

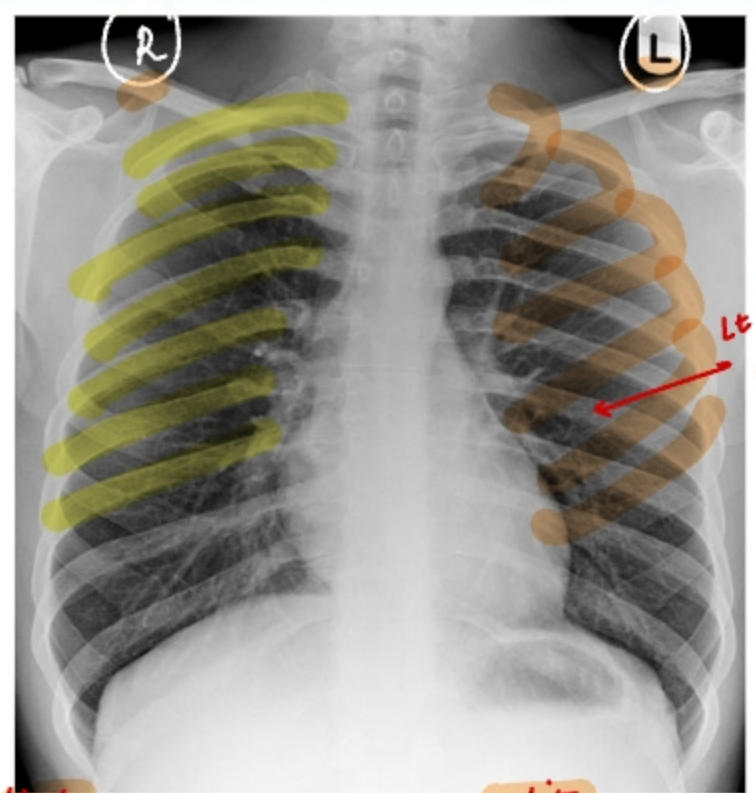
RADIOLOGY

BASIC INVESTIGATIONS

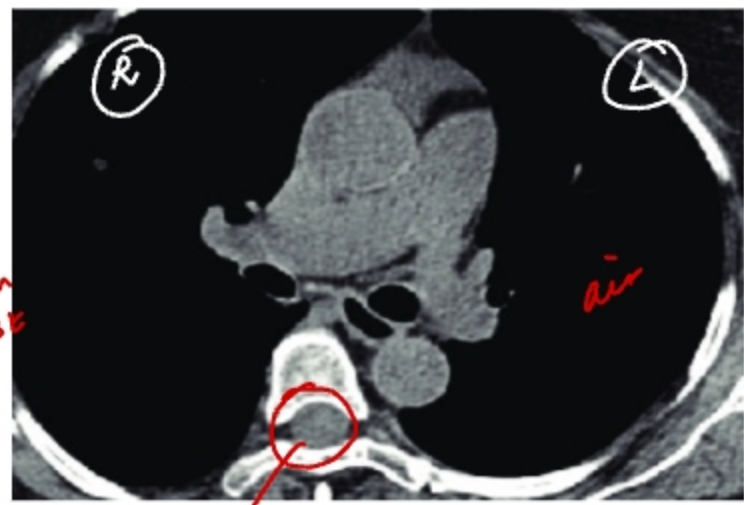
	Concept	Ionizing Radiation	Black	White
X-ray	attenuation (2D)	✓	Lucent	Opaque
CT <i>Computed tomography</i>	" (3D)	✓	Hypo dense	Hyper dense
MRI <i>magnetic resonance imaging</i> <i>Best contrast resolution time</i>	NMR: nuclear magnetic resonance <i>H⁺</i> <i>1.5T / 3T</i>	⊗	Hypo intense	Hyper intense
USG <i>Real time operator dependent</i> <i>2-20 MHz</i>	Sound waves <i>Piezo electric crystals</i> <i>Pb zirconate titanate</i> <i>transducer</i> <i>mechanical → sound</i>	⊗	Hypo echogenic	Hyper echogenic
NUCLEAR MEDICINE	Gamma rays <i>Scintigraphy</i> <i>SPECT</i> <i>PHOTON</i> <i>PET</i> <i>position</i>	✓✓ <i>MAX: PET-CT</i>	⊖	Hot spot / avid =

Modality	Dose	
CXR	0.02 mSv	Q
Skull Xray	0.07 mSv	
Abdomen Xray	1 mSv	
Mammography	0.5-0.7mSv	
CT head	2 mSv	}
CT chest	5 mSv	
CT abdomen	10 mSv	
PET	10-12 mSv	WB PET-CT: 25 mSv
Barium meal follow through/enema	7-8mSv	
IVP	2-3mSv	

X-RAY - CT



black → white
air fat soft tissue / fluid bone metal



NCCT
CSF



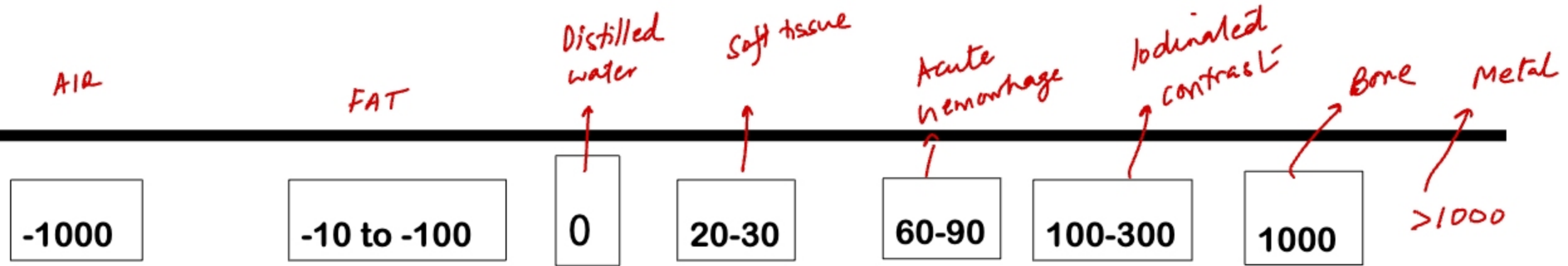
CECT (in contrast)

HRCT LUNG



RIB COUNTING

HOUNSEFIELD UNIT



NCCT-IOC

CALCIFICATION

- Intracranial Ca^{2+}
- Ca^{2+} masses

CALCULI

all IOC - NCCT
renal / ureteric / salivary
except

gallstone / CBD stones
|
USG MRCP IOC

BONE -CORTEX

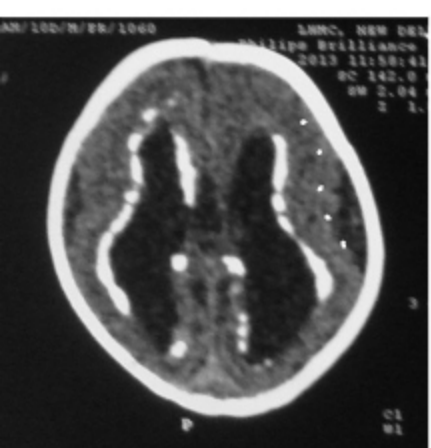
initial: Xray
IOC: NCCT
except
stress # osteoid osteoma
| |
MRI IOC NCCT IOC

ACUTE HEMORRHAGE

Head trauma
IOC - NCCT
except
DAI
|
GCS ↓↓
IOC - MRI

METALLIC FB

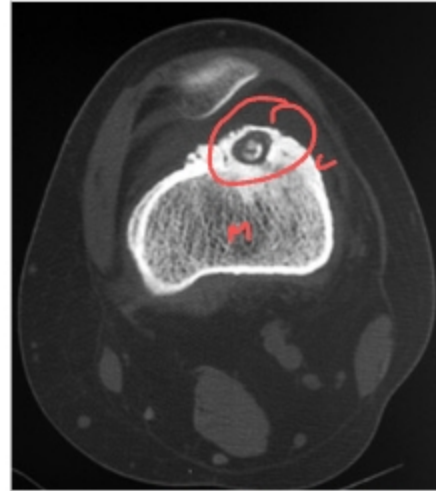
IOC - NCCT
CI - MRI
=



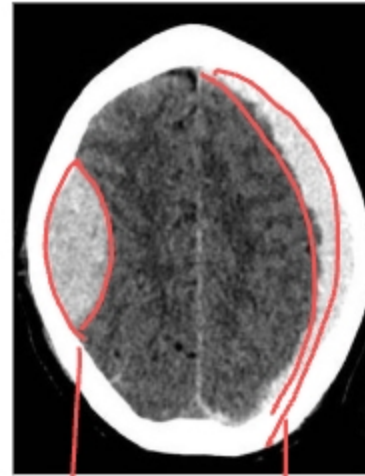
Periventricular: CMV
Parenchymal: toxoplasma
GM-WM: Zika



chance #



osteoid osteoma

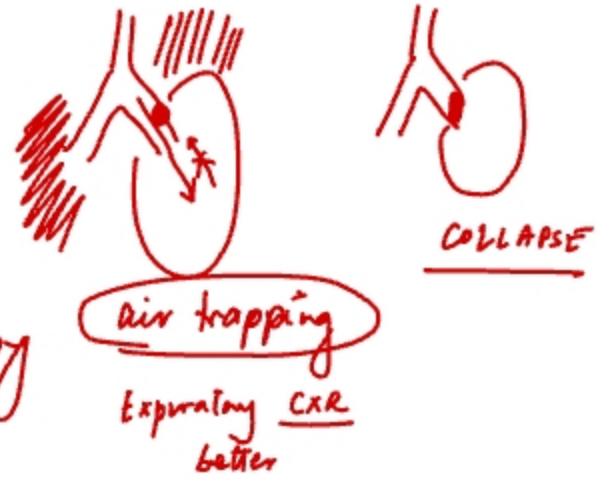
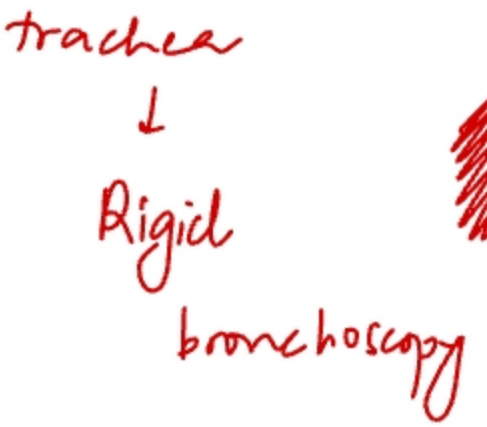
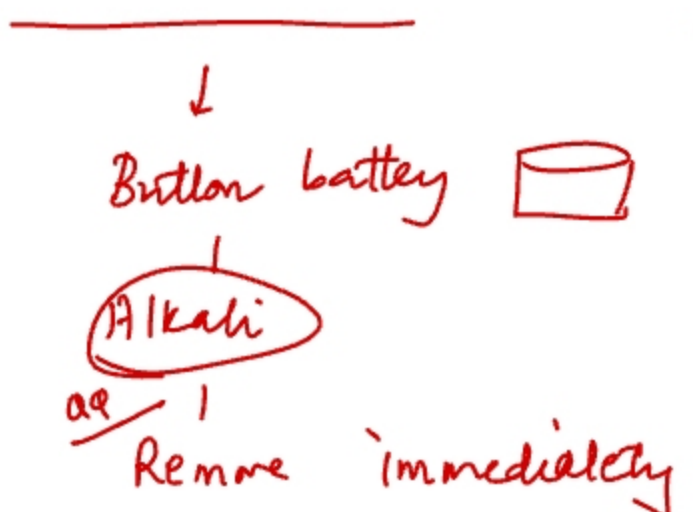
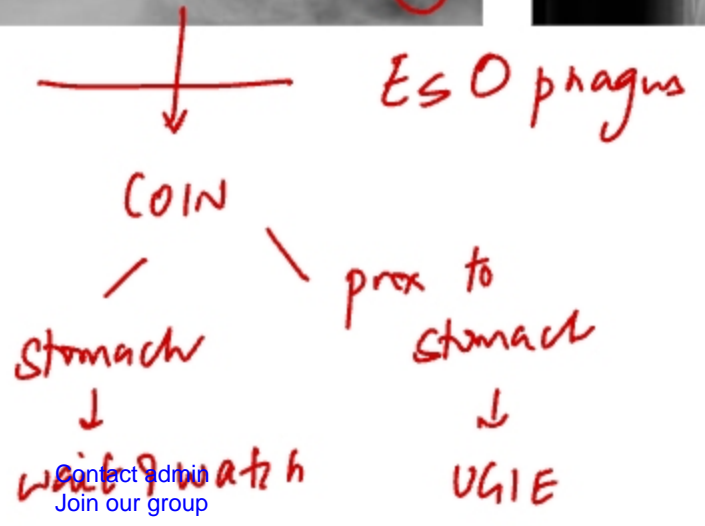
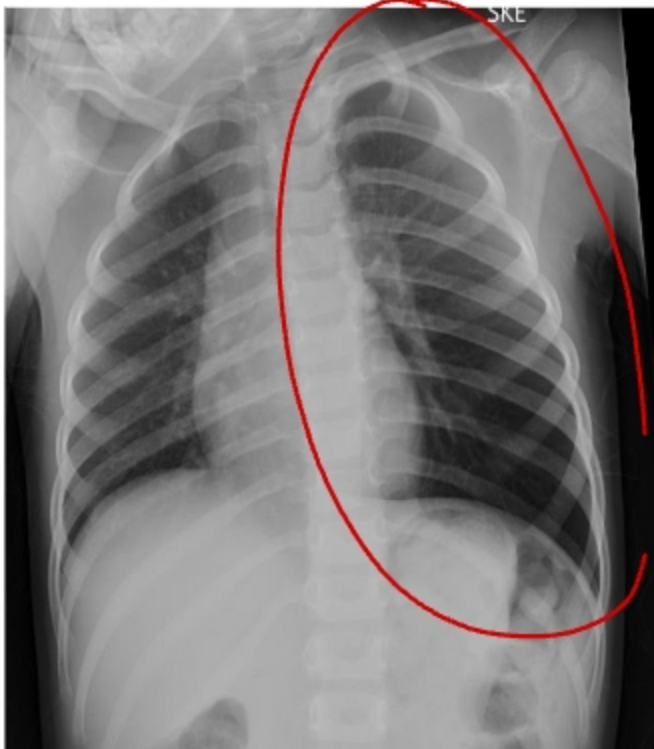
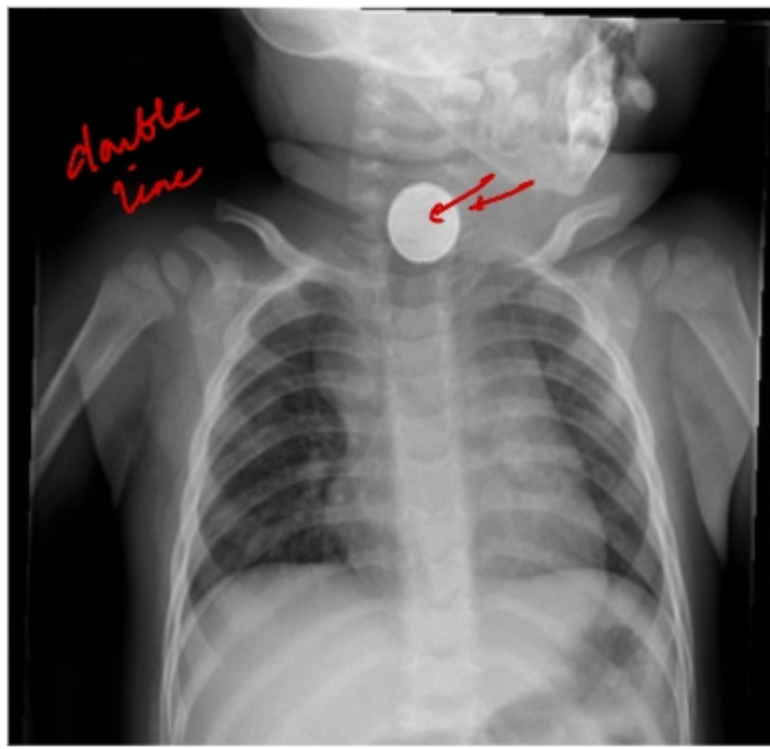


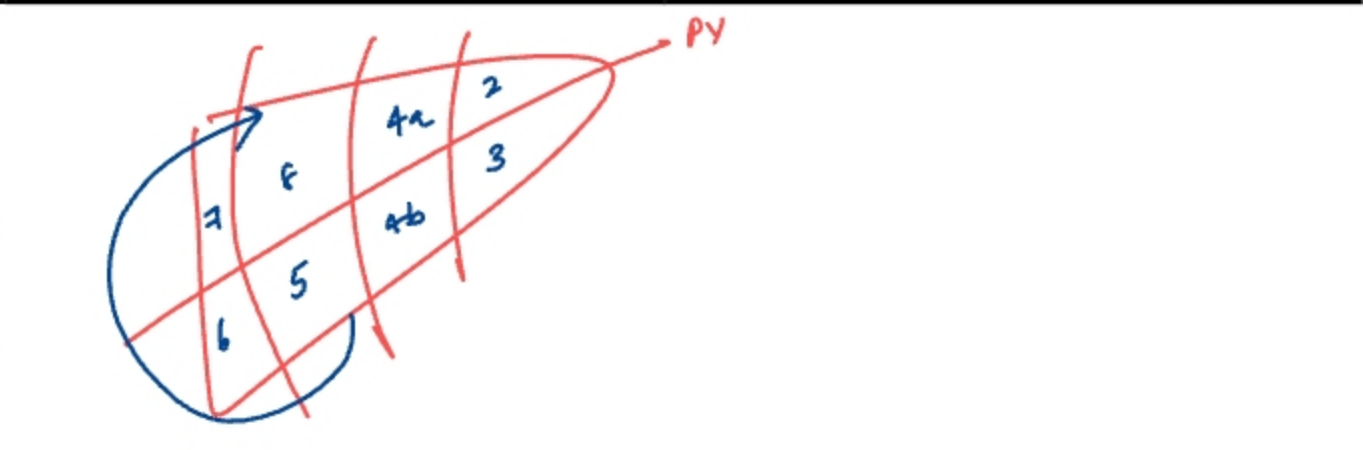
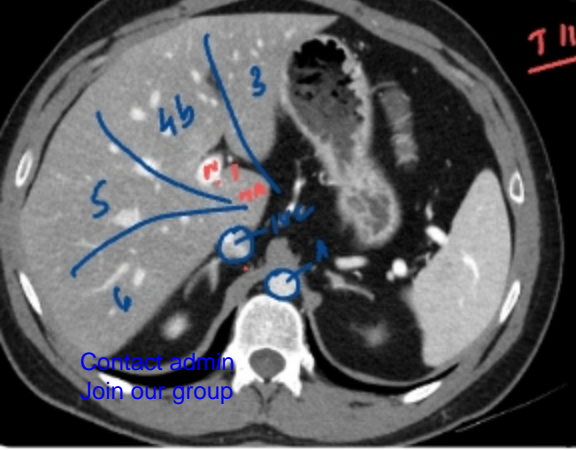
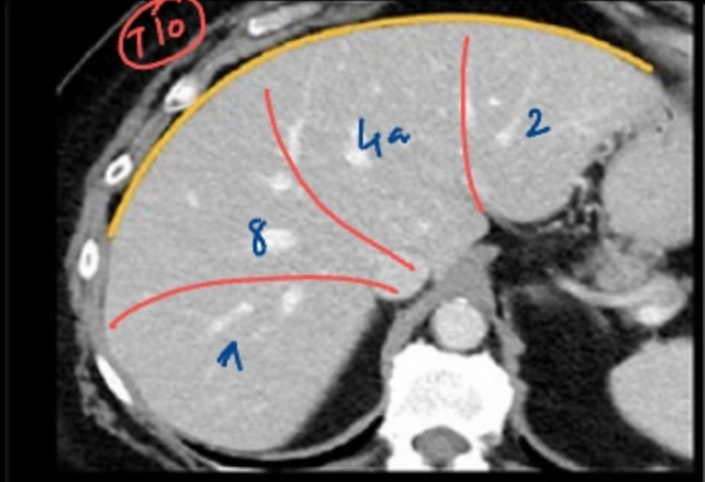
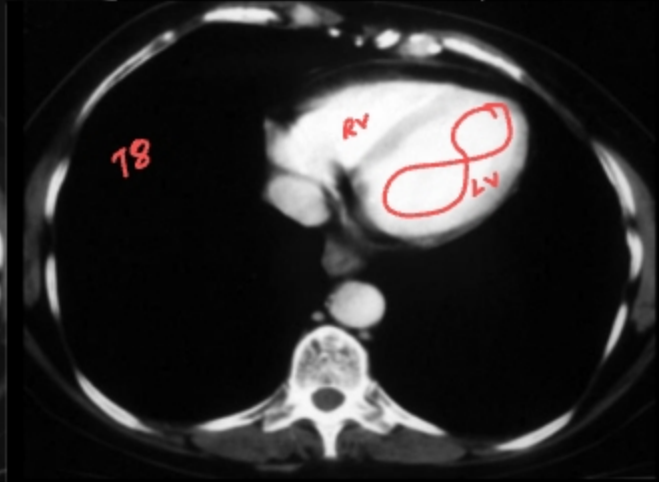
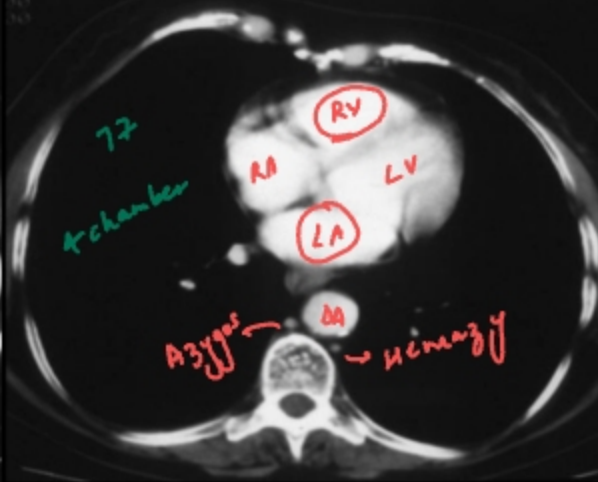
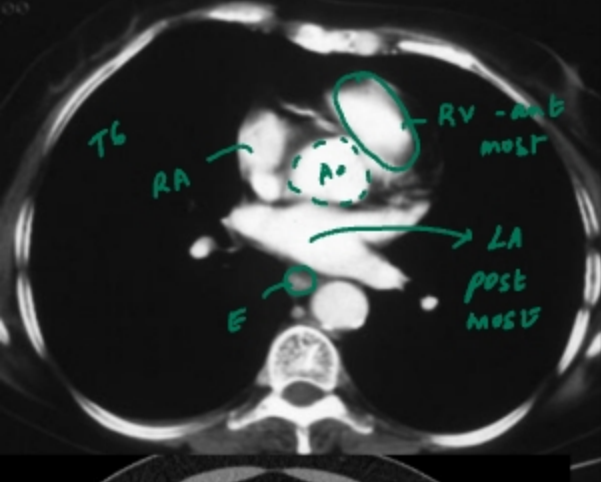
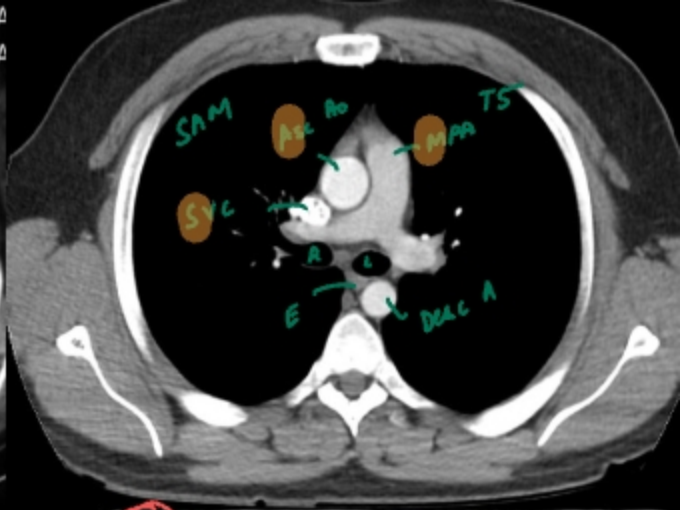
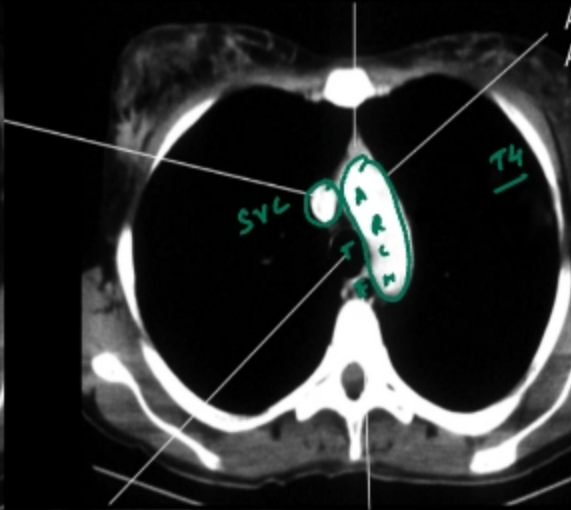
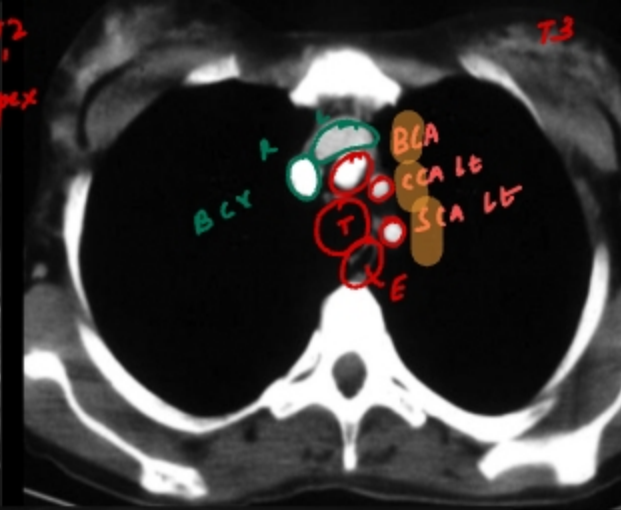
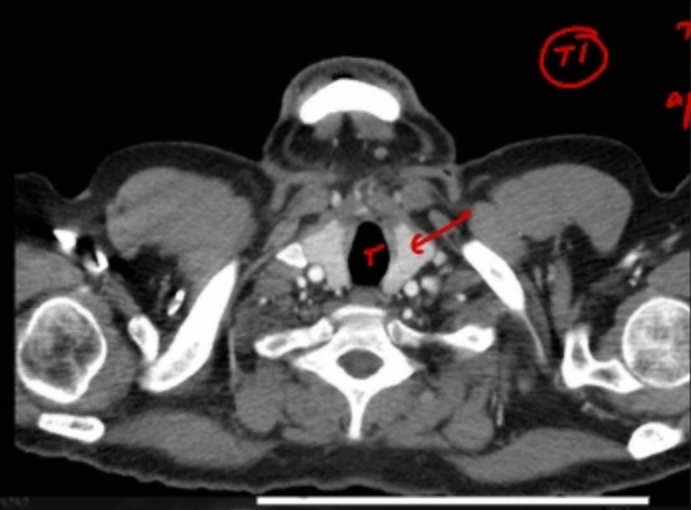
Rb EDH Lt SDH
- acute -



