



# OneShot 4.0 **Pathology**



# PATHOLOGY

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“

**Today is your  
opportunity to  
build the tomorrow  
you want**

**- Dr. Praveen Kumar Gupta**

”



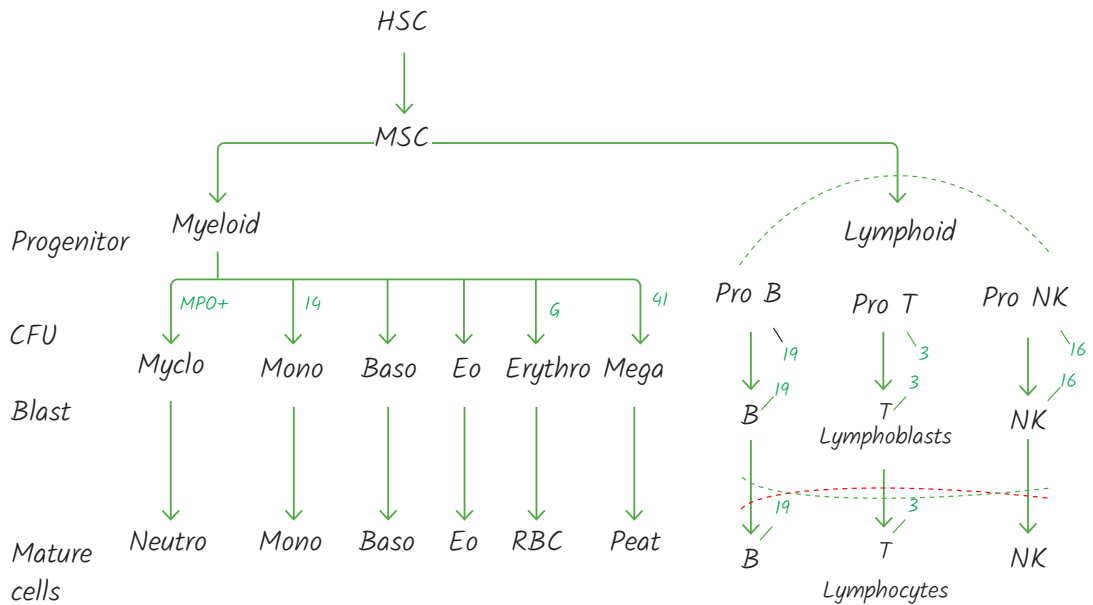
# HEMATOLOGY

## I. LEUKEMIA & LYMPHOMA

- CD markers
  - Immature Cells - CD 34
  - HSC - CD 34, HLADR
  - Lymphoblast- CD 34, TDT terminal deoxy transferases
- Mature WBC- CD 45
- Myeloid - MPO, CD 13, 33, 117

### Lymphoid Cells

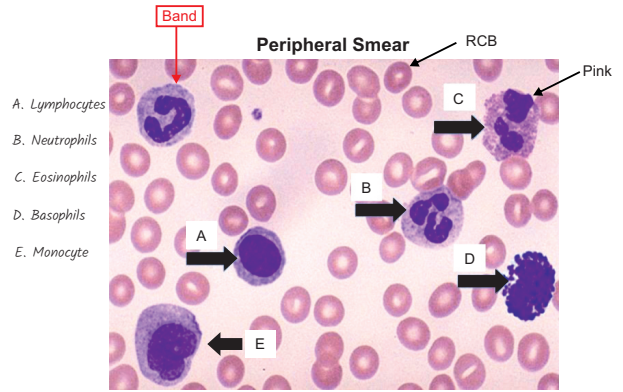
- B cells- CD 19, 20, 21, 22, 23, 24, 10, 79, PAX 5
- T cells - CD 3, 1, 2, 3, 4, 5, 6, 7, 8
- NK cells - CD 16, 56, 94
- Monocytes - CD 14, 64
- RBC- Glycophorin
- Platelets - CD 41, 42, 61



WHO 2022 AML

1. AML  $\bar{e}$  defining genetic mutation:

- a. AML irrespective of Blast %
  - b. t RUNX, RUNXTI (8,21) - M2
  - c. t PML, RARA (15,17) - M3
  - d. t CFBF, MYH (16,16) OR Inv 16 (↑EOSINOPHILS) - M4
- } Good prognosis



2. AML myelodysplasia related *poor prognosis*

3. AML therapy related *poor prognosis*

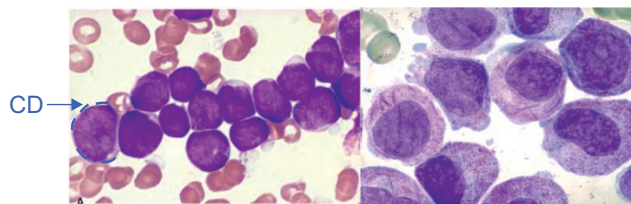
4. AML  $\bar{e}$  2-myeloid neoplasm:

CML in Blast Crisis (>20%)

5. AML  $\bar{e}$  germ line mut *good prognosis*

Trisomy chr 21 (down syndrome) Transient - M7

6. Acute leukemia of ambiguous lineage



7. AML defined by differentiation old classification (Nos)

M0 without differentiation *Poor prognosis*

M1 with differentiation without maturation

M2 maturation *Best prognosis chloroma*

M3 Ac Promyelocytic leukemia

M4 Ac. myelomonocytic

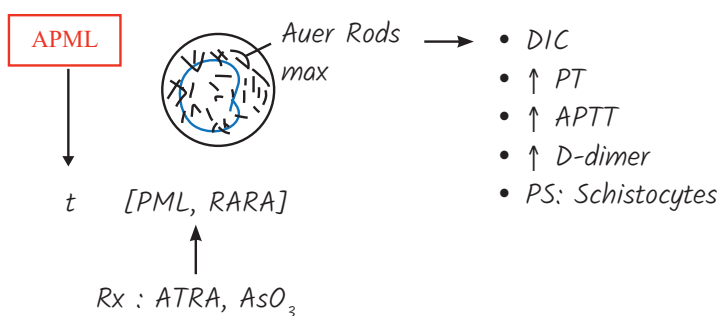
M5 Ac. monoblastic

M6 Ac. erythroblastic (*Down Syndrome*)

M7 Ac. megakaryoblastic

*M6/M7: BM fibrosis*

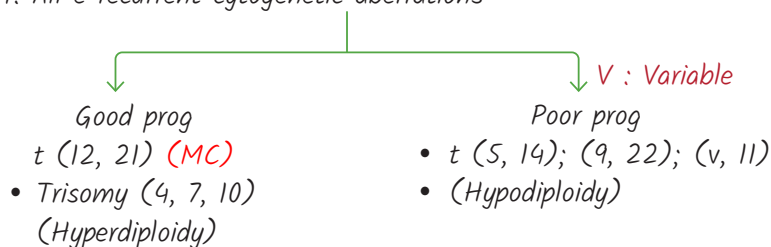




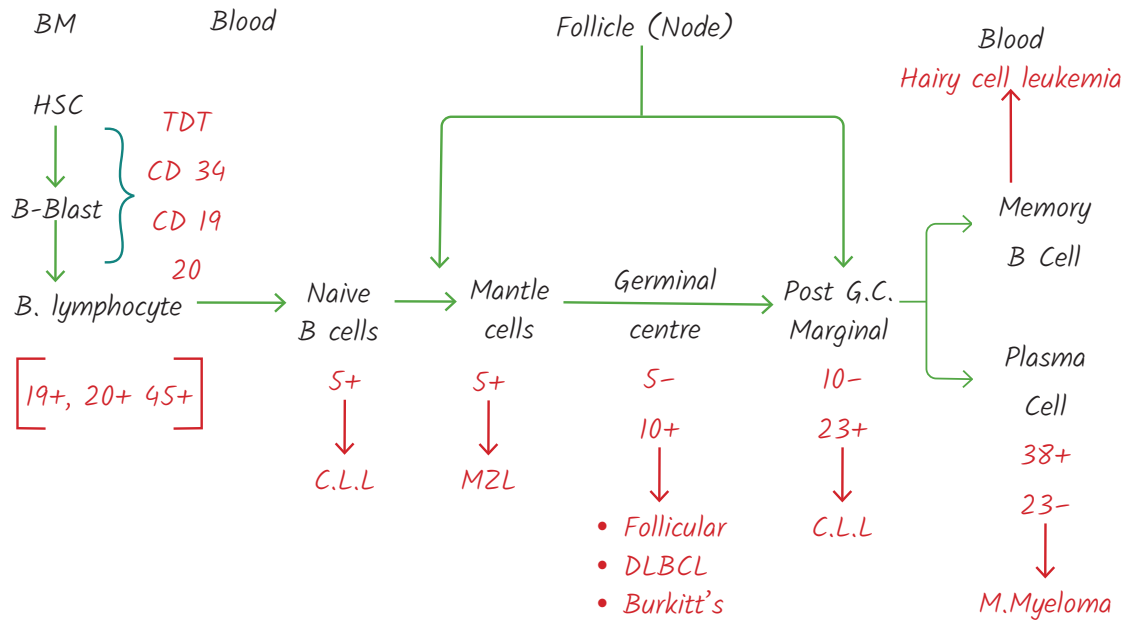
### ALL : Acute Lymphoblastic Leukemia

New : WHO 2022

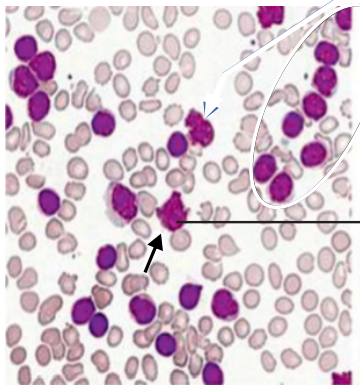
1. All  $\bar{e}$  recurrent cytogenetic aberrations



ALL WHO 2022	PROGNOSIS	
	FAVORABLE	UNFAV
Age	2-9Yr	<1yr, >10yr
Gender	F	M
TLC	<50,000	>50,000
FAB	L1	L3
WHO	t(12,21)	t (5,14) ; (9,22); (v,11)
	Hyperdiploidy, Trisomy	Hypodiploidy
Response to Rx	<7d	>28d



**CLL**

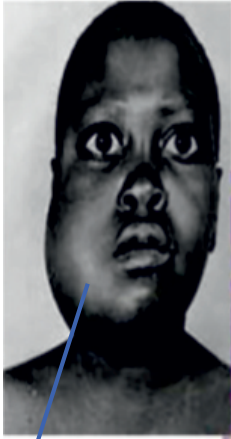


**Smudge Cells**

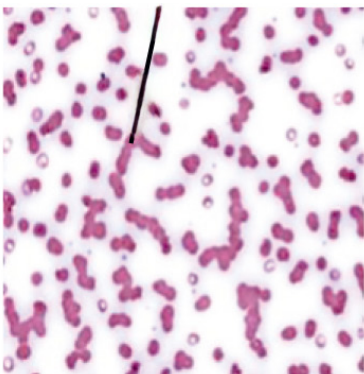
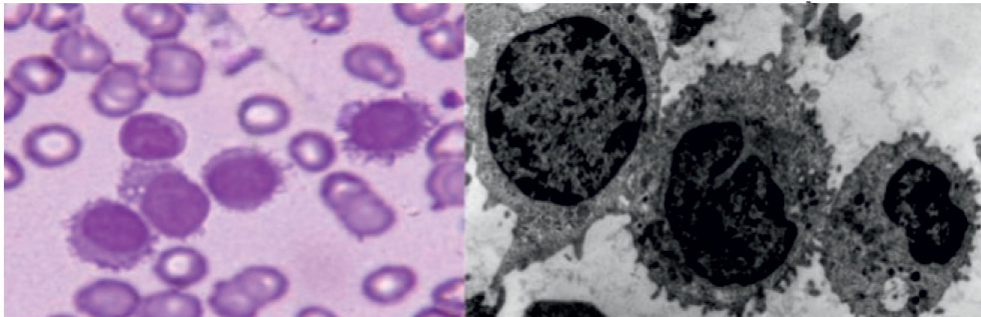
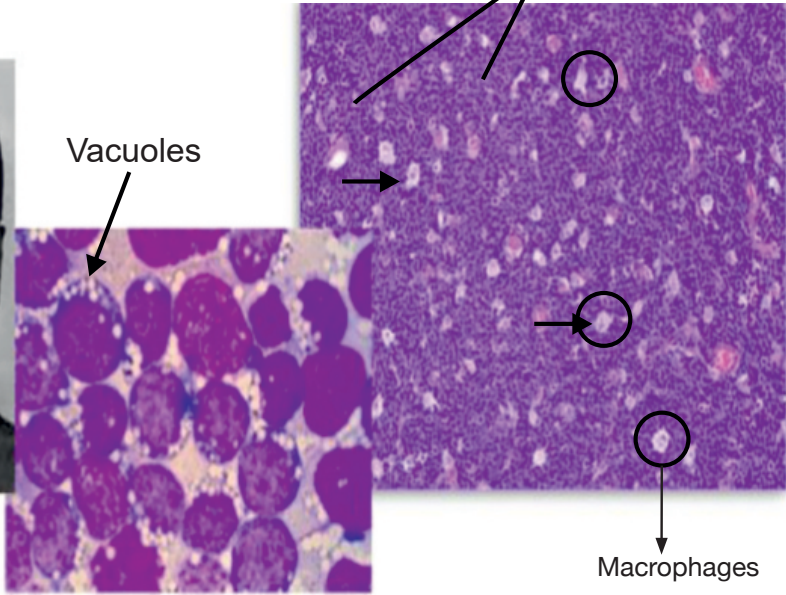


### Burkit Lymphoma

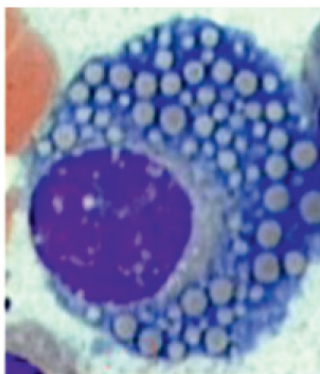
EBV+



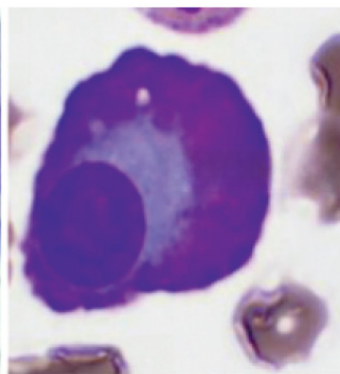
- Mandible affected
- Seen in Africans

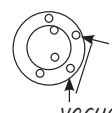

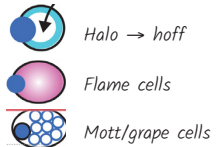


Rouleaux



Mott cells

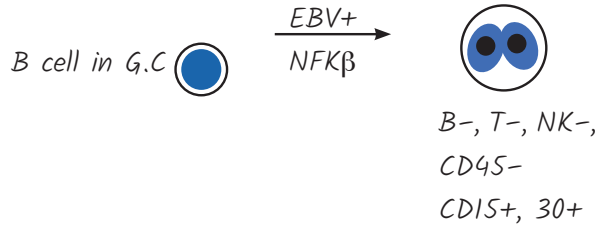


Lymphoma	Mut	CD [19,20,45+]	Morphology
1. CLL/SLL	Chr 13q deletion	S+ 23+	PS: Convent girl app appearance (Hallmark) Smudge cell L.N: pseudo follicular architecture
2. Mantle	(Anti apoptotic) BLL-1+(11) Cyclin D1 t(11,14) SOX 11+ve	S+	Mantle zone Proliferation
3. Follicular	Bcl-2+(18) t(14,18)	10+	True Follicular pattern
(mc:India) 4. DLBCL EBV+ HIV +/-	BCL6+ (3) t(3,14)	10+	Diffuse effacement of L.N by med.large lymphocytes
5. Burkitt EBV++ HIV +/-	C-MYC (8) t(8,14)(2,8) (8,22)	10+ Surface IgM +ve	BM Tumor by starry sky  vacuoles
6. Marginal lymphoma	BCL-10(1) t(1,14) t(11,18)	-	Maltoma <ul style="list-style-type: none"> <li>Chlamydia - ocular</li> <li>H. pylori - gastric</li> <li>Borrelia - skin</li> <li>Sjogren's → Lacrimal → Salivary</li> <li>Hashimoto thyroiditis</li> </ul>
7. Hairy cell leukemia	BRAF	11C, 25, 103, FMC-7, stain: TRAP, annexin A1 DBA44	 BMAP / BX: fried egg appearance
8. Plasma Cell myeloma Rx: Bortezomib (Proteasome) (Inhibitors)	Chr 13qdel 14qdel 11, 14; 4, 14 14,16,14,20	38+ 138+	 Halo → hoff Flame cells Mott/grape cells Inclusions Dutcher bodies Nuclear Cytoplasmic (Eosinophilic) Russel bodies






