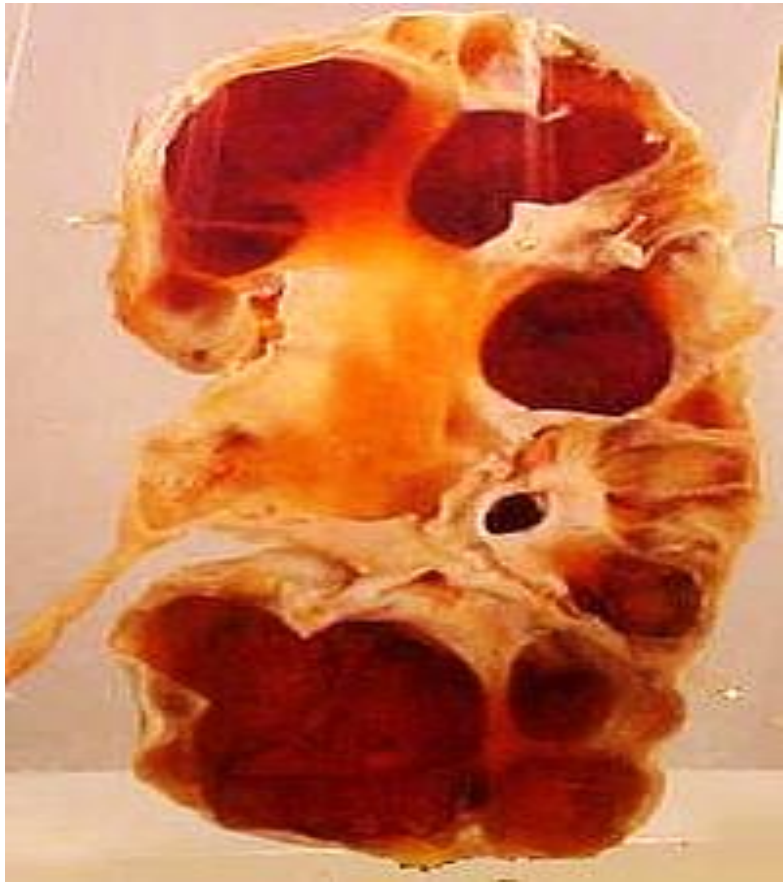
- Kidney …… hydronephrosis.
- Ureter …… hydroureter.
- Bladder…… dilatation, hypertrophy and diverticulum formation.

B- Infection:- Pyelonephritis, pyonephrosis, pyoureter and cystitis.

C- Urinary calculi.

Urinary Tract Obstruction

Hydronephrosis



Definition: -It is dilatation of calyces and renal pelvis with pressure atrophy of renal parenchyma due to lower down obstruction.

Gross appearance:

- Size Increased.
- Outer surface: Lobulated.
- Cut section: Cortex is atrophic and forms thin walled sac filled with fluid and communicating with each other and with the renal pelvis

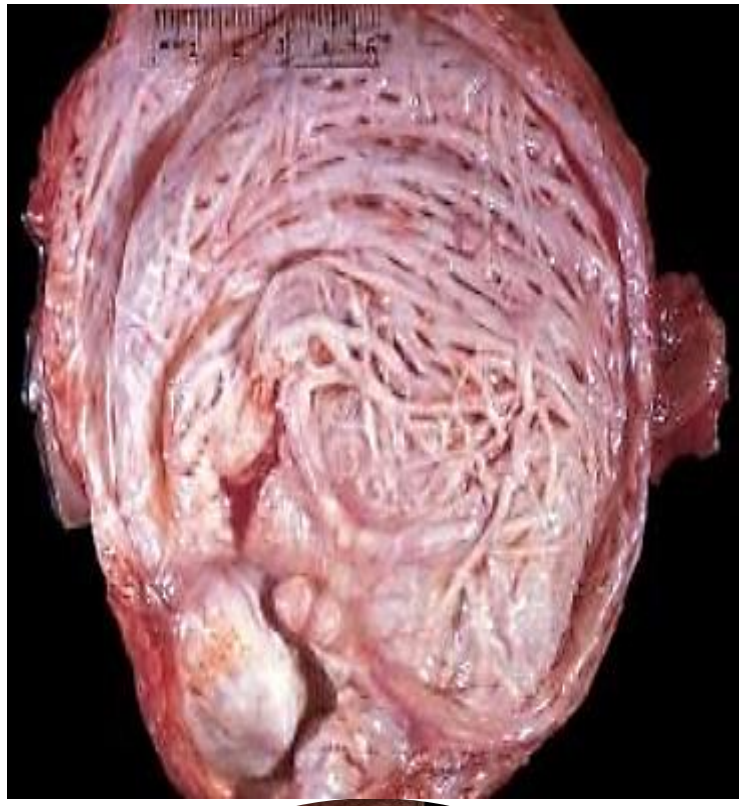
Microscopic picture: Atrophic tubules and glomeruli.

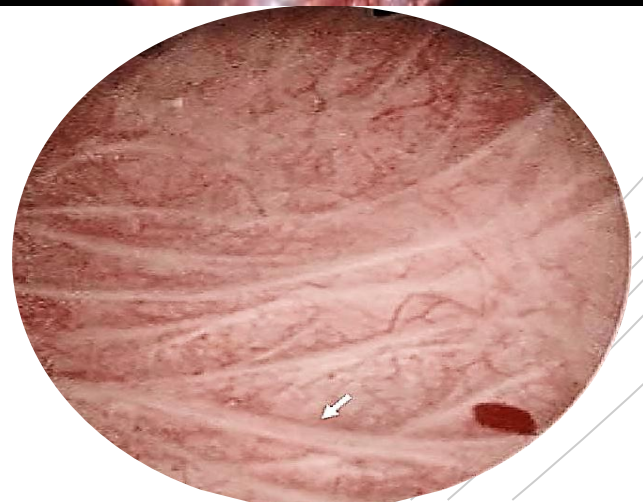
Complications: Secondary infection ,hypertension and chronic renal failure.

Urinary Tract Obstruction

Effect on Bladder

1- Dilatation.
2- Compensatory hypertrophy of the muscles with thick prominent trabeculae separated by depressions.
3- Herniation of the mucosa over the depressions leading to false diverticula.
4- Failure of compensatory mechanisms leading to huge bladder dilatation with thin wall.





Urinary Tract Obstruction

Bladder diverticulae

Definition: It is local dilatation producing a pouch-like projection.

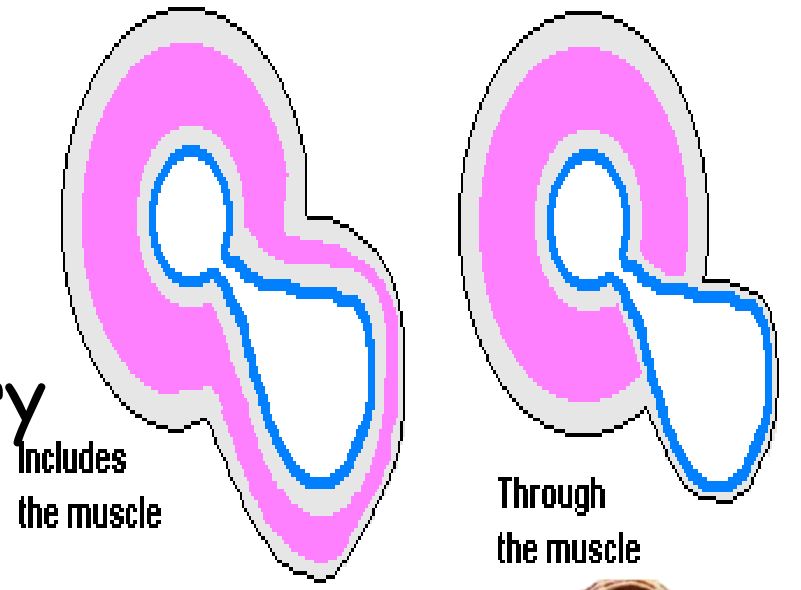
Types:

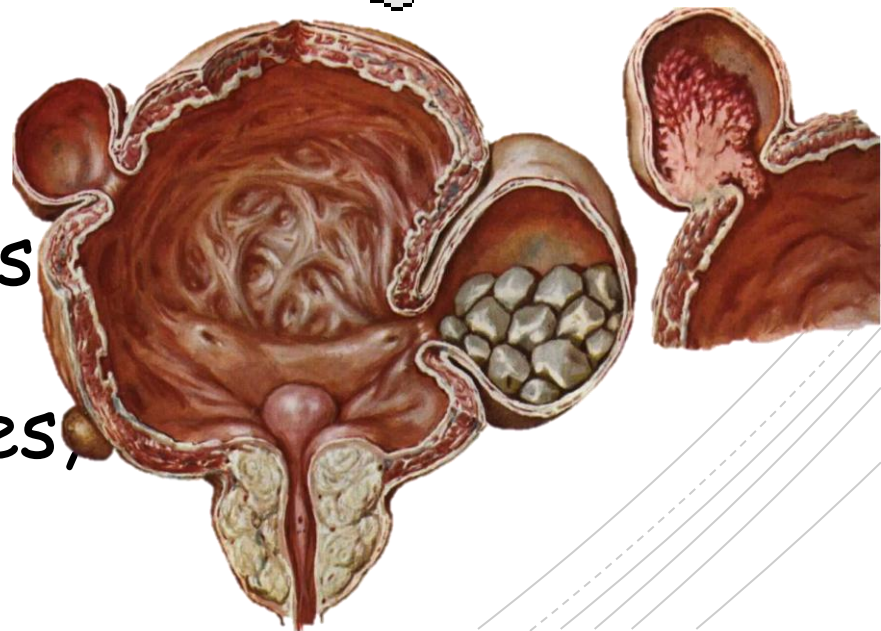
Congenital: True diverticulum. Its wall is formed of the whole thickness of the urinary bladder.

Acquired: False diverticulum. Its wall is formed of the mucosa only.

Pathogenesis: Herniation of the mucosa between the hypertrophied muscle bundles (trabeculations) due to obstruction .

Complications: Stagnation, infection, stones, ulceration, perforation and malignancy.