APPROACH TO FOREIGN BODY

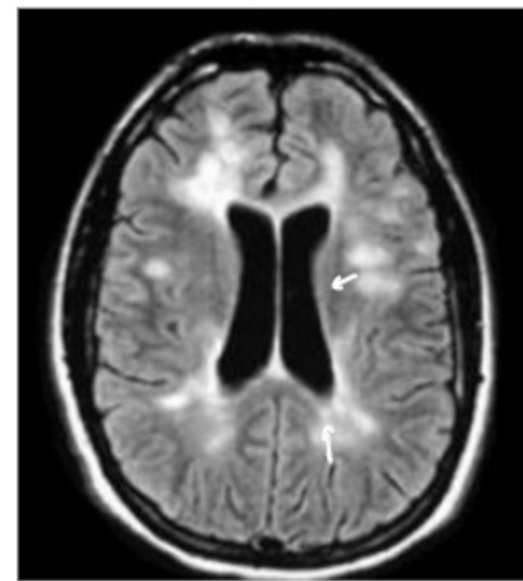
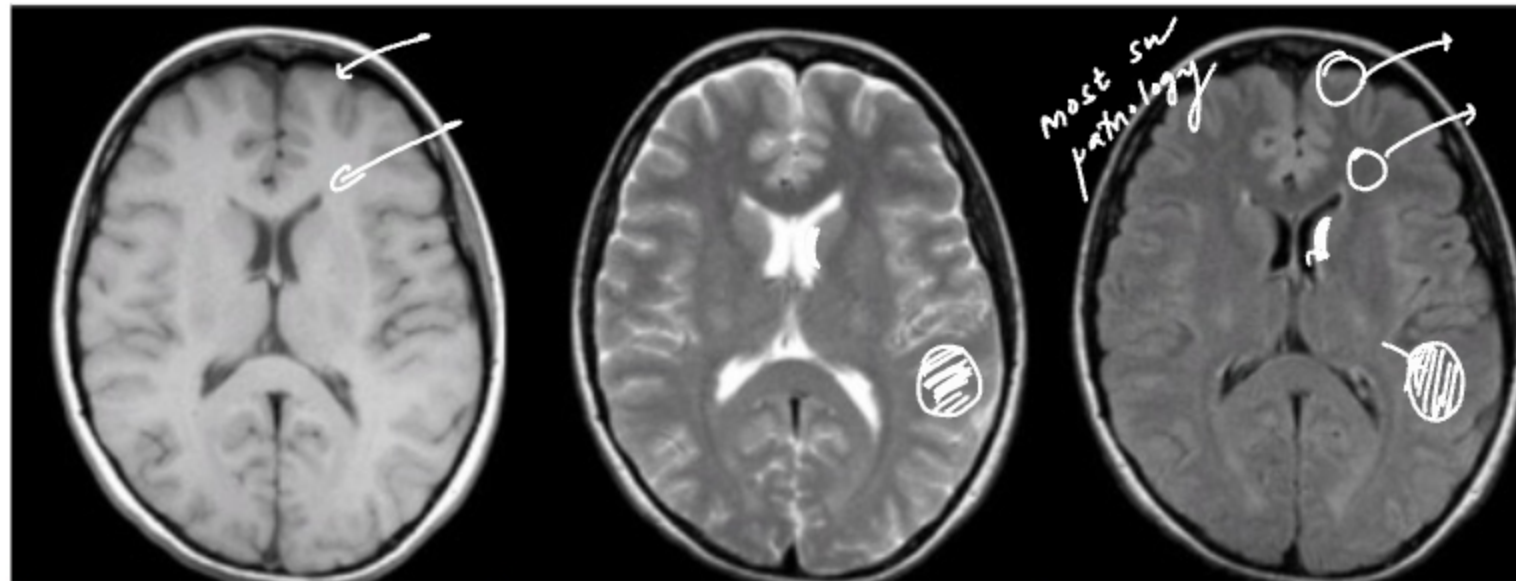
CHILD PLAYING ALONE - ACUTE





MRI

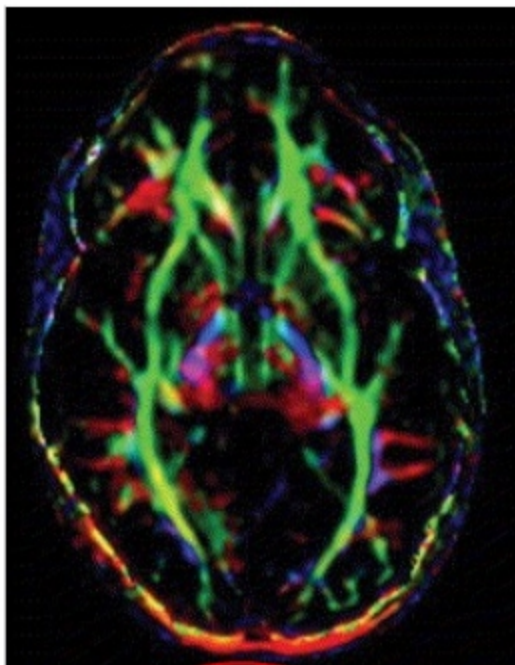
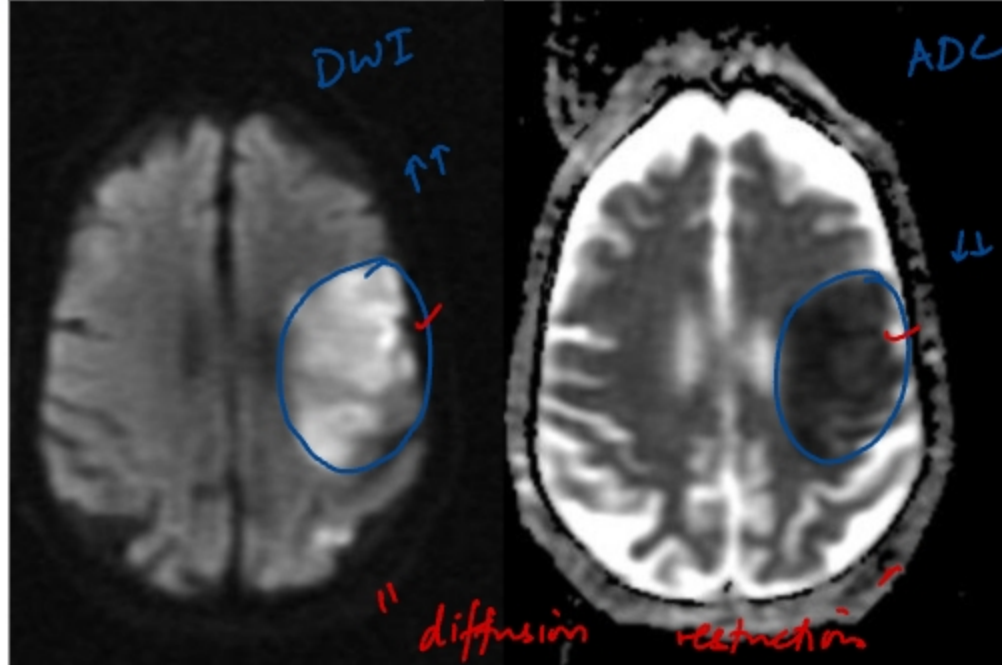
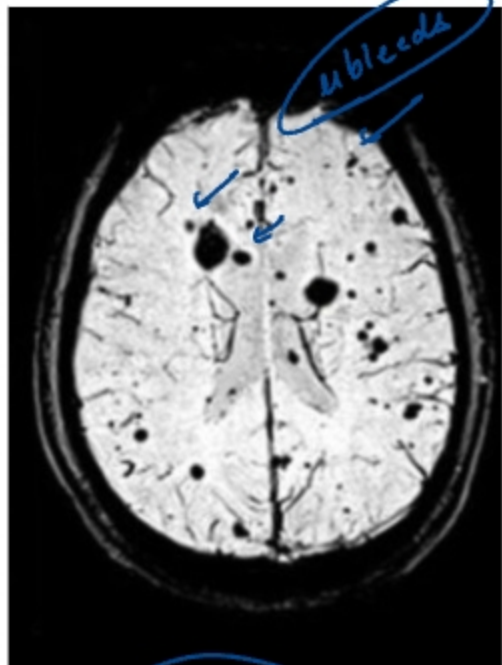
WW II



Dawson fingers
✓ FLAIR (MS)

SEQUENCE	T1w	T2w	FLAIR (T2 - CSF)
FLUID	Ⓣ	Ⓢ	CSF Ⓣ edema Ⓢ
GRAY MATTER	grey	white	white
WHITE MATTER	white	grey	grey
FAT	Ⓢ	Ⓢ	Ⓢ

MRI SEQUENCES



(T2 - fat)
STIR
IOC - BM edema

DAI
↓
SWI
susceptibility wt
imaging

Acute stroke
Initial / Next best : NCCT
Best / most sw : MRI - DWI

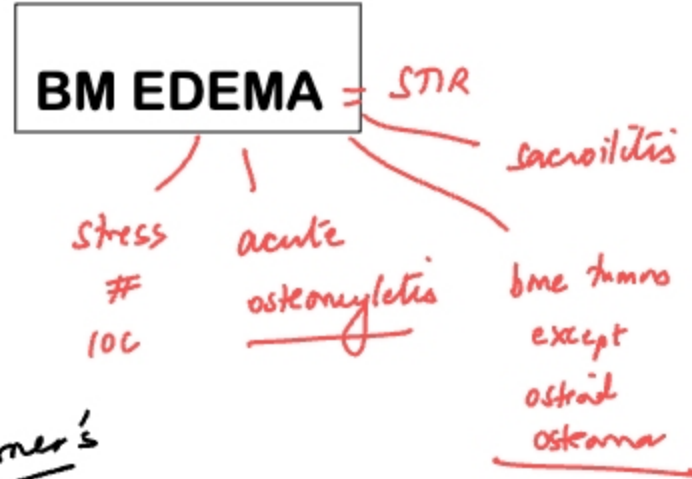
DTI
white matter
- Neuro Sx
- trauma



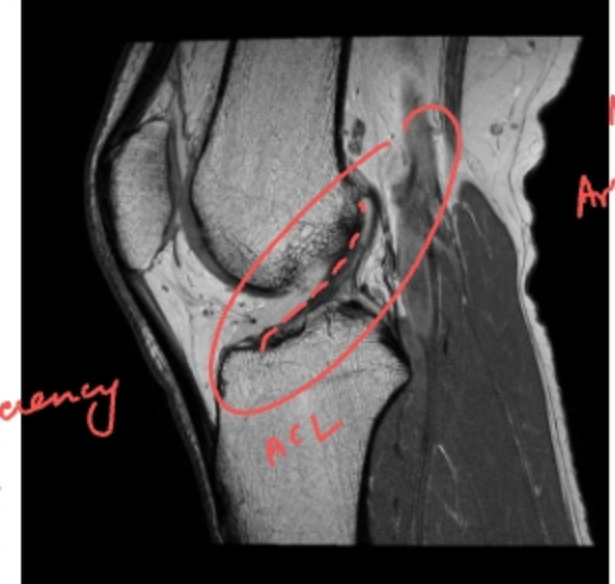
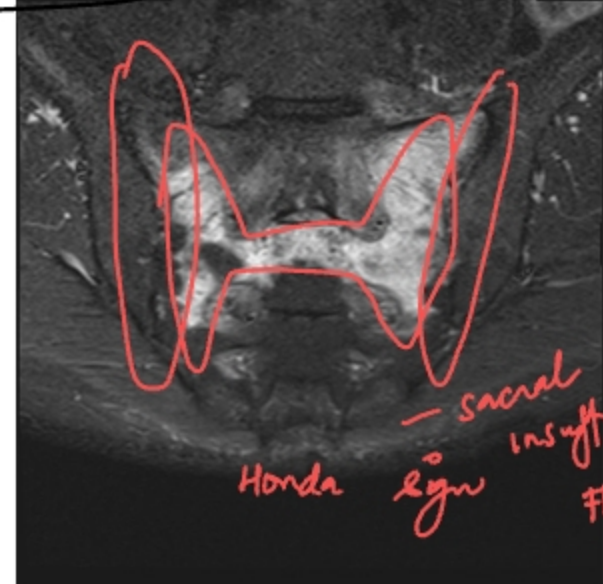
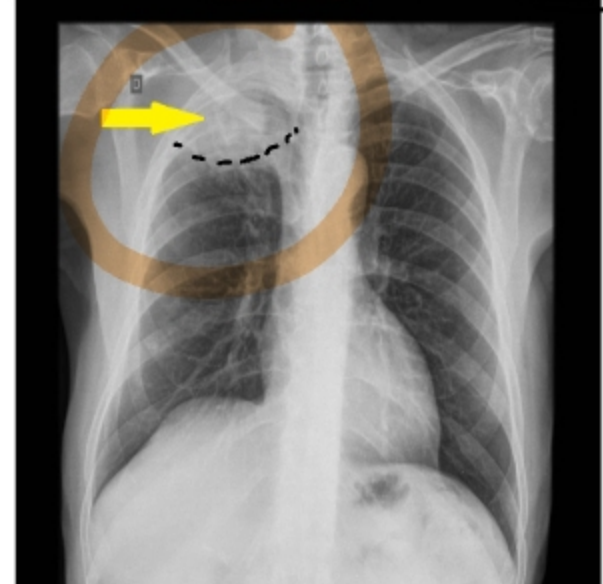
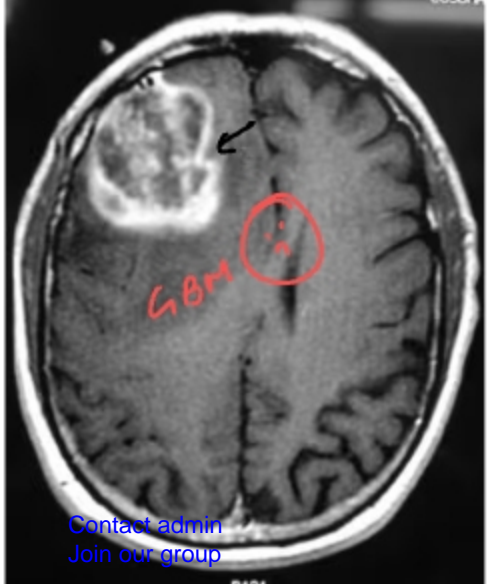
THUMB RULES-MRI



SC trauma: SCIWORA
 children
 Hitman • bv radiographic abn
 100: MRI
 Pancoast tumor → sup sulcus
 Horner's BP
 100-MRI

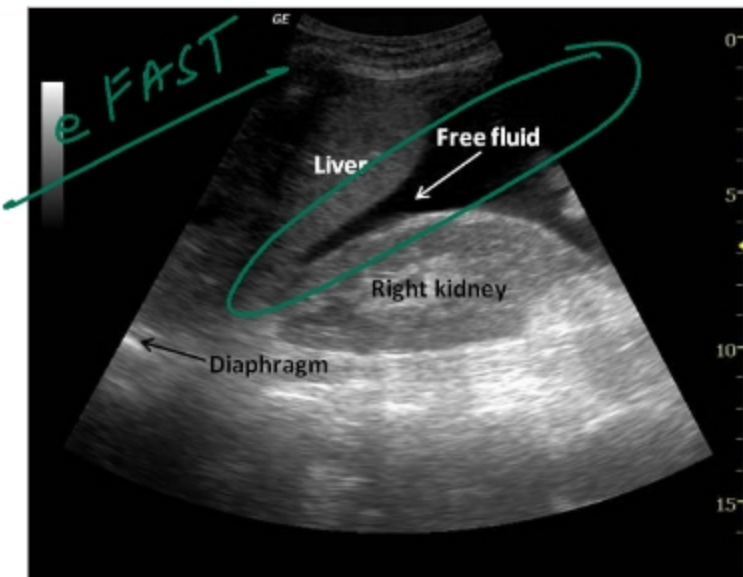
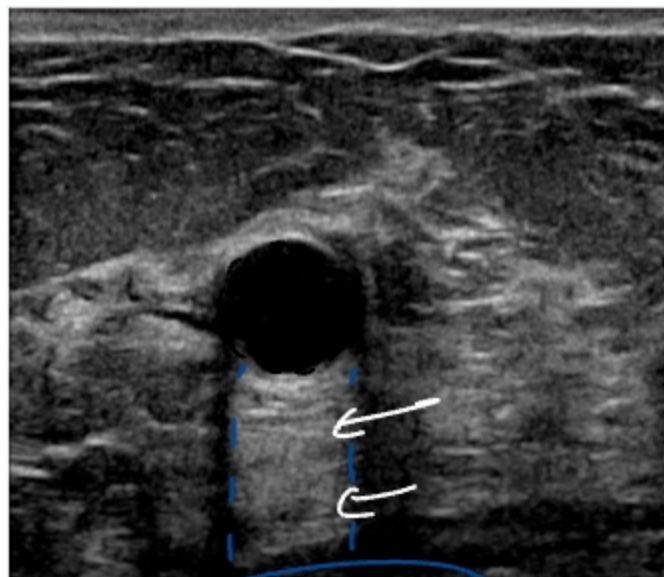
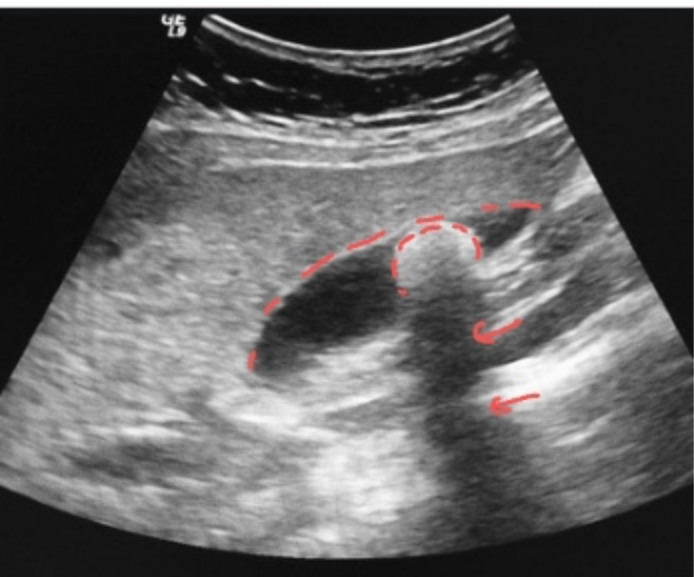


- LIGAMENTS
- CARTILAGE
- SOFT TISSUE



MRI IOC
 Arthroscopy: gold std

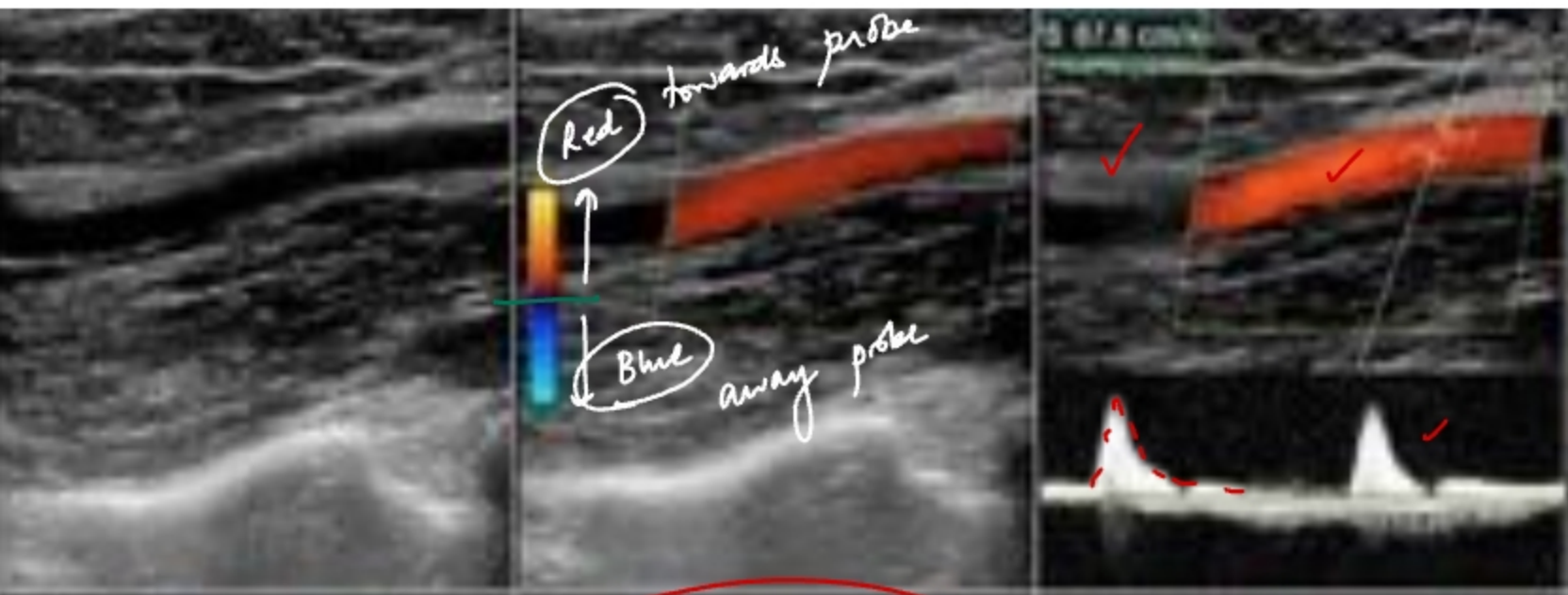
USG



post acoustic shadowing
|
CALCULUS
- gall bladder
100: USG
Bone
Ai
"dirty" shadow

anechoic +
post acoustic
enhancement
FLUID / cyst
100 - USG

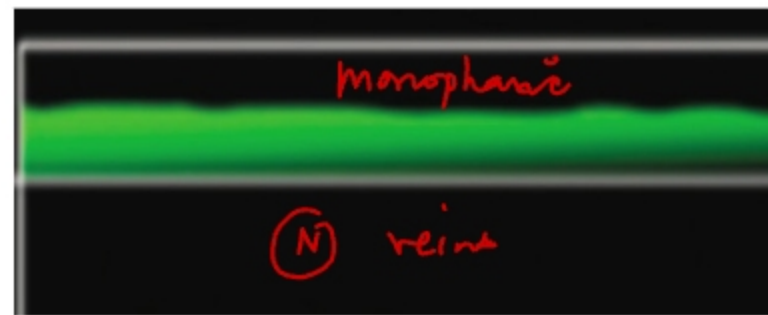
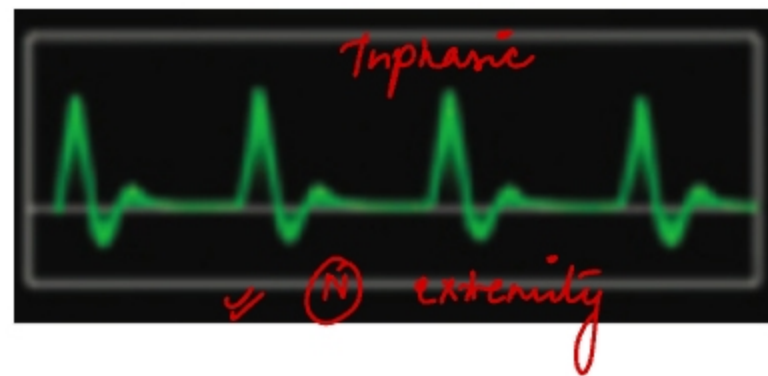
pl eff /
per eff /
ascites /
hemoperit]
100
USG