Hodgkins

Reed Sternburg Cells

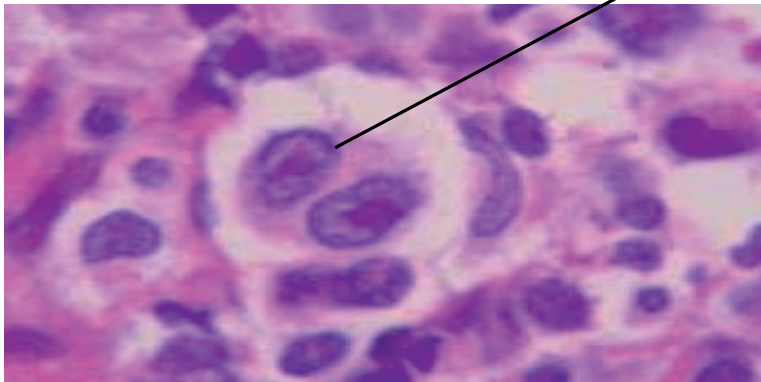


Classical		Non classical
+	CD15	-
+	30	-
-	20	+
+	EBV	-
+/-	BCL6	+/-

<p>1. Mixed Cellularity :</p> <ul style="list-style-type: none"> <li>M/C in India</li> <li>M/C in HIV affected</li> </ul> <p> Mono nuclear</p> <p>2. Nodular Sclerosis M/C in the world</p> <p> Lacunar cell</p> <p>3. Lymphocyte rich</p> <p>4. Lymphocyte depleted</p> <ul style="list-style-type: none"> <li>Seen in HIV only</li> <li>Worst prognosis</li> </ul>	<p>1. Nodular lymphocyte Predominant H.L</p> <ul style="list-style-type: none"> <li>Popcorn cells (L&amp;H)</li> <li>Rare</li> <li>Best prognosis</li> <li>EBV (-)</li> </ul> <p></p>
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**Hodgkins Lymphoma**

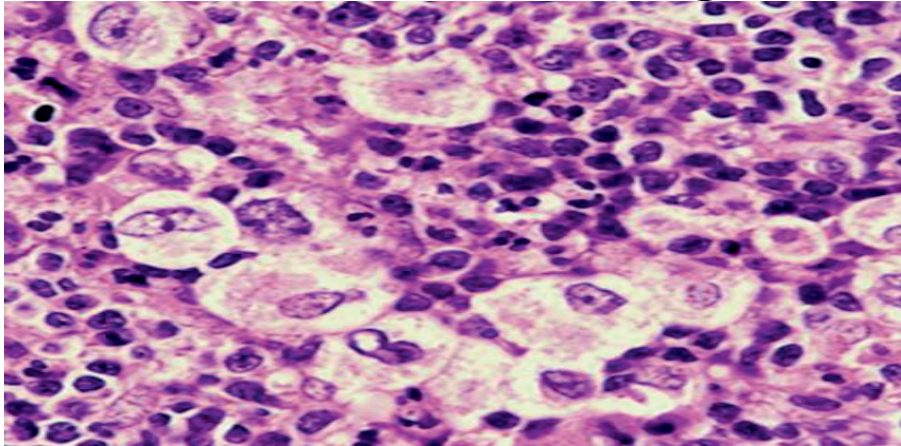
**Reed Sternburg cell**





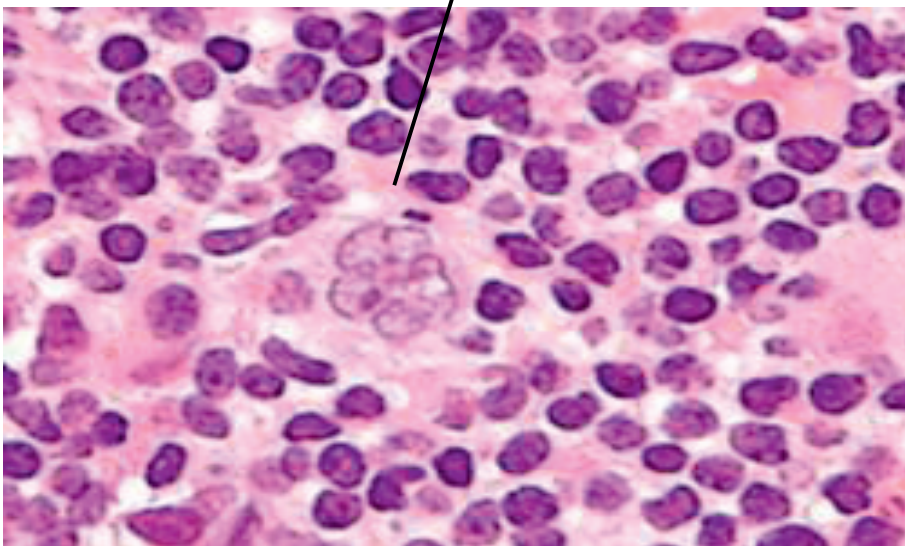
Lacunar cells

(NS)



Popcorn Cells

L&H:



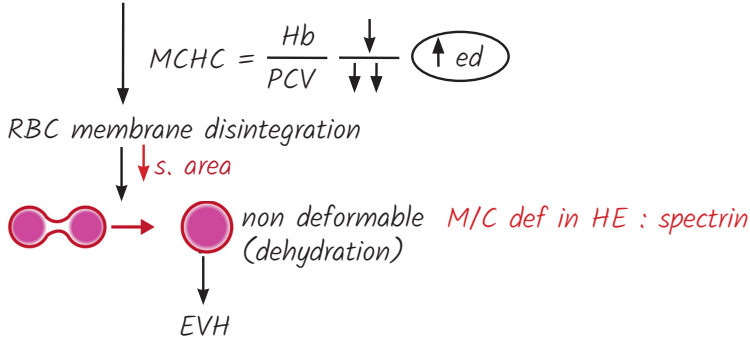
- Rx A - Adriamycin
- B - Bleomycin
- V - Vinblastine
- D - Dacarbazine



## 2. RBC & ANEMIA

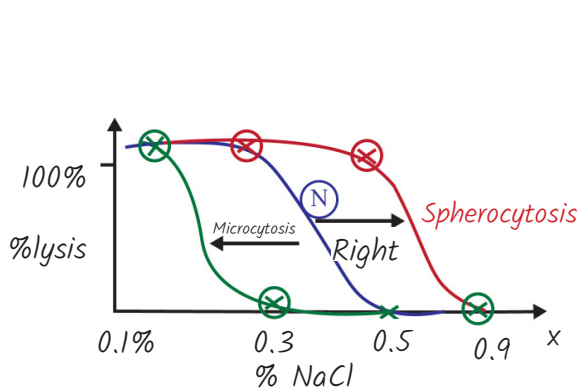
### 1. Hereditary Spherocytosis

- AD
- Mutation : (MC) Ankyrin > Band 3 > spectrin *max hemolysis*



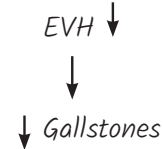
Confirmatory test :

- OFT
- EMA : Eosin S-mandellic acid → Binds to Band - 3

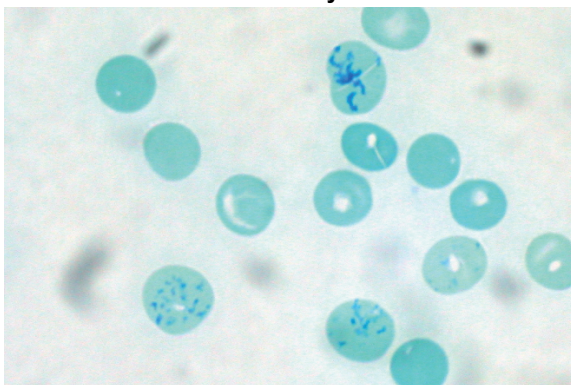


- Rx : • Folic acid  
• BTX

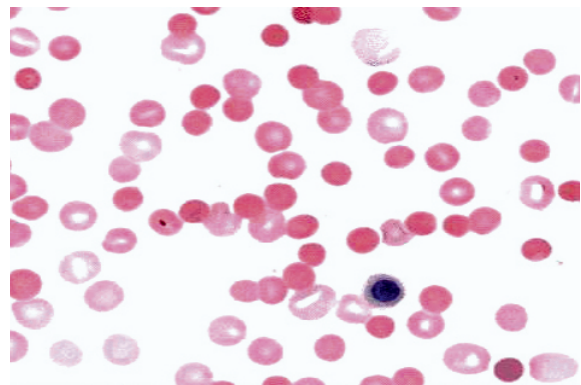
- Elective splenectomy



**Reticulocyte**



**Spherocyte**

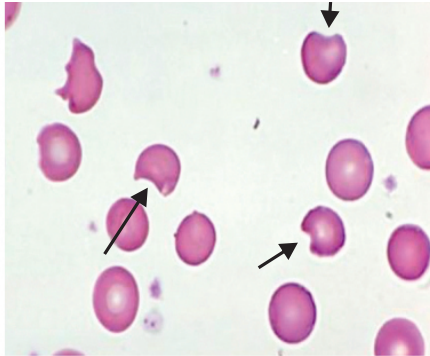


Supravital stain :

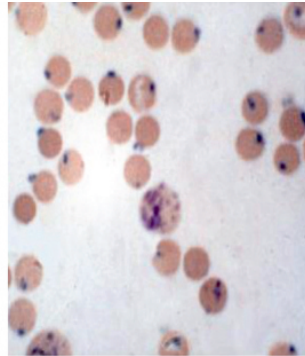
- New methylene blue
- Brilliant cresyl blue

2. G6PD Def

**Bite Cells (Keratocytes)**



**Heinz bodies.**

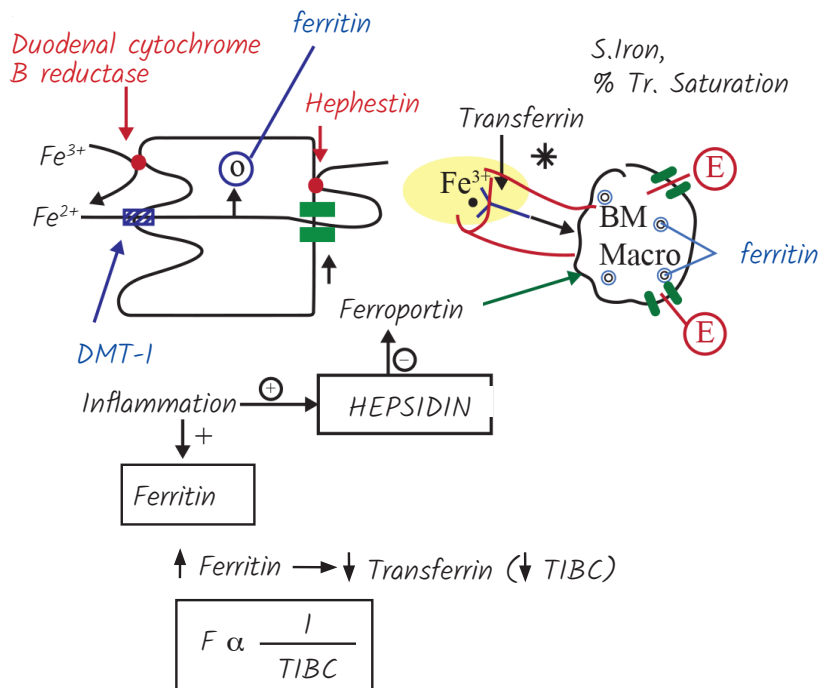


**Episodic hemolysis**

1. Fava Beans
2. Injections
3. Drugs :  
Primaquine, Sulfa,  
Fluoroquinolones,  
Dapsone, Vit K

3. Iron Deficiency Anemia

Duodenum :

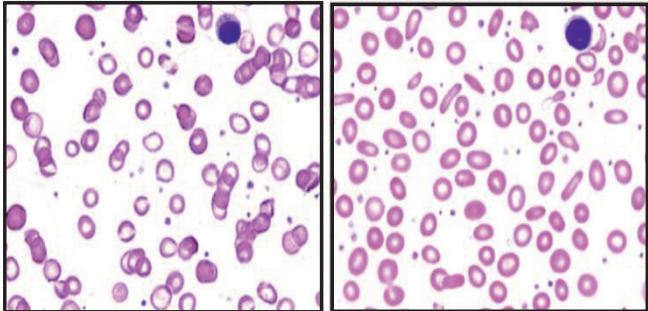




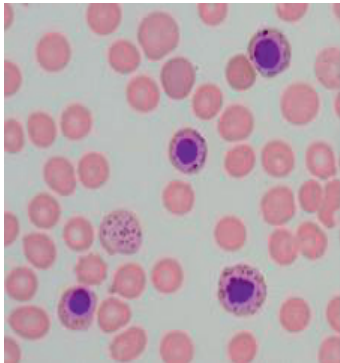
S-Iron studies

Test	IDA	Iron overload SA	ACD
S.Iron			
S Ferritin			
%Tr.Sat			
TIBC			

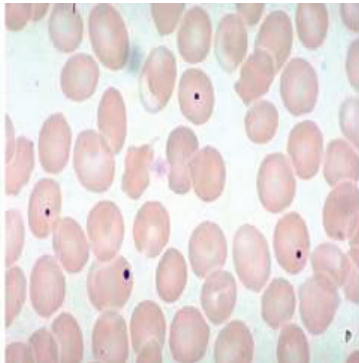
Severe Hypochromia : Iron Deficiency Anemia



Basophilic Stippling



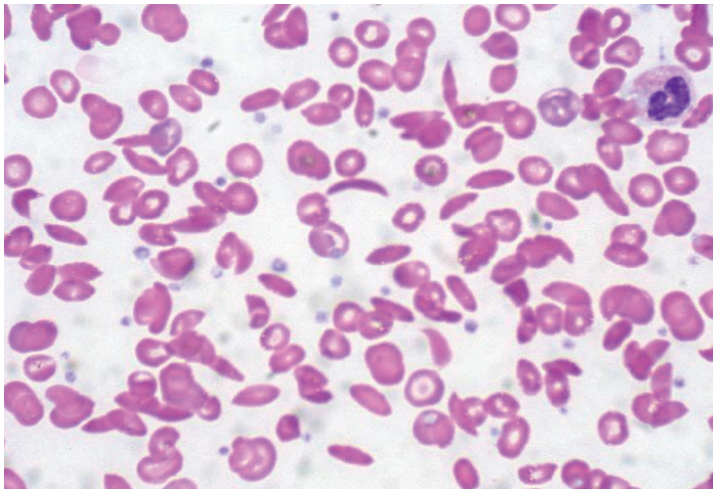
Howell Jolly Bodies



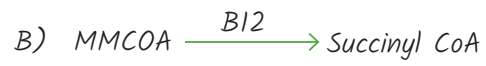
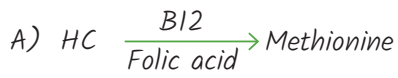
Nuclear remnant