Glomerular diseases
Clinical classification

1. Nephrotic syndrome:

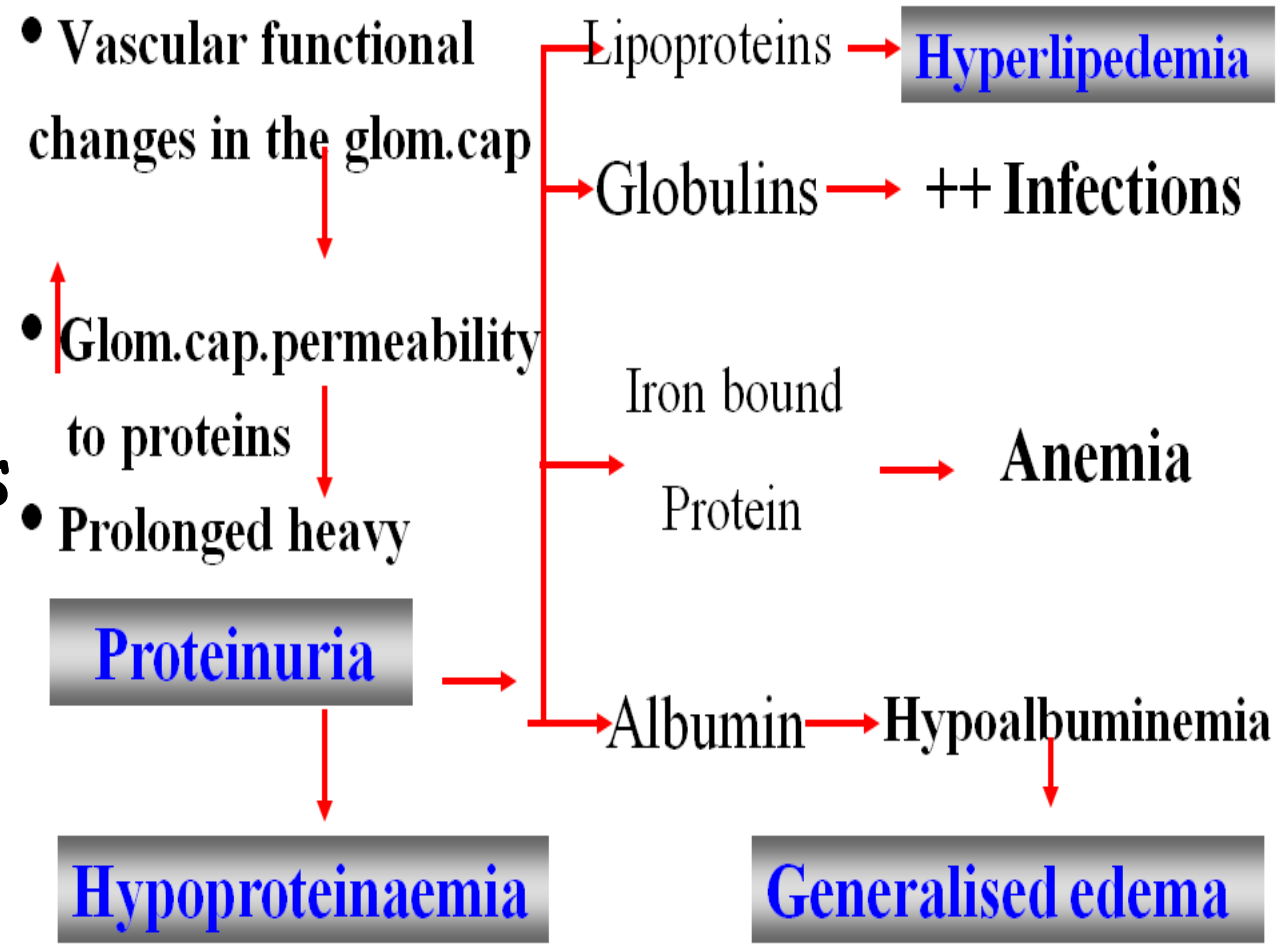
Clinically,

-Proteinuria.

-Hypoproteinemia.

-Hypercholesterolemia.

- Edema: Nephrotic oedema is massive generalized oedema.



Glomerular diseases
Clinical classification

2. Nephritic syndrome (Acute nephritis):

Clinically,
Oliguria

- Hematuria (smoky urine)
- Hypertension.
- Proteinuria.
- Nephritic edema. It is never massive. It is in the form of morning puffiness and mild oedema of lower limbs.

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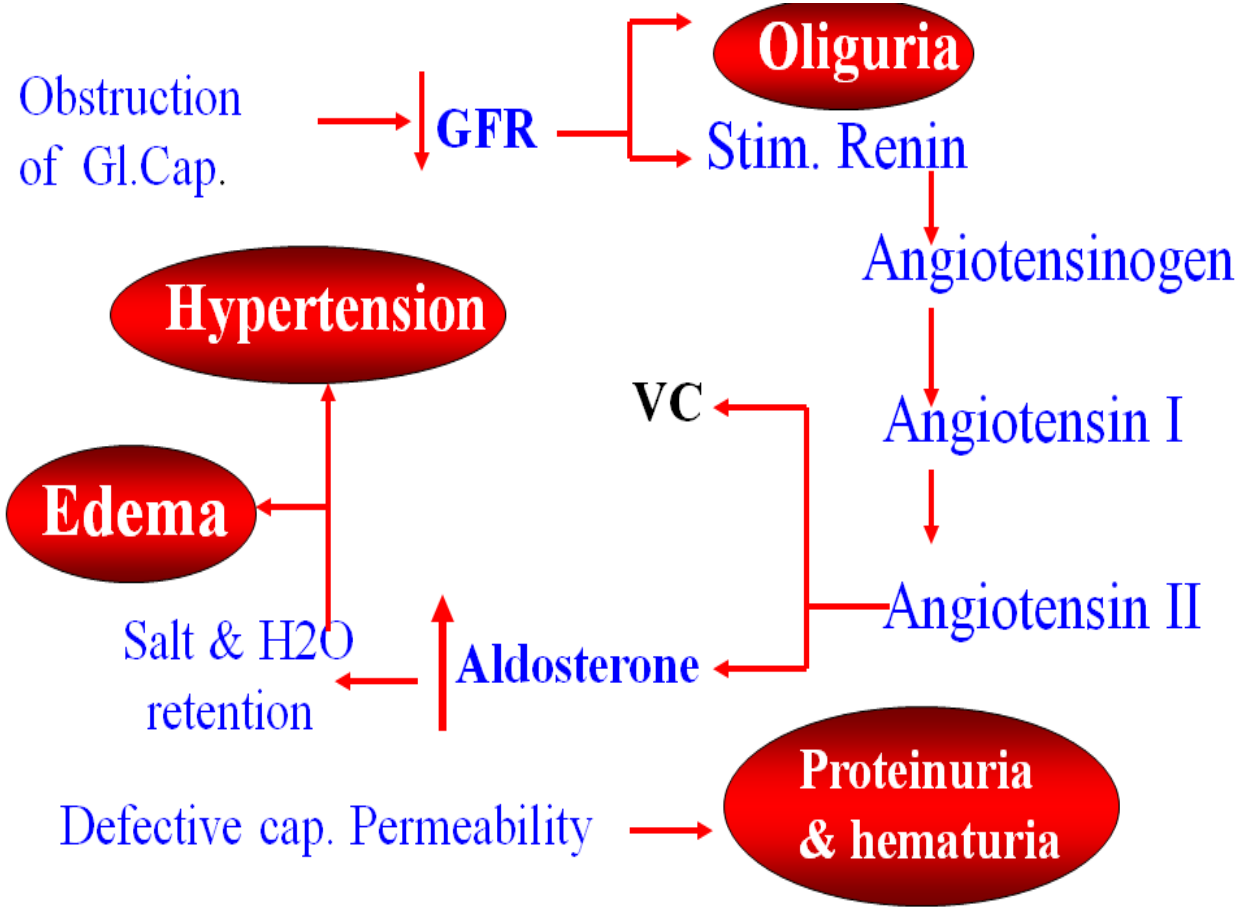


Glomerular diseases
Pathological classification

Primary GN: Etiology not known. The disease affects the kidney only

1- Minimal change
2- Focal segmental glomerulosclerosis
3- Proliferative glomerulonephritis:
4- Membranous nephropathy.
5- Membranoproliferative glomerulonephritis.
6- Crescentic glomerulonephritis.

Secondary GN: The disease affects other system +the kidney)

1- Vascular:
- SLE.
2- Infective:
- Viral (hepatitis)
- Bacterial (Post streptococcal,).
- Parasitic (bilharziasis).
3- Metabolic:
- Diabetes mellitus.
- Amyloidosis.
4- Hereditary:
5- Paraneoplastic syndromes.

Diagnosis Of Glomerular Diseases

Renal biopsy:

- **Light microscopy:** Cellularity, Extracellular matrix, basement membrane
- Can use some special stains (PAS stain, Masson trichrome, Silver for sclerosis and basement membrane)
- **Immunofluorescence microscopy** (deposits of immune complexes)
- **Electron microscopy** (deposits of immune complexes, foot processes of podocytes)

Nephropathology important terms

- **Focal:** affect some glomeruli only.
- **Diffuse:** affect all glomeruli.
- **Segmental:** affect part of the glomerulus.
- **Global:** affect the whole glomerulus.
- **Mesangial proliferation:** more then 2 cells/area.
- **Sclerosis:** Fibrosis of the glomeruli (increased Mesangial matrix).

Nephrotic syndrome

Etiology

Primary:

- Minimal change disease (commonest cause in children).
- Focal segmental glomerulosclerosis.
- Membranous nephropathy (commonest cause in adults).
- Membranoproliferative glomerulonephritis

Secondary:

- Systemic lupus erthymatosus.
- Diabetic nephropathy.
- Amyloidosis.

Minimal Change Disease

Age:

- Mainly in children
- May occur in adults.

Causes:

Idiopathic or secondary as Hodgkin's lymphoma
Clinical picture: Nephrotic syndrome

Microscopy:

- Light microscopy : Glomeruli, tubules and interstitium show no abnormalities.
- Immunofluorescence : No immune deposits.
- Electron microscopy : The only abnormality seen is fusion of foot processes.

Prognosis:

- Spontaneous remissions and exacerbations.
- Good response to steroids. With increasing age spontaneous cure occurs.

Focal segmental glomerulosclerosis (FSGS)

Age: Any age may be affected.
Causes: Idiopathic or secondary (as SLE, Bilharziasis)
Clinically: Nephrotic syndrome, hypertension and hematuria.
Microscopy:
- L/M: Glomeruli: show focal (Some but not all the glomeruli involved) and Segmental (a segment of an individual glomerulus is affected) glomerulosclerosis.
- I/F: focal immune deposits of Ig M and C 3.
- E/M: fusion of foot processes, increased mesangial matrix and electron dense deposits.

Prognosis: Progression to renal failure.

Membranous glomerulopathy

Age: Mainly in adults or older children.
Causes: Idiopathic or secondary to (hepatitis, lymphoma, SLE).
Clinically: Nephrotic syndrome with or without hypertension.
Microscopy:

- L/M: Glomeruli show thickening of the basement membranes, appears as spikes or double contour by **silver stain**.
- I/F: Diffuse finely granular deposits of IgG and C3 along the basement membranes.
- E/M: Fusion of foot processes.
  Diffuse subepithelial deposits along the Basement membranes

Prognosis: Remission. Others progress to renal failure

Nephritic Syndrome

Etiology

- Acute poststreptococcal glomerulonephritis.
- Membranoproliferative glomerulonephritis.
- Rapidly progressive glomerulonephritis (crescentic glomerulonephritis).