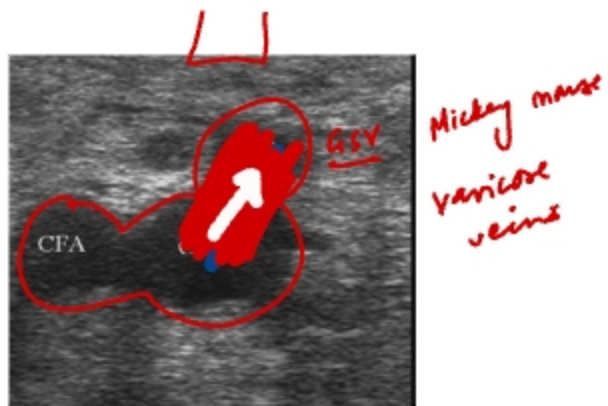
B-mode USG

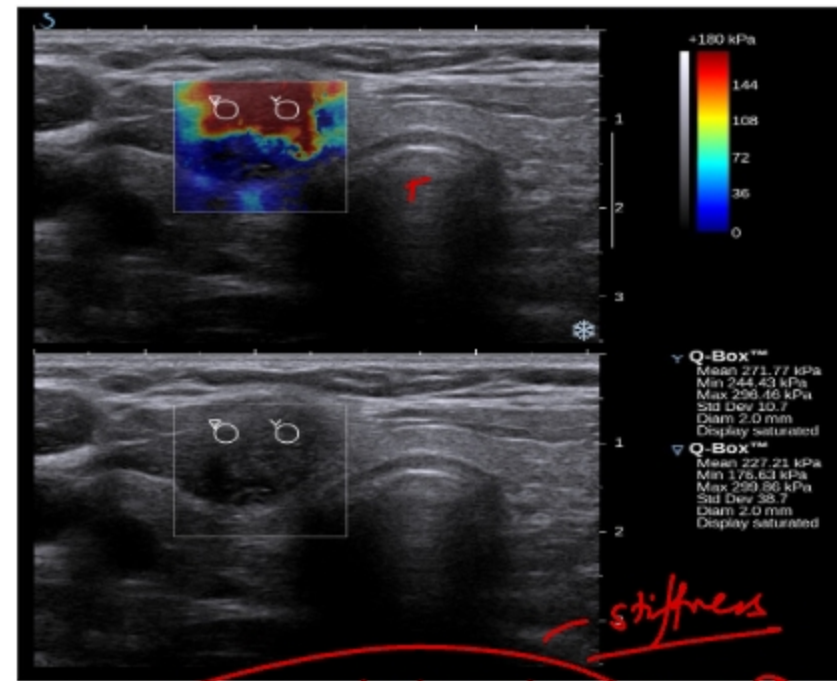
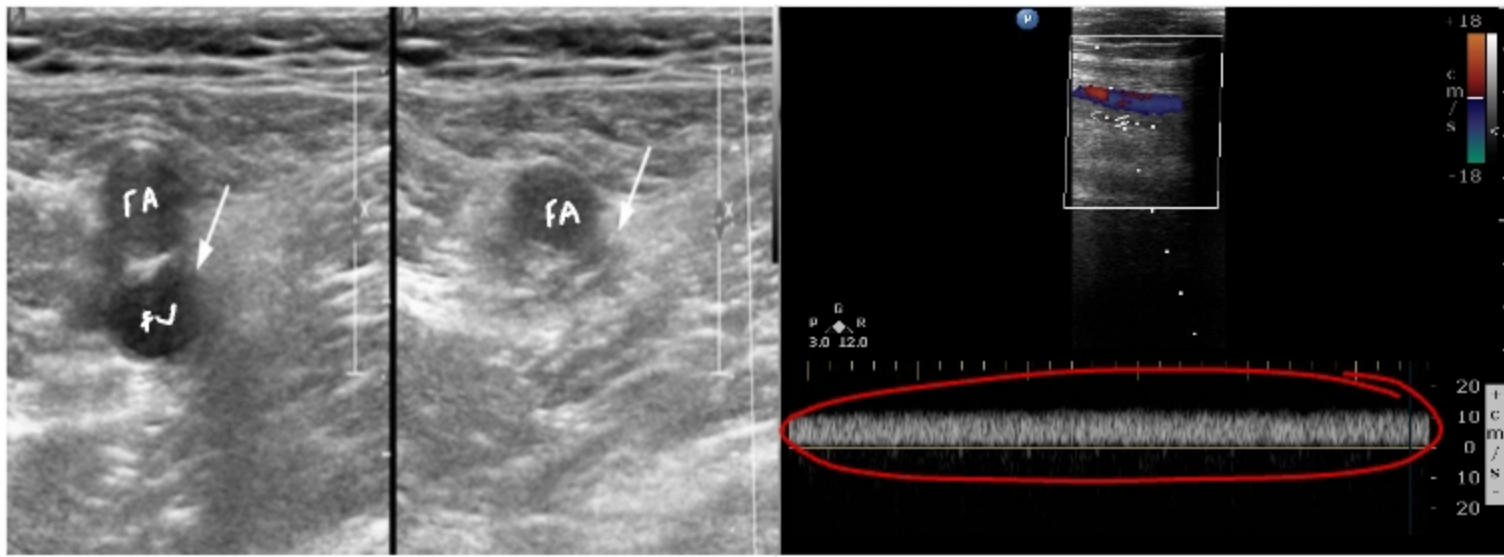
Colour doppler = duplex
 direction of flow

Spectral doppler =
 Triplex
 Velocity of flow



Doppler shift





stiffness

VSA elastography hard (😞)
(shear wave)

	NORMAL VEIN	DVT
COMPRESSIBILITY	<i>✓✓</i>	<i>non compressible</i>
FLOW	<i>monophasic</i>	<i>absent flow</i>



CEVS

THUMB RULES-USG

GALL BLADDER

100 - USG

FLUID 

CYST

✓ 100 - USG

PREGNANCY

1st line


USG MRI

Problem solving

Fetal anomalies

Placenta accreta spectrum

DVT

VARICOSE VEINS

100

Doppler
USA

ARTERIAL

DISEASES

1st - Doppler
USG

100 - CT

angiography

Gold std - DSA
dx + lg

femoral A (mc)

CONTRAST MEDIA

Contrast media	Modality	Route	Pre-requisite	Complication
IODINATED CONTRAST	Xray / CT	iv / any route	RFT (eGFR < 30 CI)	<p>→ PREVENT: Hydration (if fluids)</p> <p>CIN - Contrast Induced N AKI \leq in 48hr of expo > 0.3 mg/dl absolute / > 50% from baseline</p>
GADOLINIUM	MRI	iv	RFT	NSF Nephrogenic systemic fibrosis
SONOVUE SF₆ bubbles	USG	iv	sulfa allergy n/o	Safe in renal F ^{RQ}
BARIUM SULFATE	Xray	oral / enema	perforation / obstruction / TEF / post-op	<p>→ CI } iodinated contrast preferred</p> <p>iohexol } gastrografin</p>

GI and HBP RADIOLOGY

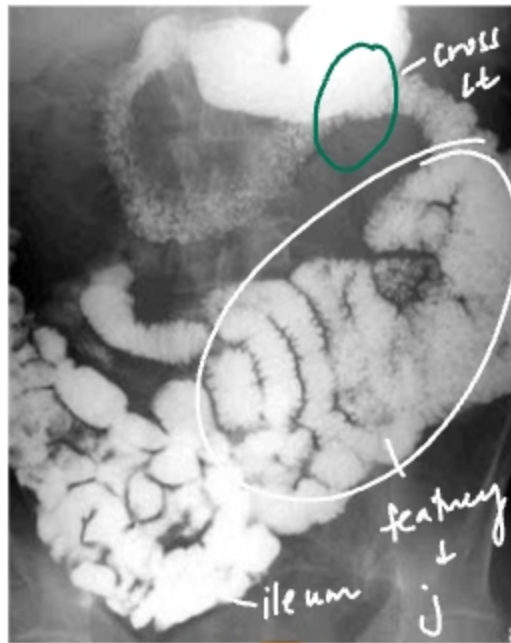
BARIUM PROCEDURES



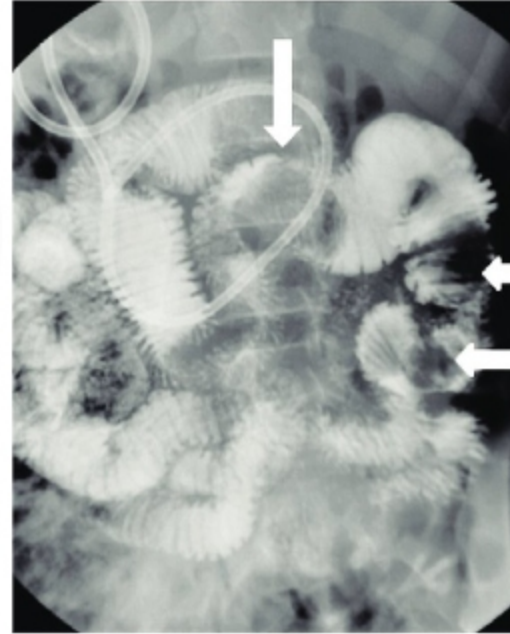
Ba Swallow
↓
Esophagus



Ba meal
↓
Stomach / prox duodenum



BMFT
↓
Small bowel
j  valvulae conniventes / v. of Kerkring
i 

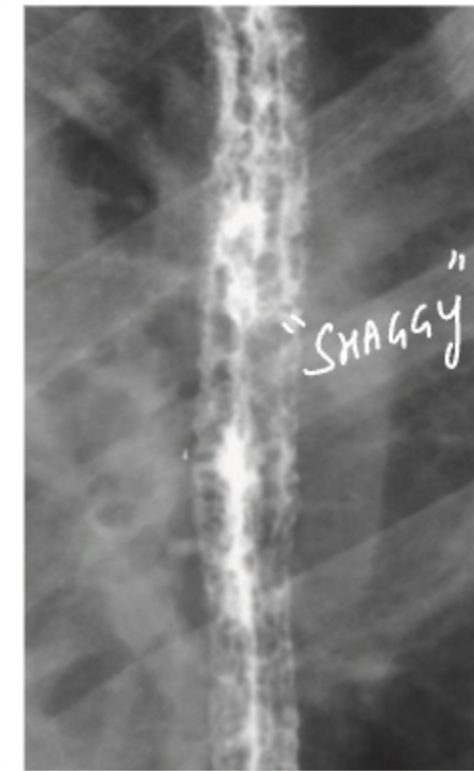
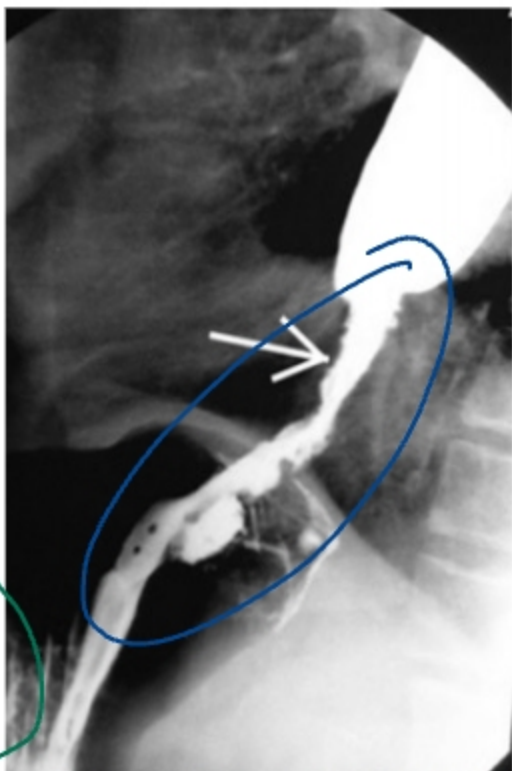
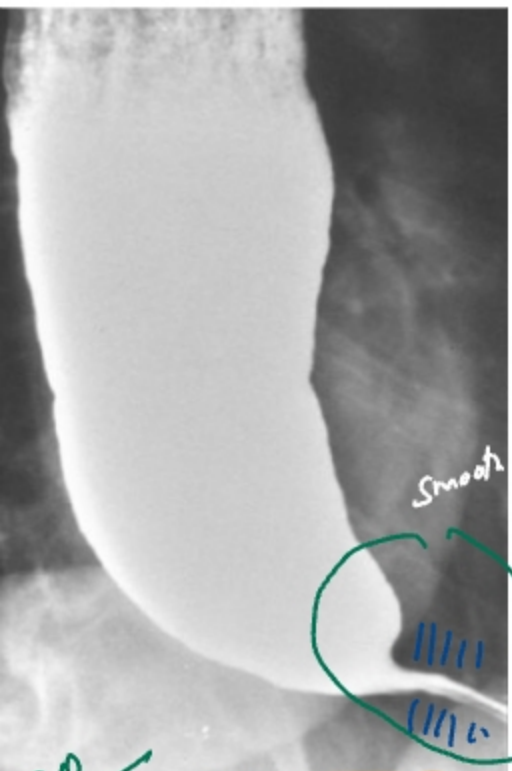


Ba enteroclysis
• TUBE ⊕
• Distension better



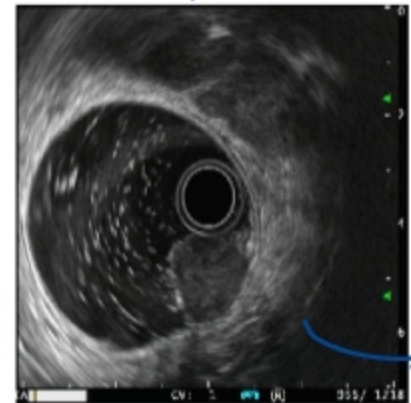
Ba enema
{ } - Haustra^m

ESOPHAGEAL PATHOLOGIES



ACHALASIA
 .VIP/NO xx LES
 .Motility
 IOC: Manometry
 Dysphagia: liq \geq solids
 Bird beak > Rat tail

CANCER ESOPHAGUS
 Rat tail sign

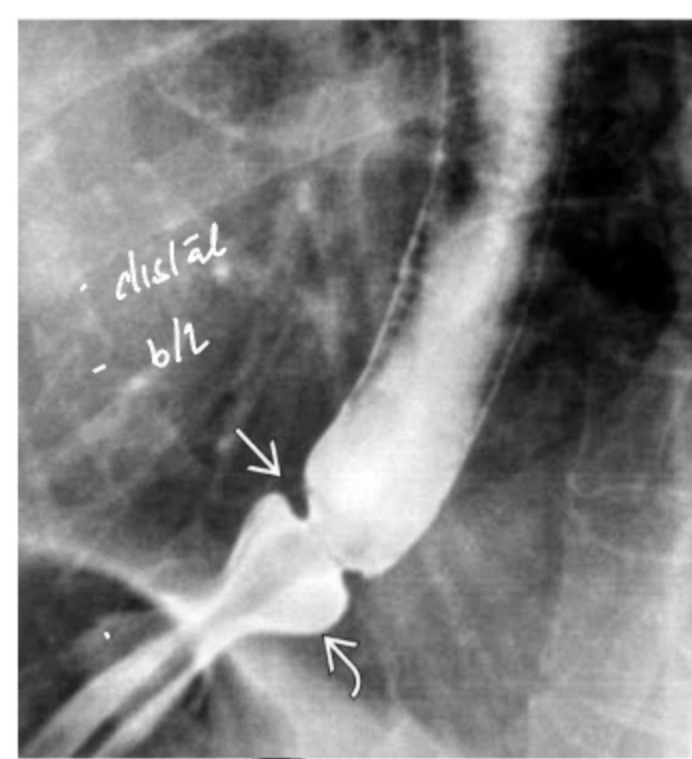


IOC: V4IE
 + bx
 Dysphagia:
 solid > liq
 EUS: IOC: T/N staging

Thin, esophagus
 Eosinophilic
 esophagitis

h/o HIV/AIDS
 ↓ Esoph
 Candidiasis
 (AIDS defining)
 (empirical Fluconazole)
 ↓ V4IE
 "volcano" punched out
 "raggedness"
 HSV CMV

Corkscrew
 ↓
DES



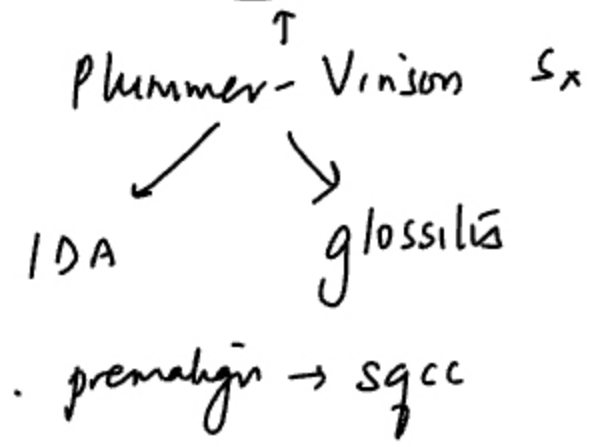
Zenker's D

- Killian dehiscence

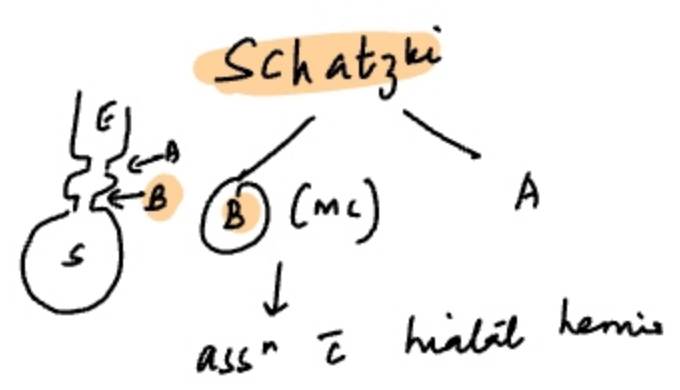


- Falck
- Pulsions

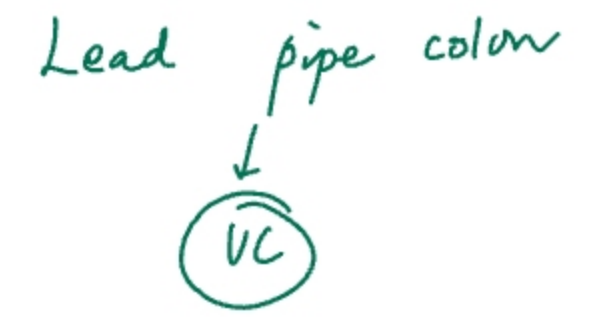
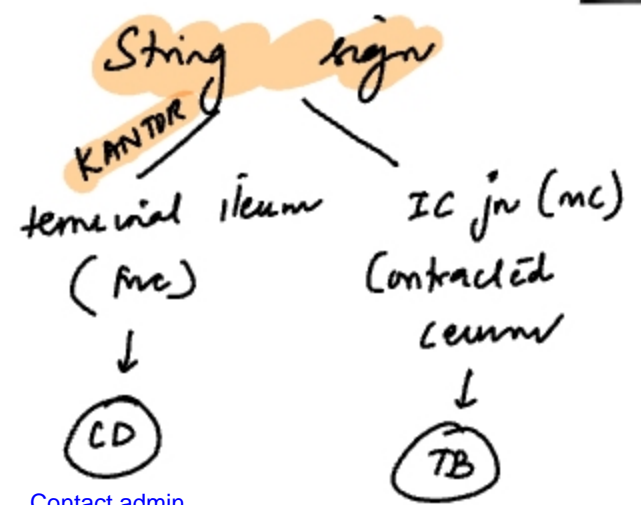
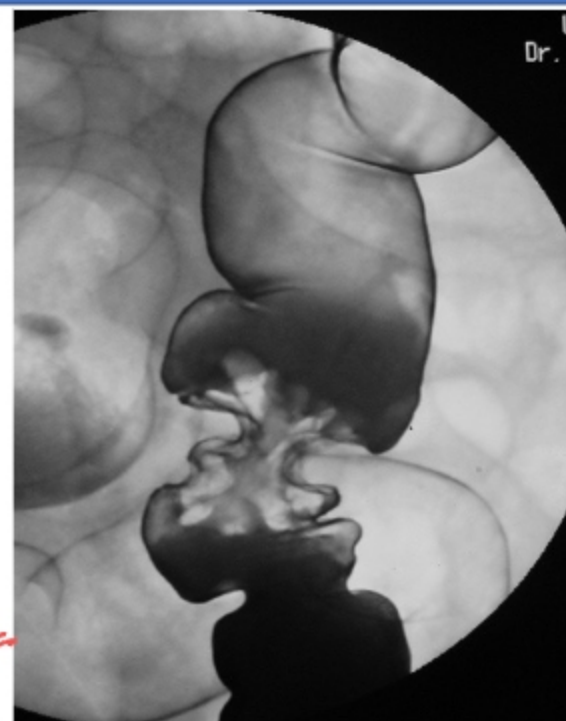
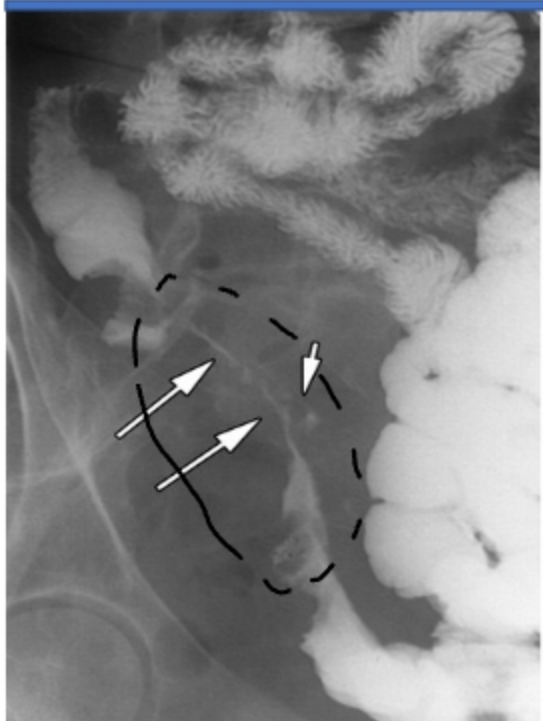
WEB



RING

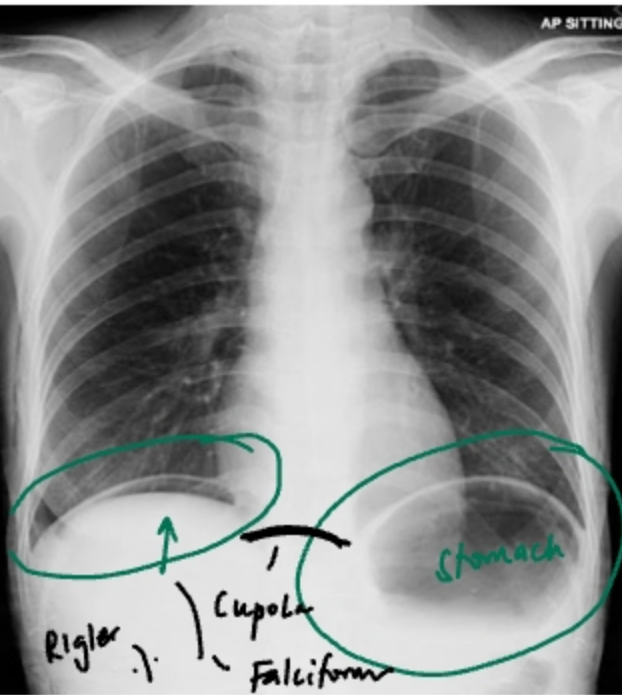


IMPORTANT BARIUM SIGNS



Apple core
+
Ca colon

PNEUMOPERITONEUM



Rt air under diaphragm

Acute pain abdo + guarding rigidity

↓

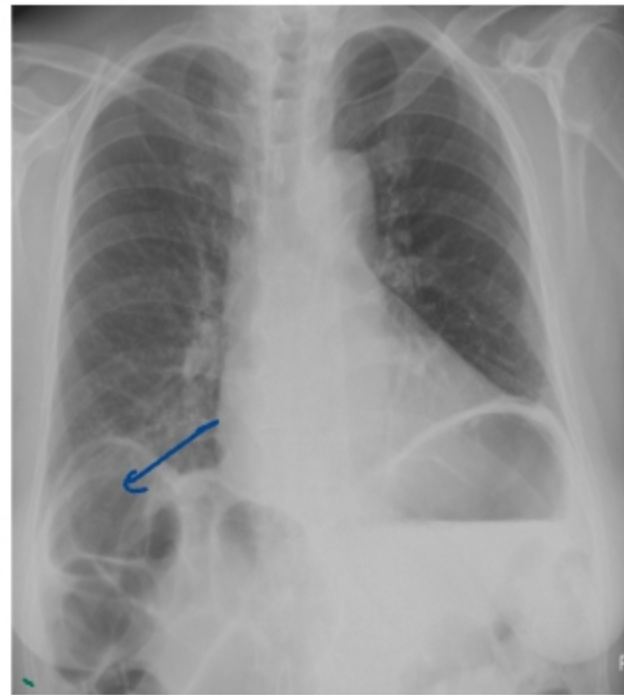
Perforⁿ / pneumoperitoneum

Next: CXR - PA erect

↓

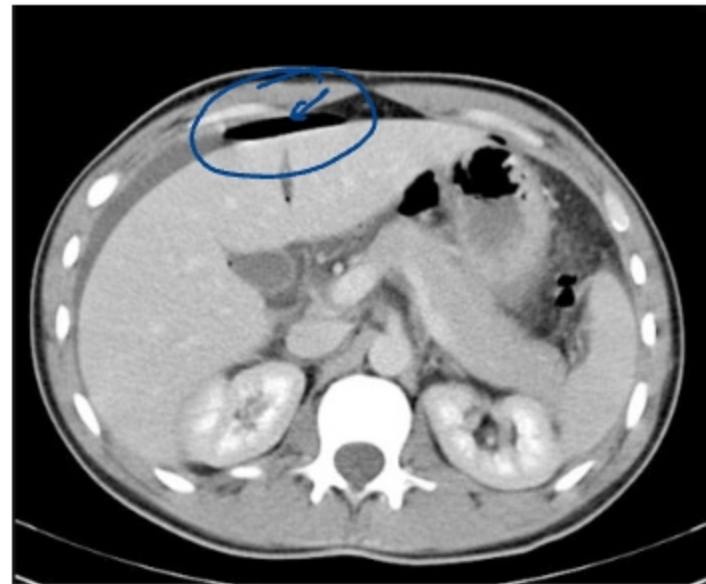
Next: iv fluids

Best/definitive: Expl lap



Chiladiti Sx

pseudopneumoperit



IOC: CECT + oral iodinated contrast

Ba - CI

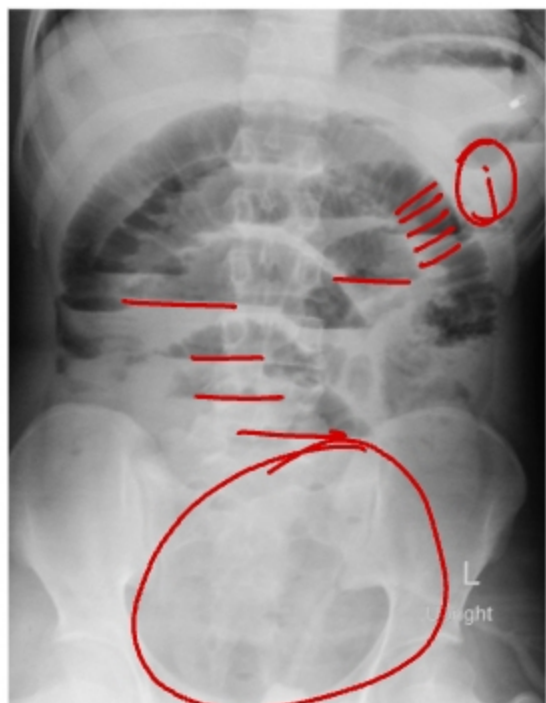


Football sign
NEC 3b

APPROACH TO INTESTINAL OBSTRUCTION

Pain abdomen + Obstipation + Abdominal distension + Vomiting : IV fluids / NPO / NG tube

Next: AXR



Proximal SBO

	SBO - <u>mc</u>	LBO
MC Cause	adhesions (prior Sx)	Cancer rectum
Distribution	central	peripheral
Diameter	>3cm	>6cm
Valvulae conniventes	++	-
Stepladder sign	++	-
Haustra	-	++
Mx	conservative	Sx (Hartmann's)

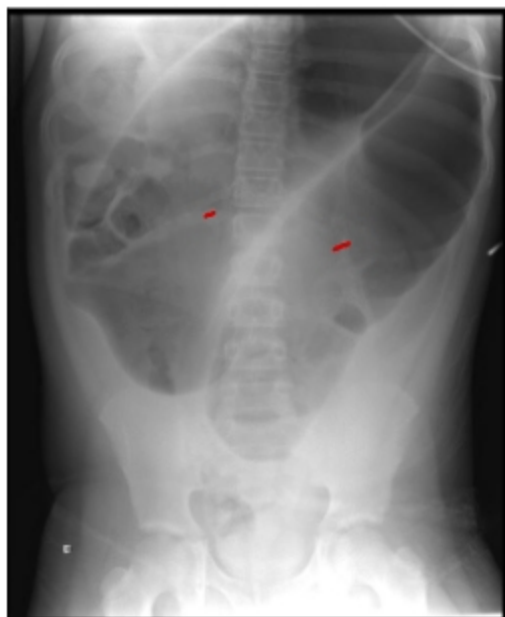


3-6-9 : SB >3cm LB >6cm Cecum >9cm abN

Paralytic ileus: bowel sounds / post op / electrolyte imb / no transition zone

Mx -> underlying cause -> cholera + (neostigmine)