- 1. Megaloblastic
- 2. S Hemolytic
- 3. Post splenectomy

Sickle Cells



**Megaloblastic Anemia**

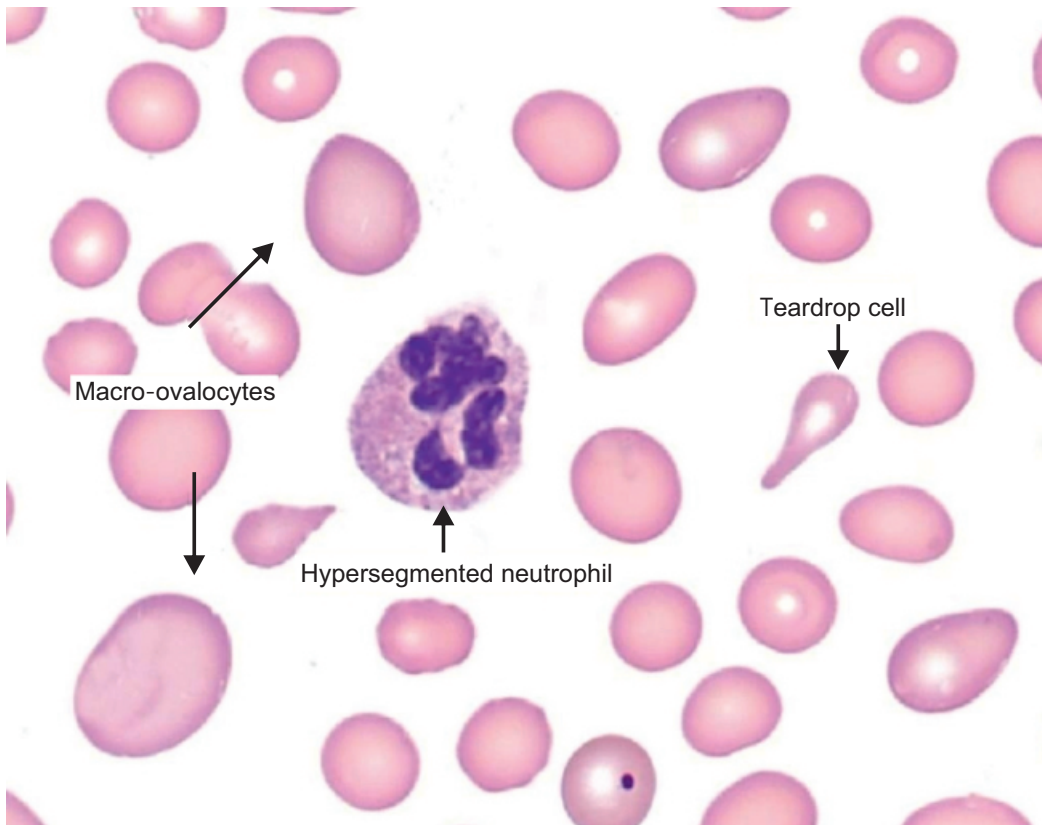


**Only Folic Acid**

- Neurological deficits : Worsen
- Anemia : Improve

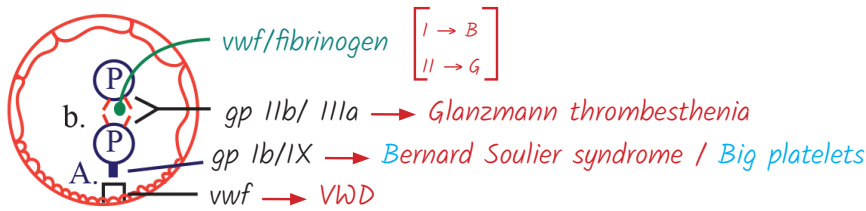
Source : B12	Folic
Non veg	Green leafy veg + fruits
Def : Veg	Junk food diet
Abs : Stomach, Duodenum Ileum	Jejunum

**Macrocytic Anemia**





### 3. BLEEDING & COAGULATION



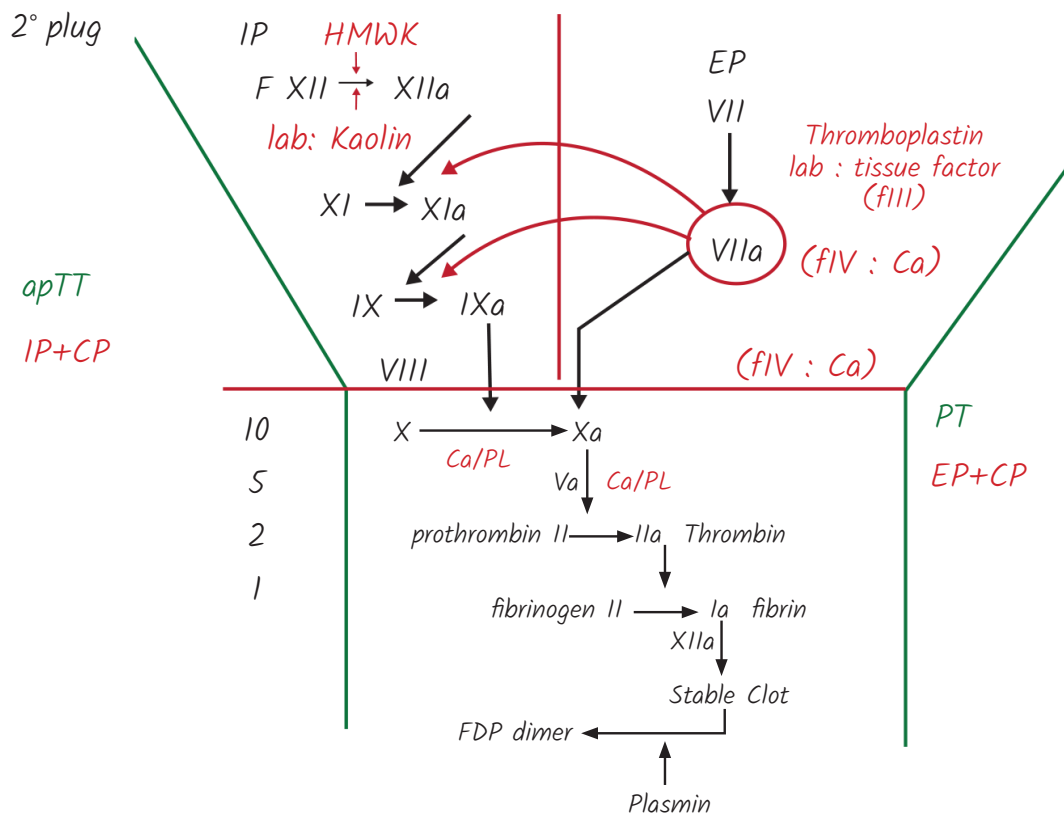
1° plug :

- a. adhesion
- b. Aggregation

Defect :

Clinical features:

- Petechiae 1-3 mm
- Purpura 3-10 mm
- Ecchymosis >1cm



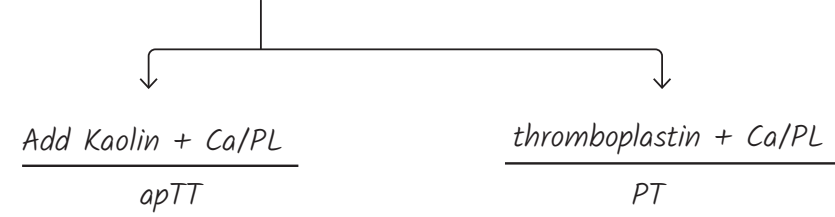
XIII def : Severe umbilical bleeds ; Diag : Clot Stabilization test  
 PT (n), aPTT (n)



Pathology

Coagulation Test :

Sample: Platelet poor plasma

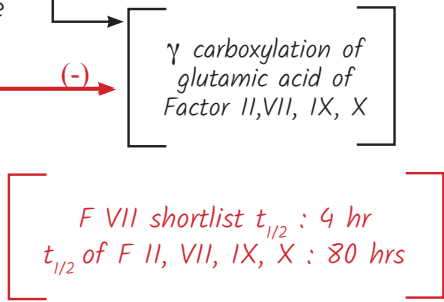
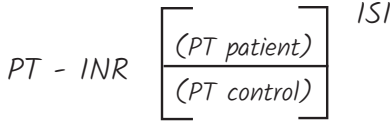


Case 1: ↑ PT → FVII Deficiency, vit k deficiency

Ⓝ ↑ aPTT

Warfarin dose

Case 1: PT



Case 2: ↑ aPTT → F XII, XI, IX, VIII Deficiency VWD

Ⓝ PT

VWF (a) adhesions >> aggregation

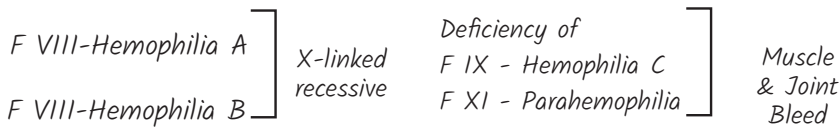
(b) Stabilizes FVIII

} So, deficiency → ↑ aPTT only

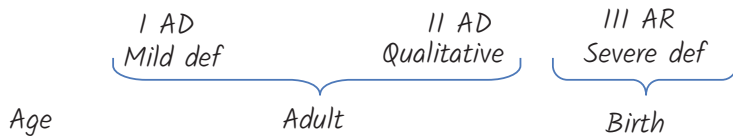
Case 3: ↑ PT → IP + EP defect → DIC

↑ aPTT Common pathway defect: F X, V, II, I Deficiency

Deficiency



VWD : Most common





## 4. BLOOD TRANSFUSION

### Blood Banking

Q	Components	Use	Storage	
			Temp	Time
1	PRBC	Anemia	2-6°C	21/35/42 days
2	FFP	<ul style="list-style-type: none"> <li>DIC</li> <li>Hemophilia A/B</li> </ul>	< -30°C	1 yr
3	Cryoprecipitate f 8/vwf+ fibrin	<ul style="list-style-type: none"> <li>Hemophilia A</li> <li>VWD</li> <li>Hypofibrinogenemia</li> </ul>	< -30°C	1 yr
4	Cryo poor plasma (Coag-f8/vwf)	<ul style="list-style-type: none"> <li>Hemophilia B</li> </ul>	< -30°C	1 yr
5	Platelets	Thrombocytopenia	22°C	5 day
6	Washed RBCs	↓ Alloimmunization	2°-6C	1 day

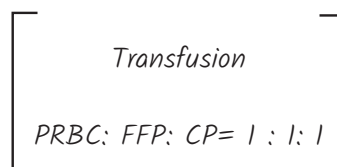
Massive BT : Equal blood volume of pt given in 24 h

or

50% Blood volume in 3 hrs

### Complication :

- Hypothermia
- ↑ K<sup>++</sup>
- Citrate toxicity
  - Hypocalcemia
  - Hypomagnesemia
- Metabolic acidosis > Alkalosis
- Dilutional coagulopathy



### Shelf life

- ACD → 21d
- CPDA → 35d
- CPDA+ → 42d
- SAGM

### Universal Donor :

PRBC → O<sup>-ve</sup> >> O<sup>+ve</sup>

FFP → AB<sup>-ve</sup> >> AB<sup>+ve</sup>

Blood group	Ag	Ab
A	H, A	Anti B
B	H, B	Anti A
AB	H, A, B	-
O	H	Anti A, B
Bombay	hh, oh	Anti A, B, H

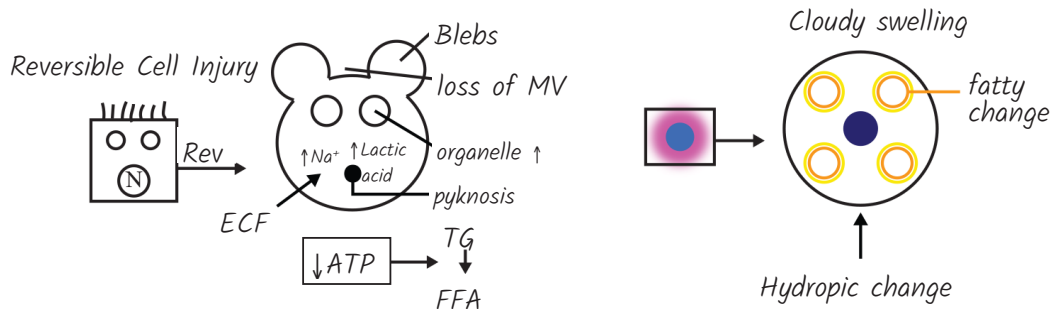


NOTES

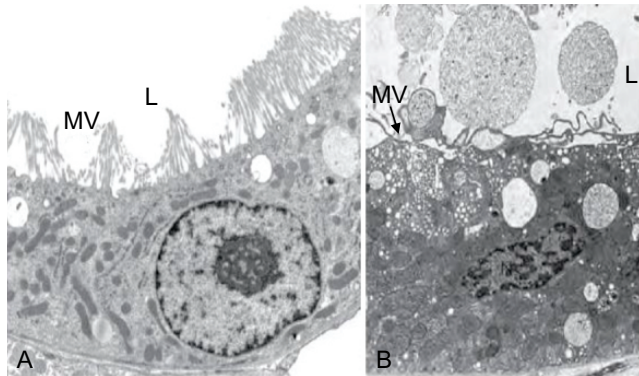


# GENERAL PATHOLOGY

## 5. CELL INJURY



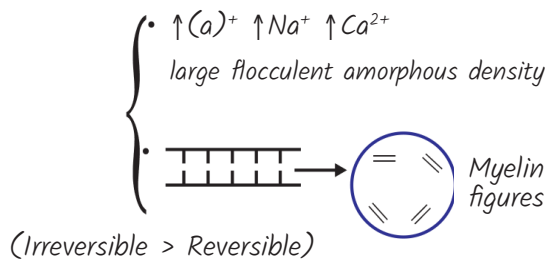
### EM : Normal Cell & Reversible Injury