Acute diffuse Proliferative glomerulonephritis (Post streptococcal G.N)

Age: Children and young adults.
Causes: following (2-3 weeks) acute infection with Group A beta hemolytic streptococci
Clinically: Nephritic syndrome.
Microscopy:
• L/M: Glomeruli are hypercellular due to endothelial and mesangial proliferation as well as excess infiltration by neutrophils
• I/F: Large granular deposits of IgG
• E/M: Subepithelial immune complex deposits called humps
Prognosis: -90% of children and 65% of adults recover.
-Death from heart or renal failure.
-Development of chronic glomerulonephritis

Membranoproliferative glomerulonephritis

Age: Any age.
Causes: Idiopathic or Secondary (Viral infection e.g. hepatitis, paraneoplastic syndrome, SLE
Clinically: Nephrotic syndrome and in some cases nephritic.
Microscopy:

- L/M: Diffuse thickening of the capillary basement membranes and increased mesangial matrix and cellularity.
- I/F: Mesangial and capillary deposits of IgM, IgG and C3
- E/M: Subendothelial deposits

Prognosis: -Progression to renal failure

Crescentic glomerulonephritis (rapidly progressive)

Age: Any age.
Causes: Idiopathic or Secondary (poststreptococcal, SLE,..)
Clinically: Nephritic or acute renal failure.
Microscopy:

- L/M: Glomeruli show Epithelial crescents, result from Proliferation of parietal epithelial cells lining the Bowman's capsule, fibroblasts, histocytes and cells of unknown origin.
- I/F: No deposits
- E/M: Fusion of foot processes and crescents

Prognosis: -Rapid Progression to chronic renal failure

Chronic Glomerulonephritis

Causes: End stage of any type of GN
Clinically: Chronic renal failure.
N/E:

- Size: The kidney becomes smaller. • Consistency: firm.
- Capsule: Adherent with decortications (It strips off with portions of the cortex).
- Outer surface: It is finely granular.
- Cortex and medulla: Narrow with no differentiation between
- Large vessels: Thick gaped.

M/E: *Glomeruli: most are totally sclerotic. Few show the original glomerulopathy. Some show compensatory hypertrophy.
* Tubules and Interstitium: Tubular atrophy, interstitial fibrosis and chronic inflammatory cellular infiltrate.
* Blood vessels: Hypertensive changes.

Chronic Glomerulonephritis Vs Chronic Pyelonephritis

N/E	Chronic glomerulonephritis	Chronic pyelonephritis
Size	Decreased	
Consistency	Firm	
Capsule	Adherent with decortications	
Outer surface	Finely granular	Coarsely granular
Cut surface Cortex and medulla	Narrow with no differentiation between cortex and medulla	
Calyces and pelvis	Not affected	Distorted and deformed Contain pus Rough mucosa
Large vessels	Thick gaping due to effect of hypertension	

Chronic Glomerulonephritis Vs Chronic Pyelonephritis

M/E	Chronic glomerulonephritis	Chronic pyelonephritis
Glomeruli	Most of them are sclerotic. Small No. still shows glomerulopathy.	Some glomeruli are sclerotic. Other show periglomerular fibrosis.
Tubules	Atrophy, thyrodization and dilatation.	In addition to changes seen in chronic GN. There are neutrophil casts.
Interstitium	Diffuse fibrosis and focal chronic inflammatory cells.	Focal fibrosis and chronic suppurative inflammatory cells.
Blood vessels	Hypertensive changes	

Tumors of the kidney

Benign tumors

a. Renal Tubular Adenoma.
b. Angiomyolipoma
c. Oncocytoma

Malignant tumors:

a. Renal adenocarcinoma (Hypernephroma).
b. Wilm's Tumor (Nephroblastoma).
c. Secondaries.

Benign Renal Tumors

Renal Tubular Adenoma.

N/E:

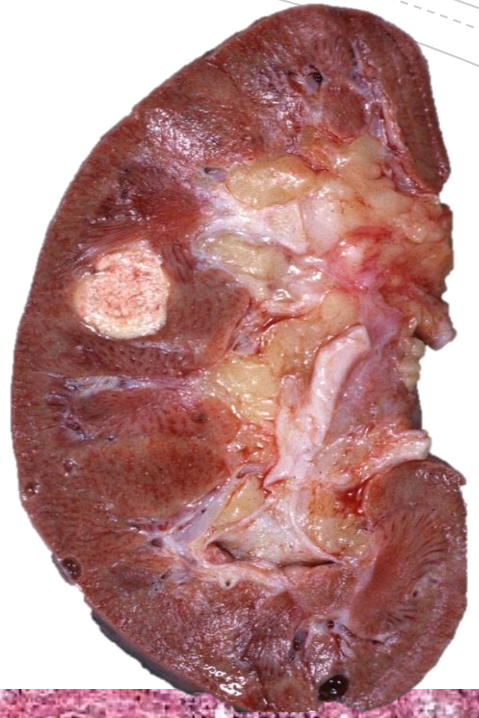
Small Pale nodule on the renal cortex

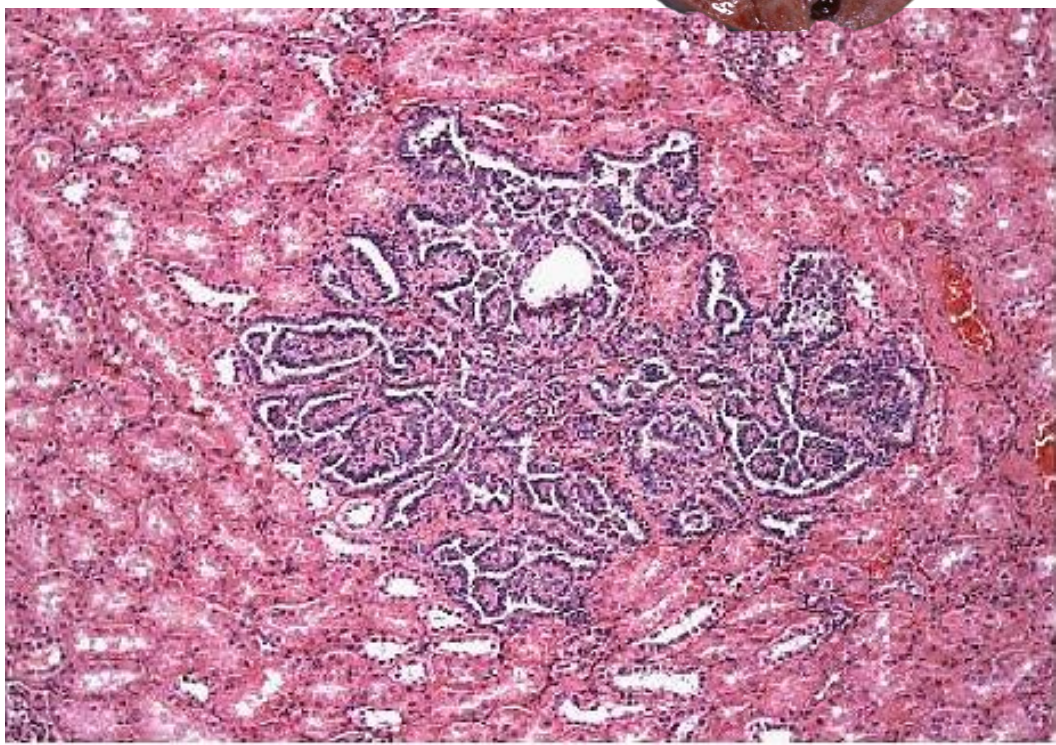
M/E:

Benign tubular cells

Clinically:

Not critical





Benign Renal Tumors

Angiomyolipoma

N/E:

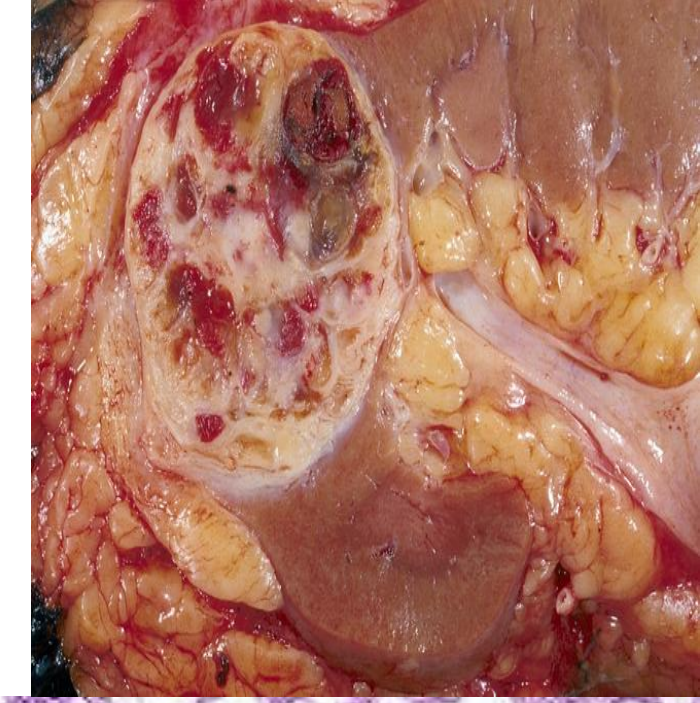
Vascular mass may be large and bilateral, compresses kidney tissue

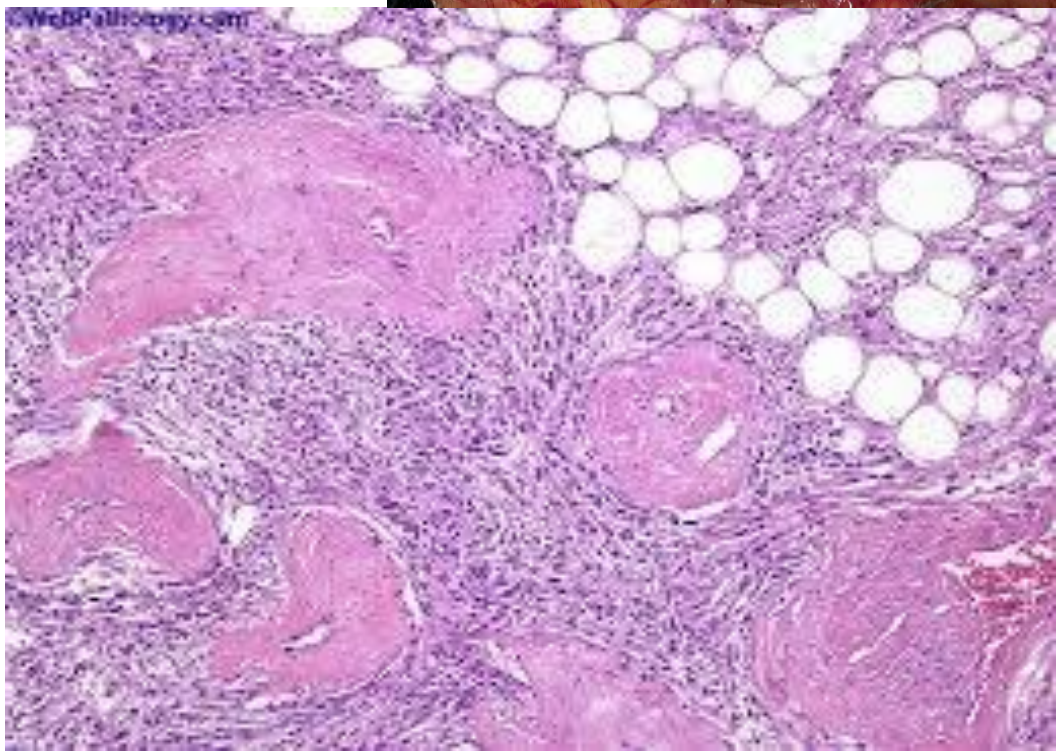
M/E:

Angio = vascular , myo = smooth muscle cells , lipoma= lipomatous lesion.