SIGMOID VS CECAL VOLVULUS



coffee bean

Sigmoid volvulus

R/F - chr constipation

← ahaustral
2 bowel loops

Rp - Flatus tube/
endoscope



C-sign

Cecal volvulus

✓ haustra

✓ single loop

R/F - pregn
↳ pelvic Sx

Rp - Sx

GU RADIOLOGY

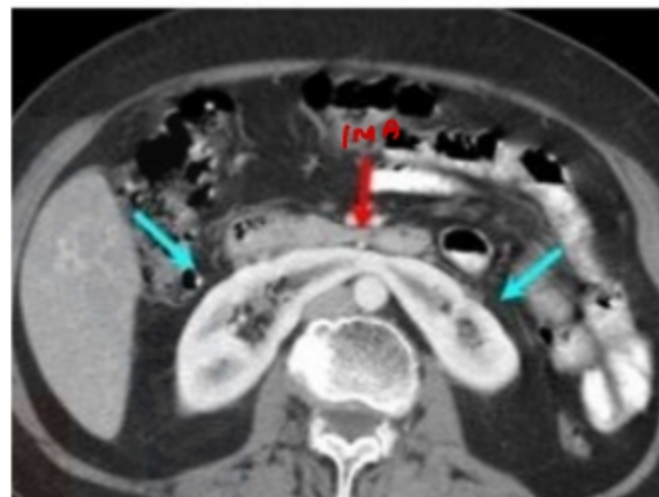
IVP Intravenous pyelography / urography



Hydronephrotic cyst
Adder head / cobra head

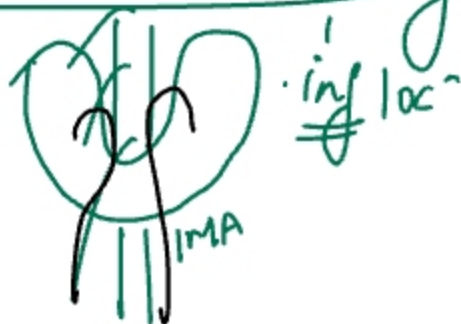


Shaking hand /
Flower vase sign

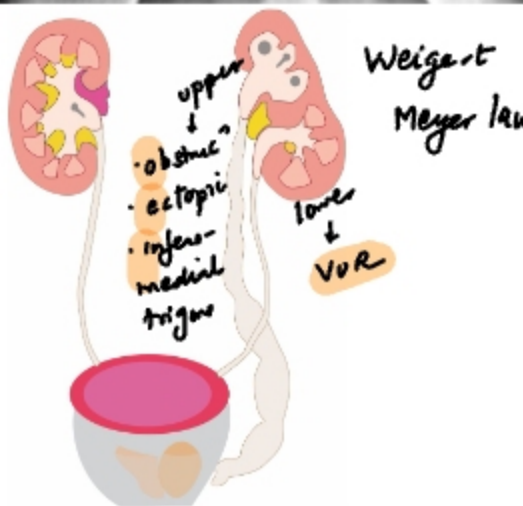


- stasis / obstructⁿ / calculus
- Turner Sx

Horse shoe kidney

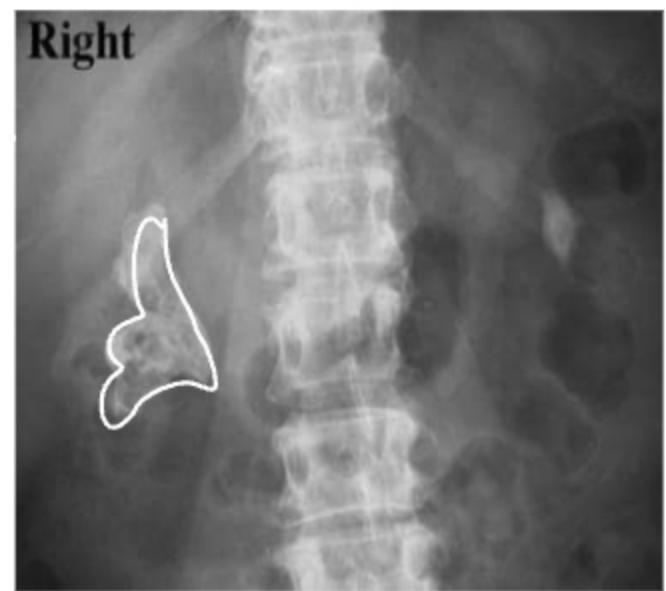


Duplicated collecting system
Drooping lily sign



'WHITE KIDNEY'-PATTERN APPROACH

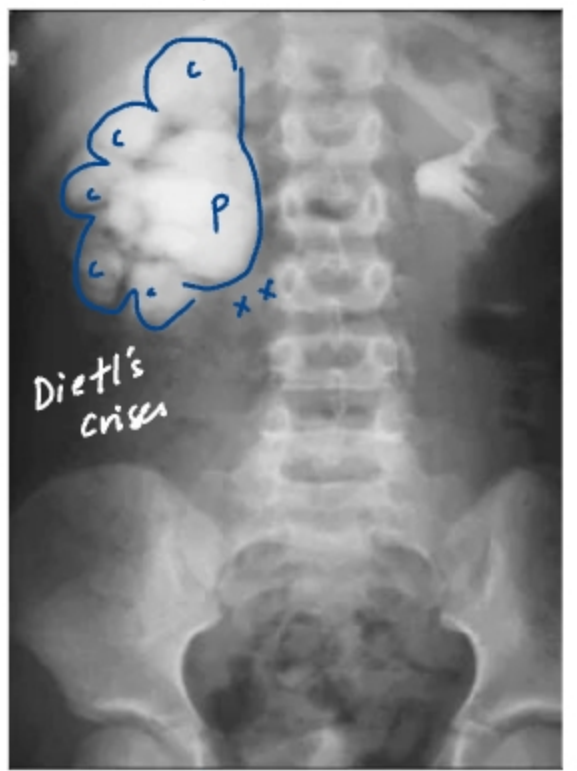
IVP: Anderson-Hynes
AP - pyeloplasty



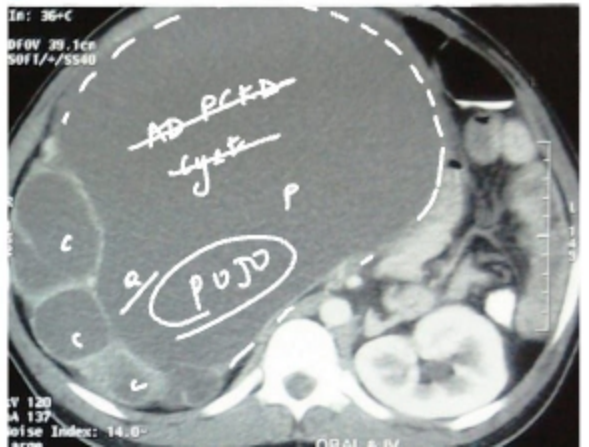
Staghorn calculus
Struvite



Medullary nephrocalcinosis
 • ↑ Ca²⁺ - hyperPTH^a
 • Medullary sponge kidney

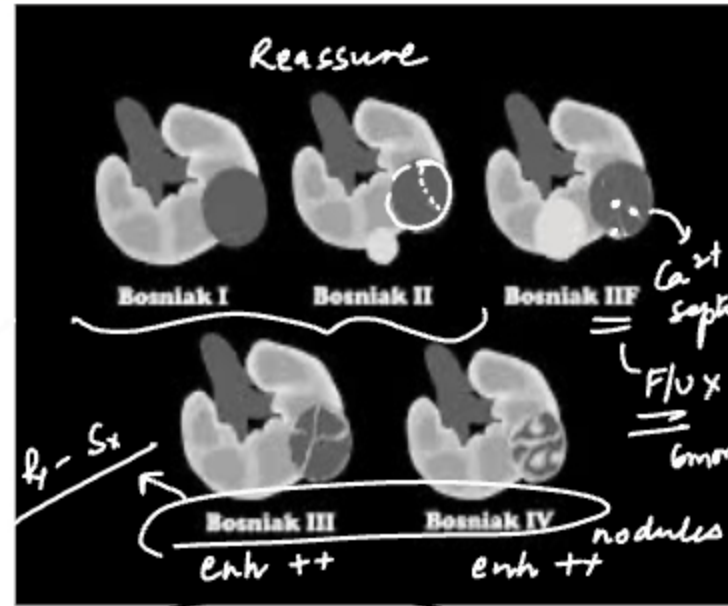
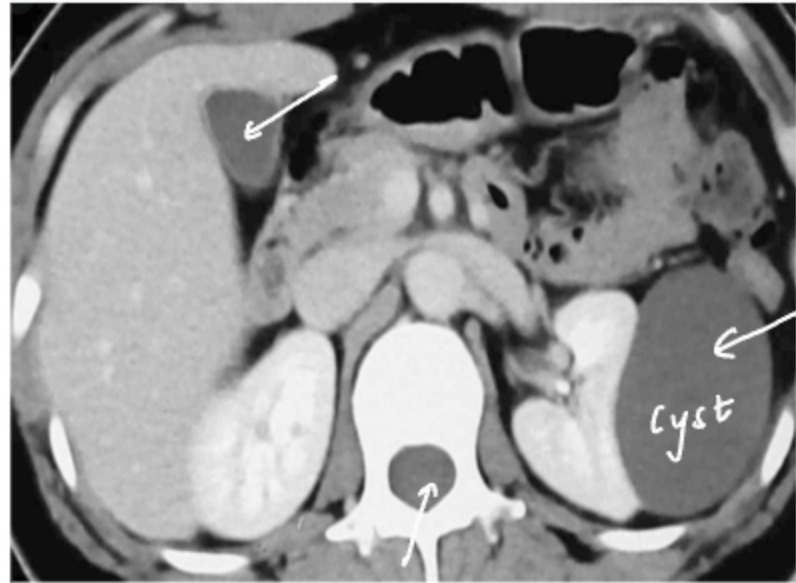


PUV obstructⁿ

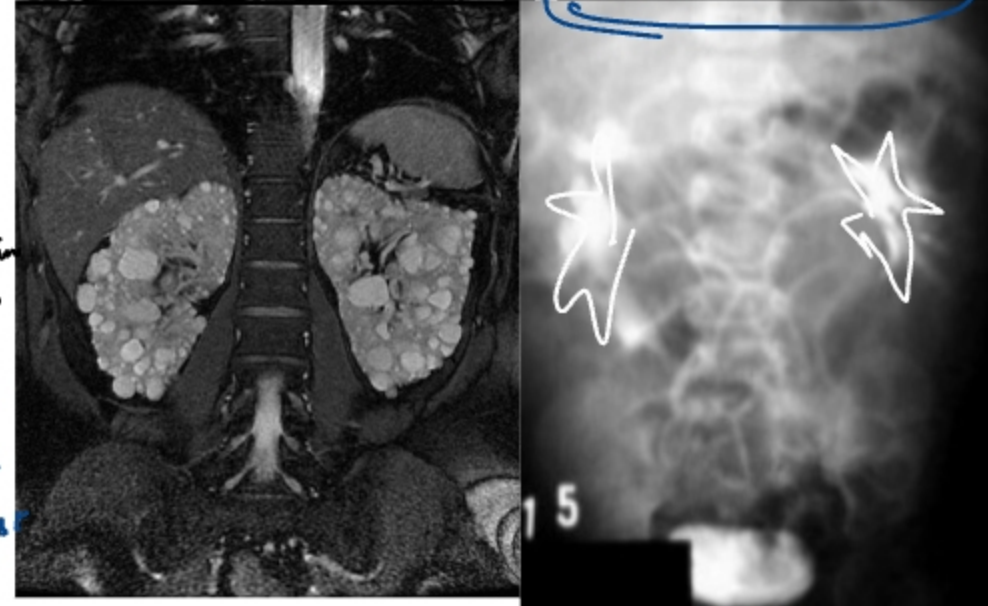
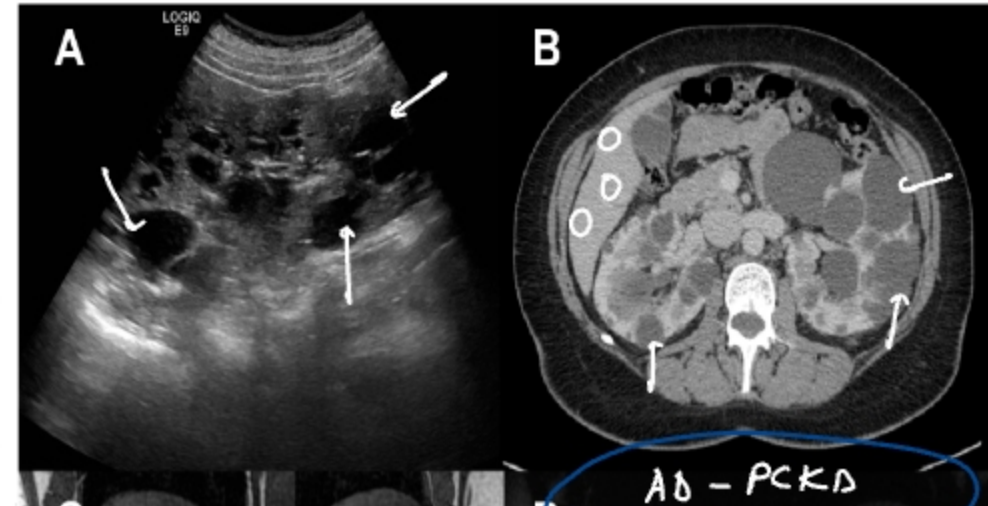


PUTTY KIDNEY
 - end stage GU TB
 P - hemogeneous route
 earliest: moth eaten - IVP
 calyx
 • pipestem ureter / golfhole ureter^a
 • double UB - ↑ freq (mc C/F)
 Contact admin
 Join our group
sterile pyuria → Urine AFB

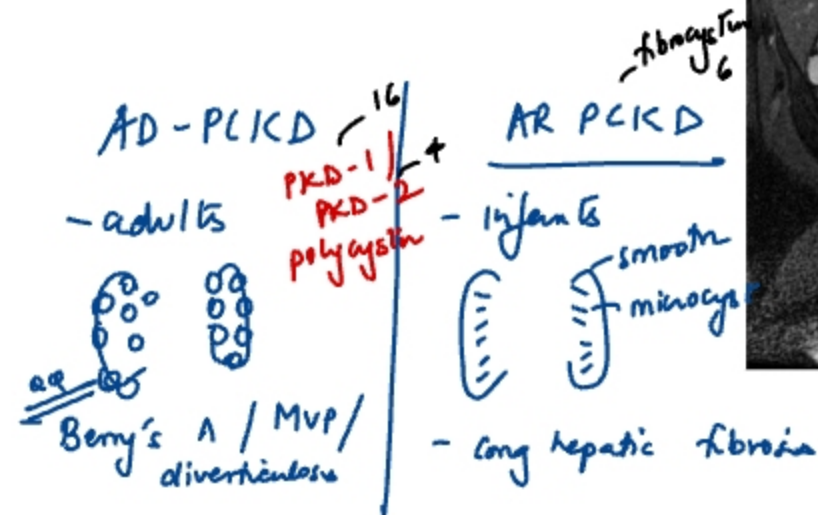
RENAL CYSTS



BOSNIAK



Spider leg / Swiss cheese
sup cheese

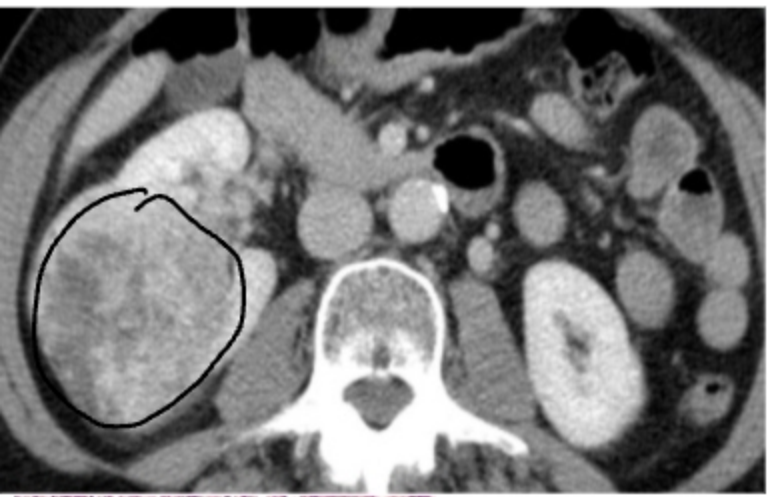


RENAL MASSES

IOC → CECT
 mc ACC: clear cell

best progn: Chromophobe
 worst progn: Duct of Bellini > clear cell
 child (RCC): Xp11 translocⁿ

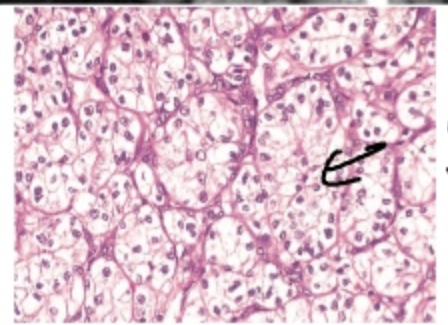
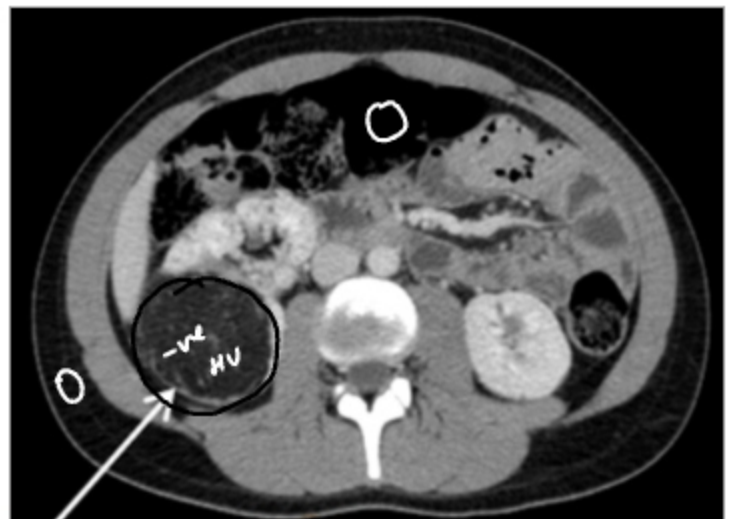
Clear cell RCC



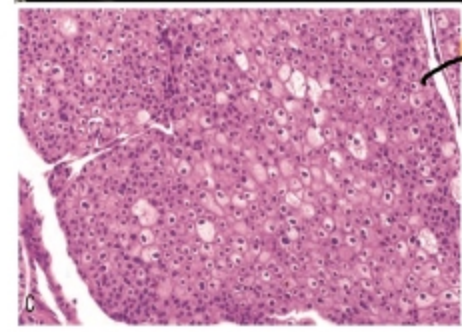
Oncocytoma / chromophobe RCC



side cell tract:
 medullary RCC
 dialysis / fumarate dH / histiny 7/17
 ↓
 papillary RCC



glycogen / lipid
 PAS +
 duct sn



Chromophobe
 (PLANT cells)
 raisinoid N
 'tan coloured'
 Hale's colloidal Fe

AML Hamartoma
 TSC
 Rx - Everolimus
 mTOR ⊖

Hematog mets

VHL 3p

Cerebellar hemangioblastoma, Pheochromocytoma

Birt-Hogg-Duke

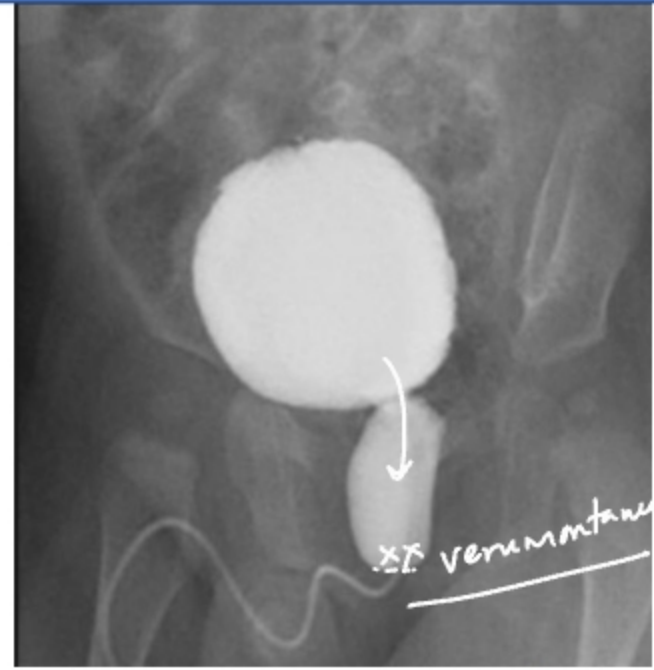
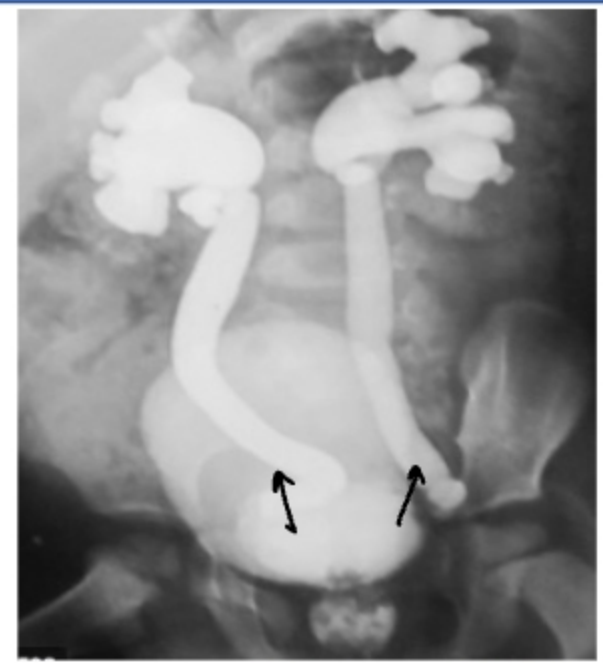
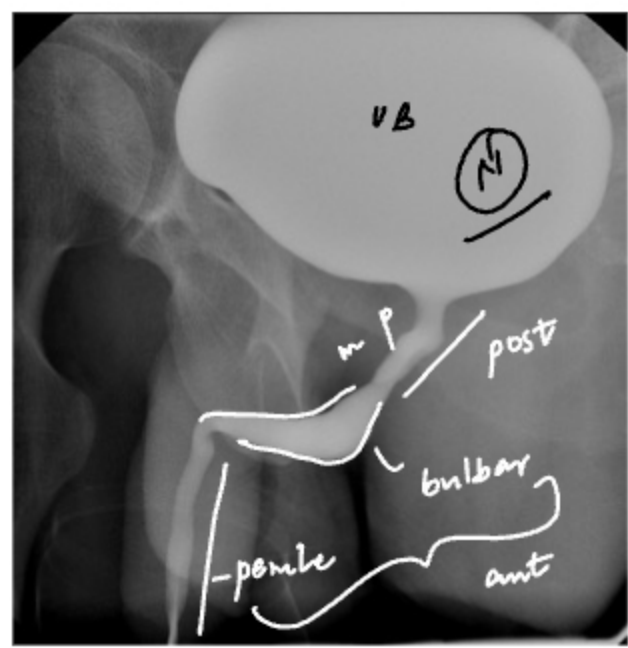
Lung cysts, fibrofolliculomas (Folliculin)