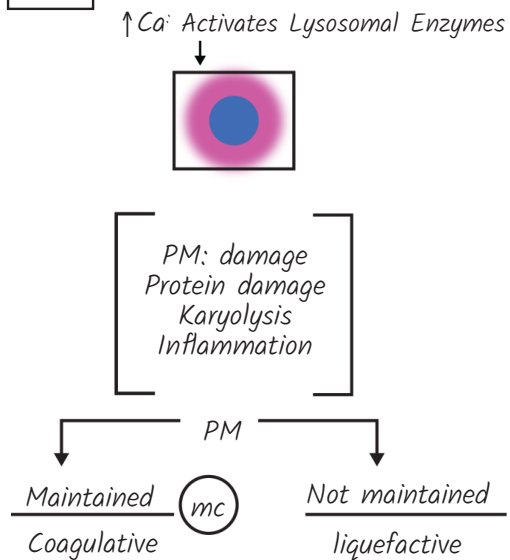
### Irreversible Cell Injury

(a) Necrosis

EM

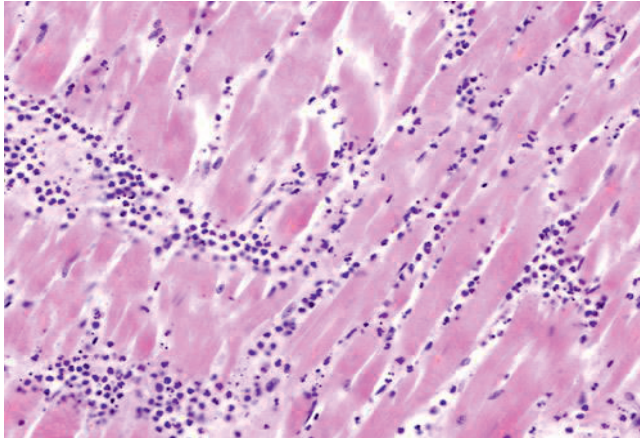


LM

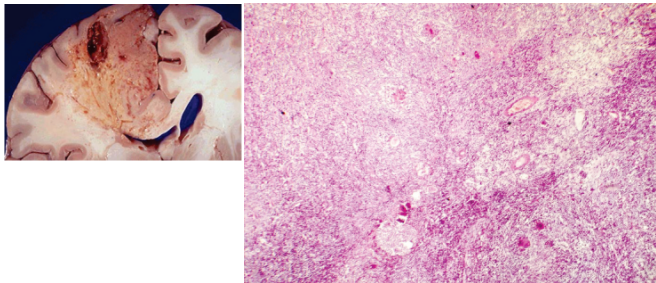




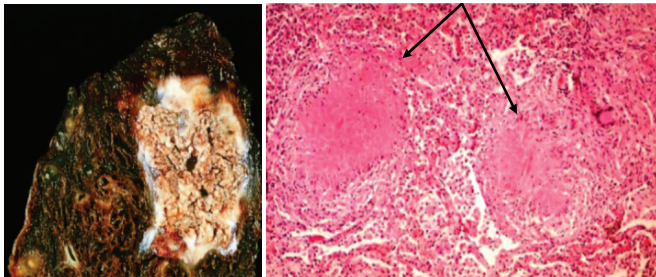
### Coagulative Necrosis Heart



### Liquifactive necrosis in brain

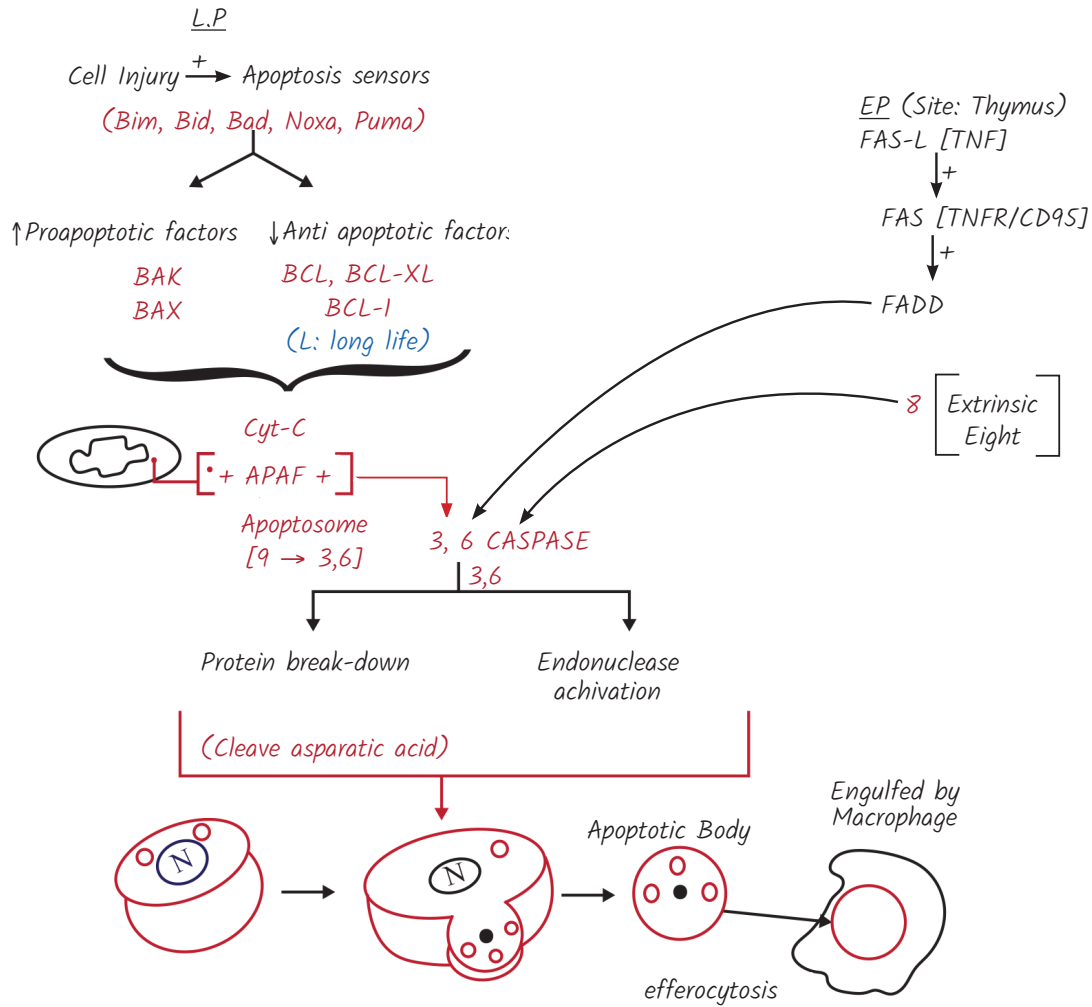


### Caseous Necrosis in Lungs





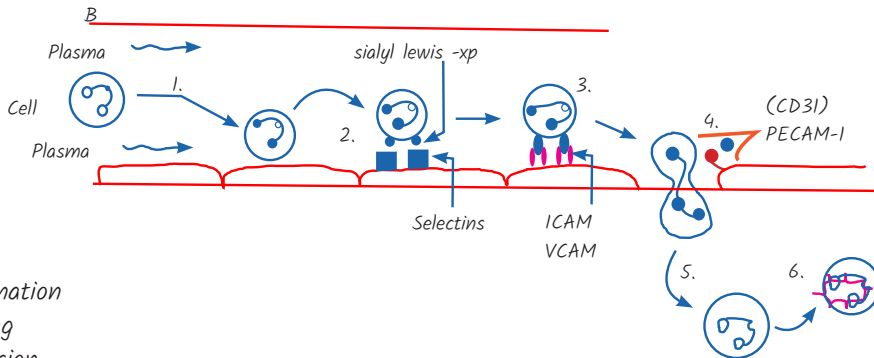
(b) Apoptosis : Mechanism :



Necrosis	Feature	Apoptosis
↑	Size	↓
Damage	Outline	Intact
Lysis	Chromatin	Condensation
(+)	Inflammation	(-)
Lysosomal	Enzyme	Caspase

## 6. INFLAMMATION

### Cellular Events:



1. Margination

2. Rolling

3. Adhesion

4. Transmigration / Diapedesis

5. Chemotaxis:  $CSa$ ,  $(\alpha\alpha)$   
 $LTB_4$  (Before)  
 $IL-8$   
 Bacteria

6. Phagocytosis: Recognition, opsonization

opsonin :

- $C3b$ ,  $C4b$ ,  $CSb$
- $IgG$ ,
- $CRP$
- fibrinogen

engulfment

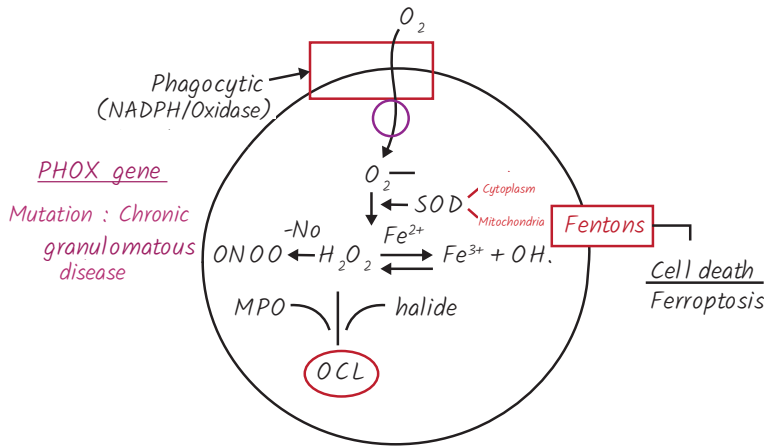
*LYST gene*

*Chediak Higashi Syndrome*

7. Killing

7a.  $O_2$  independent: Lysosomal Enzymes

7b.  $O_2$  dependent :



$OCl \rightarrow$  most efficient Bactericidal Ion

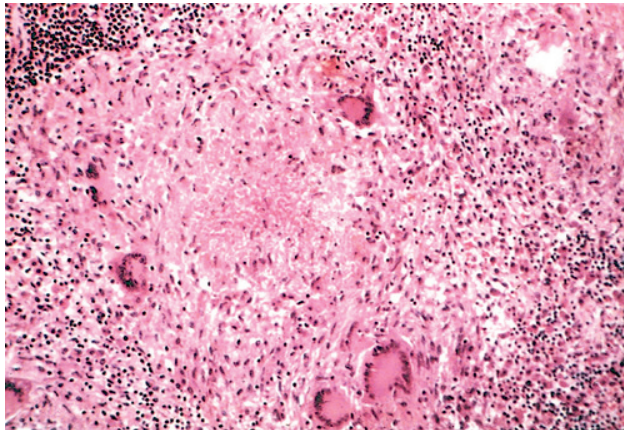
$H_2O_2$ -MPO-halide: most efficient bactericidal System

Cytokine : Acute Inf:  $IL-1$ ,  $TNF-\alpha$   
 $IL-17, 22, 23$

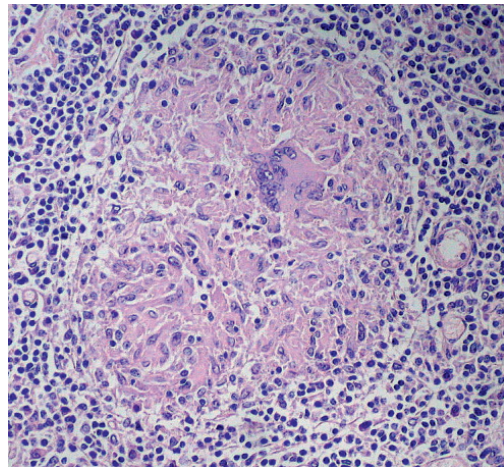
Chronic inf :  $IL-12$ ,  $IFN-\gamma$ ,  $TGF-\beta$   $\rightarrow$  Antinflammation + Repair



**Necrotic granuloma**



**Non Necrotizing Granuloma**







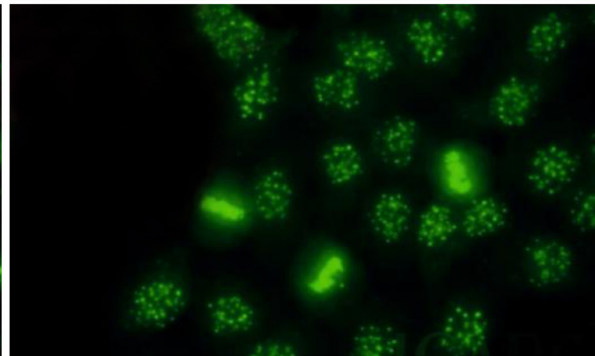
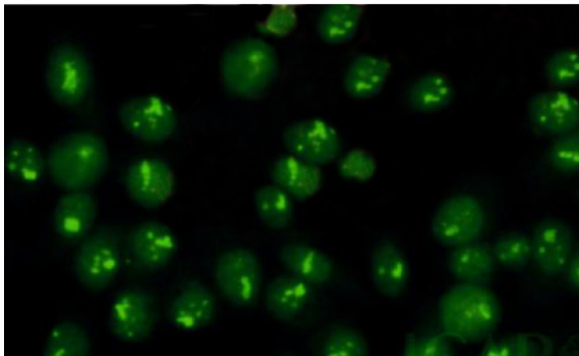
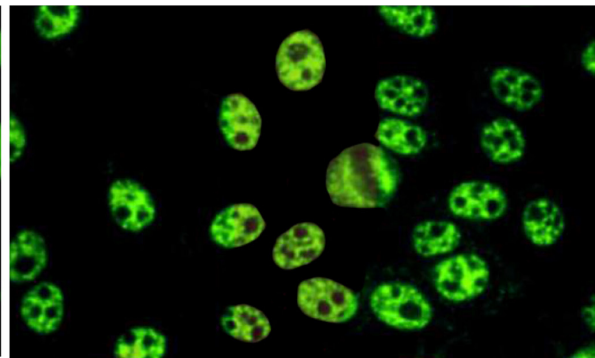
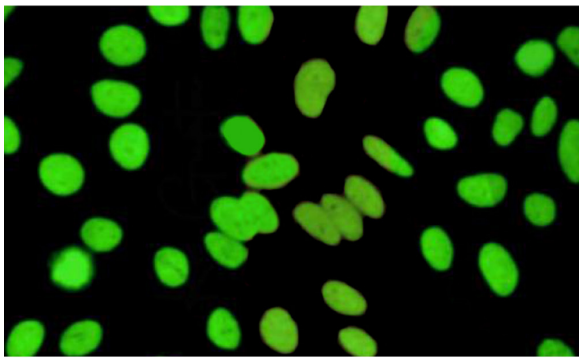
	<b>Keloid</b>	<b>Hypertrophic Scar</b>
Time	>2 month	<2 month
Collagen	I > III	III > I
Recurrence	++	+
Site	Sternum, Pinna, Shoulder	Any where
Colour	Darker	Same as Skin
Rx:	Triamcilonone + Surgical removal	Reassurance

**Keloid & Hypertrophic scar**



## 7. IMMUNE SYSTEM

 Homogenous	 Nucleolar	 Centromere	 Speckled
DNA → SLE Histone Ab → Drug induced SLE	RNA Polymerase Ab → diffuse SSC	Centromere Ab → CREST	Smith Ab → DNA → SLE SS-A(Ro) → SS SS-B (La) → Diffuse Scl-70 Ab → SSC (Topo) U <sub>1</sub> RNP Ab → MCID





### Graft Rejection

Graft :

Auto = Self

Allo = Same species

ISO = Identical twins

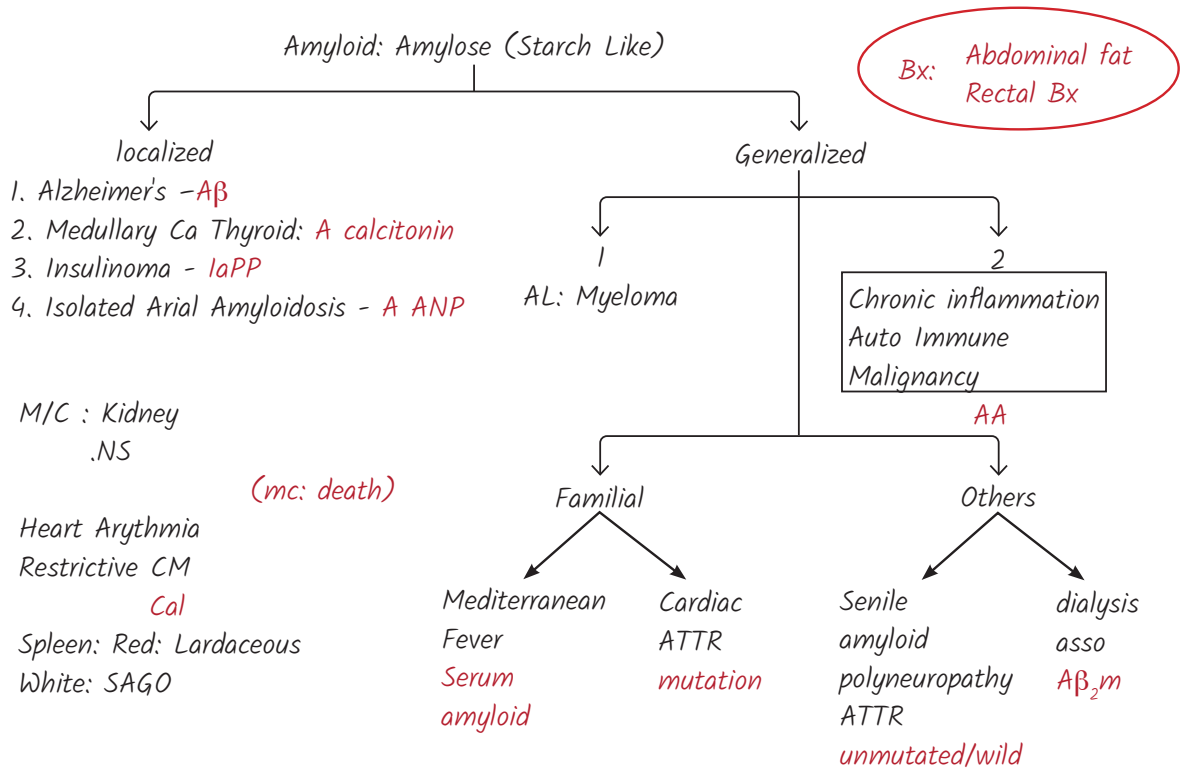
Xems = Diff species

G V H D / Runt ds / Runts

C F : 1st Rash (skin)