Clinically:

Mass effect, May cause hemorrhage.





Benign Renal Tumors

Oncocytoma

N/E:

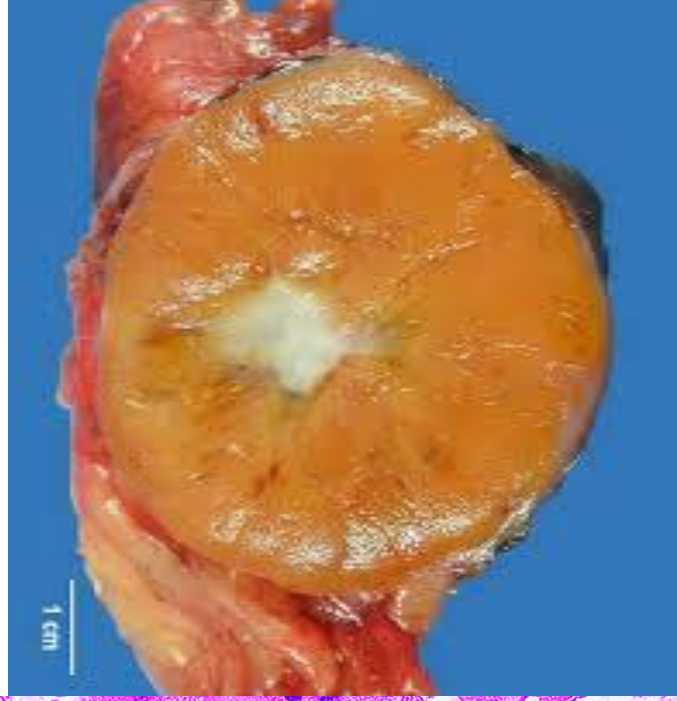
A mass may be large with central scar (seen also radiologically)

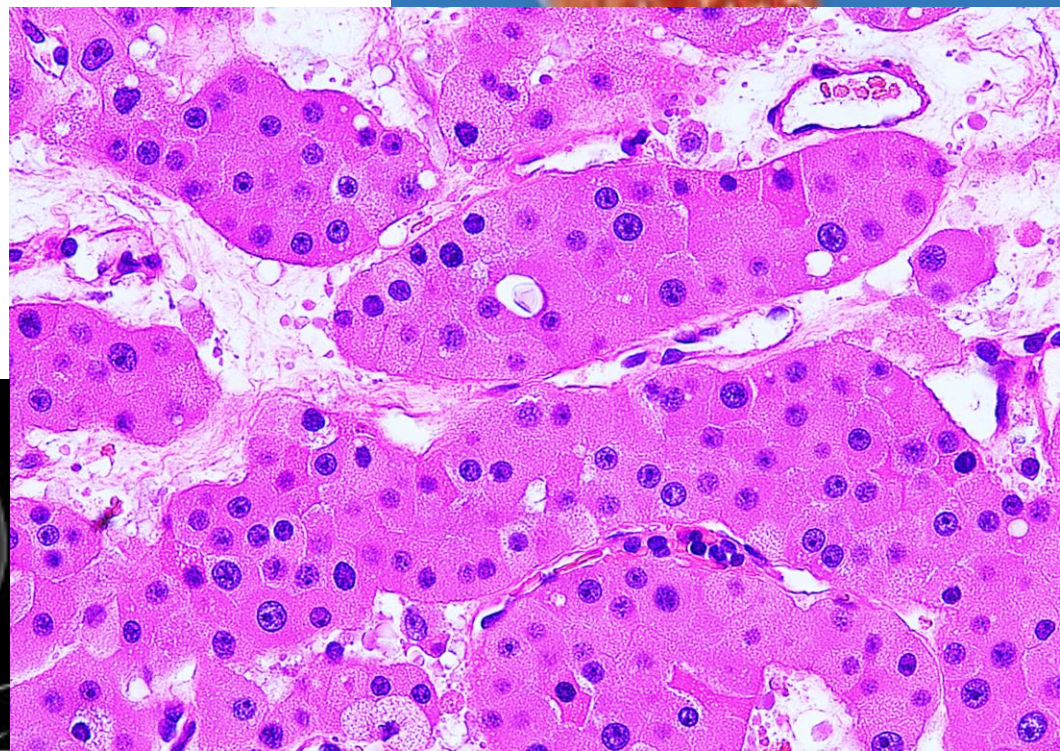
M/E:

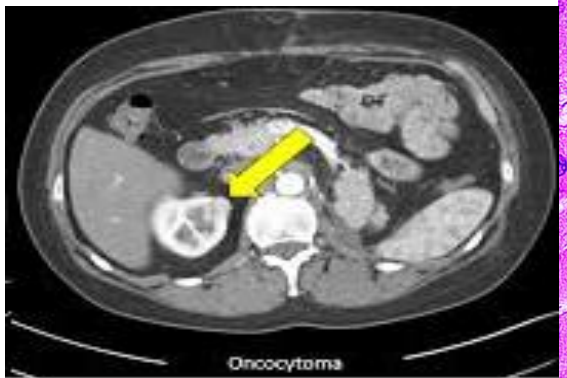
The tumor consists of benign cells are called **Oncocytes** (reddish granular cells which are rich in **mitochondria**)

Clinically:

Only mass effect.







Malignant Renal Tumors

Renal Cell Carcinoma /Hypernephroma

Origin: Renal tubules.

Epidemiology: Males are more affected >40 Years.

*Inherited : 10% (Absent VHL tumor suppressor gene).

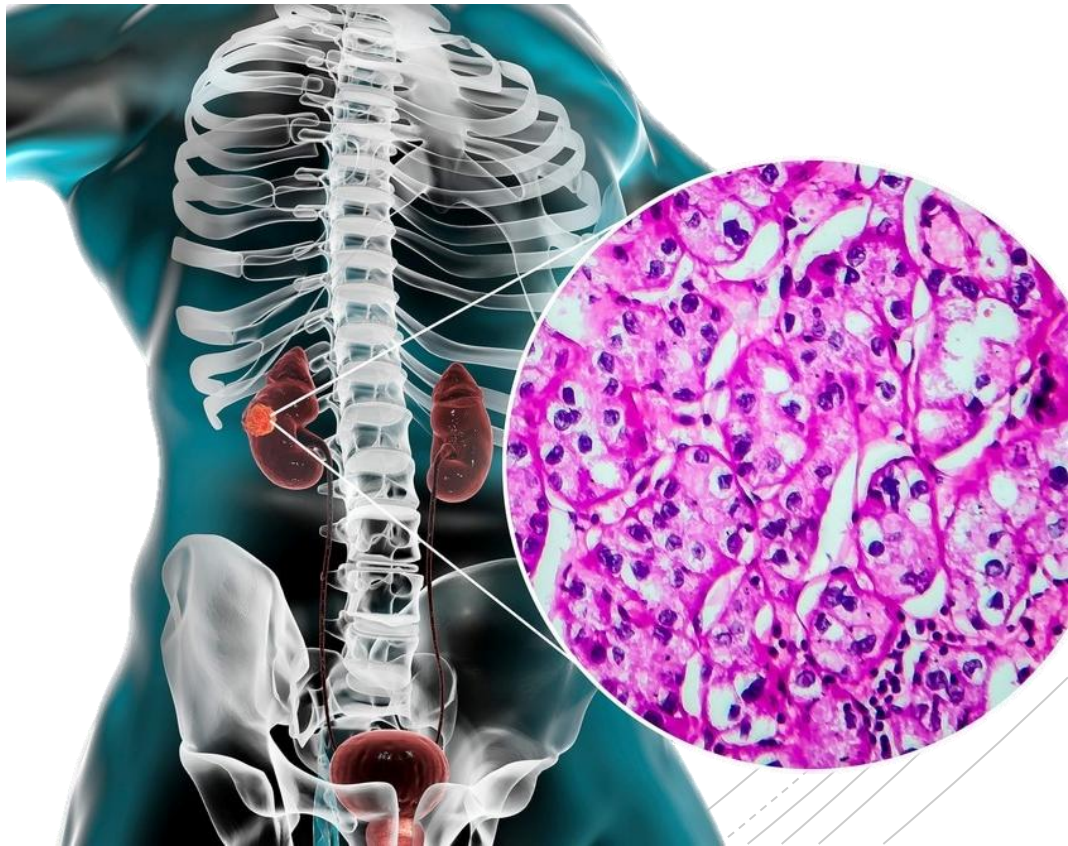
*Sporadic : 90%

Clinically:

*Flank pain *Hematuria

*Abdominal mass *Weight loss

*Polycythemia; the tumor secretes Erythropoietin that stimulate RBC production(erythropoiesis).



Malignant Renal Tumors

Renal Cell Carcinoma /Hypernephroma

N/E:

-Arises from any part of the kidney.

-It is pseudocapsulated.