TSC
 Seizures, adenoma sebaceum

RP hemorrhage: Wunderlich Sx

MCU / VCU

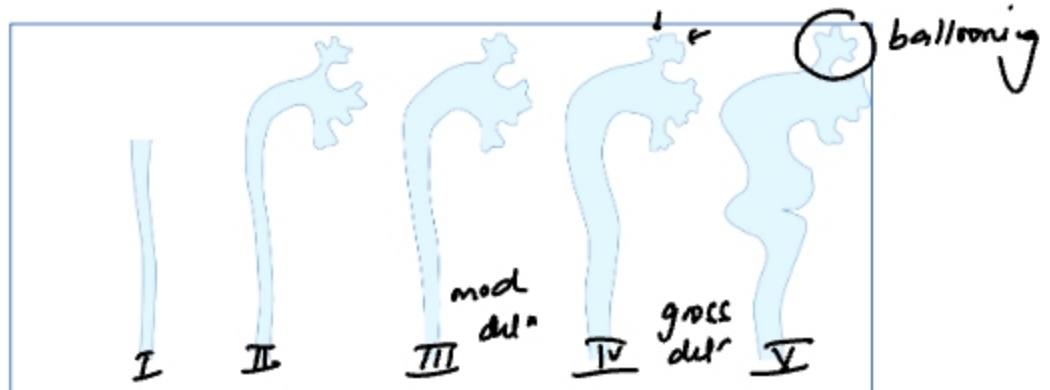
Foley's → 300ml contrast + saline → VOID → Xray



mechanism of congenital urinary obstruct

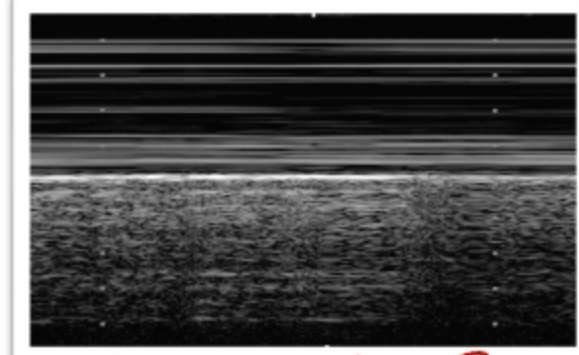
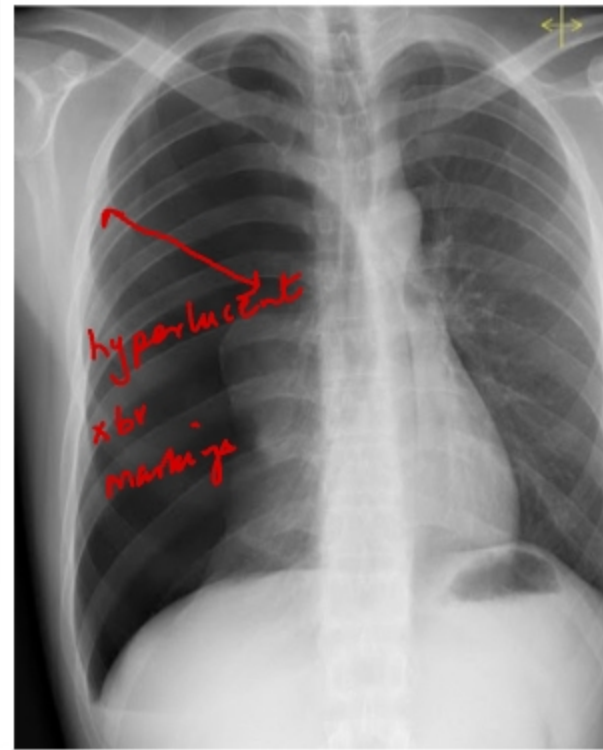
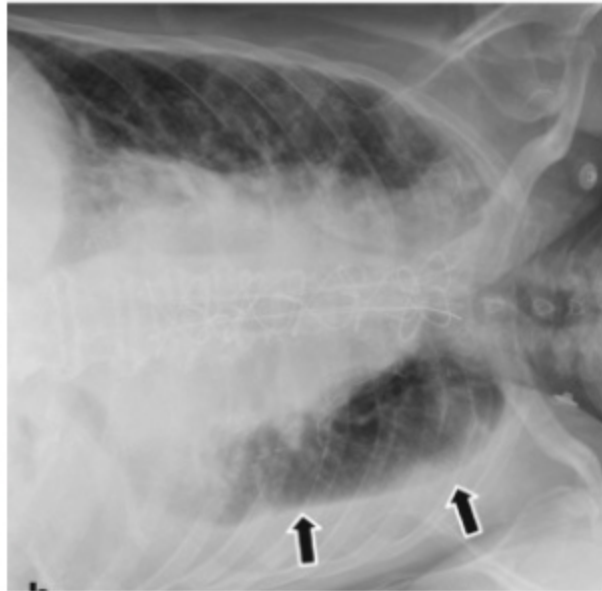
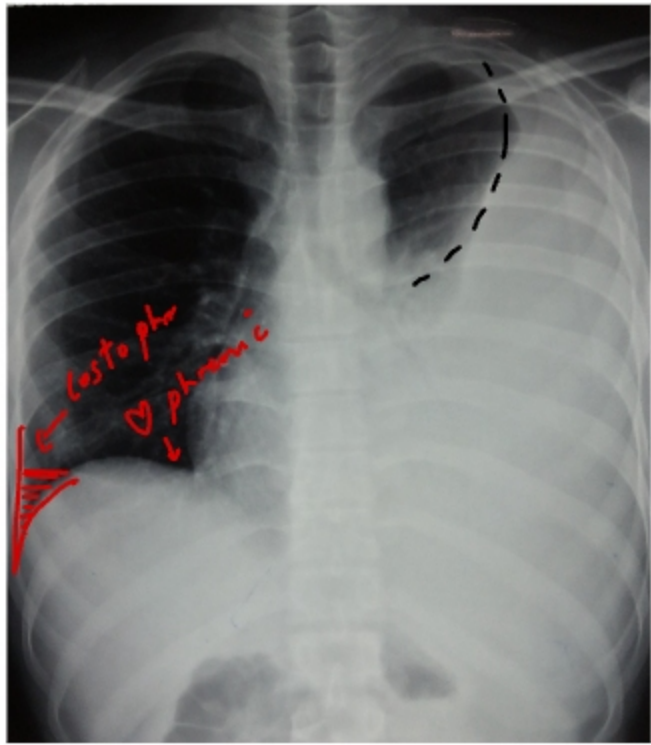
PUV

Rx - endoscopic ablation

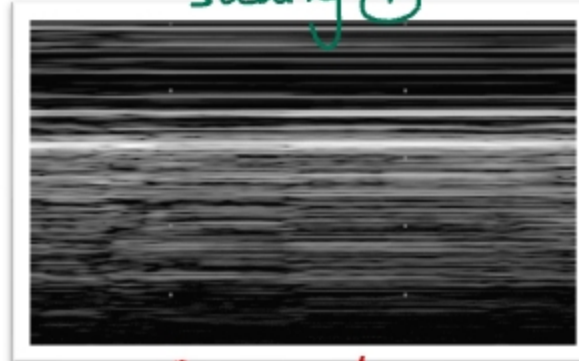


THORACIC RADIOLOGY

PLEURAL EFFUSION - PNEUMOTHORAX



Seashore sign - (N)
Sliding (+)



Barcode / - Ptx
Stratosphere /

Loss of sliding

SIGN: Meniscus sign
EARLIEST FINDING: Blunting CP L
MEDIASTINAL SHIFT: C/L
MOST SENSITIVE IX: USG (~5ml)
MOST SENSITIVE XRAY: Lateral decubitus (nas-50ml)
 i/l

MEDIASTINAL SHIFT: C/L shift
MOST SENSITIVE IX: CT
MOST SENSITIVE XRAY: Expiratory CXR

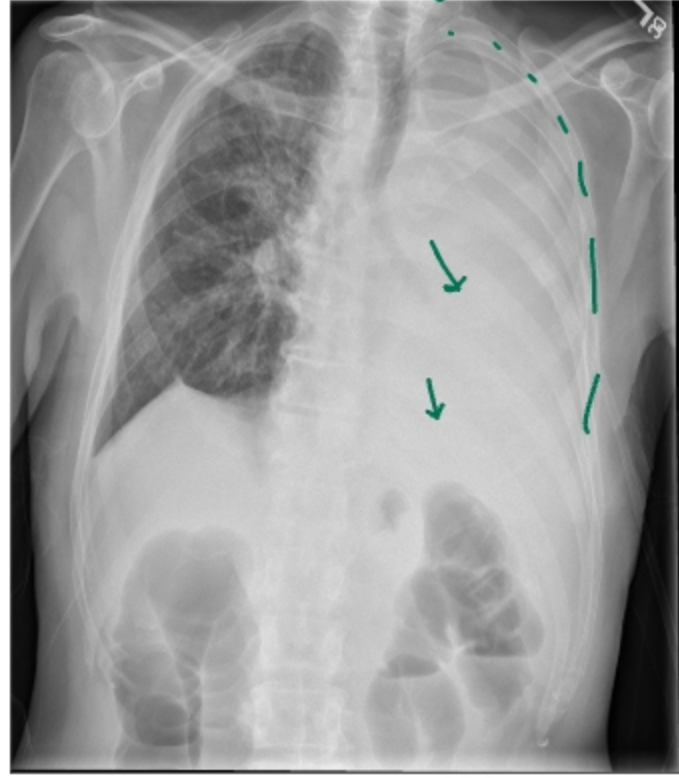
APPROACH TO OPAQUE HEMITHORAX

C/L shift



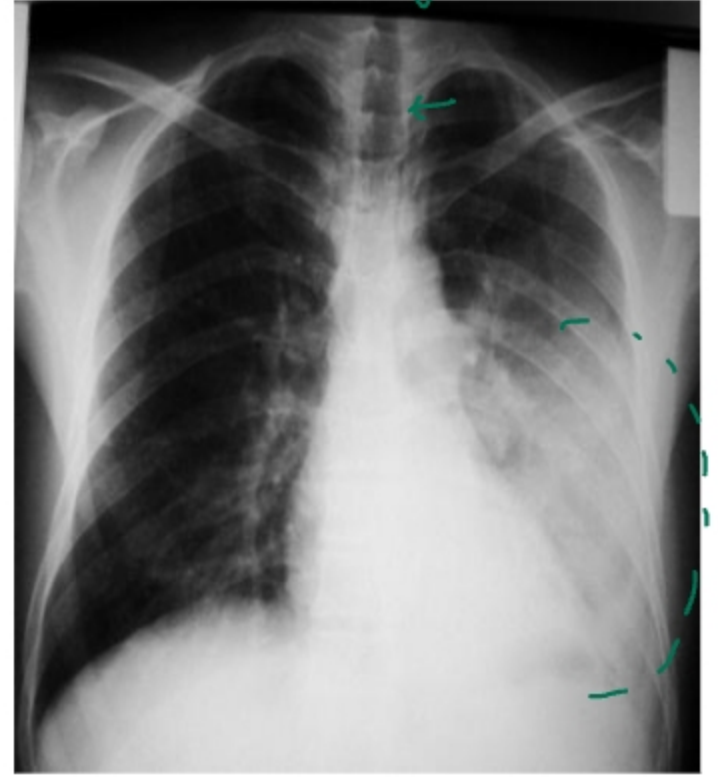
Massive pl. effusion

Mediastinum ill shift



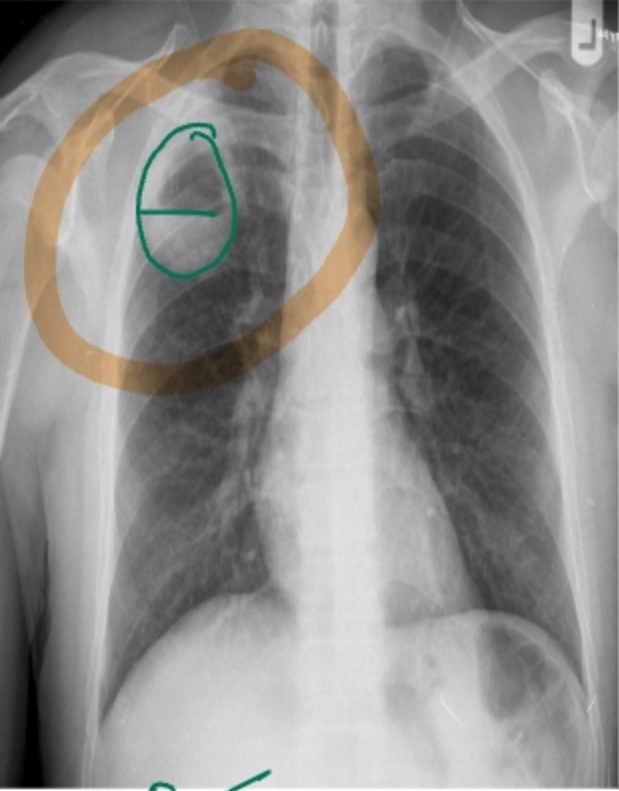
Collapse
child: FB
elderly smoker: cancer

No shift

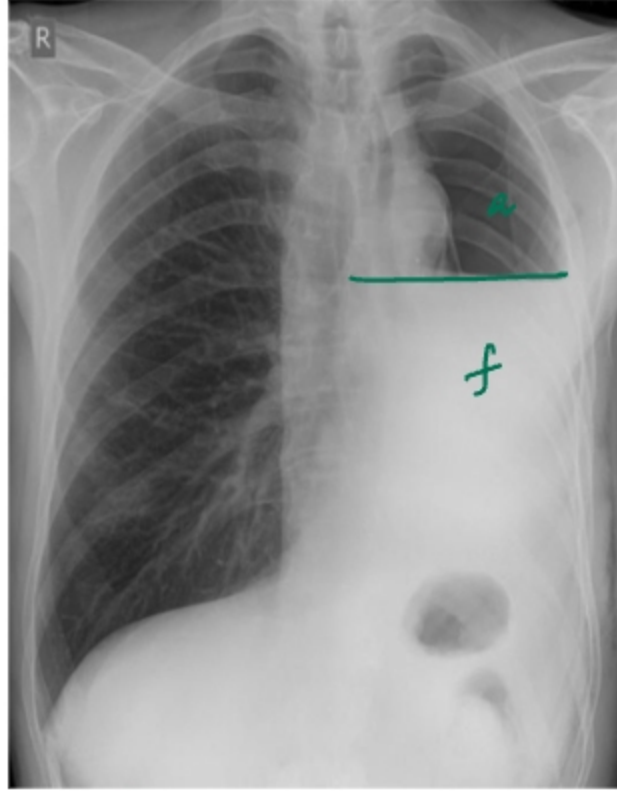


Consolidation

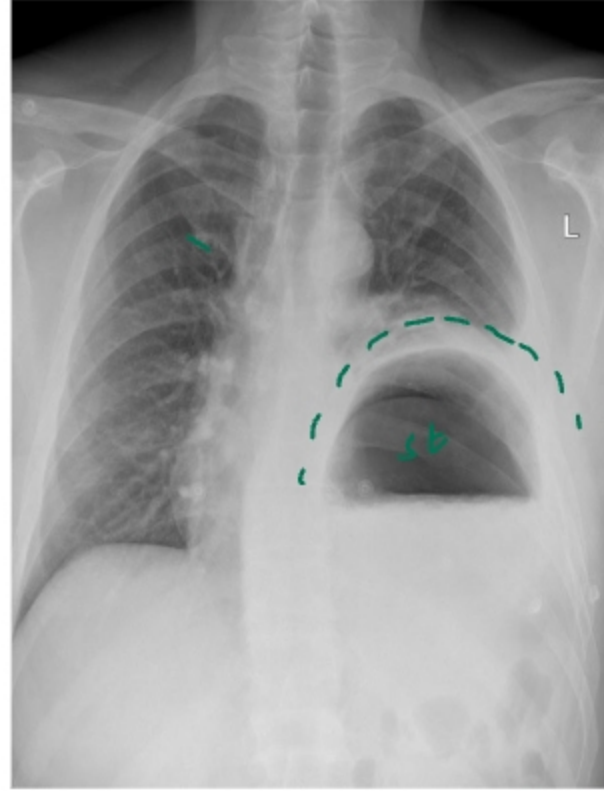
AIR-FLUID LEVELS



2 / Abscess

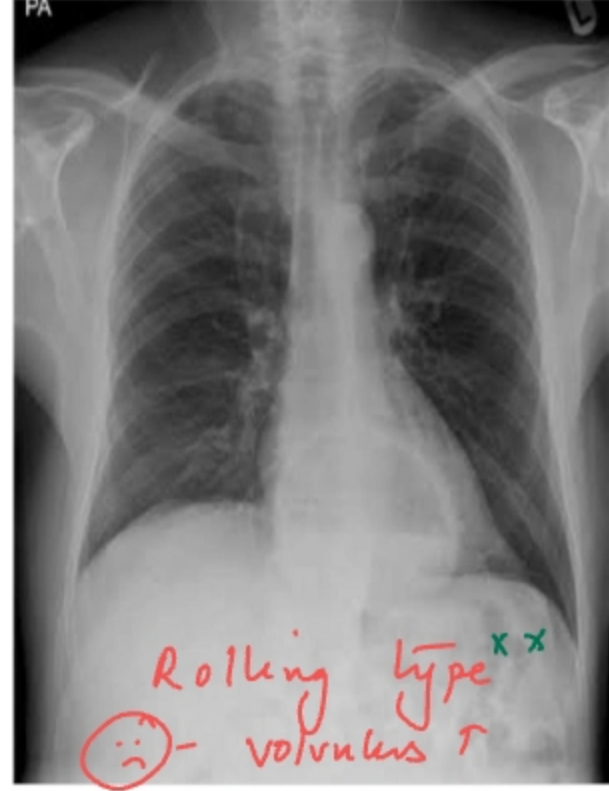


Hydropneumothorax

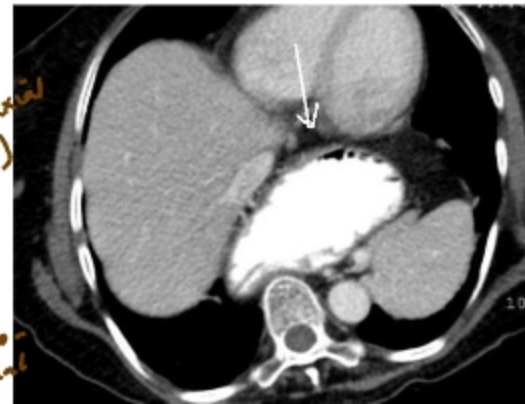


Diaphragm injury

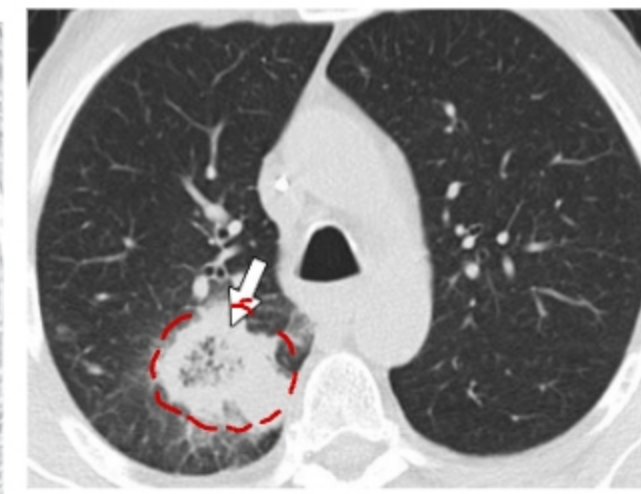
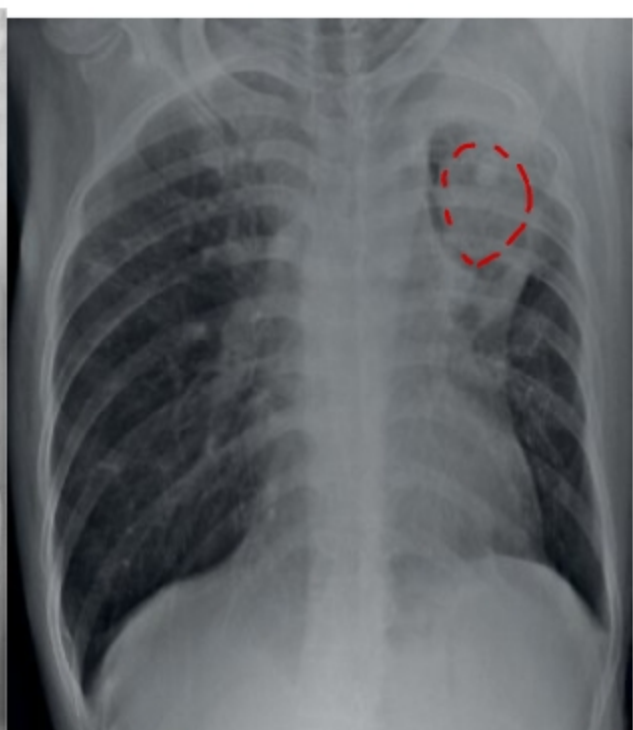
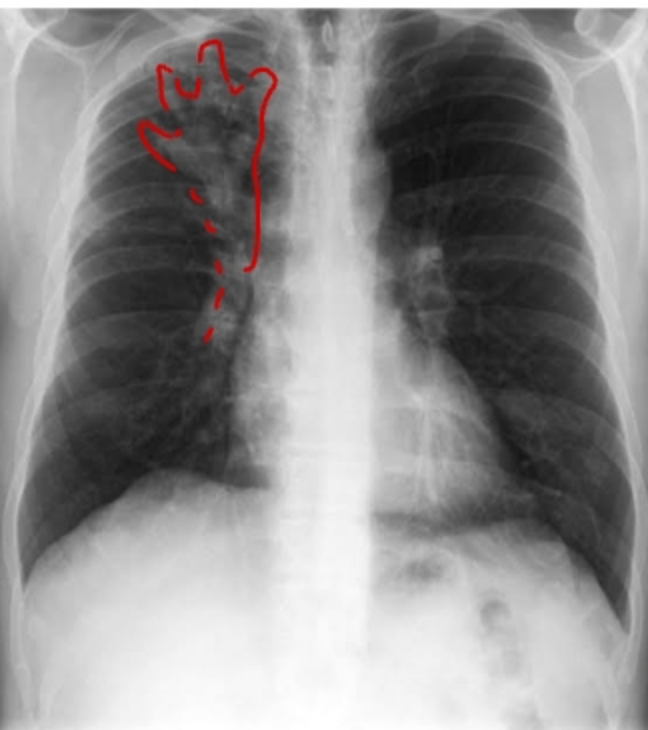
ICD CI



Hiatal hernia



ASPERGILLUS



Finger in glove

ABPA - type 1 hypers

HAM = toothpaste sign

Fungal ball =



Aspergilloma

Monod sign

R - symptomatic

neutropenia (febrile)

Halo sign

Invasive Aspergillosis

R - VORICONAZOLE

Reverse halo /

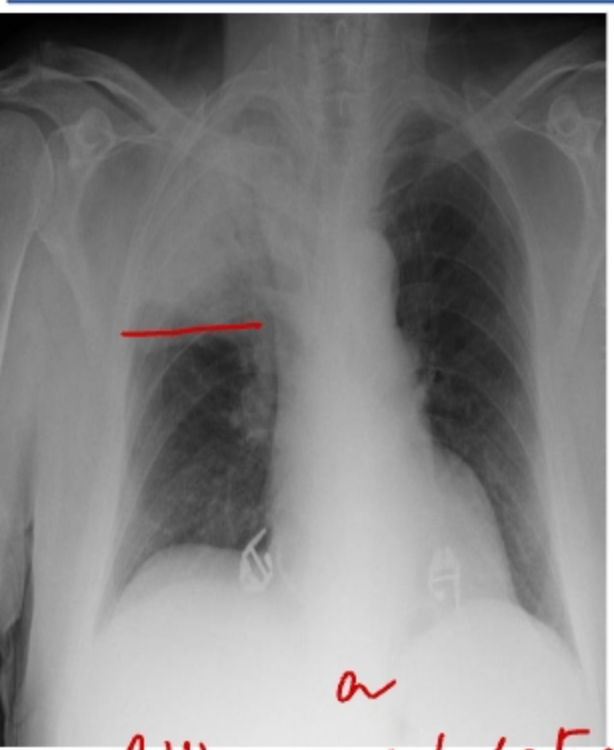
Burd neck /
air crescent



MUCORMYCOSES

R - Amp B

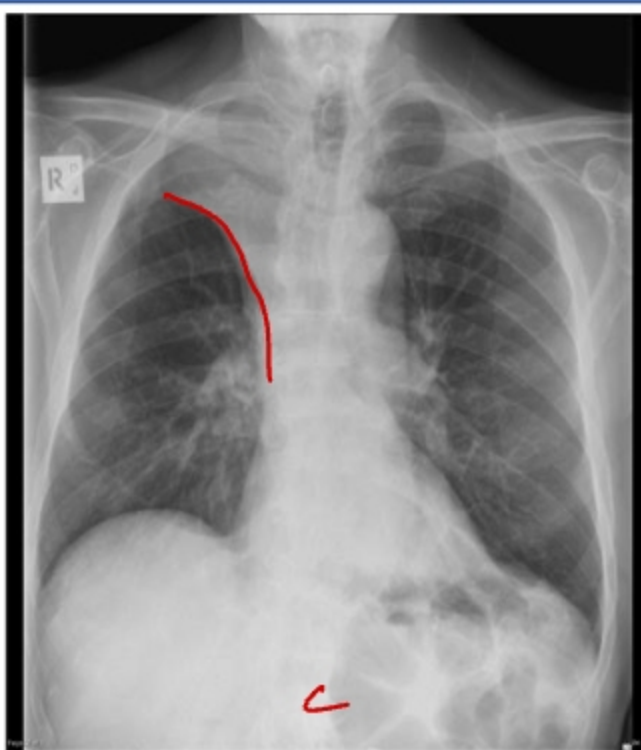
CONSOLIDATION VS COLLAPSE ^{vol loss} (A) (xx)



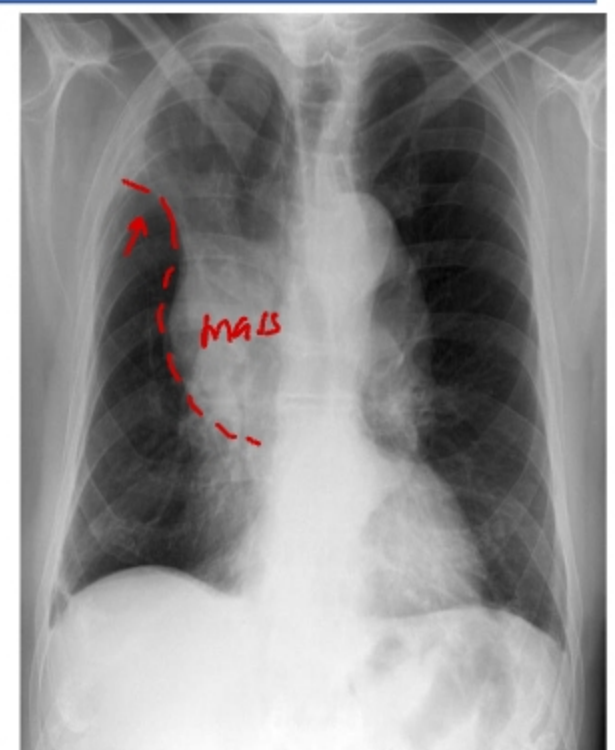
RUL consolidation



Klebsiella



RUL collapse



Golden S sign



Air bronchogram sign

bulging fissure

red currant

jelly sputum

mcc: S. pneumoniae

(Mycoplasma → infiltrates - atypical)