< 100 d : Acute	GIT Blood diarrhea
> 100 d : Chronic	Liver Jaundice

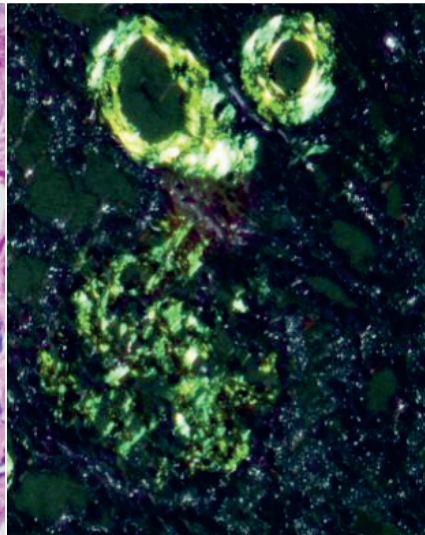
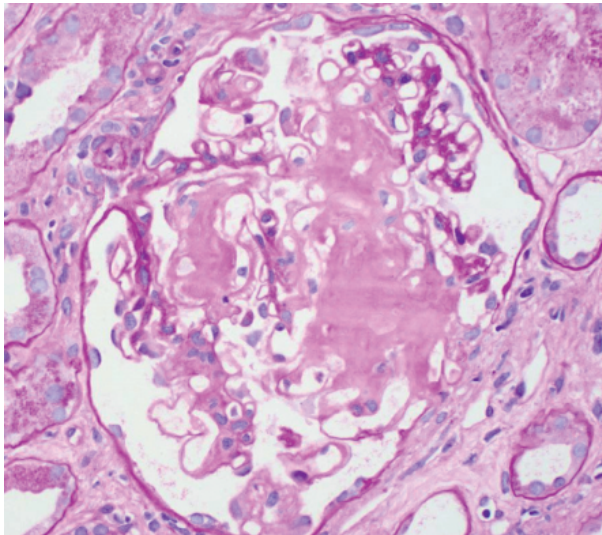
Hyperacute	Acute	Chronic
Time min - hrs	Day - wks	>6m
Mech: preformed antidonor HLA Type2 Ab in recipient (Prior: Blood/organ Tx)	Post Tx Type2 Ab med Type2 T cell med	Post Tx Type4 T cell
Biopsy : Dense Neutrophil++ : Thrombotic occlusion : Fibrinoid Necrosis	Ab : C4d deposition T cell CD3+T Cell	Organ fibrosis + Atrophy



Bx: Abdominal fat  
Rectal Bx

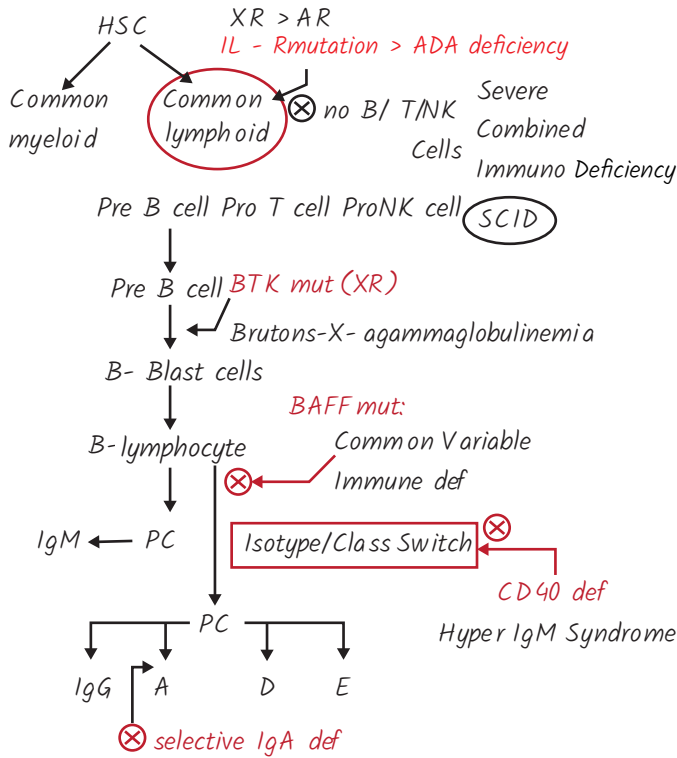
EM: Unbranching fibrils, X-ray Crystallography:  $\beta$  pleated sheets  
Specific stain: Congo Red - Apple green birefringence

**Amyloidosis : Apple Green birefringence**





**10 Immunodeficiency Diseases**



**JOBS: STAT 3 mut**

- F- Face: Coarse facial
- A- Abscess: Cold abscess: Staph aureus
- T- Teeth: Abn 1° Teeth
- E- Eczema, ↑ IgE

**CATCH 22**

- Di George Syndrome : 3rd/4th ph. pouch
- Velo Cardio facial defect : microdeletion of Chr22q

- C - Cleft palate
- A - Anomalous face
- T - Thymus hypoplasia: ↓T Cells
- C - Cardiac defects
- H - Hypo Calcemia

**Wiscott Aldrich WASP (XR)**

- Δ Thrombocytopenia
- Enzema
- Infections

BLS: Bare lymphocyte Syndrome

	Type I	Type II (mc)
Defect:	Absent MHCI	MHC II
	↓	↓
	↓ CD8T Cells	CD4T




# GENETICS

**PATAU Syndrome**

Cleft lip/palate  
Renal abnormalities  
cArdiac defects  
Microcephaly  
Mental retardation  
Polydactyly

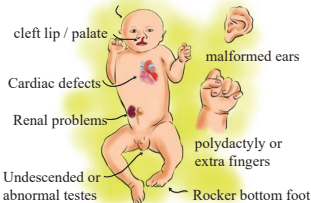
**"CRAMP"**



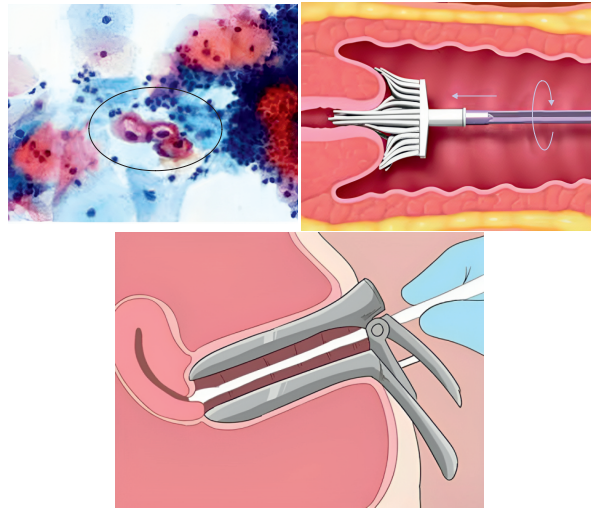

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13 letters = Trisomy 13  
**PATAU Syndrome**

Microcephaly  
Mental retardation



cleft lip / palate  
malformed ears  
Cardiac defects  
Renal problems  
polydactyly or extra fingers  
Undescended or abnormal testes  
Rocker bottom foot



## Edwards Syndrome



## DOWN'S Syndrome



Mongoloid slant  
Epicanthic folds  
Depressed nasal bridge



Sandal gap



Simian crease





### DOWNS syndrome



Mongoloid slant  
Epicanthic folds  
Depressed nasal bridge



Sandal gap Simian crease

### Klinefelter Syndrome

- Long stature with long legs; Eunuchoid body proportions
- Testosterone reduced, small Testes & penis, Infertility
- Estradiol/testosterone ratio elevation → Gynecomastia
- FSH elevated, scanty Facial & axillary hair
- LH elevated, Leukemias (increased risk for AML) & breast tumors, Learning disability
- Secondary sexual characters absent

### Turner's syndrome

#### Clowns

- Cardiac abnormalities (Bicuspid aortic valve > Coarctation of aorta), Cubitus valgus
- Lymphedema
- Ovaries underdeveloped: "streak ovaries" (causing infertility, amenorrhea)
- Webbed neck
- Normal intelligence / Nipples widely spaced
- Short stature / Short 4th metacarpal

### Edwards Syndrome

#### Trisomy 18 (Edwards syndrome)

#### "ROCKY Mountain"

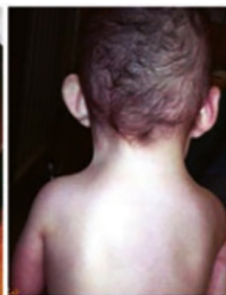
- **R**: Rocker bottom foot
- **O**: Overlapping fingers
- **C**: Cardiac defects
- **K**: Kidney malformations
- **Y**: Microcephaly
- **M**: Mental retardation



### Turners



Webbed neck



Low posterior hairline



Shield shaped chest with widely spaced nipples

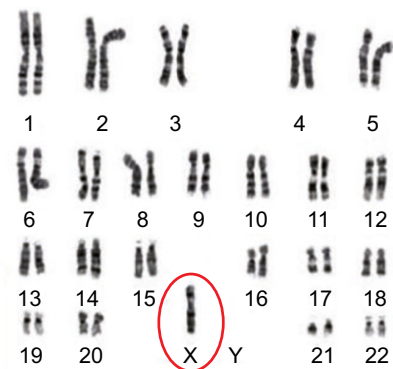


D



E

Lymphedema of hands & feet



## TUMOR MARKERS

<i>Tumor Markers</i>	<i>Tumor Markers</i>
<b>Hormones</b>	
<i>Human chorionic gonadotropin</i>	<i>Germ Cell Tumor-Ovary, Testis</i>
<i>Calcitonin</i>	<i>MCT medullary Ca Thyroid</i>
<i>Catecholamine and metabolites</i> <i>24-hour urinary metanephrines &gt; VMA</i>	<i>Pheochromocytoma</i>
<b>Oncofetal Antigens</b>	
<i>α-Fetoprotein (AFP)</i>	<i>Yolk sac tumor, HCC</i>
<i>Carcinoembryonic antigen</i>	<i>Ca Colon, lungs</i>
<b>Lineage- Specific Proteins</b>	
<i>Immunoglobulins</i>	<i>Multiple myeloma [G&gt;A&gt;M&gt;D&gt;E]</i>
<i>Prostate-specific antigen and prostate-specific membrane antigen</i>	<i>Prostate Adeno Ca</i>
<b>Mucins and other Glycoproteins</b>	
<i>CA-125</i>	<i>Ovarian (Epithelial Tumors)</i>
<i>CA-19-9</i>	<i>Pancreatic Ca</i>
<i>CA-15-3</i>	<i>Breast Ca</i>



## NOTES



NOTES

# SYSTEMIC PATHOLOGY

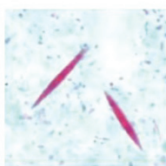
## 8. RESPIRATORY SYSTEM

### Chronic Pulmonary disease

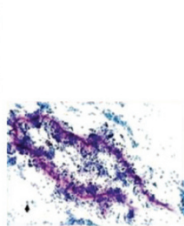
OBSTRUCTIVE : FEV1 ↓↓ (>0.7)  
FVC

1. Emphysema		2. Asthma		3. Ch-Bronchitis	4. Bronchiectasis
<ul style="list-style-type: none"> <li>Irreversible</li> <li>Acinus involved</li> </ul>		<ul style="list-style-type: none"> <li>Reversible</li> <li>Bronchoconstriction</li> </ul>		<ul style="list-style-type: none"> <li>Irreversible</li> <li>Bronchus involved</li> </ul>	<ul style="list-style-type: none"> <li>Irreversible</li> <li>Bronchus involved</li> </ul>
Centriacinar <b>mc</b>		Panacinar		<ul style="list-style-type: none"> <li>&gt;3m of productive cough in last 2 consecutive years</li> <li>Smoking</li> <li>Dust</li> <li>Reid index &gt;0.4</li> <li>Squamous metaplasia</li> </ul>	Lower Lobe ↓ dilated/destroyed Bronchus Etiology <ul style="list-style-type: none"> <li>Foreign Body</li> <li>Direct B/V/F/ Aspergillus</li> <li>Congenital                         <ul style="list-style-type: none"> <li>Cystic fibrosis</li> <li>Kartagener synd</li> <li>Young syndrome</li> </ul> </li> </ul>
Proximal	acinus	prox + distal			
Apex	lung	Base			
Smoking	Etiology	α1 AT def			
<ul style="list-style-type: none"> <li>3C Sputum</li> <li>Charcot leyden Crystals</li> <li>Creola body</li> <li>damaged Respiratory cells</li> <li>Curschmann spiral</li> <li>Impacted mucin plugs</li> <li>Remodeling of Bronchus</li> </ul>					

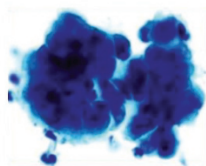
### Sputum findings in Bronchial Asthma



Charcot Leyden crystals

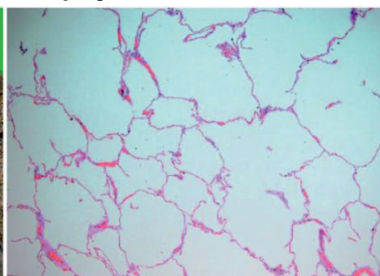
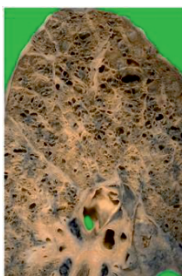


Curschmann spirals



Creola bodies

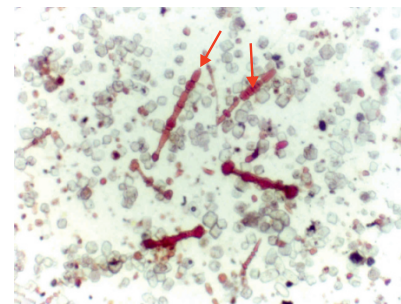
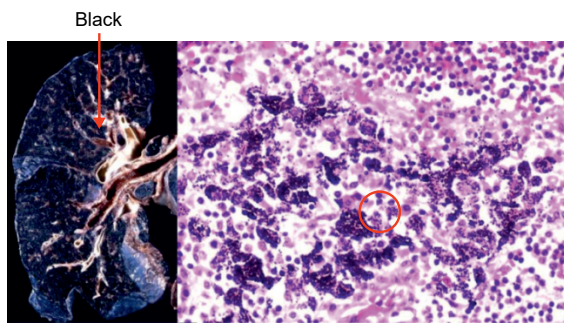
### Emphysema



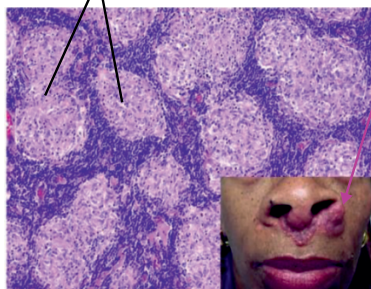
Pneumoconiosis : Injury  $\propto$  amount, duration, smoking

$$\propto \frac{I}{Size}$$

	<b>Coal (Anthracosis)</b>	<b>Silicosis</b> <i>mc</i>	<b>Asbestosis</b>
Dust	Coal	Crystalline $\rightarrow$ $\uparrow$ Injury	Amphibole Crochidolite
Lung	UL	UL	LL
CAPLAN (P + RA)	(1st + seen)	+	+
TB $\uparrow$	-	$\uparrow$	-
Pleura	-	-	+
lung ca	-	$\uparrow$	$\uparrow\uparrow$
PMF	++	+	+
Morpho:	Black pig: Anthracotic	B/L HILAR L.Node Xray: Eggshell calcification	<ul style="list-style-type: none"> <li>• Pl Plaque/effusion</li> <li>• Lung fibrosis</li> </ul>
m/e:	Coal deposit	collagen nodules	Asbestos body Asbestos + Iron protein Ferruginous body