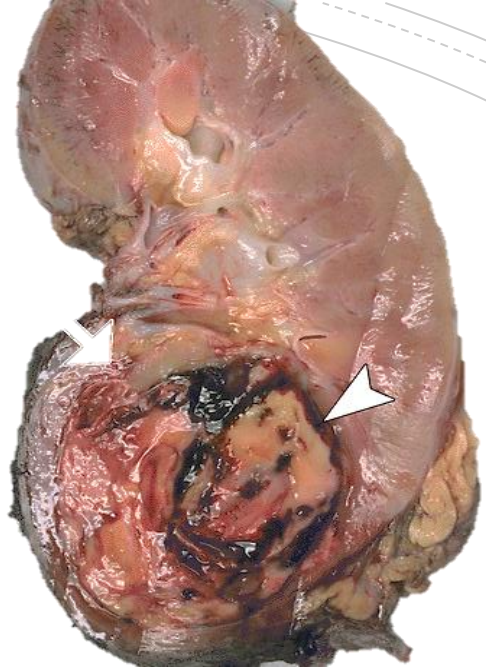
-Cut surface shows variable colors:

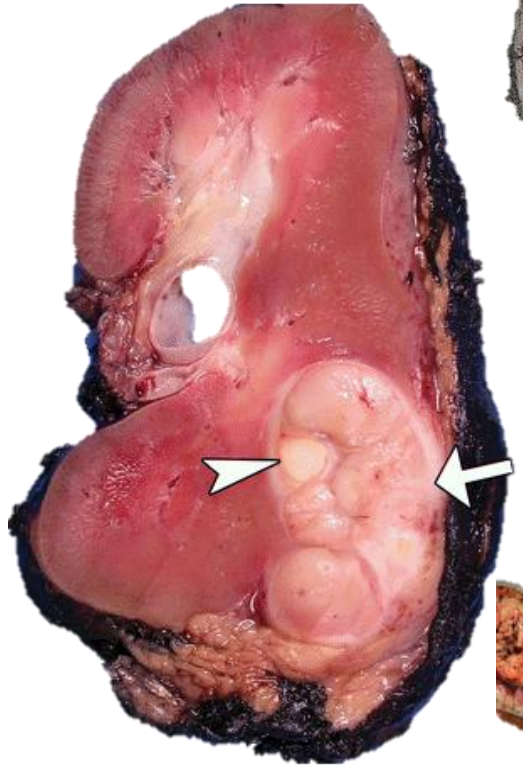
*Golden yellow due to excess lipid contents of the cells.

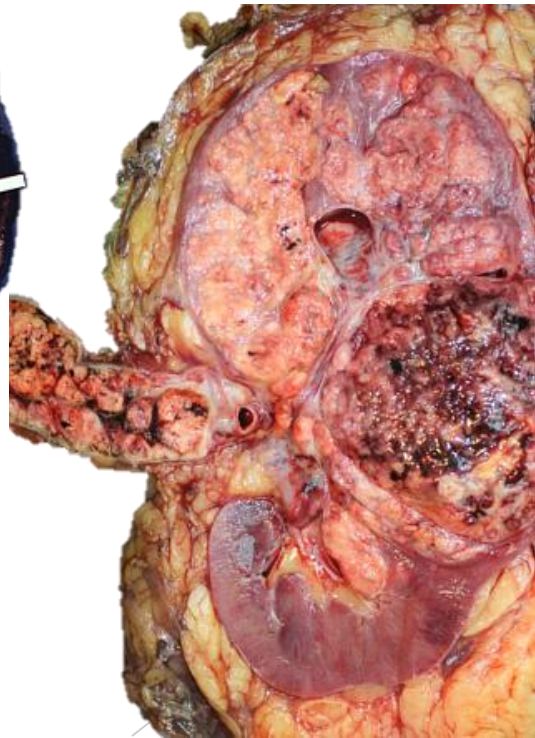
*Brownish red due to excess vascularity and hemorrhage.

*Whitish due to fibrous tissue.

-Cysts containing fluid, hemorrhage or necrotic material may be seen.







Malignant Renal Tumors

Renal Cell Carcinoma /Hypernephroma

M/E:

Cell arrangement: tubules, papillae or papillary cystadenocarcinoma pattern.

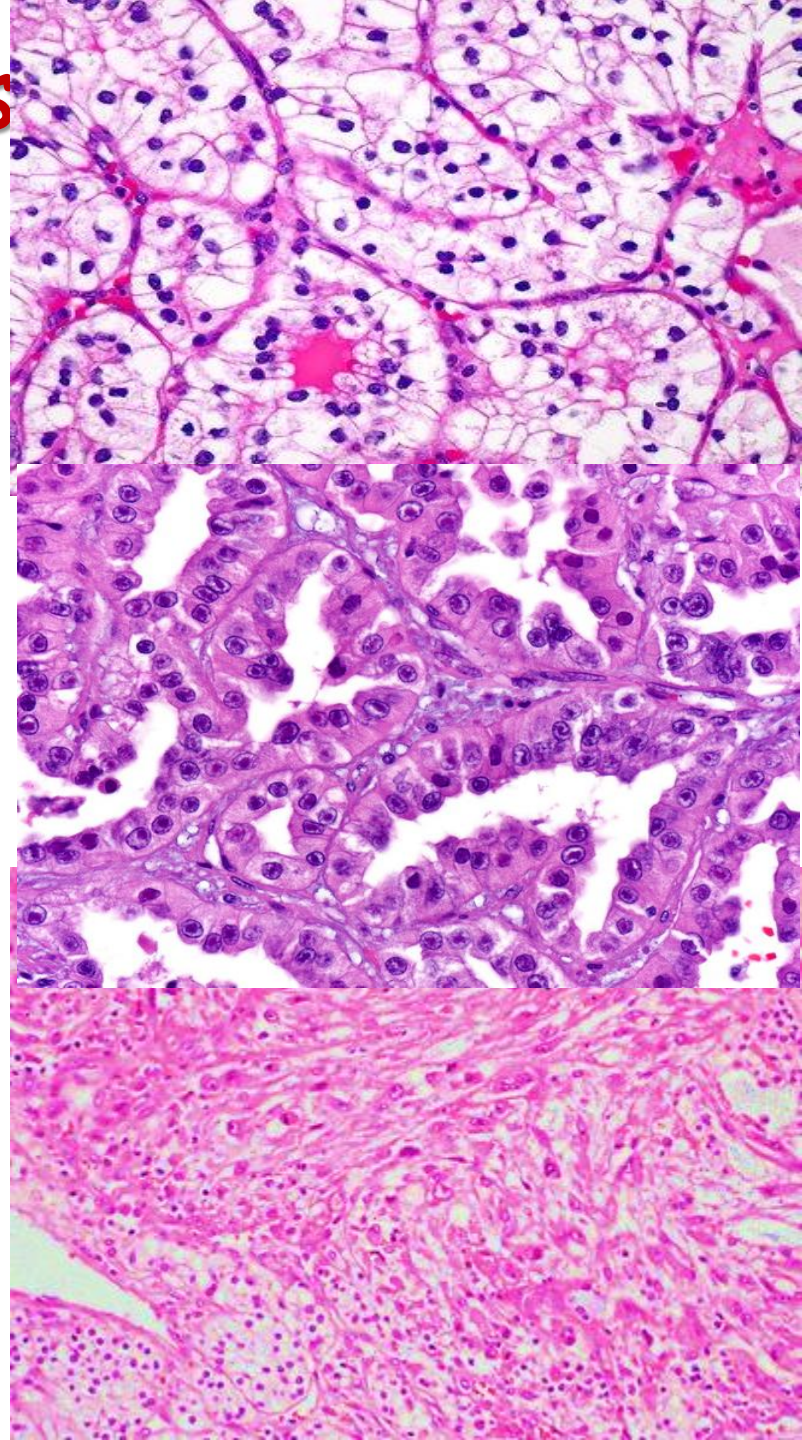
Stroma: Thin vascular.

Cells: either;

-Clear cells: This is the commonest. They are large, uniform, with well defined border, clear abundant cytoplasm (due to its content of lipids and glycogen). The nucleus is small, rounded and central.

-Tall columnar -Cuboidal

-Spindle cells



Malignant Renal Tumors

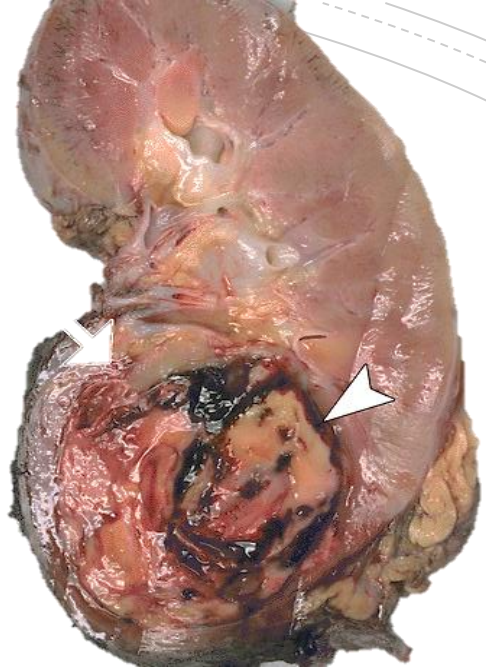
Renal Cell Carcinoma /Hypernephroma

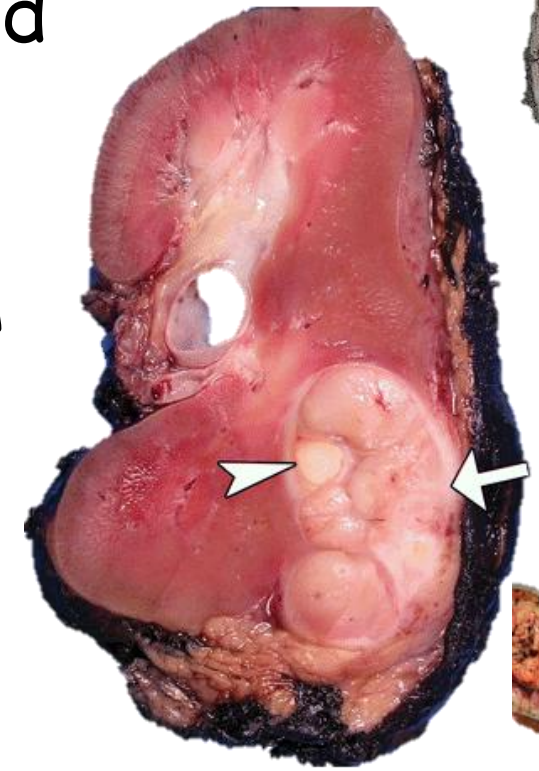
Spread:

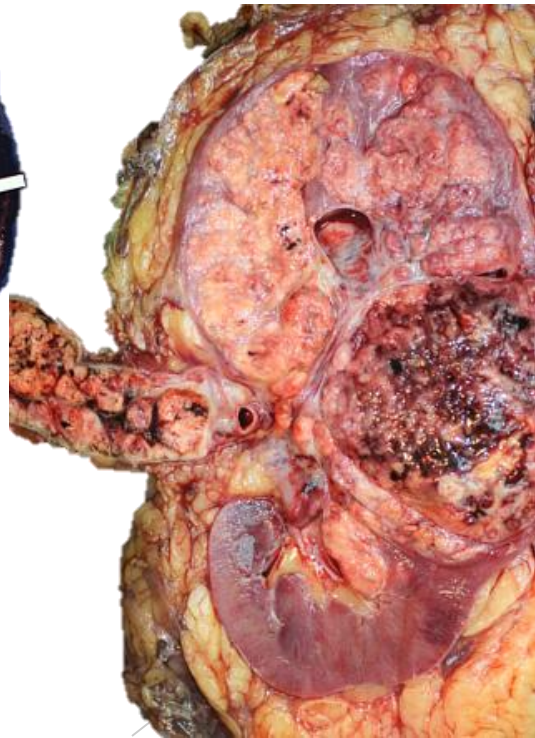
Local: To the renal pelvis, capsule and surrounding tissue.