Smoker

Mass + RUL collapse

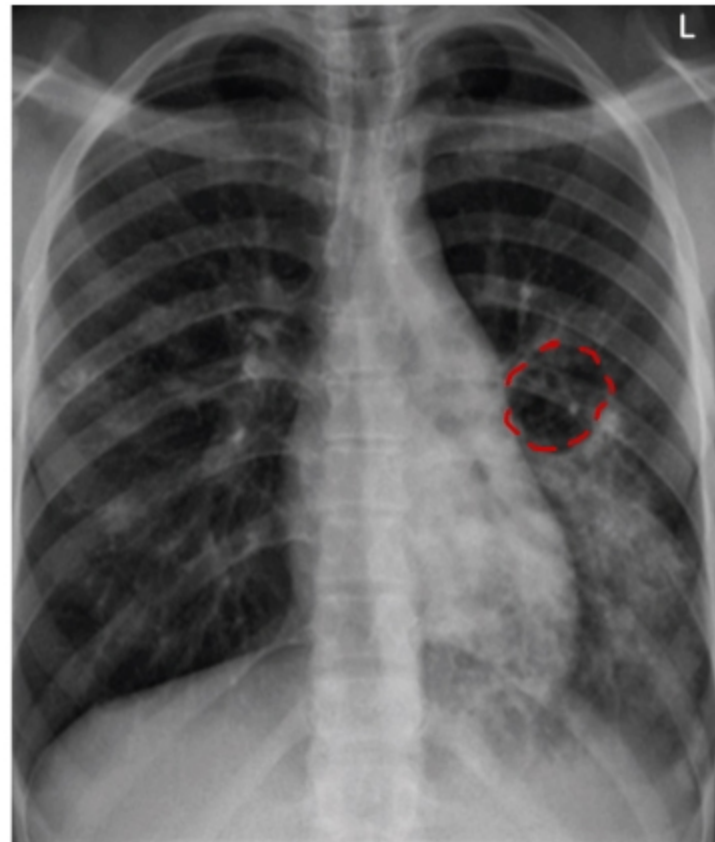
SILHOUETTE SIGN



RML Consolidation

ML - \heartsuit border

LL - diaphragm



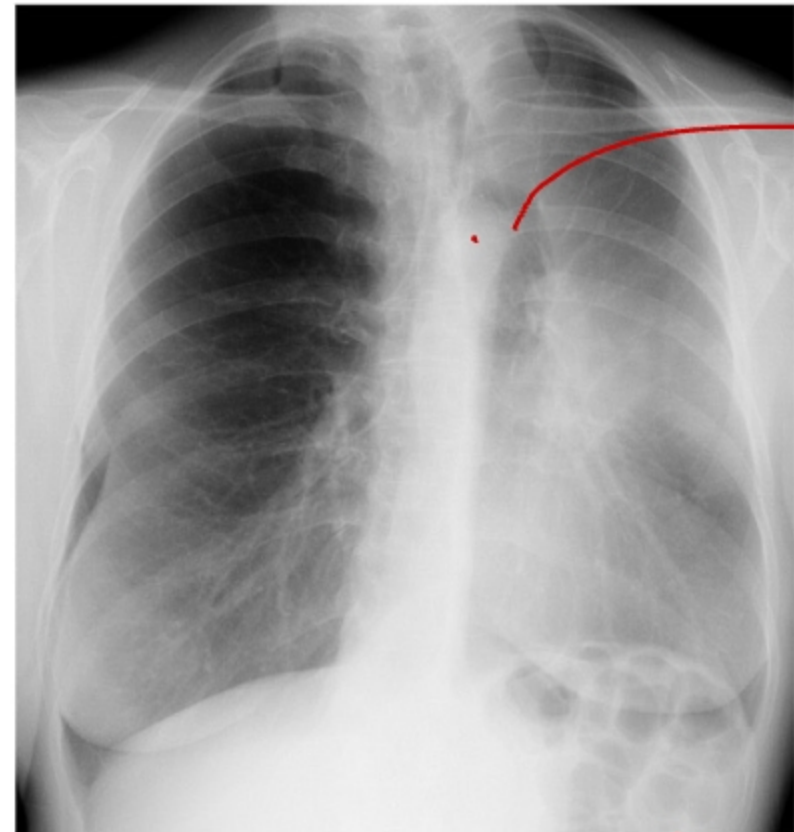
LLL Consolidation

+

Pneumatocele - periviral

S. aureus pneumonia

viral
URTI

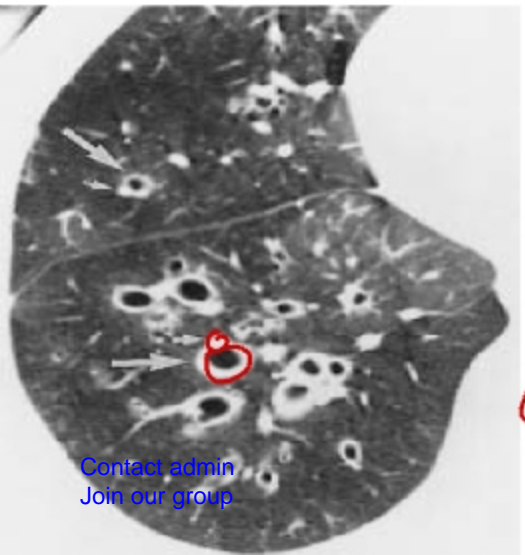
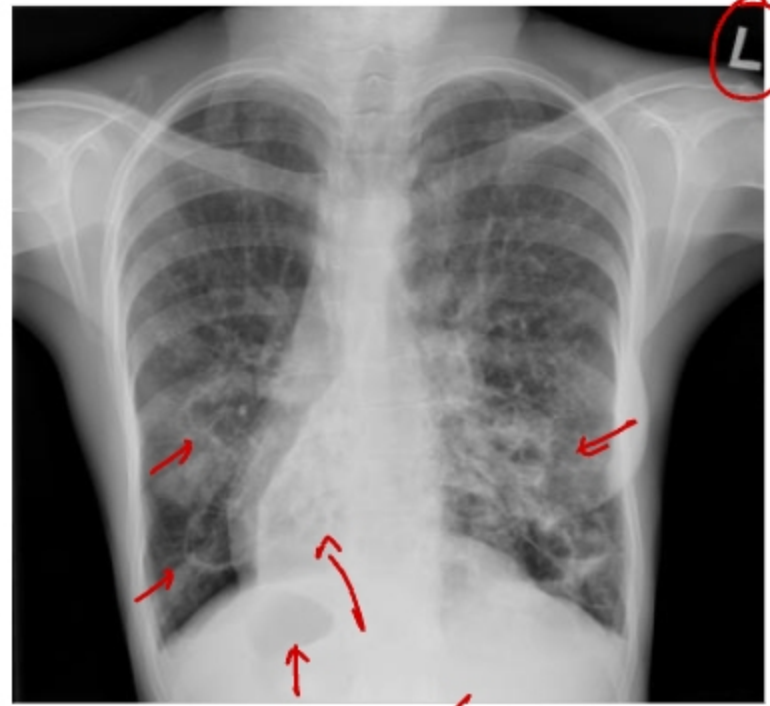
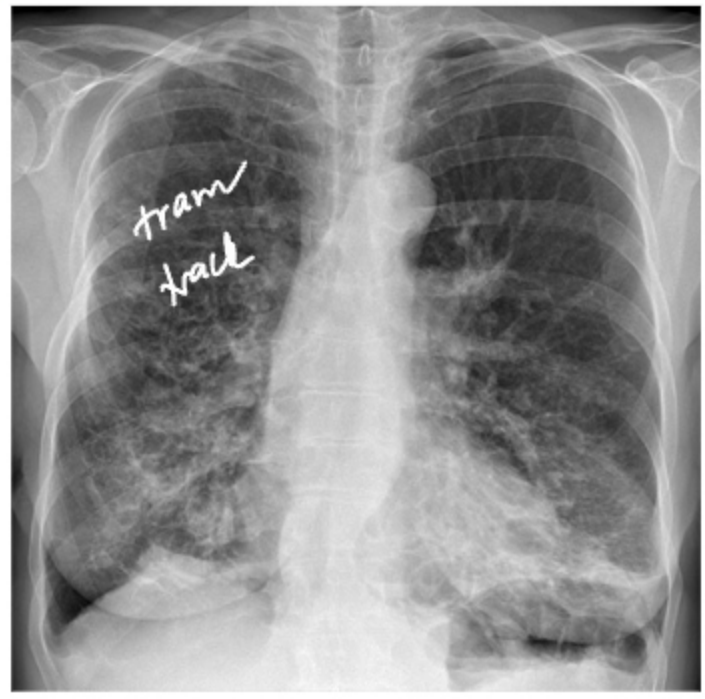


LLL
sup
segment

Luft sichel sign

LVL collapse

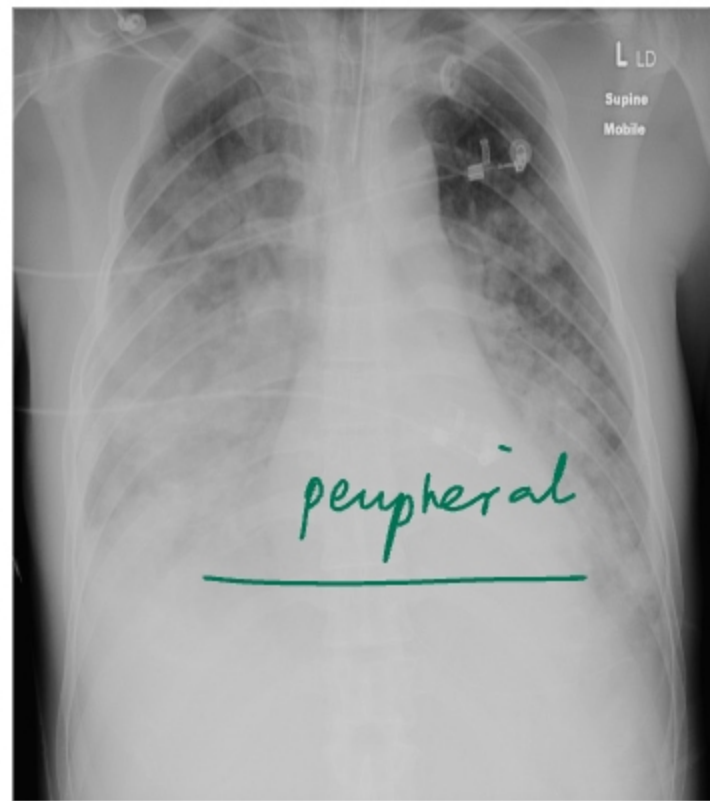
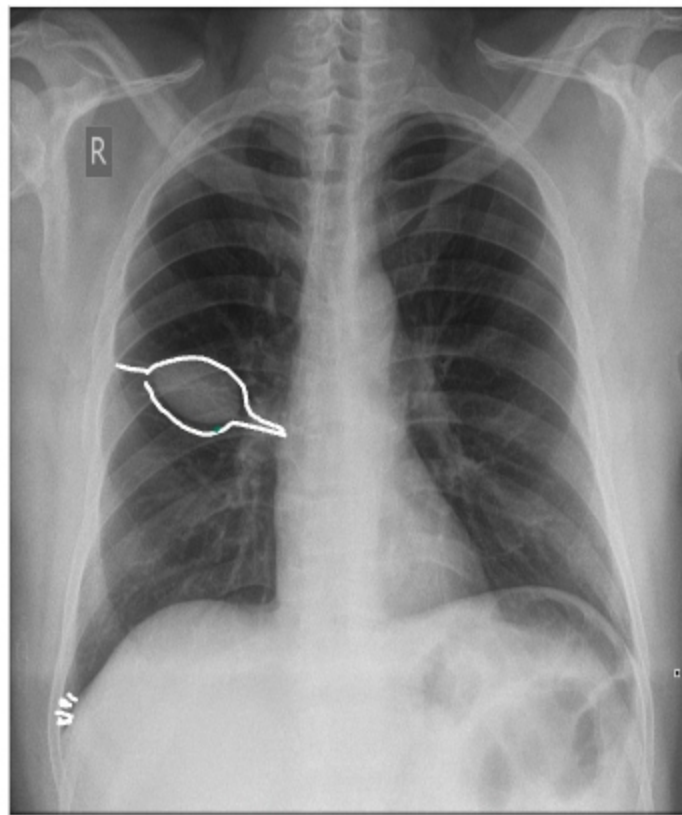
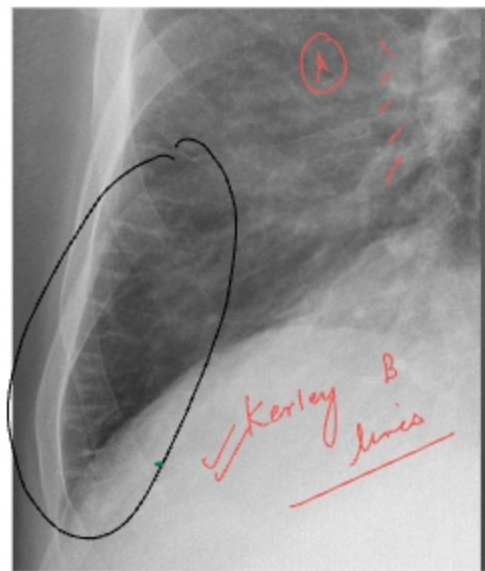
MISCELLANEOUS



◦ signet ring
 ◦ bronchiectasis
 / Kartagener's
PCD - sinusitis
 └ bronchiectasis
 +
 situs inversus
 +
 dextrocardia

Cannon ball
 ┌ mets ─ CCA
 └ clear cell
 RCC
 └ Wegener's ─ follicular
 myriad
 RA

PULMONARY EDEMA



♥ p. edema
 1st: Cephalisation of p. veins



Contact admin
 Join our group
 (interlobular septal thickening)

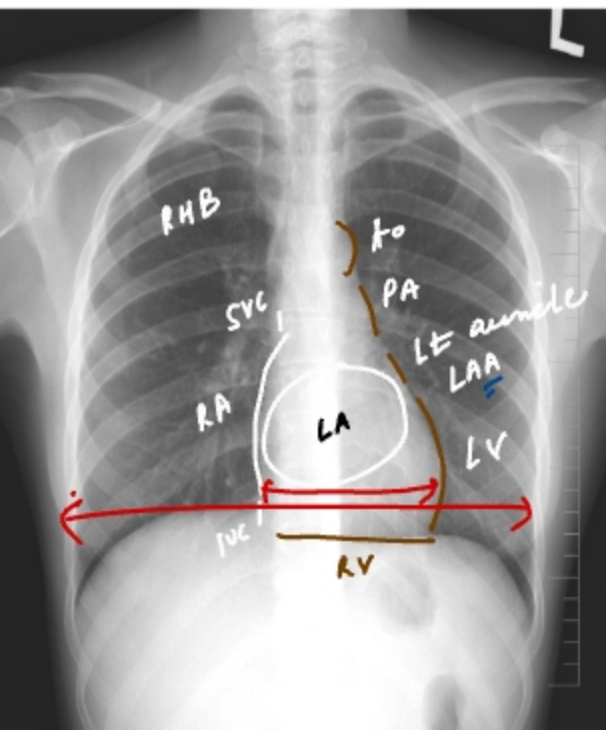
→ Edema - batwing sign, pleural effusions

Phantom tumor
 loculated - fissure
 effusions

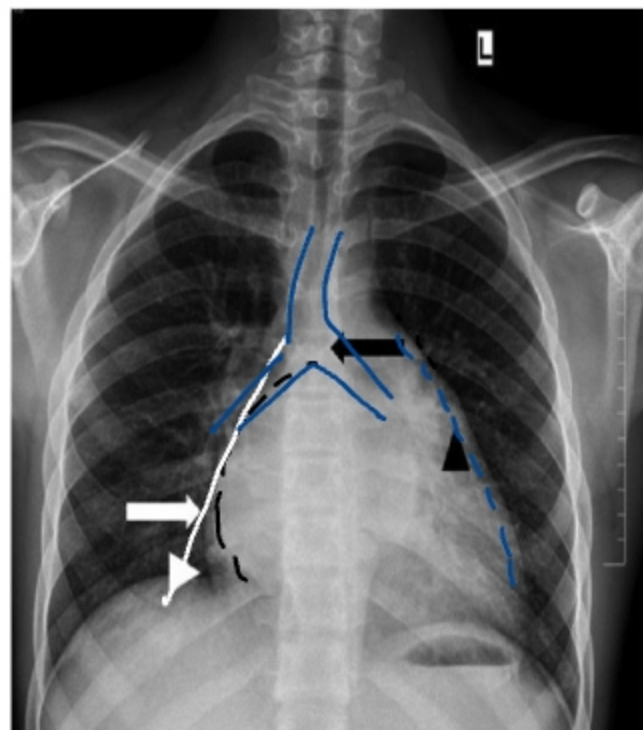
Non-♥ p. edema =
 ARDS

- systemic - sepsis /
 pancreatitis /
 toxins

CARDIAC SILHOUETTE

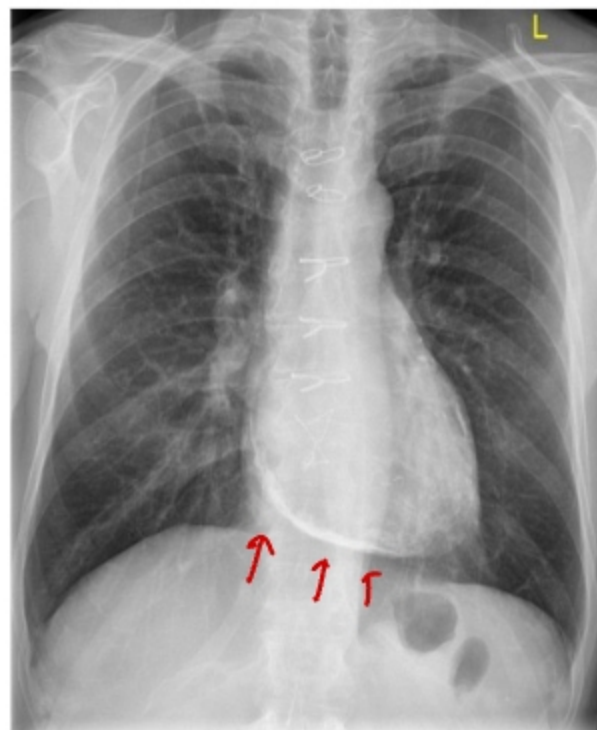


CT ratio = ≤ 0.5



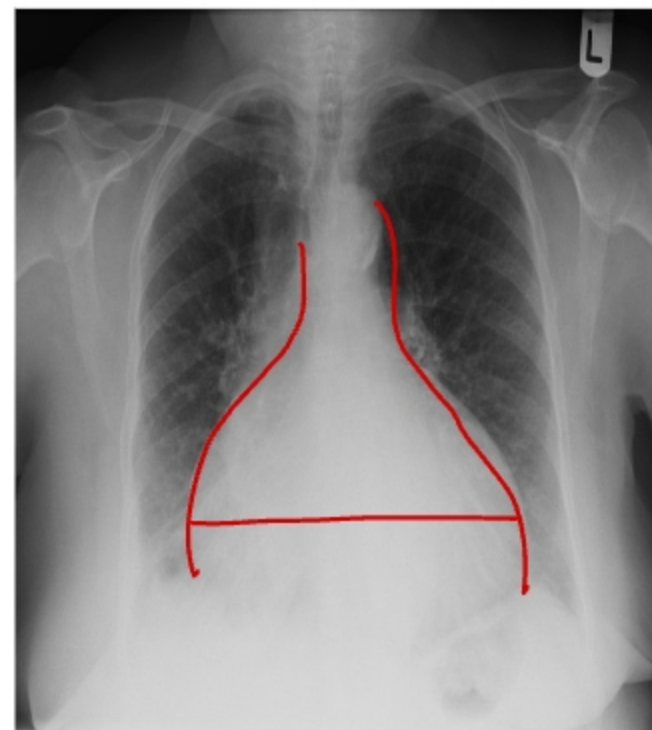
Signs of MS / LAA:

1. Double RHB
 2. Straightened LHB
 3. Splaying of carina
- Dysphagia
 - RLV - Ortner's Sx



Chronic calcific pericarditis

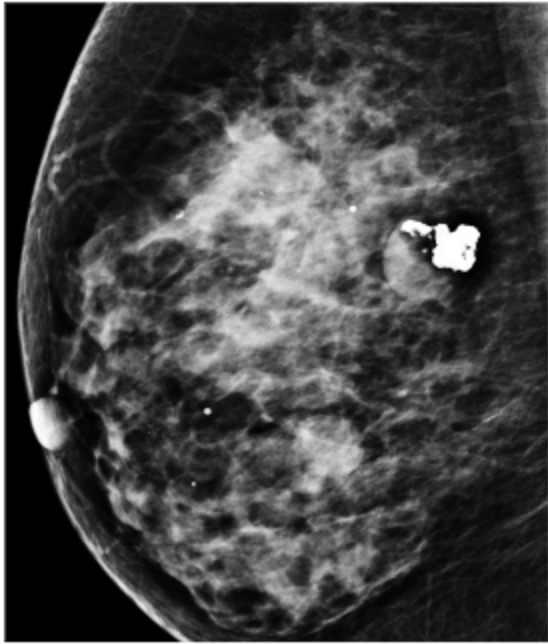
(egg in cup sign)



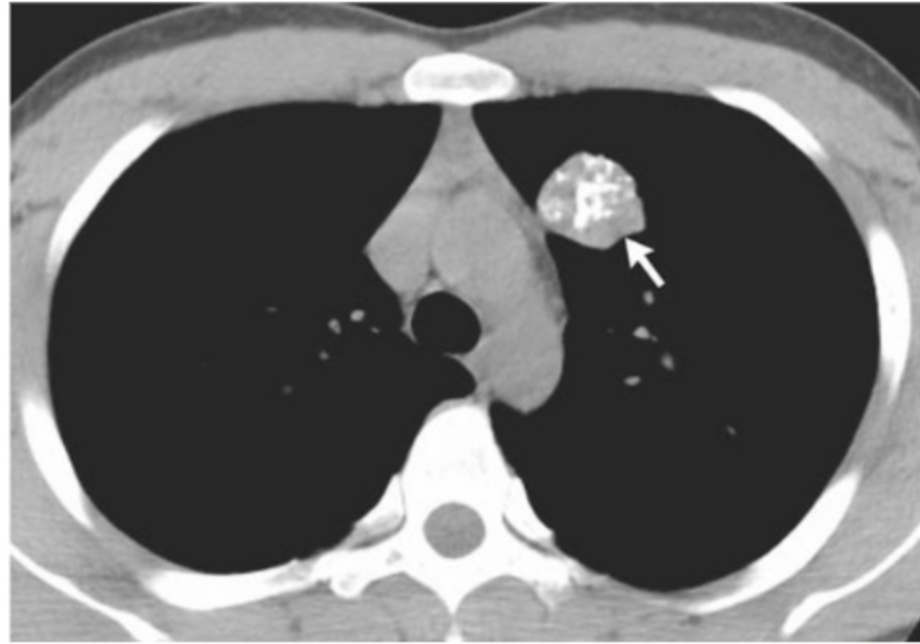
♡ effusion / tamponade

Water bottle /
Leather bottle

POPRCORN SIGN



Fibroadenoma



- Pulm hamartoma / chondroma

· mc benign tumor

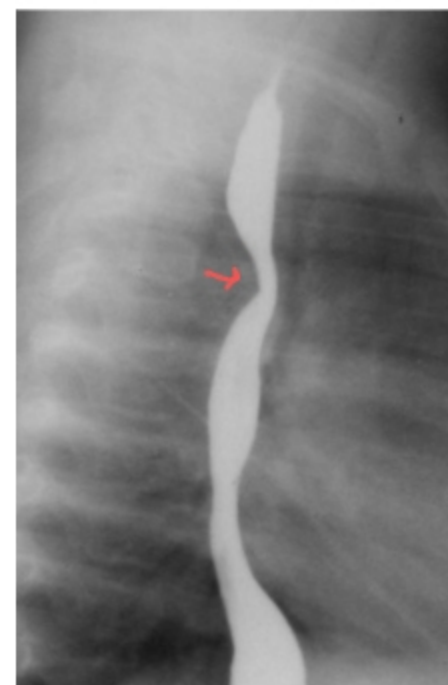
· Carney Δ ✓ ✓ ✓

GIST p.chondroma paraganglioma



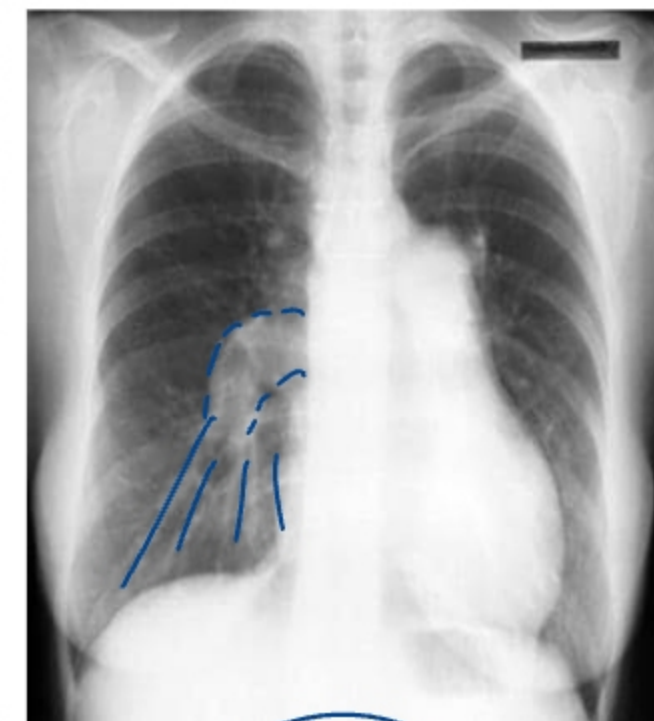
Cavernoma

SPOTTERS



ARSA - Aberrant RSA
(mc variant)

post indentⁿ of
esophagus
Dysphagia lusoria



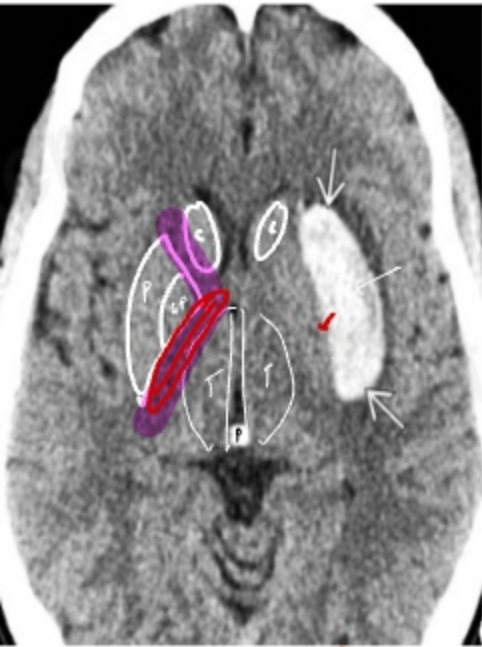
Egg shell Calc
 silicosis Sarcoidoma post RT-LN PAH
 Jughandle sign

NEURORADIOLOGY

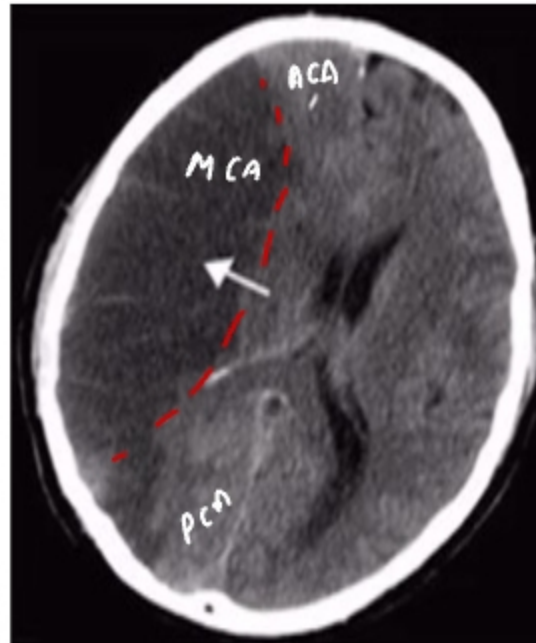
STROKE

Isk: NCCT
loc / most sn: DWI (MRI)