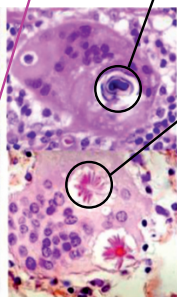


Granuloma non caseating



**Sarcoidosis**

Lupus Pernio

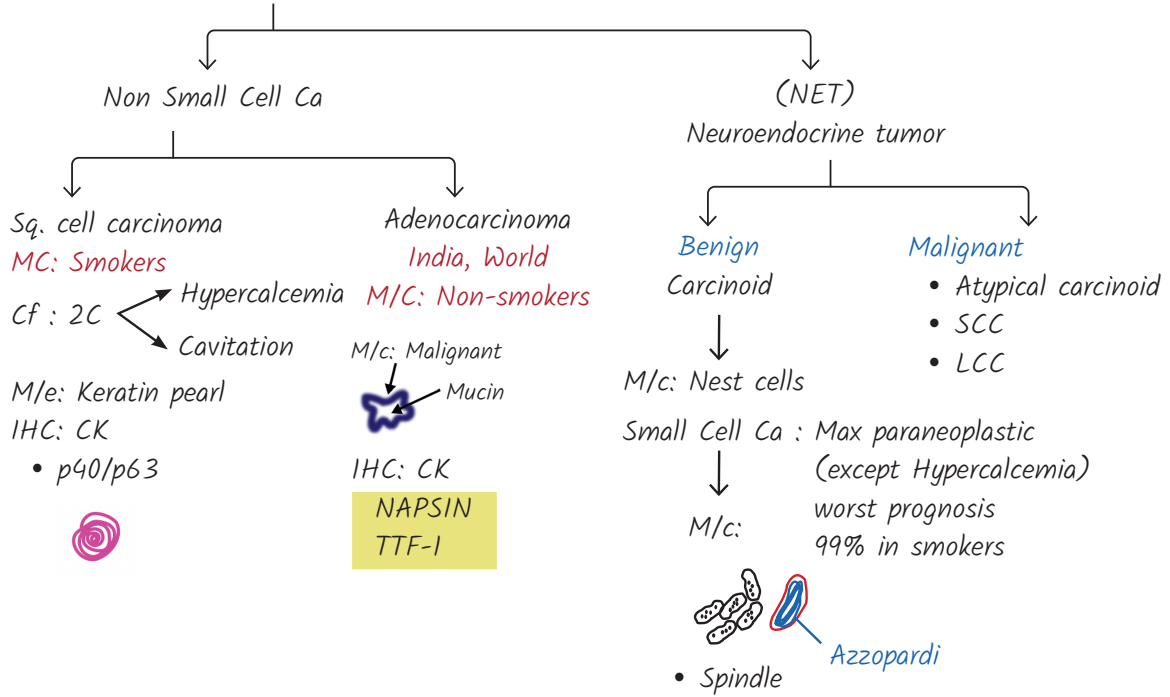


Schauman bodies

Asteroid bodies

Sheek Kebab app

Lung Ca: Smoking, Nickel, Chromium, Cadmium, Radon



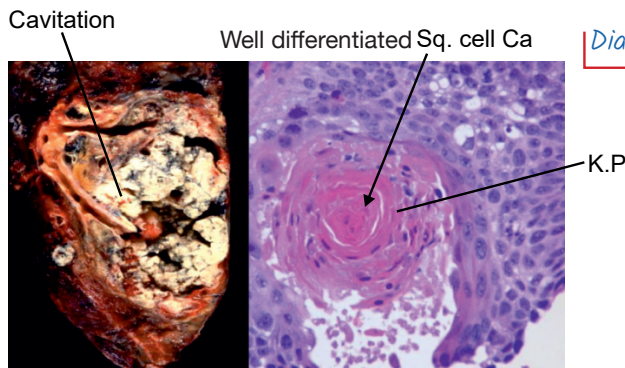
IHC: Synaptophysin, Chromogranin, NSE, CD-56, INSM-1  
Site: Bronchus

EM:

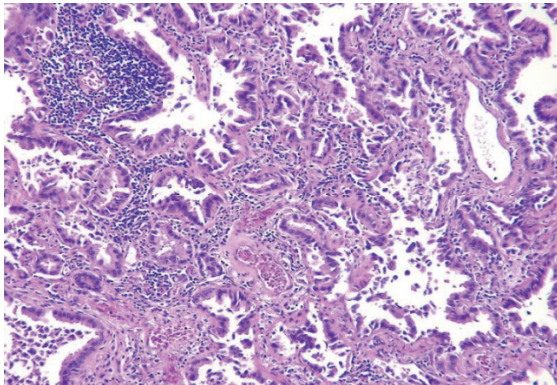


Diarrhea + flushing + Cyanosis,

Carcinoid Syndrome

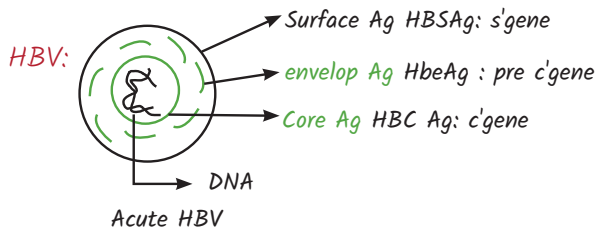


Well differentiated Adenocarcinoma

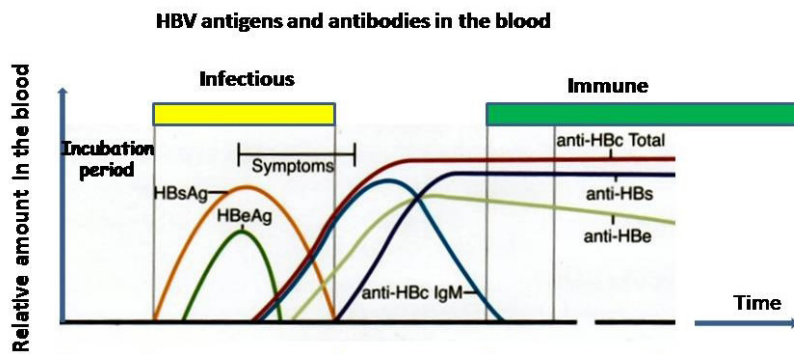


## 9. LIVER

### Hepatitis



Infection SAg (+) : Infected SAg (-) : Recovery



#### 1. Acute hep B

Infection: HBS Ag (1st marker)

HBeAg: ↑Infectivity (HBVDNA ↑↑)

IgM HBC Ab

#### 2. Recovery: HBSAg (-)

Recent: IgM HBC Ab		HBS Ab +/-
Remote: IgG HBC Ab		HBe Ab +/-

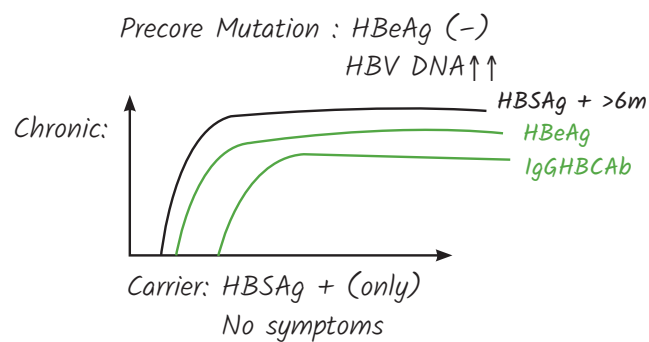
#### 3. Core window: HBSAg -

HBSAb-

IgM HBCAb+

#### 4. Vaccination HBS Ab > 10milli IU/mL

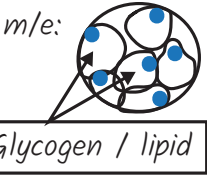
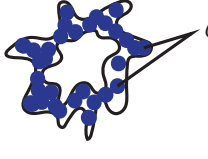


#### 5. Mutation



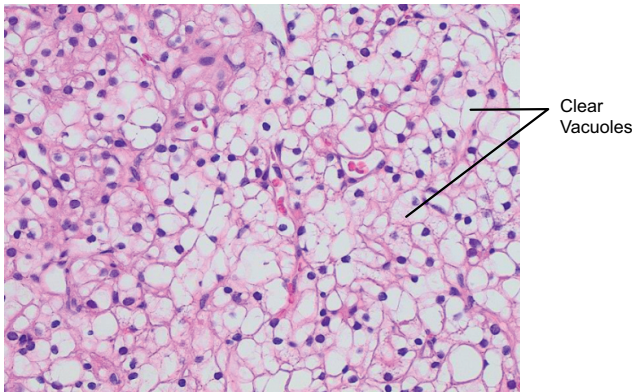


## 10. KIDNEY

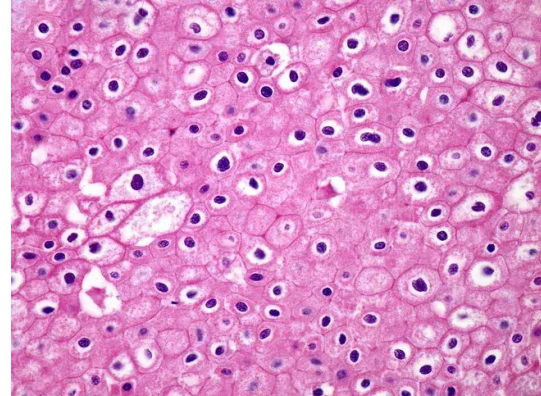
### Renal Cell Ca:

Clear Ca	Papillary Ca
Origin: PCT	DCT, PCT
mut: VHL (3p)	MET(7): Tri 7, 17, loss of Y
m/e:  Glycogen / lipid	 Chromophilic
Other	Origin
3. Chromophobic - CD	prognosis
	good  Plant cell appearance
4. Bellini duct Ca - CD	Poor  Hob Nail appearance

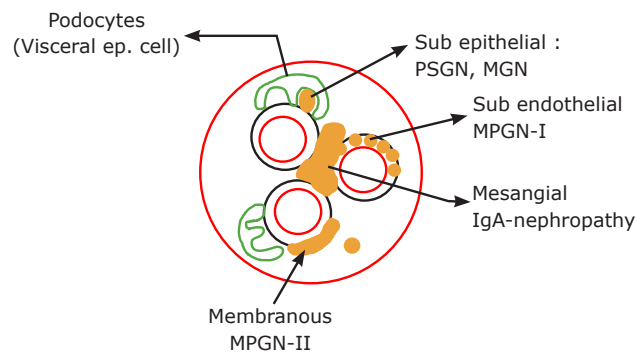
**Clear Cell Carcinoma**







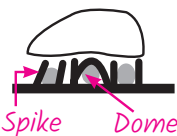

**Chromophobe**

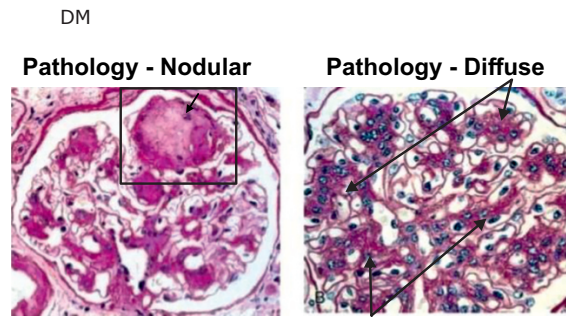
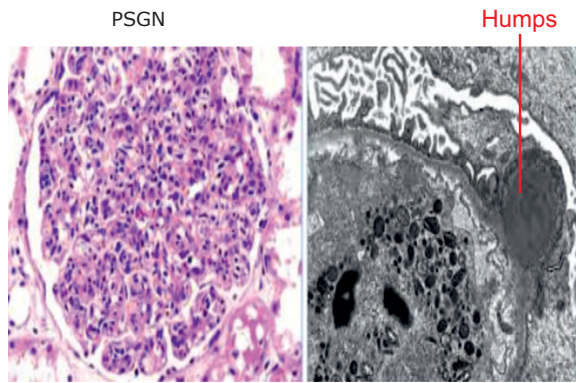


### Immune complex deposits

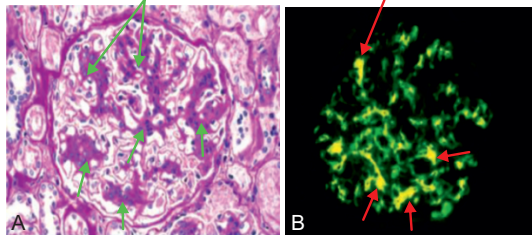


**Glomerulonephritis :**

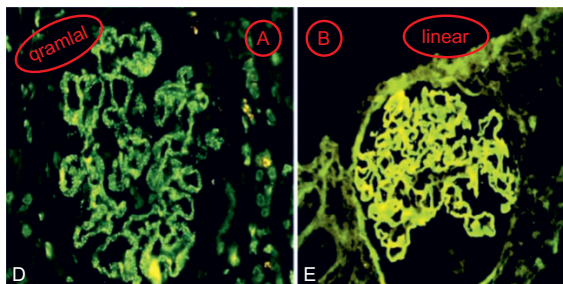
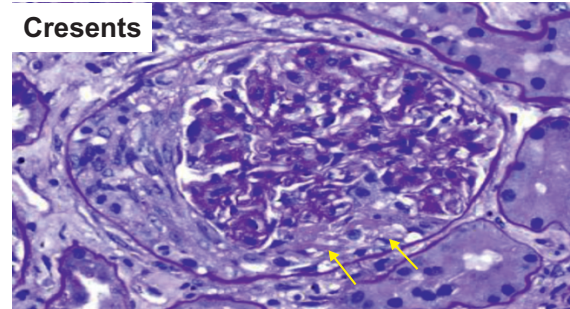
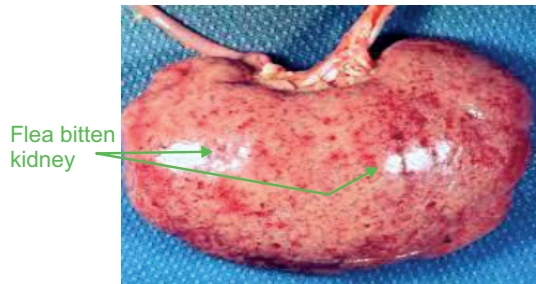
<b>Nephritic</b>			
1- PSGN	<b>LM</b> Max Endo + Exo Capillary Proliferation	<b>EM</b>  Sub epithelial Humps	<b>FM</b> Starry sky
2. IgA nephro	Mesangio - proliferation -	Mesangial deposit	IgA > G, M + C <sub>3</sub> in mesangium
3. MPGN	Proliferation of GBM mesangium + Capillary	I-Sub endothelial  Tram Track app II - Intramembranous  Dense deposit disease	Granular deposit
4. RPGN	Crescents Gross: flea Bitten appear- ance	Rupture of GBM	I- linear II- Granular III- X
<b>Nephrotic</b>			
1. Minimal change disease	-	 Effacement of foot process of podocyte	-
2. Membranous GN	Diffuse GBM thickening	 Spike Dome	Granular deposits
3. Focal Segmen- tal Glomerulo Sclerosis	Fibrosis <50 % of Glomerulus (Focal) involving parts (Segmental)	 Effacement	IgG/M+C3 in Sclerosed part