Blood: The cells frequently form thrombus-like masses into renal vein tributaries and inferior vena cava.

Lymphatics: To the lumber and para aortic lymph nodes.







Malignant Renal Tumors

Nephroblastoma (Wilm's tumor)

Origin: Nephrogenic rests (persisting immature kidney cells).

Presence of nephrogenic rests in kidney may lead to development of Wilm's tumor

Epidemiology: Age; 2-10 years.

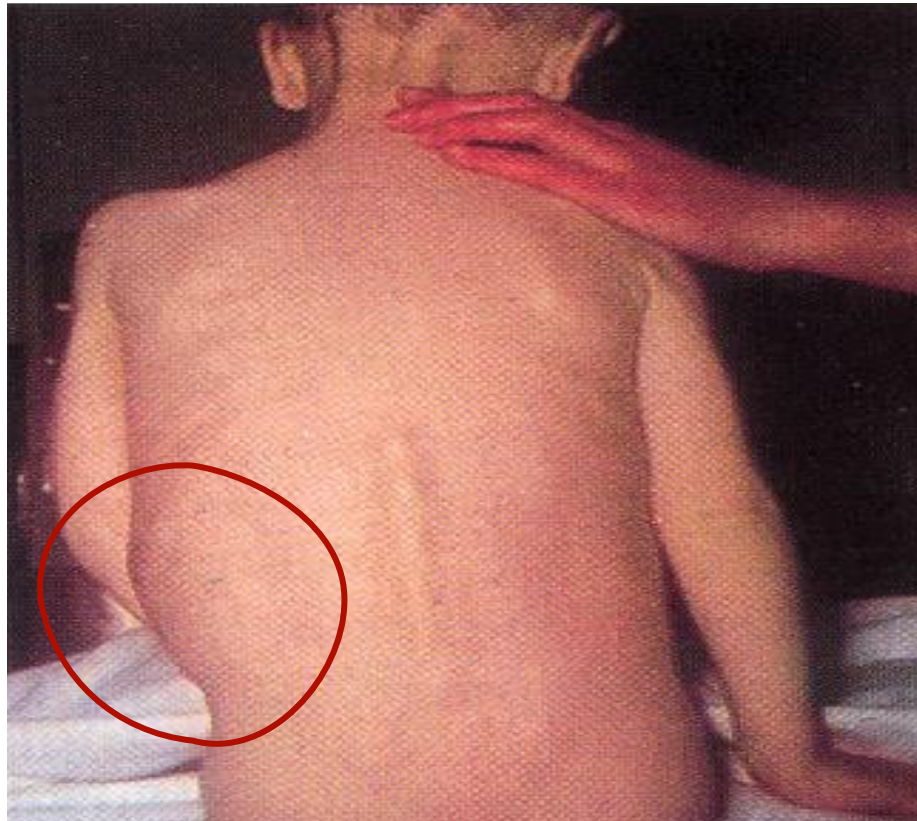
The most common primary abdominal tumor in children

Clinically:

*Abdominal mass

*Delayed growth (fails to thrive)

*Hypertension



Malignant Renal Tumors

Nephroblastoma (Wilm's tumor)

N/E: -May be bilateral.

-Remains enclosed within the kidney capsule

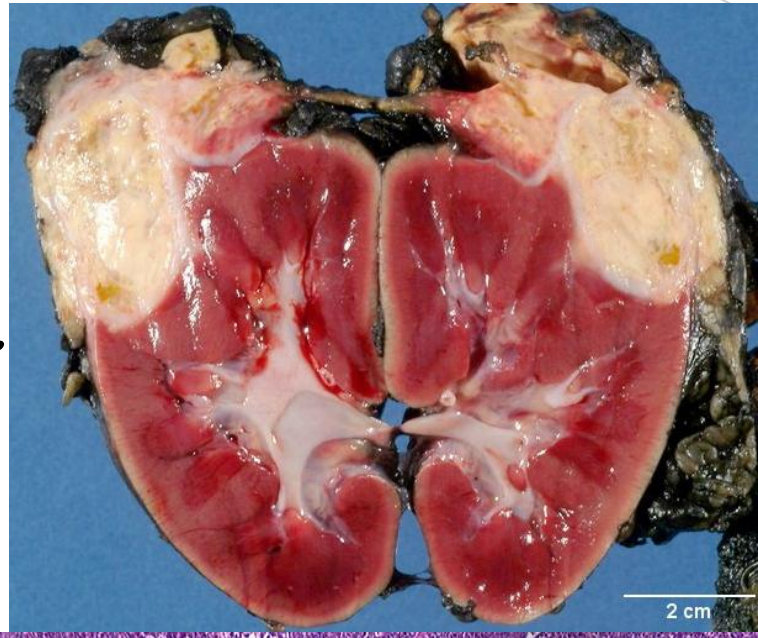
-Soft and fleshy.

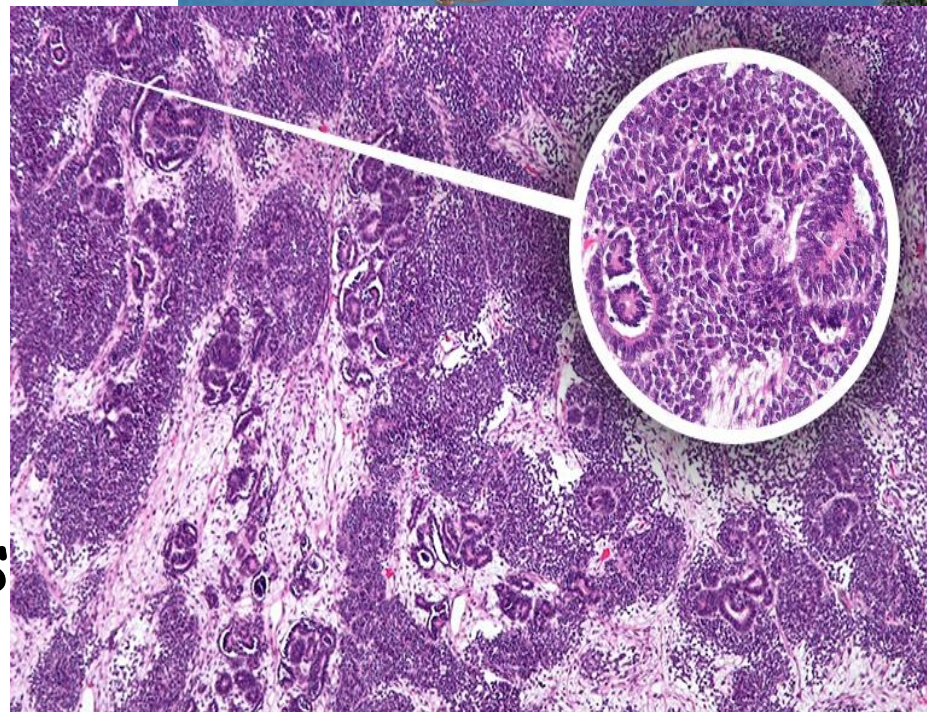
-Cut surface is homogeneous grey

M/E: Composed of

-Embryonal or blastemal Cells: Short, spindle or rounded dark cells with focal stromal (mesenchymal) differentiation to fibrous, muscles, cartilage….

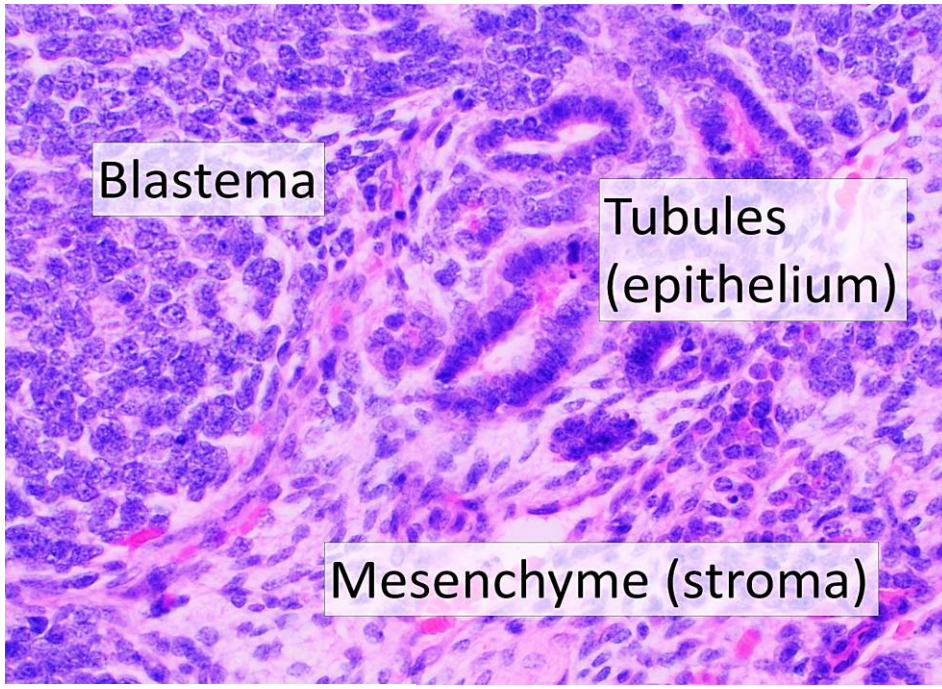
-Carcinomatous (epithelial)elements: Acini, imperfect tubules and glomerulus like structures.