Penumbra: CT Perfusion
+ CTA



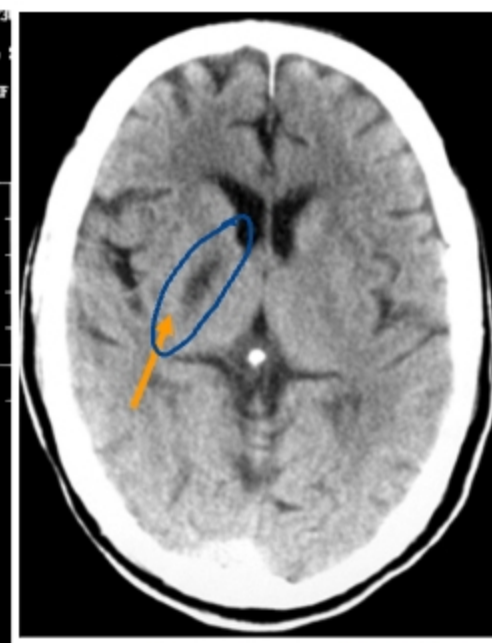
Hytn bleed
mc: Pulamenu
Charcot's A =
MCA
(Lentilostriate)
dense hemiplegia



Ischemic stroke



<24hr: Hyperdense
MCA
sign



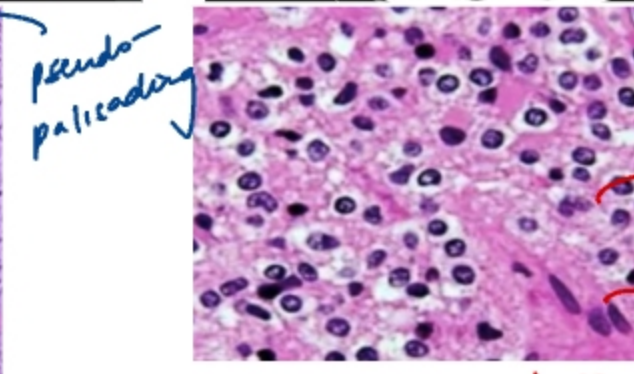
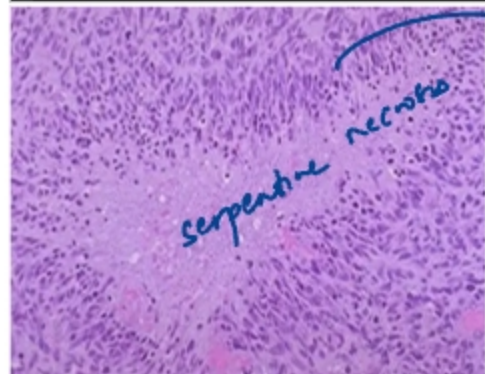
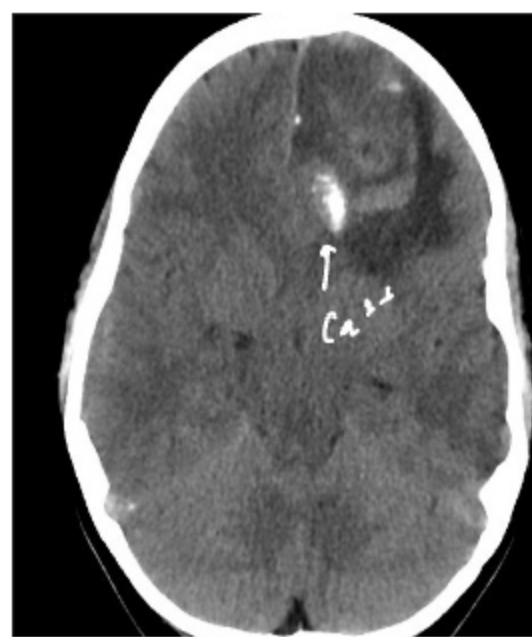
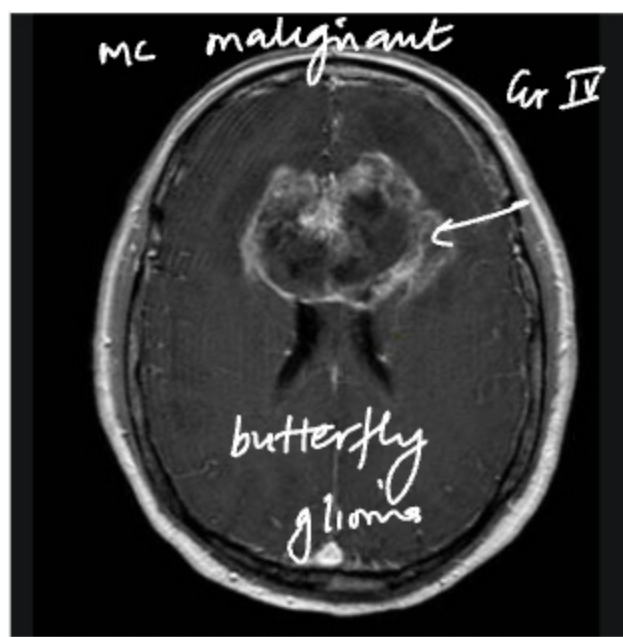
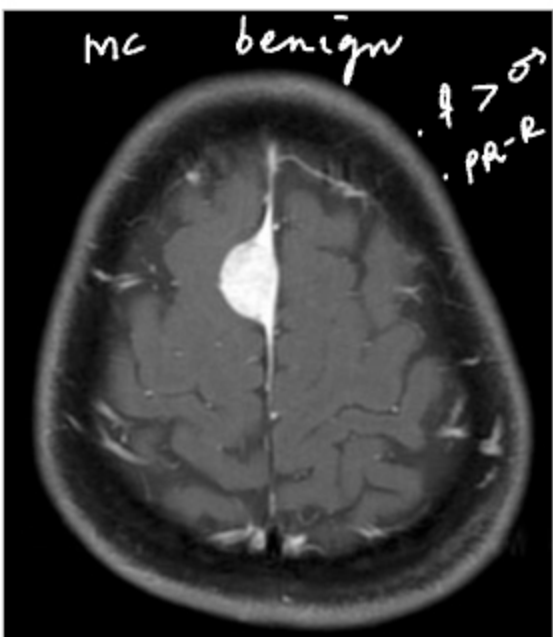
Lacunar stroke
BG ischemic



venous stroke
CECT
empty delta
sign
SSS thrombosis

BRAIN TUMORS IN ADULTS

IOC - MRI



CC Lipoma = bracket Ca²⁺

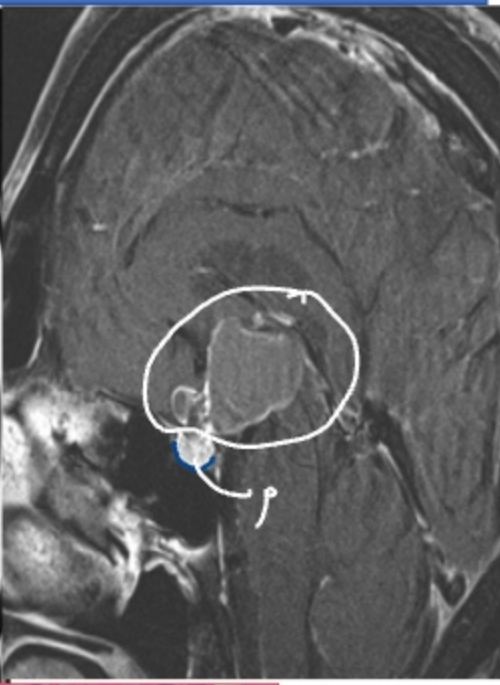
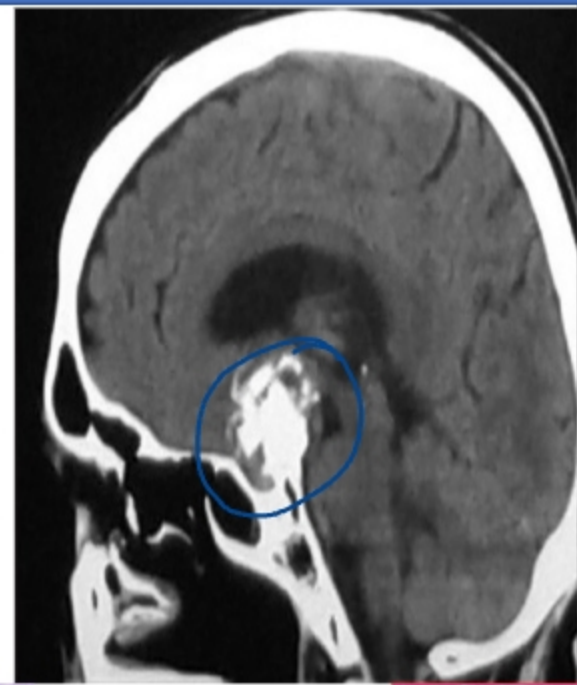
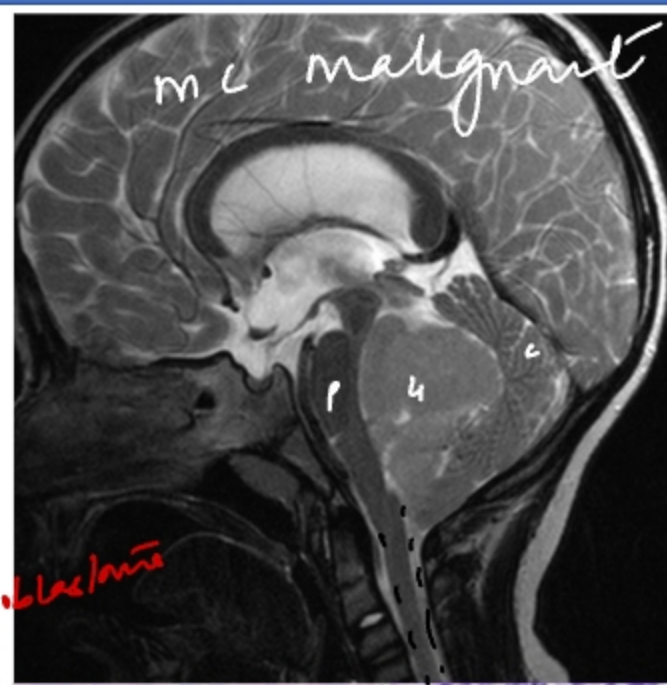
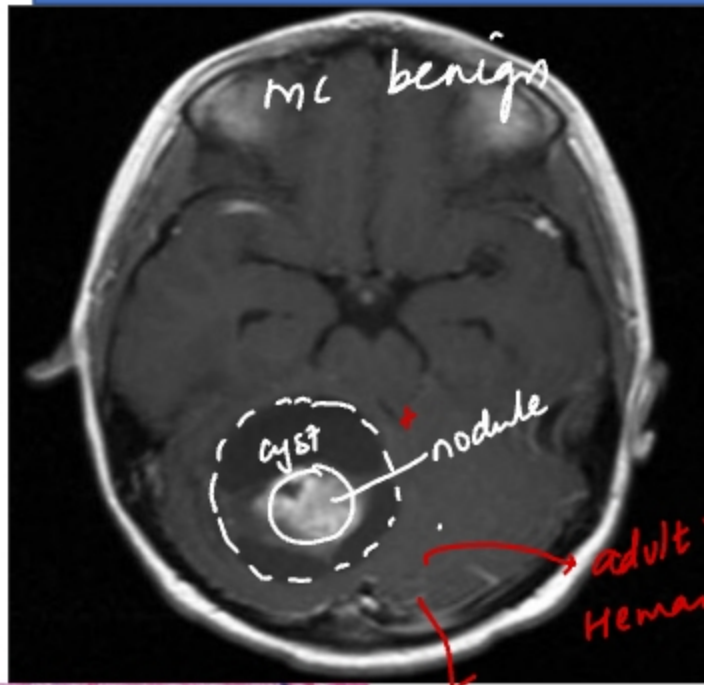
- Dural tail
- Ca²⁺ - Hyperostosis
- Psammoma bodies

Glioblastoma
 IDH (wild type)
 temozolamide

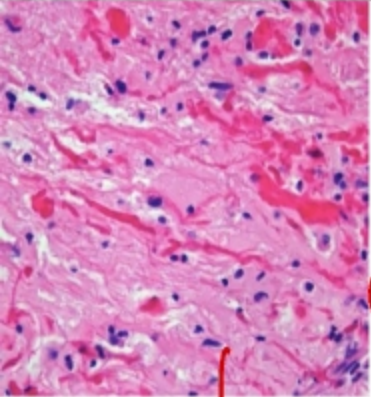
- IDH - mutant
- 2p/19q codeletion

Oligodendroglioma

BRAIN TUMORS IN CHILDREN

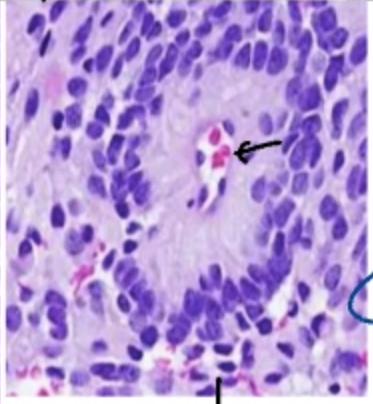
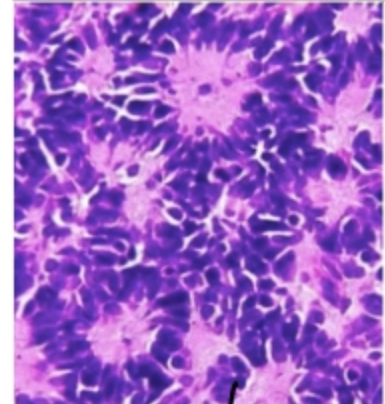


adult:
Hemangioblastoma



Pilocytic
astrocytoma
☺ Cr I

Rosenthal
fibres

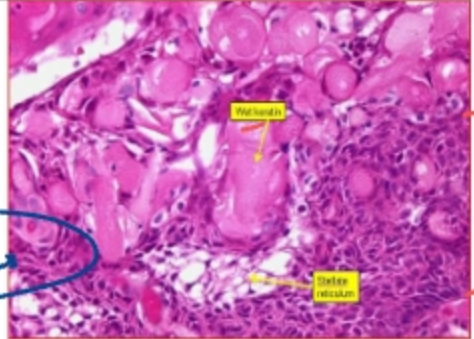


Homer Wright pseudo R
Cr IV
MB - roof

perivasc
pseudo R
floor
ependymoma

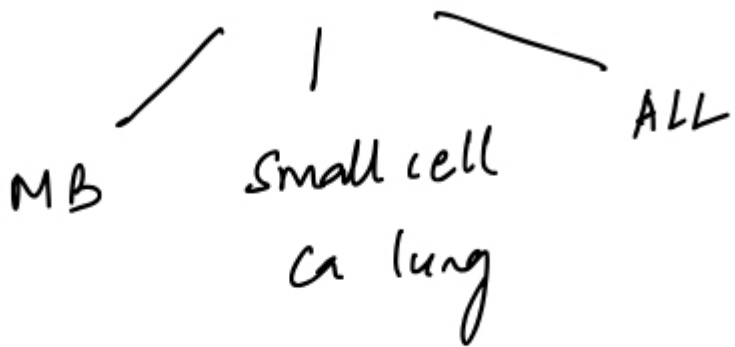
- Cr⁺
- cystic
- chiasma

Craniopharyngioma



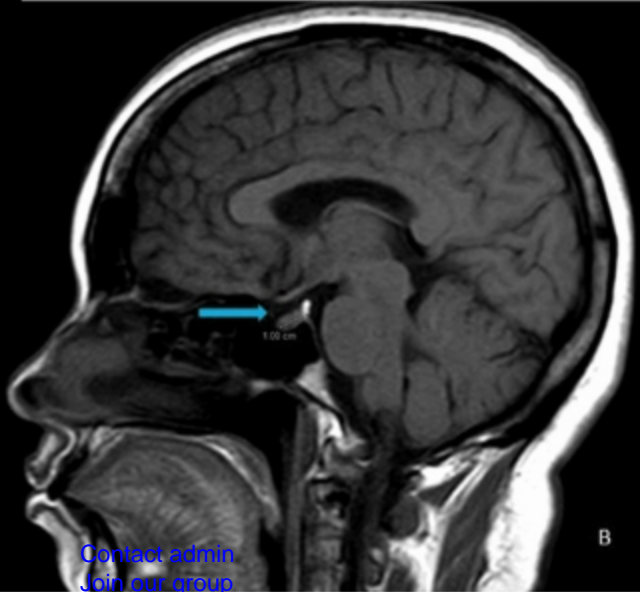
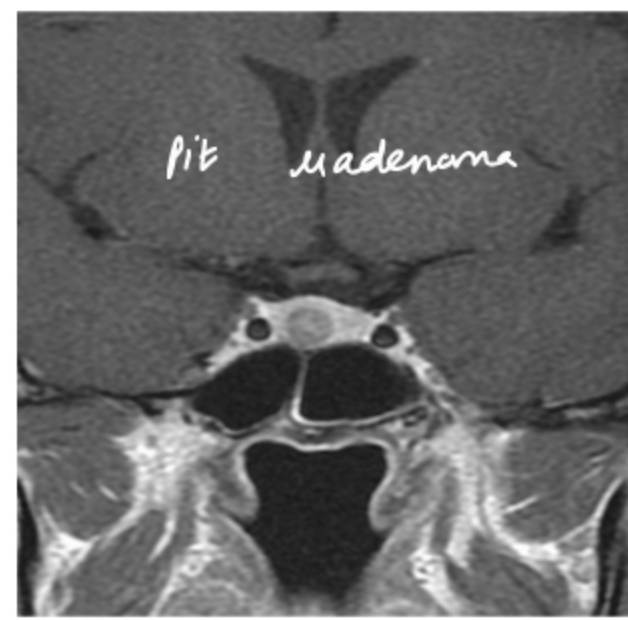
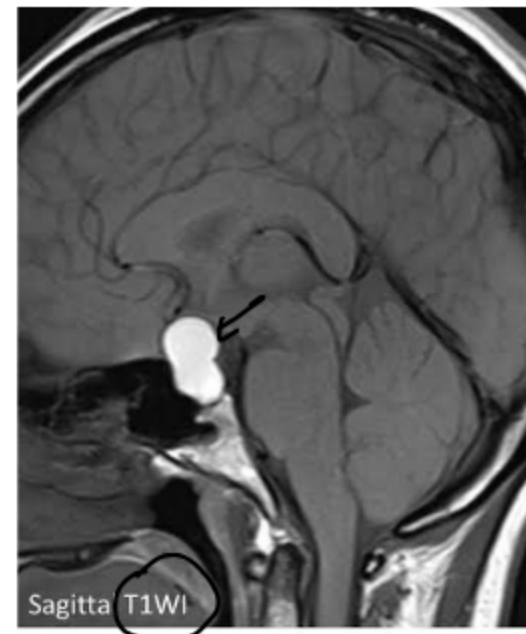
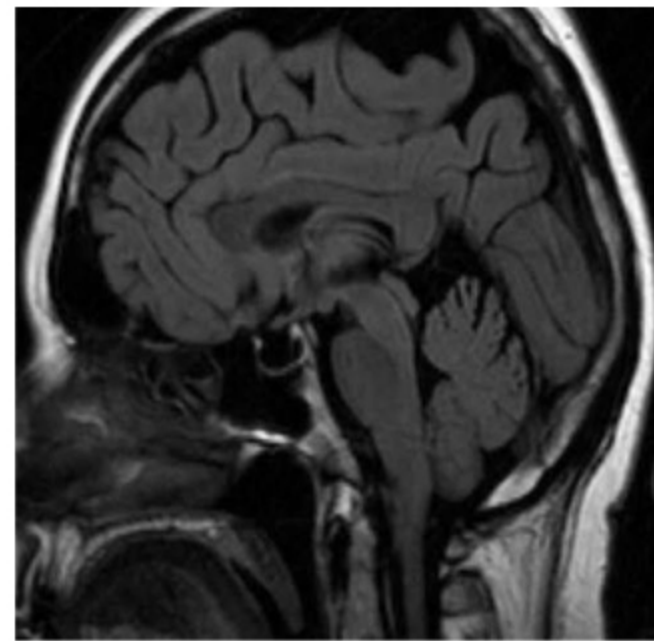
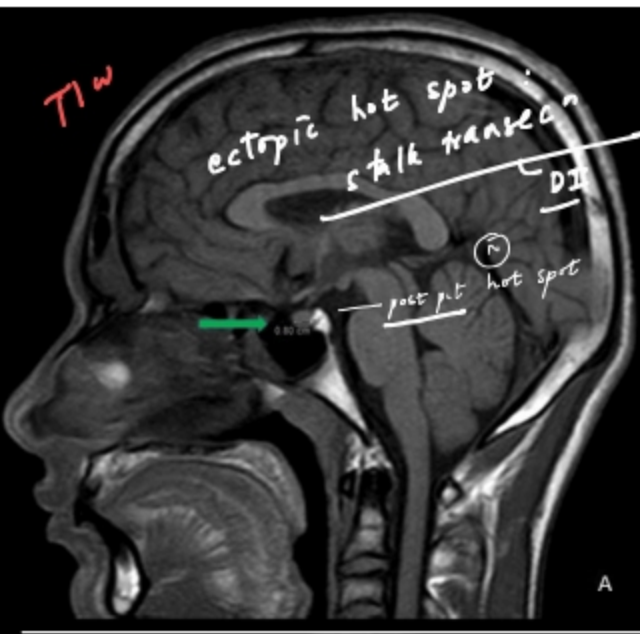
hot
machine
oil

prophylactic craniospinal
radn



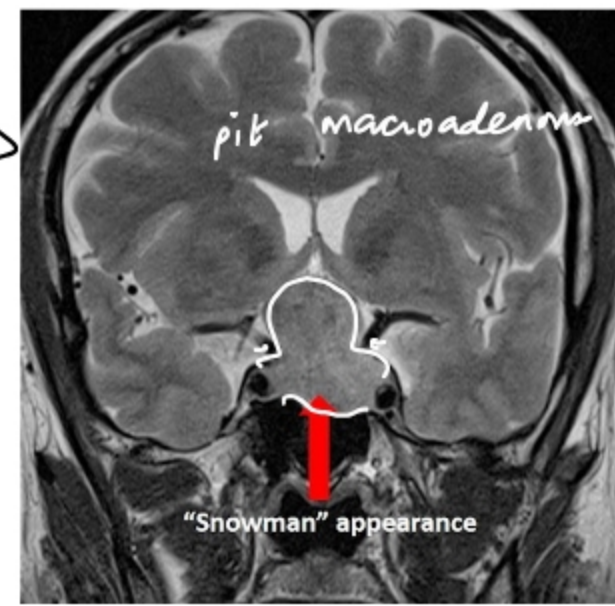
' S M A L L '

SELLA LESIONS

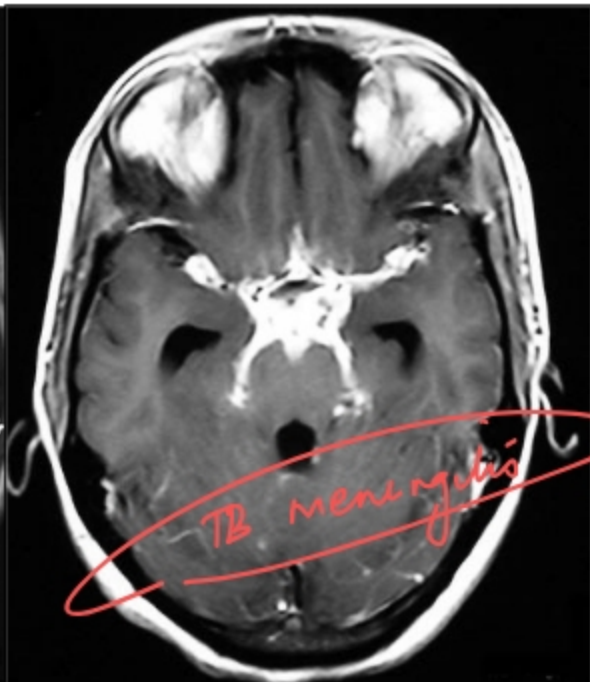
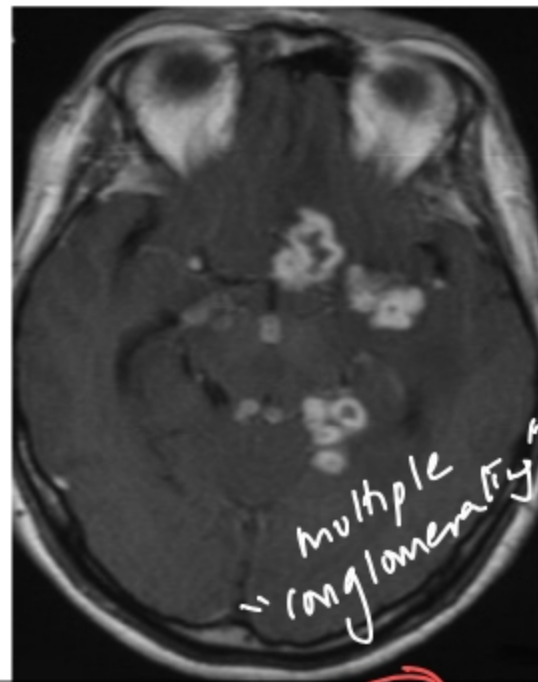
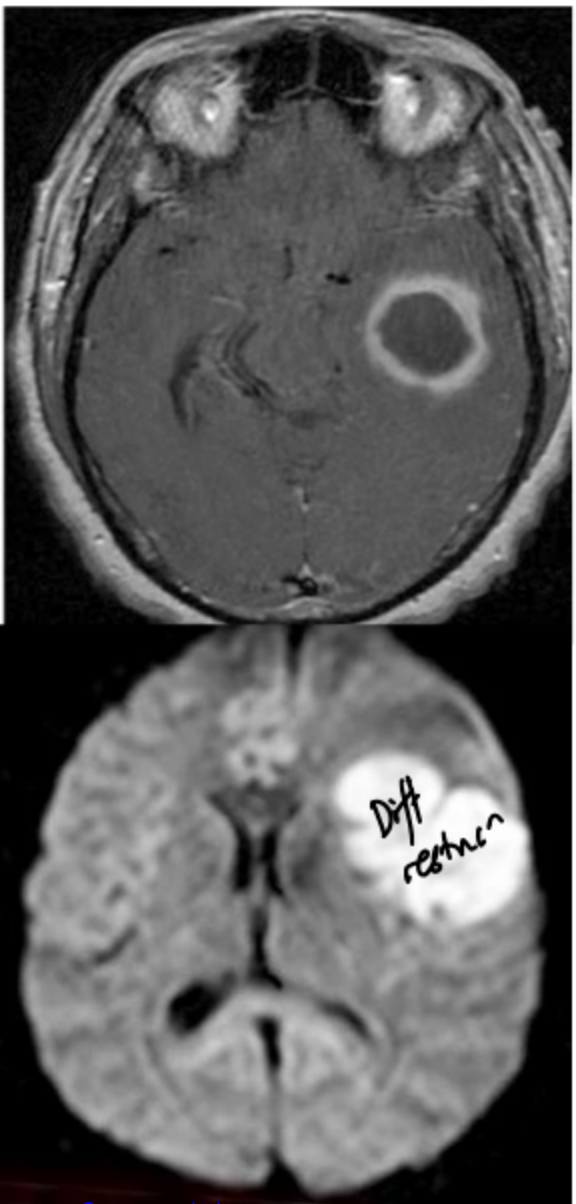