**IgA nephropathy / Mesangioproliferative GN**



**RPGN**

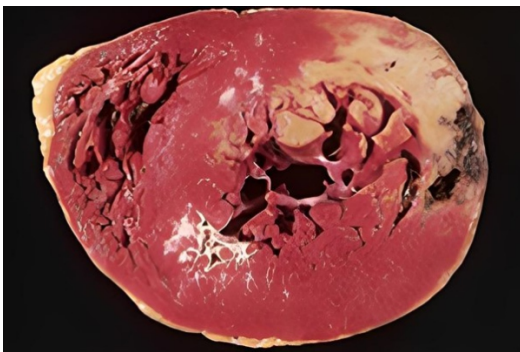


## II. HEART

### Morphological changes of MI

Time	Gross	LM	EM
<30 min (Rev)	—	—	<ul style="list-style-type: none"> <li>• Loss of M.V</li> <li>• Blebs, organelle Swelling</li> <li>• Pyknosis; Relax of myofibrils</li> </ul>
30 min-4 hv (Irrev)	—	Waviness of myofibrils	<ul style="list-style-type: none"> <li>• Large floccular density (Ca)</li> <li>• Myelin figures (PL)</li> </ul>
12hr - 24hr	Red	• Necrosis-Starts Neutro - appear	—
d1 - d3	Red - Yellow	• Necrosis ++ Neutro ++	—
d3 - d7	Yellow	• Macrophages appear (engulf debris)	—
d7 - d14	Red	• Granulation tissue (FB+ vessel)	—
>d14	Grey	• Collagen appears	—

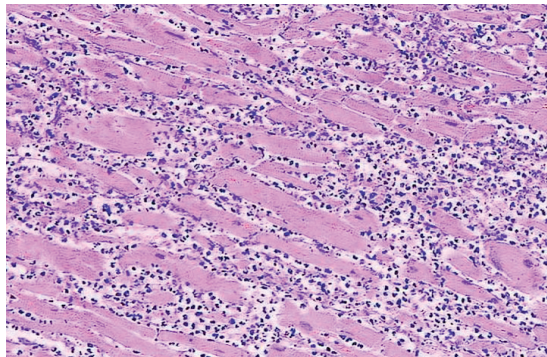
#### TPTC test in MI



#### Triphenyl Tetrazolium Chloride (TPTC)



#### Day 3 MI

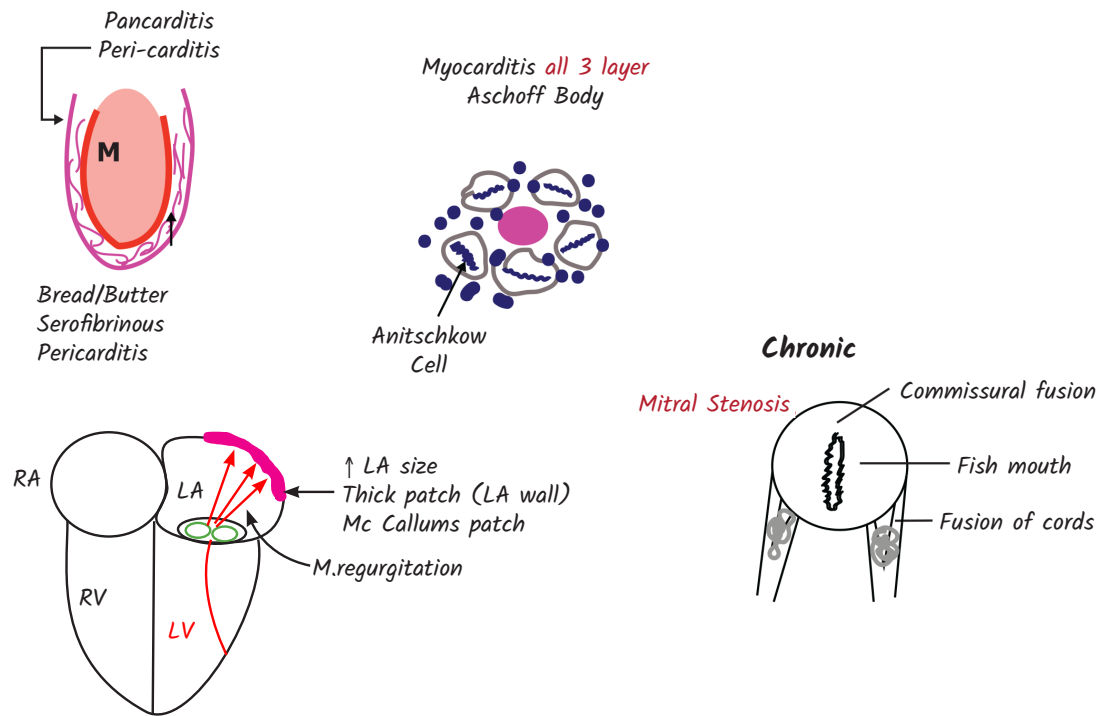




### Rheumatic Heart Disease

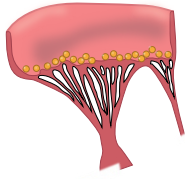
Group A  $\beta$  hemolytic streptococci (1, 3, 5, 18)

Antibodies against 'M' protein of streptococcus  $\rightarrow$  cross-react with specific antigens  
'JONES' criteria

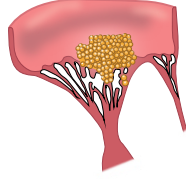




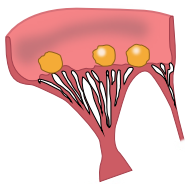
### Vegetations



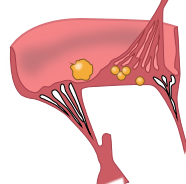
RHD- Rheumatic heart diseases



IE- Infective endocarditis

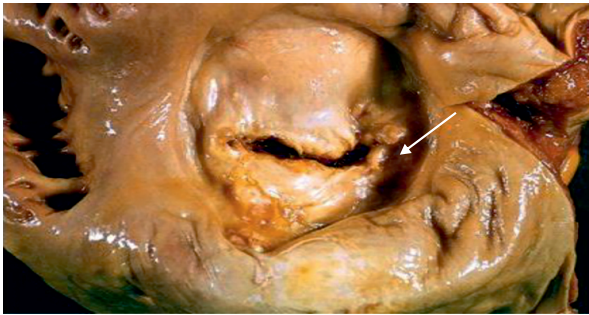


NBTE- Non bacterial thrombotic endocarditis

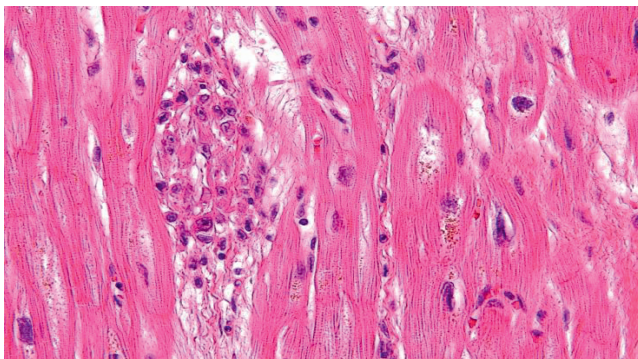


LSE- Libman-Sacks endocarditis

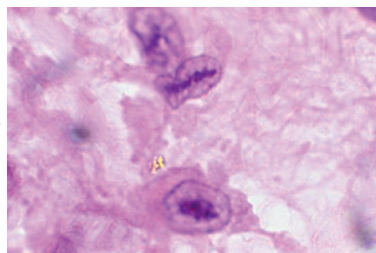
### Fish Mouth Appearance



### Aschoff Body

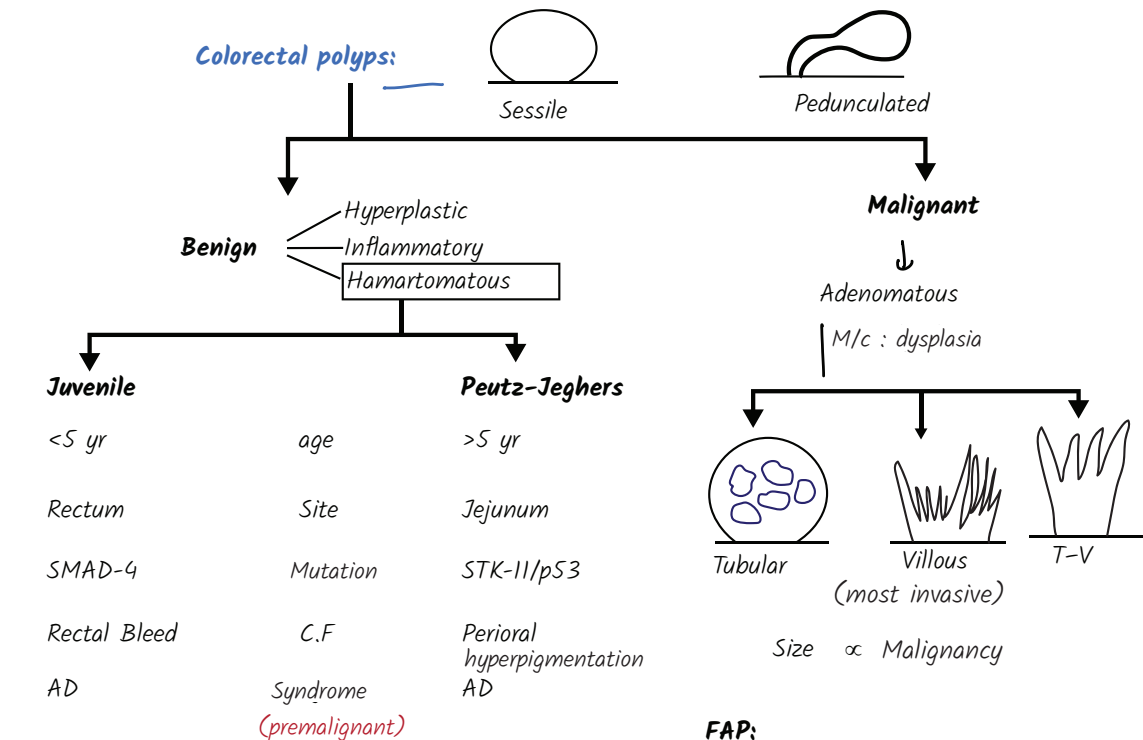


### Anitschkow Cells



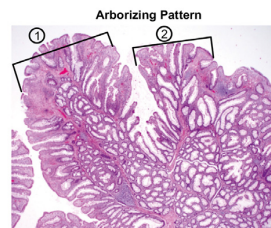
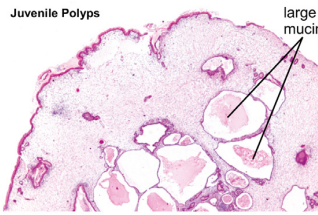


## 12. GASTRO INTESTINAL SYSTEM



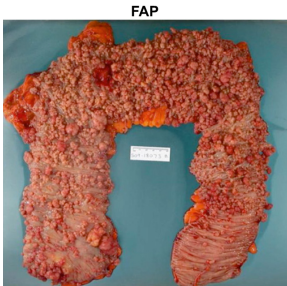
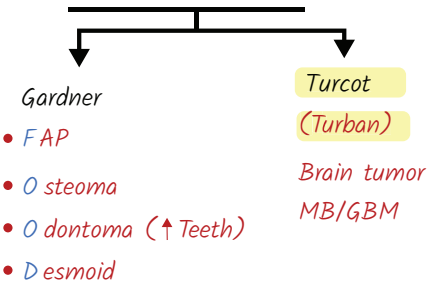
Juvenile		Peutz-Jeghers
<5 yr	age	>5 yr
Rectum	Site	Jejunum
SMAD-4	Mutation	STK-11/p53
Rectal Bleed	C.F	Perioral hyperpigmentation
AD	Syndrome	AD

*(pre-malignant)*



**FAP:**

- mut: **APC(Sq)**; AD inh
- Number >100 → 100% Risk of Adenocarcinoma
- Syndrome of FAP

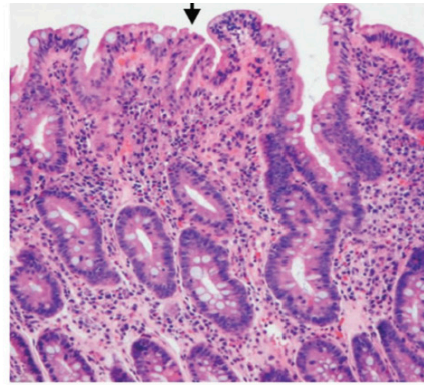
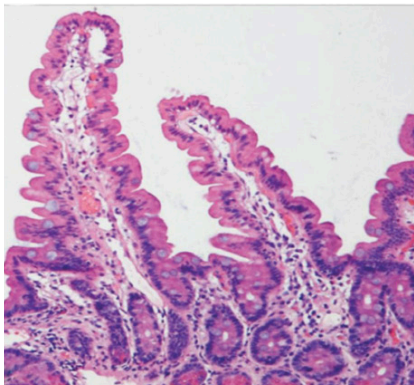
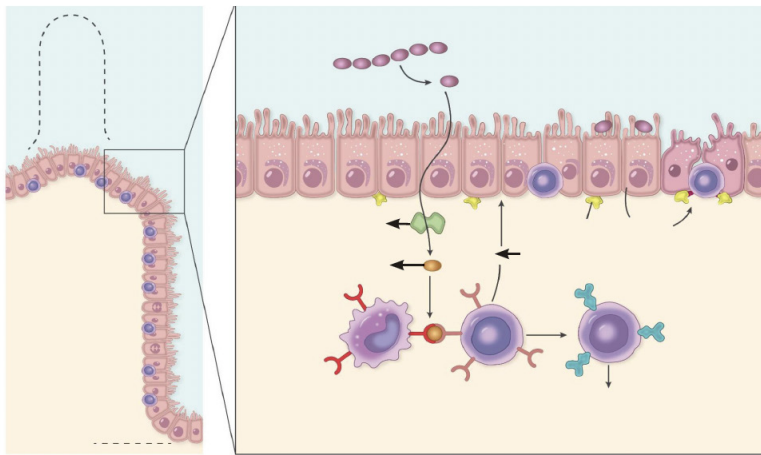


- Attenuated FAP: polyp ≈ 60
- Mut: **MYH**
- HNPCC/LYNCH Synd
- Mut: **MSH/MLH**

## INTESTINAL MALABSORPTION SYNDROME:

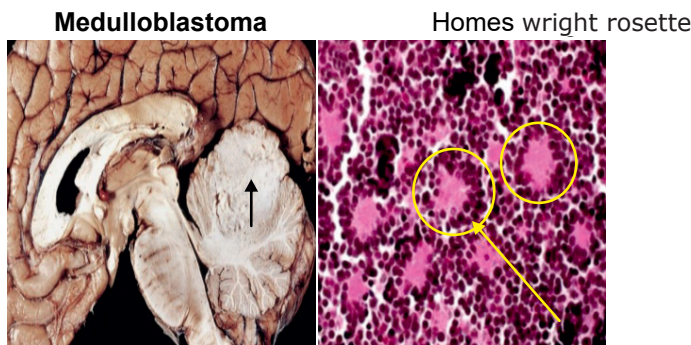
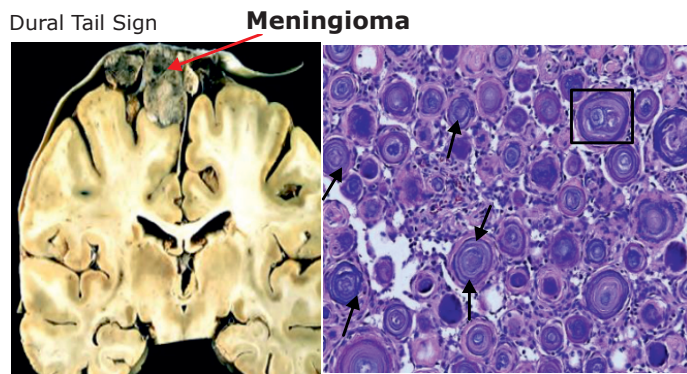
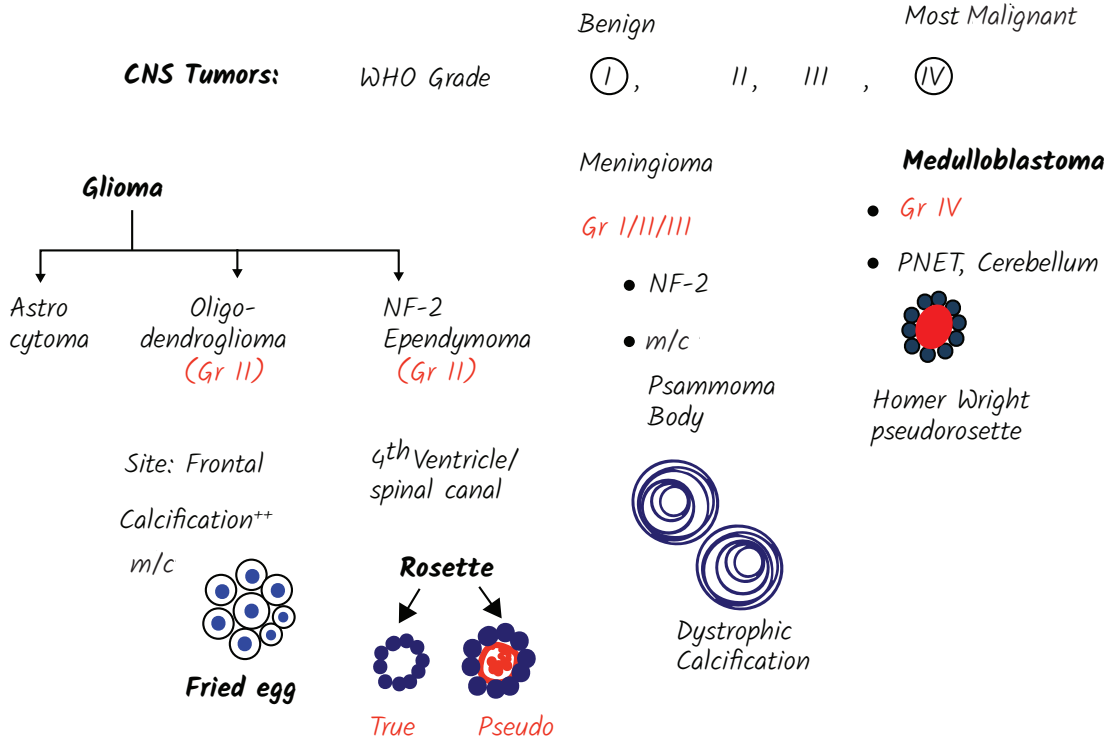
### 1. Celiac disease :