Malignant Renal Tumors

Nephroblastoma (Wilm's tumor)

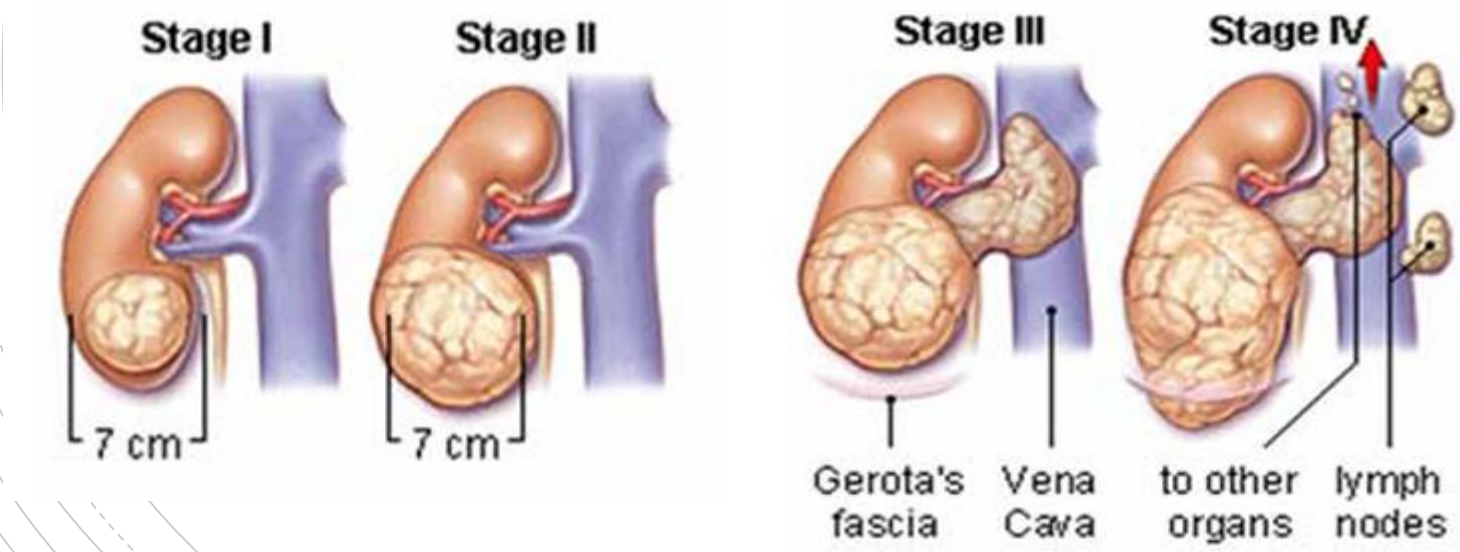


Spread:

*Local: To the capsule and surrounding tissues

*Lymphatics: To the lumbar and para aortic lymph nodes.

*Blood: Rapid spread.



Now,
can you answer the following?

Hypernephroma:

a. A tumour of childhood,
b. Tumour originates from embryonal rests.
c. The tumour can have a sarcomatoid pattern,
d. Clear cell pattern is common.

Tumors of the urinary bladder

Benign tumors

1. Epithelial Transitional cell papilloma.
2. Non epithelial: Leiomyoma, fibroma, lipoma, hemangioma.

Malignant tumors:

1- Transitional cell carcinoma
2. Squamous cell carcinoma
3- Adenocarcinoma
4- Anaplastic carcinoma.

Urinary Bladder Carcinoma

Origin: Bladder epithelium.
Age: >50 years.
Predisposing Factors:
1- Urinary Bilharziasis
2- Villous papilloma
3- Workers in some industries as aniline dyes, rubber and benzidine.
4- Cigarette smoking
5- Prolonged high doses of analgesics.
Clinically:
Gross painless hematuria

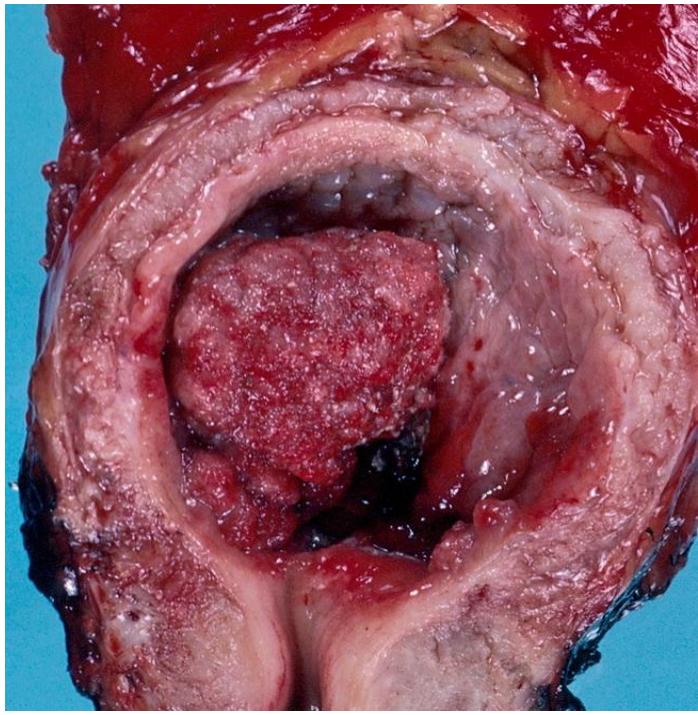
Urinary Bladder Carcinoma

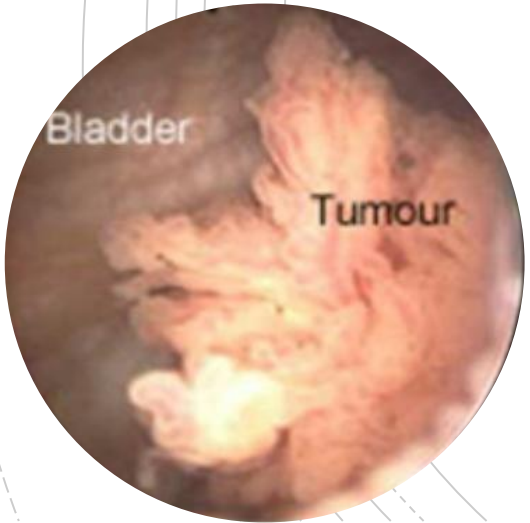
N/E:

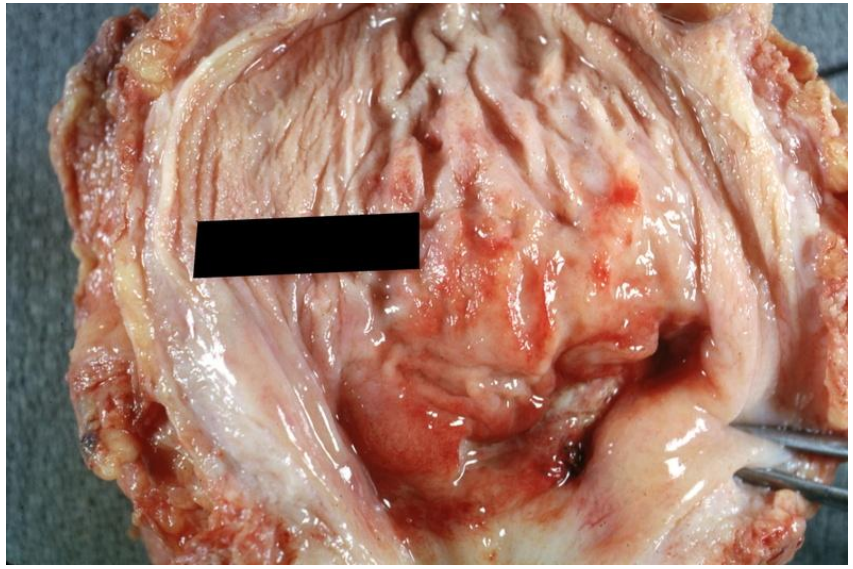
It could be

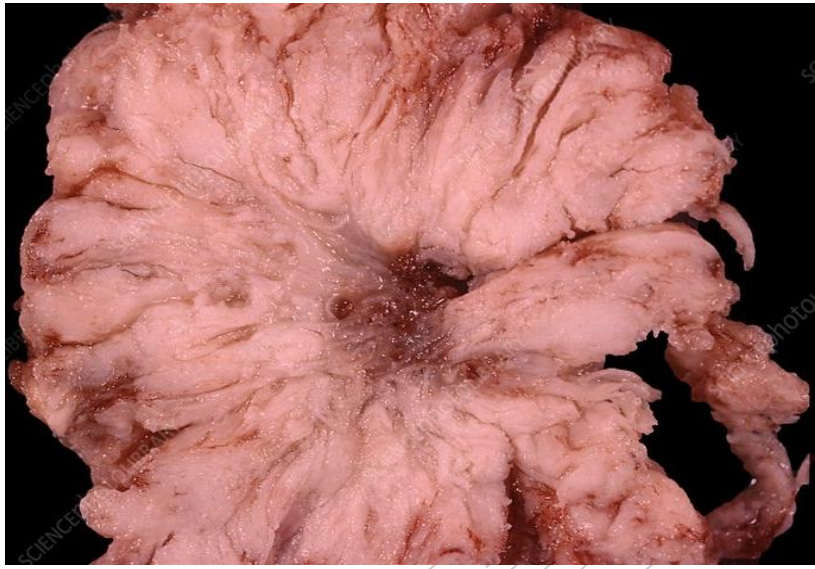
Fungating mass or malignant ulcer or diffuse infiltrating tumor

-Transitional cell carcinoma may have a papillary villous pattern.









Urinary Bladder Carcinoma

M/E:

Histopathologic patterns

1- Transitional cell carcinoma:

It could be

Transitional cell carcinoma in situ: Replacement of normal urothelium by highly atypical cells having the criteria of malignancy. No invasion of the basement membrane.

Papillary transitional cell carcinoma: Arranged in papillae with thin vascular cores not infiltrating the muscles or subepithelial tissue.