- Hypersensitivity to Gluten
- HLA DQ-2/B-8  
DQ-8



- **IgA anti TTG Ab:** most sensitive, cross reacts  $\bar{e}$  skin Ag  $\longrightarrow$  Dermatitis herpetiformis
- **IgA anti Gliadin Ab:**
- **IgA anti Endomysial Ab:** most sp

### 13. CNS TUMOR





### Astrocytoma

**Gr I**

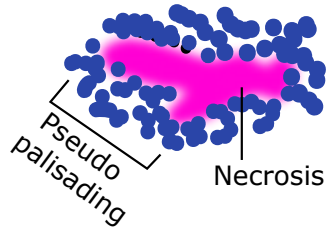
#### Pilocytic

Site: Cerebellum

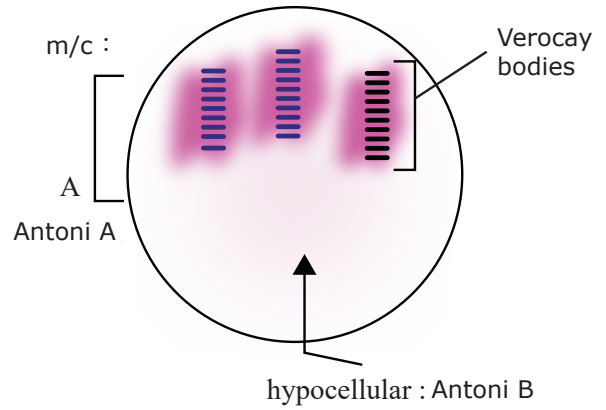
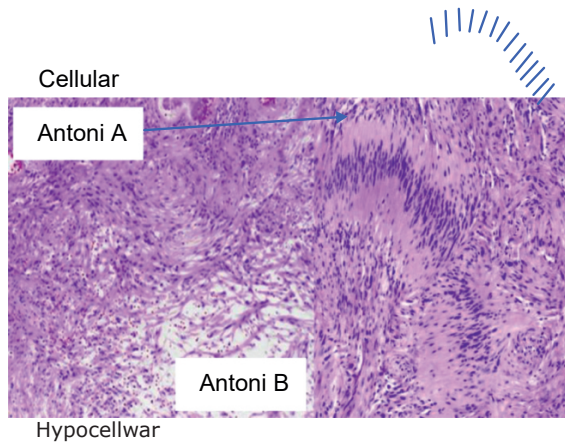
m/e: Rosenthal  
fibres

### **IV** Glioblastoma

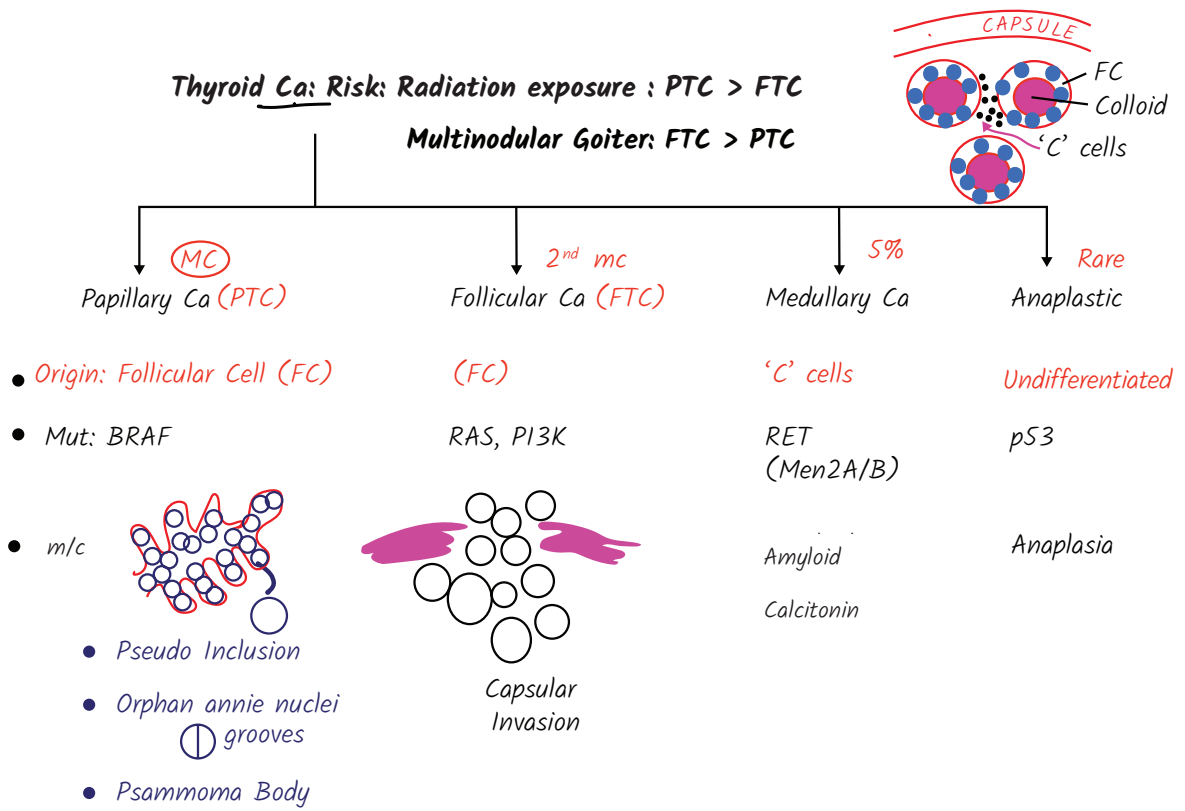
Cerebrum



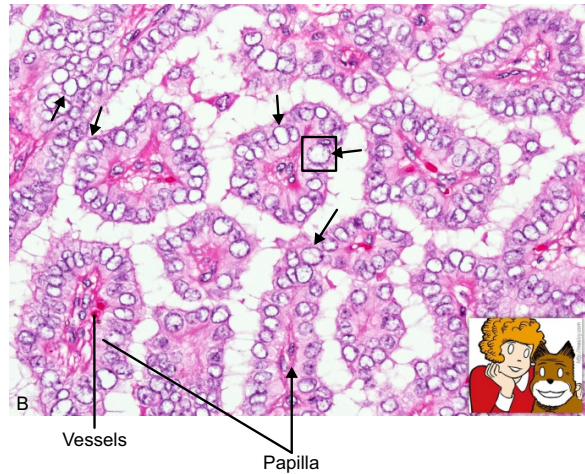
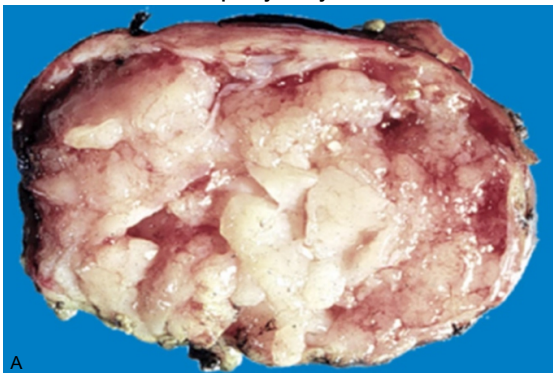
### Schwannoma

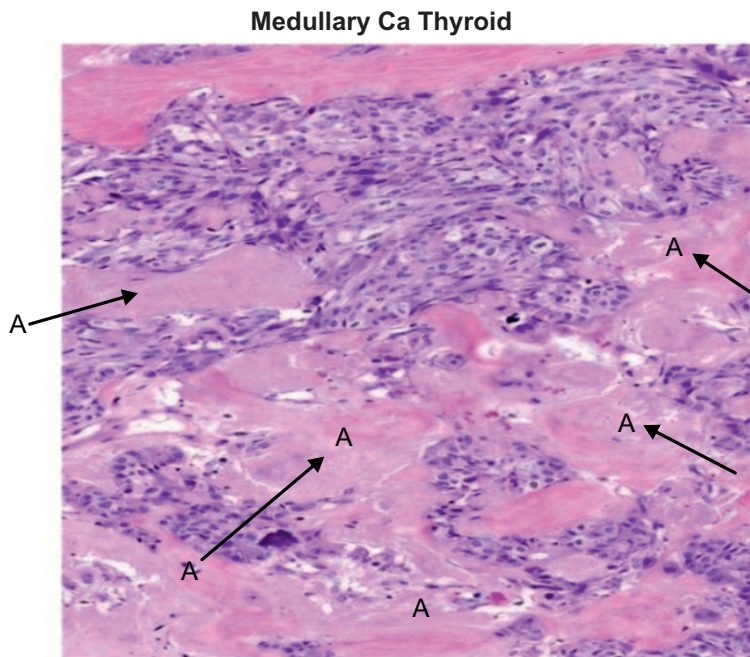
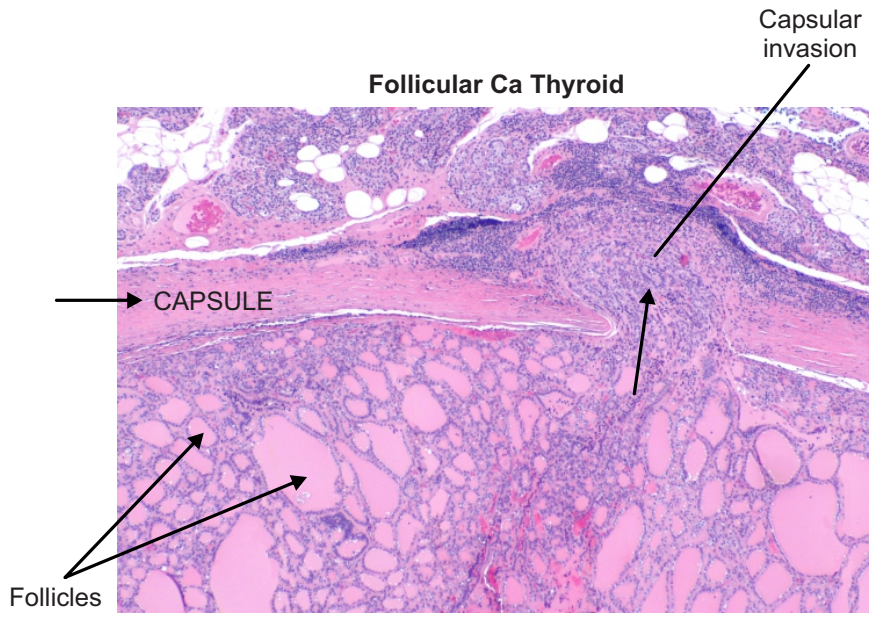


14. ENDOCRINE



Papillary Thyroid





**IMAGE 1**

Identify and mention uses?



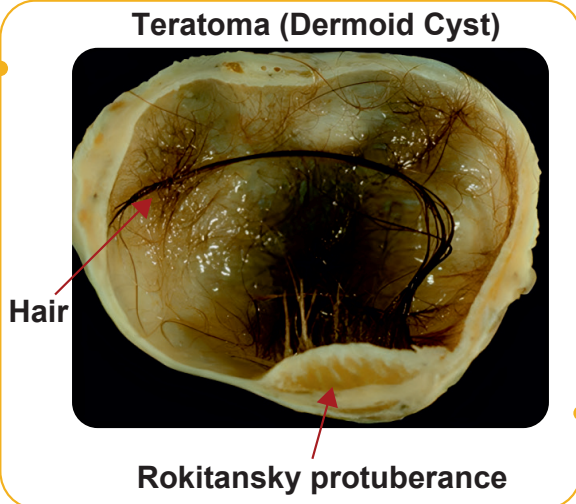
Order of Draw: Culture (1)

	Colour	Anticoagulant	Use
(2)	 Light blue	Tri Na citrate 1:9	Coagulation: PT, aPTT, D-dimer
(3)	 Red	—	Serum: KFT, LFT, lipid, hormone
(4)	 Yellow	— SST: Serum separator tube	Serology, Electrolytes
(5)	 Green	Heparin	ABG, OFT Electrolytes (best) <sup>Q</sup> Cytogenetics (FISH)
(6)	 Purple	EDTA	CBC + ESR HbA1c <sup>Q</sup> Blood group, Ammonia
(7)	 Grey	NaF (- enolase) + K-oxalate	Glucose
(8)	 Black	Na citrate (1:4)	ESR

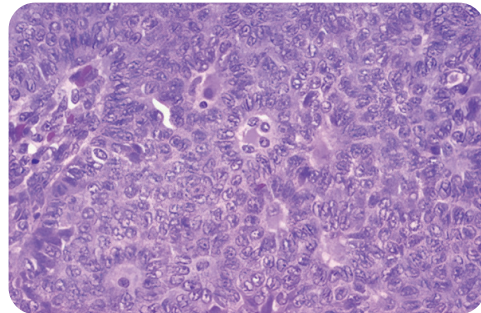
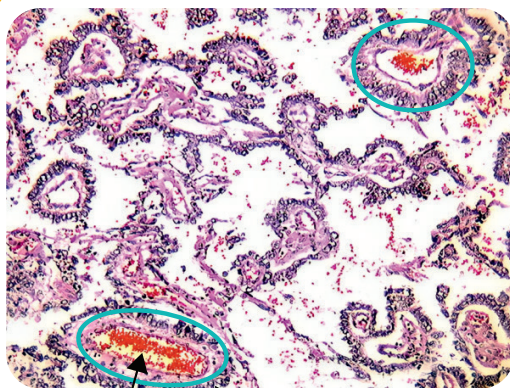
Order: To reduce cross-contamination

**IMAGE 2**

A 55-year-old female patient has a large adnexal mass and abdominal discomfort. Ovary was removed and the morphology has been shown below. Identify the type of tumor?

**CASE: "A"****CASE: "B"**

**Granulosa Cell Tumor**  
**Call Exner Body**

**CASE: "C"**

**Shillar  
Duval Body**

**CASE: "D"**

**Reinke Crystalloids**  
**Hilus Cell Tumor/  
Leydig cell tumor**



NOTES