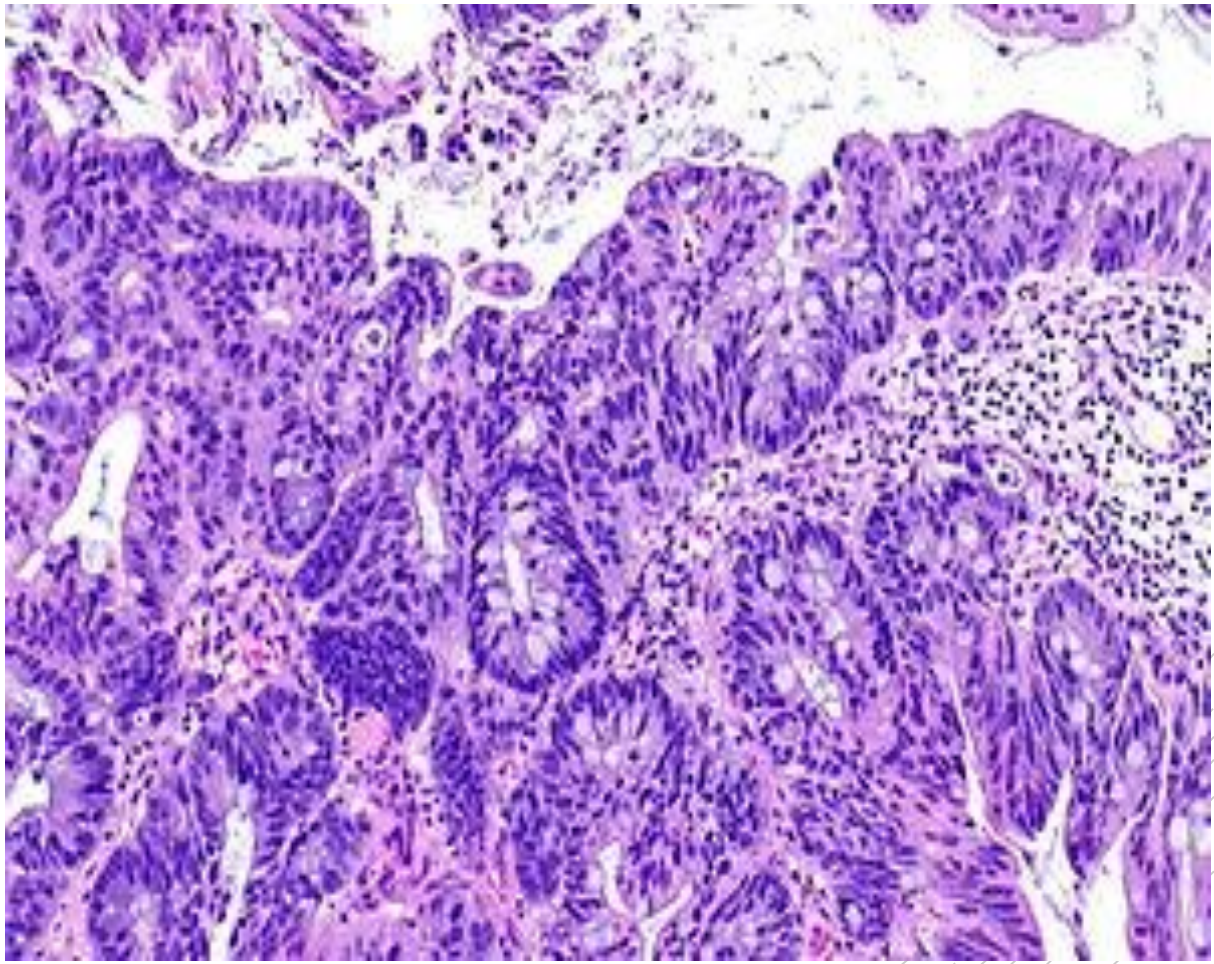
Infiltrating transitional cell carcinoma: Solid sheets infiltrating the subepithelial tissue with or without invasion of the muscles.

Urinary Bladder Carcinoma
M/E:
Histopathologic patterns

3.Adenocarcinoma:

It arises on top of glandular metaplasia or remnants of urachus at the apex of urinary bladder.

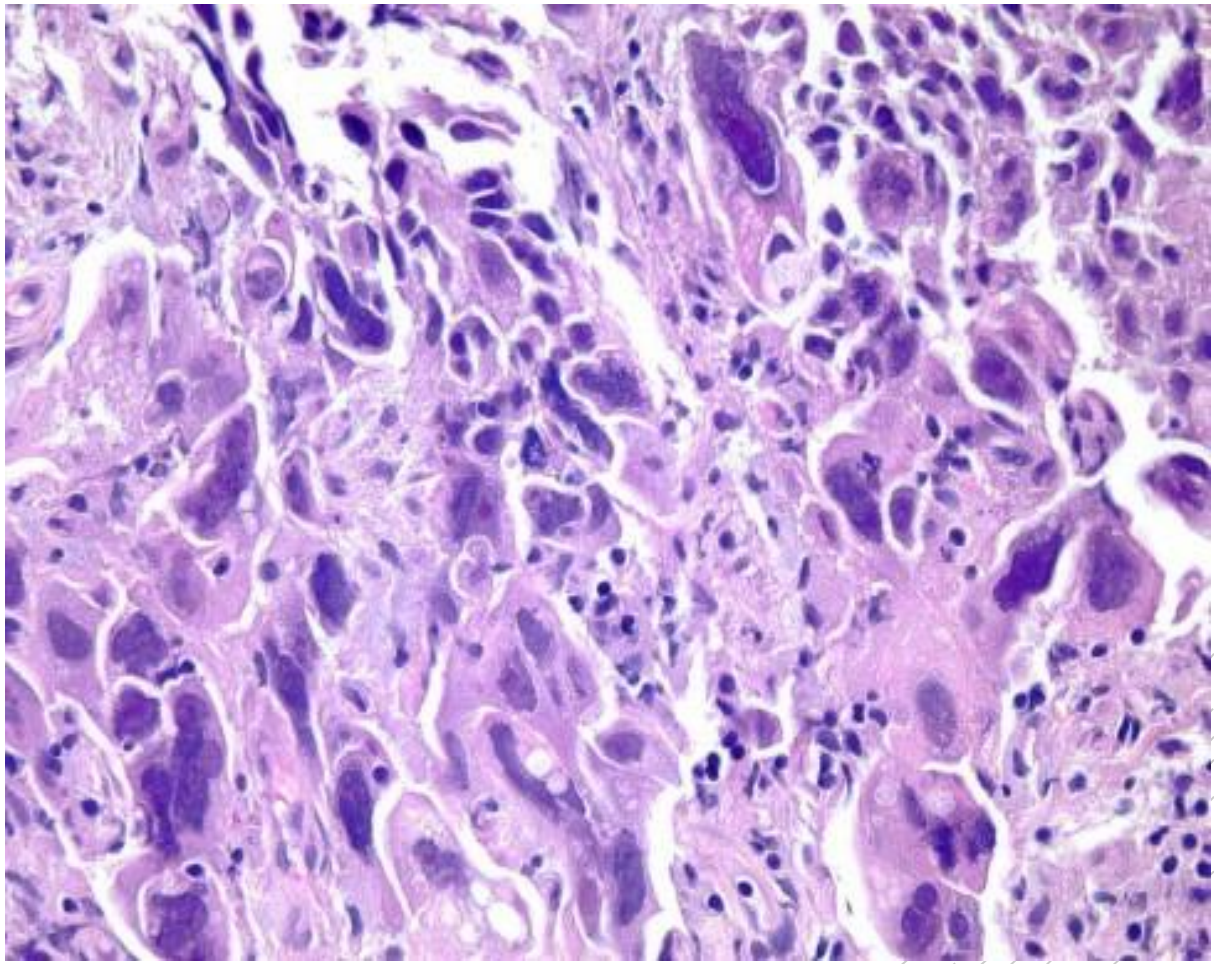
Malignant Glands in different grades of differentiation forming irregular glands sheets infiltrating the subepithelial tissue and surrounded by a fibrous stroma.



Urinary Bladder Carcinoma
M/E:
Histopathologic patterns

4. Anaplastic carcinoma:

Tumour cells Lose any pattern of differentiation



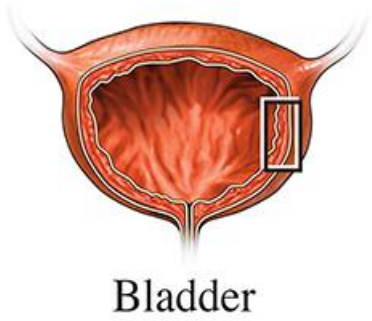
Urinary Bladder Carcinoma

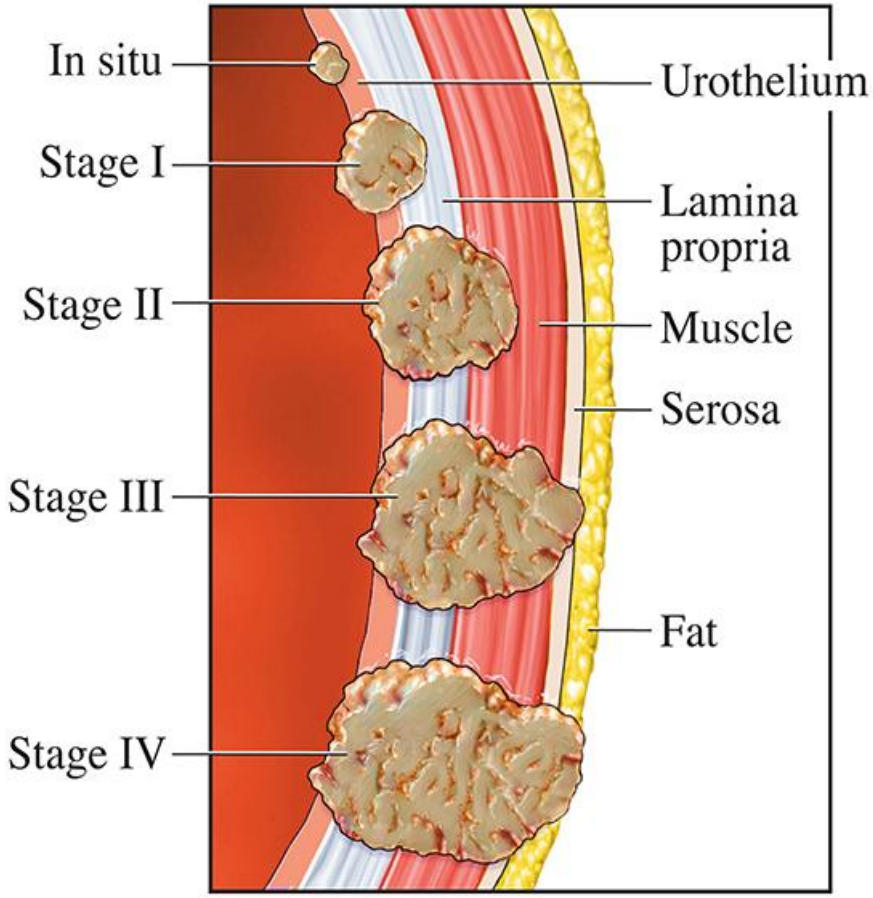
Spread of bladder carcinoma:

*Local: To the wall of bladder and surroundings

*Lymphatic: To pelvic lymph nodes.

*Blood: By the systemic circulation to the lungs then bones and other organs.





Urinary Bladder Carcinoma

Bilharziasis & bladder carcinoma

Common in Egypt. Males are affected more than females.
At younger age.
M/E: squamous cell carcinoma mainly and to lesser extent adenocarcinoma.
Pathogenesis: Chronic bilharzial cystitis → squamous and glandular metaplasia and predisposes to Gm-ve cystitis.
Bacteria break down dietary nitrites and nitrates secreted in urine forming the carcinogenic material nitrosamines which acts as initiator of carcinoma.


Thank you