Empty sella
↓
Sheehan's Cr

h/o sudden shock
visual deficit
PIT APOPLEXY
bleed
Ⓢ T1
FAT



CNS INFECTIONS



MRS: Lipid lactate peak

Tuberculomas

- Child
- behavioral ab N
- RBC - CSF

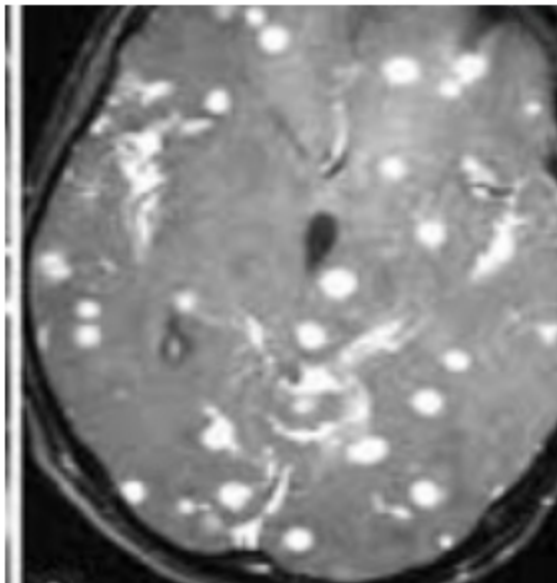
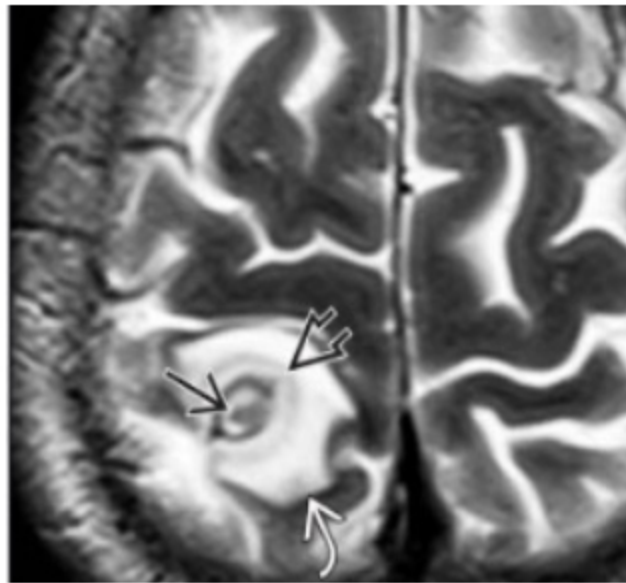
HSV-1 encephal

Vesicular

Colloid vesicular

Granular nodular

Nodular calcified



⊙ Scolex
x edema
x Sz

✓ edema
✓ Sz - max

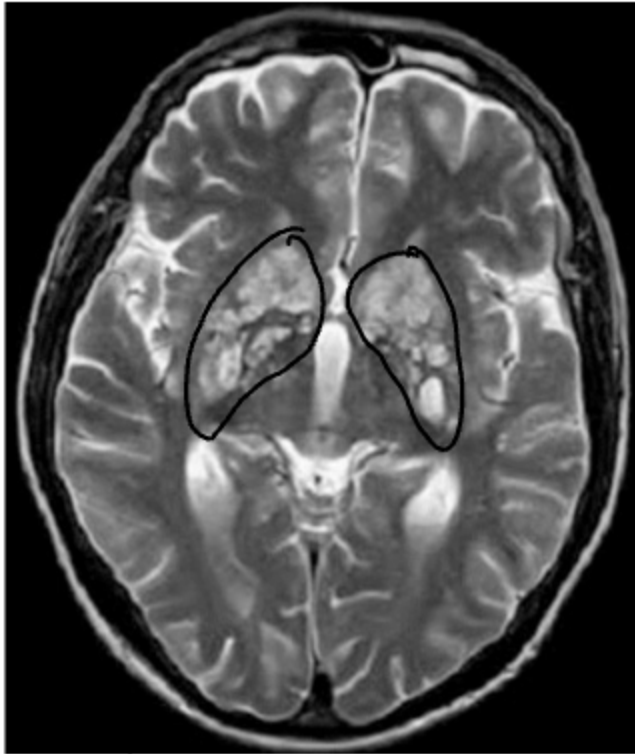
↓↓ edema
✓ Sz
✓ Ca²⁺

x edema
x Sz
Ca²⁺

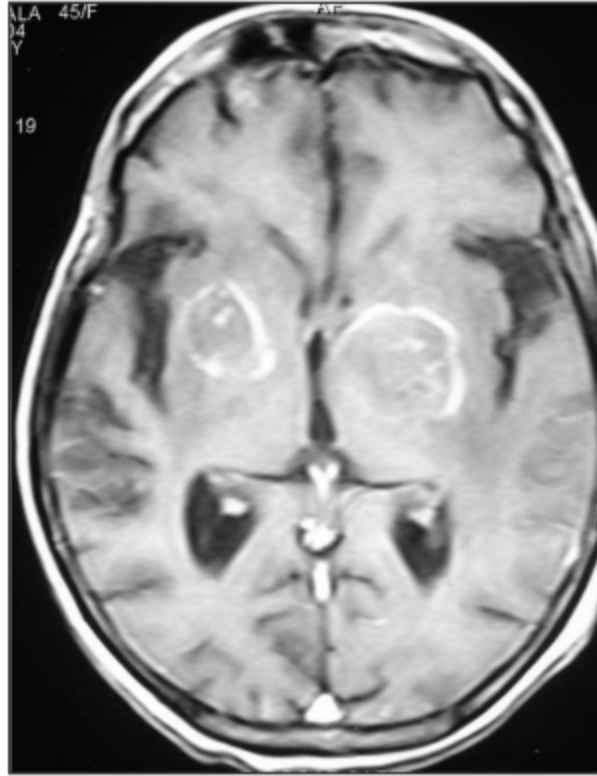
(Rx - AED + steroids + Albendazole)

Inactive

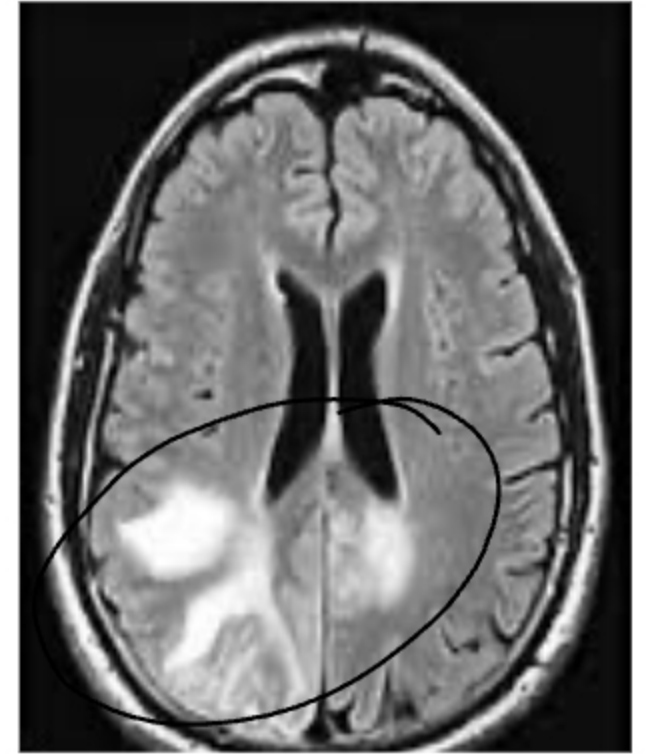
HIV/AIDS



'Soap-bubble'
↓
Cryptococcomae
"pseudo cyst"



'target'
↓
OP
↓
TOXOPLASMA
(MC)

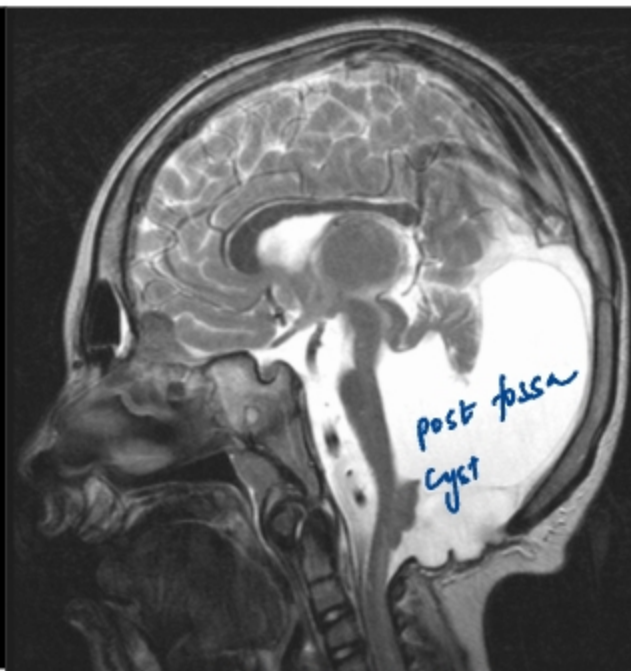


PML - WM tract
↓
JC virus

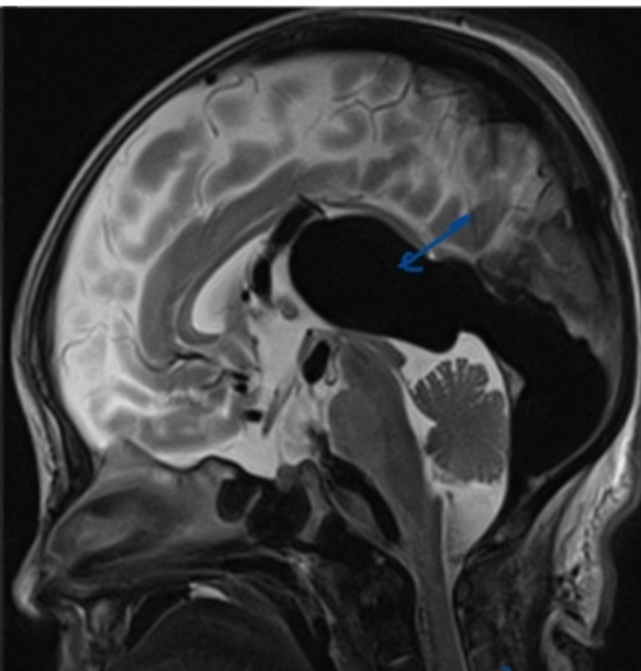
CONGENITAL ANOMALIES



Chiari I malformⁿ

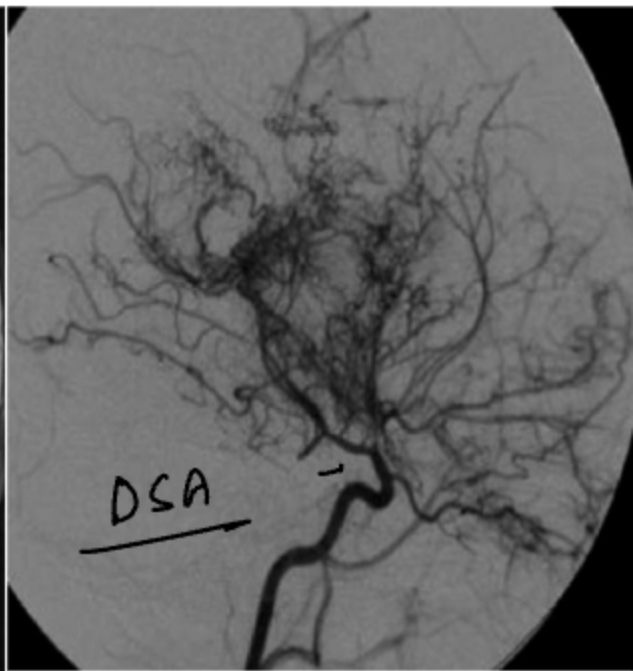


Dandy-Walker
vermis agenesis

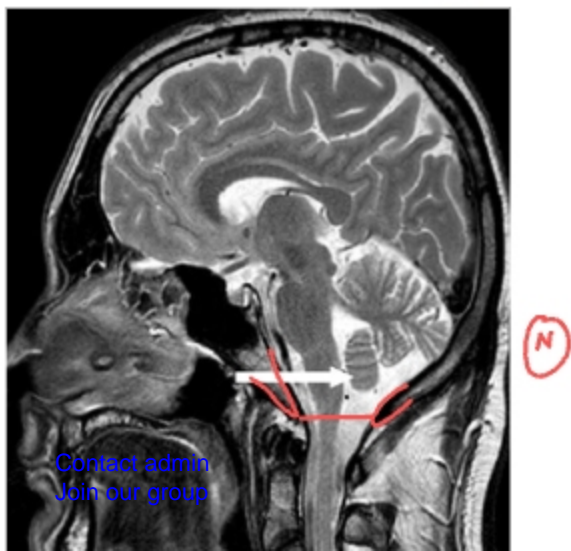


flow void
neonate + HOLF
+ "bruit"

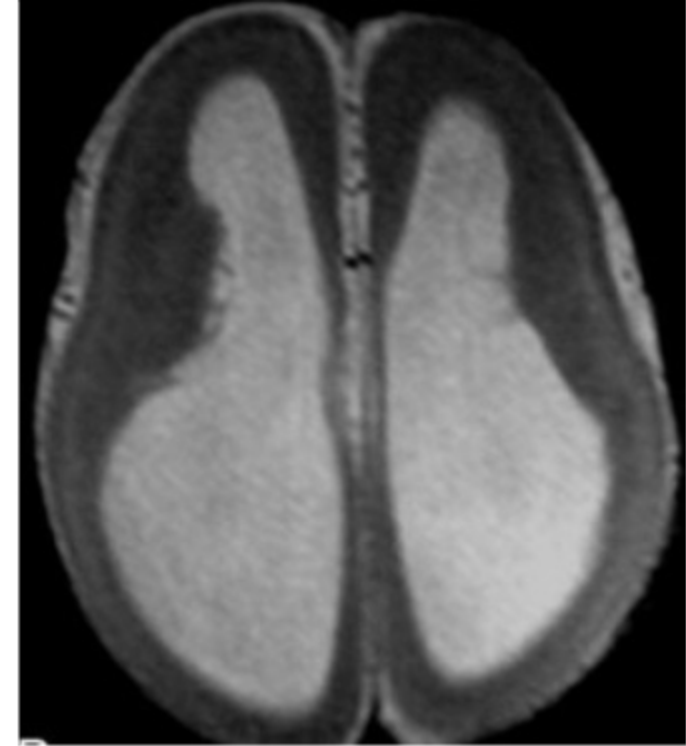
Vein of Galen
malform (AVF)



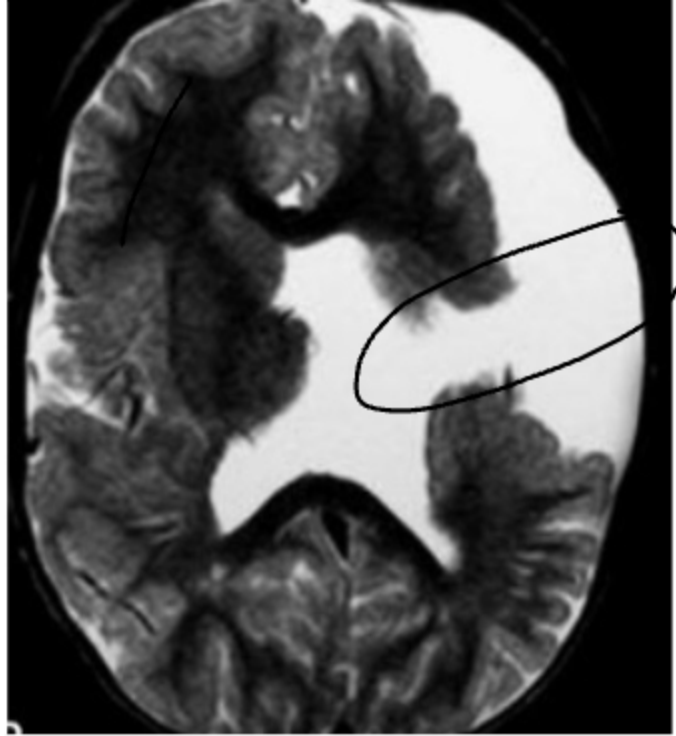
puff of smoke
Moya Moya



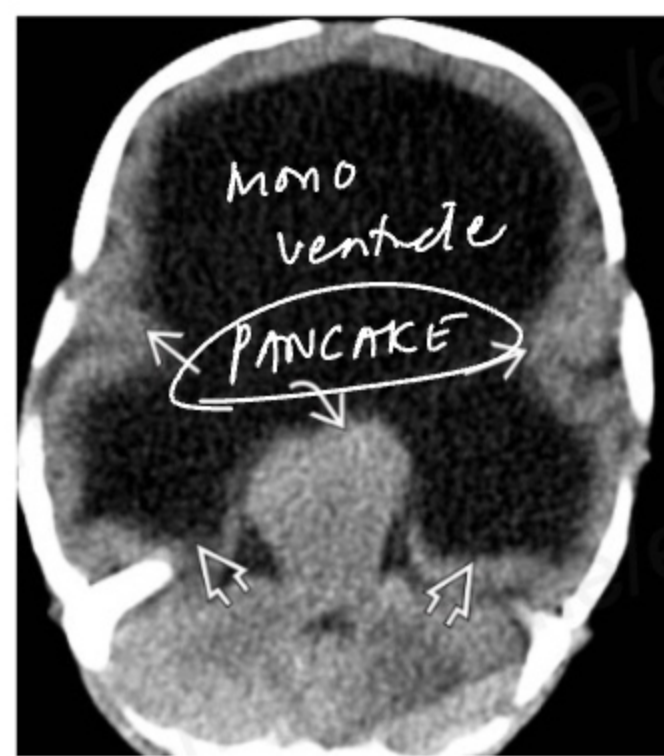
(N)



Lissencephaly

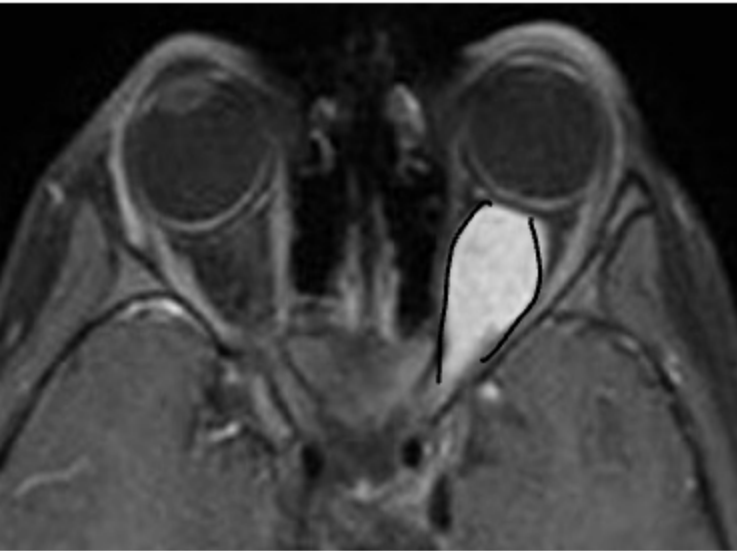


Schizencephaly

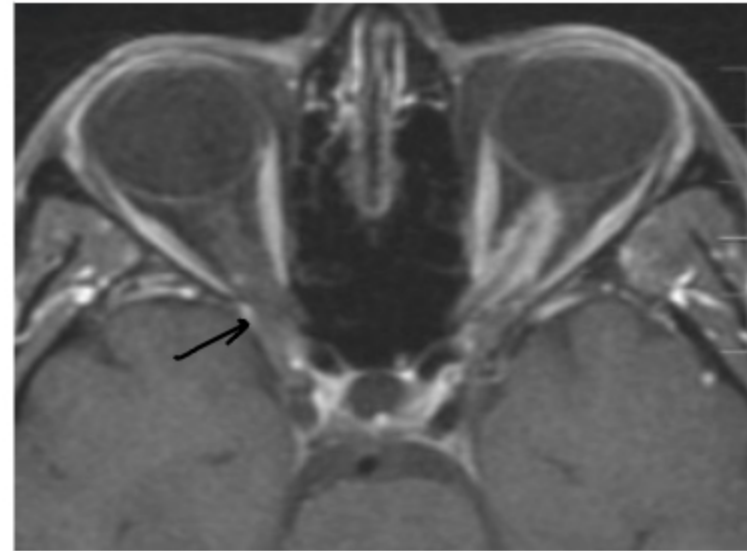


Holoprosencephaly
|
Patau's (13)
—————>

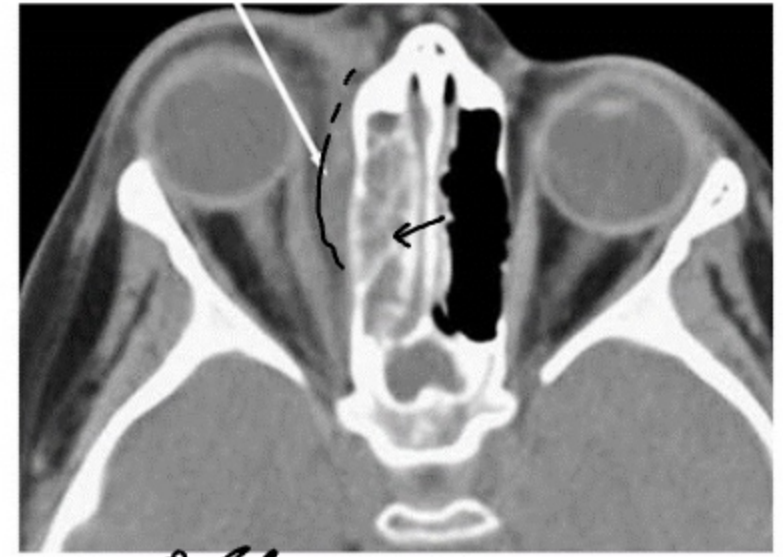
ORBIT IMAGING



ON glioma
NF 1 (mc)

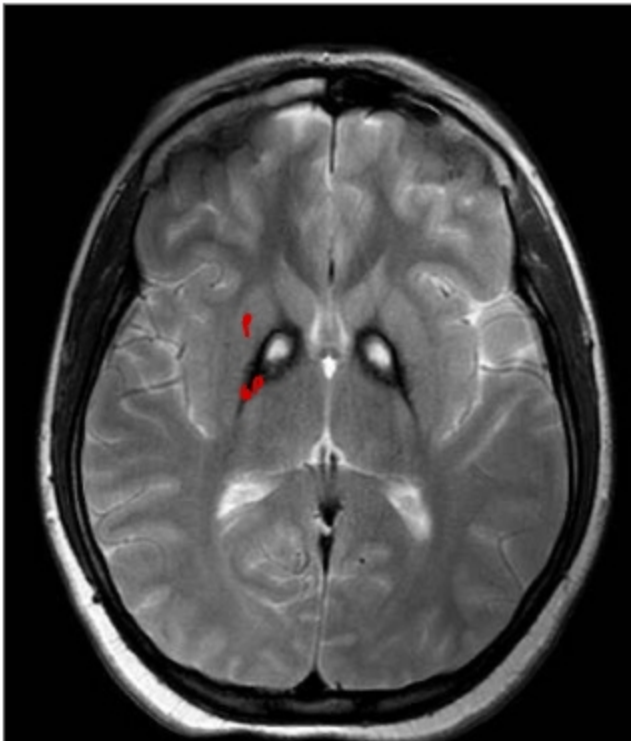


tram track
ON meningioma
NF 2 (mc)

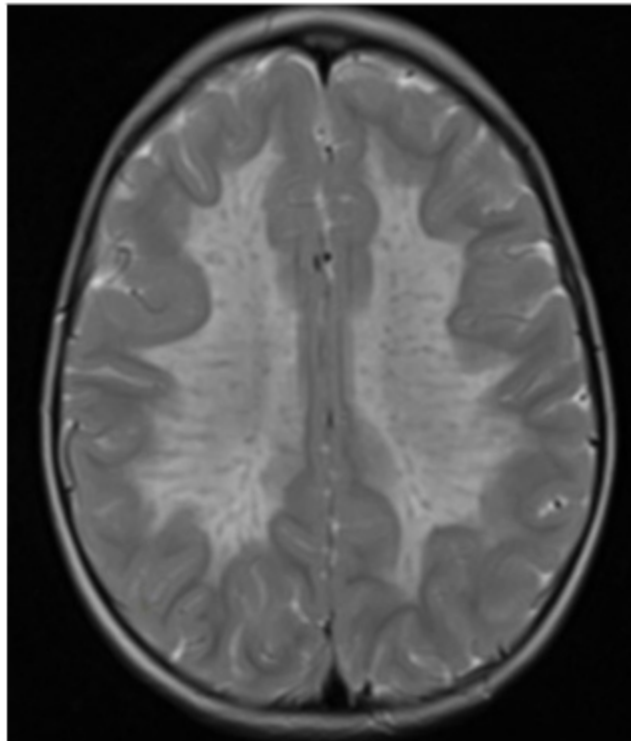


~~OO~~ Subperiosteal abscess
) ethmoid sinuses

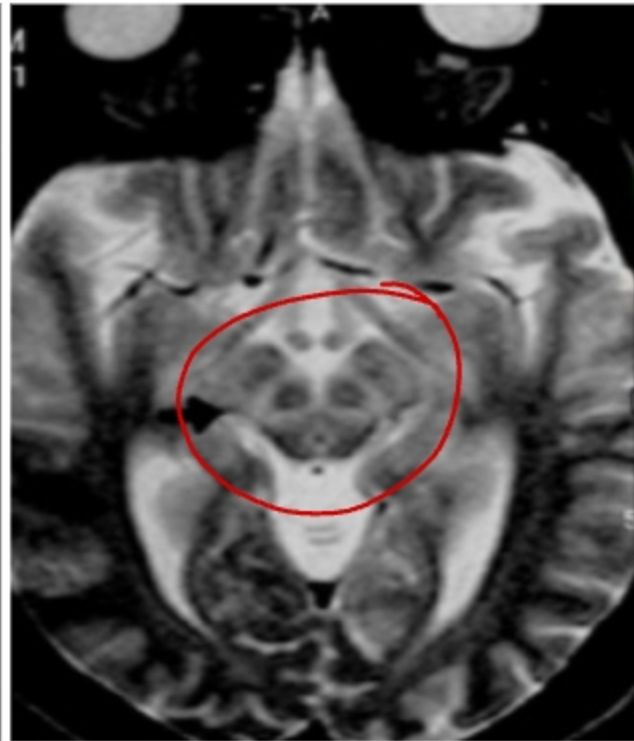
NAMED SIGNS



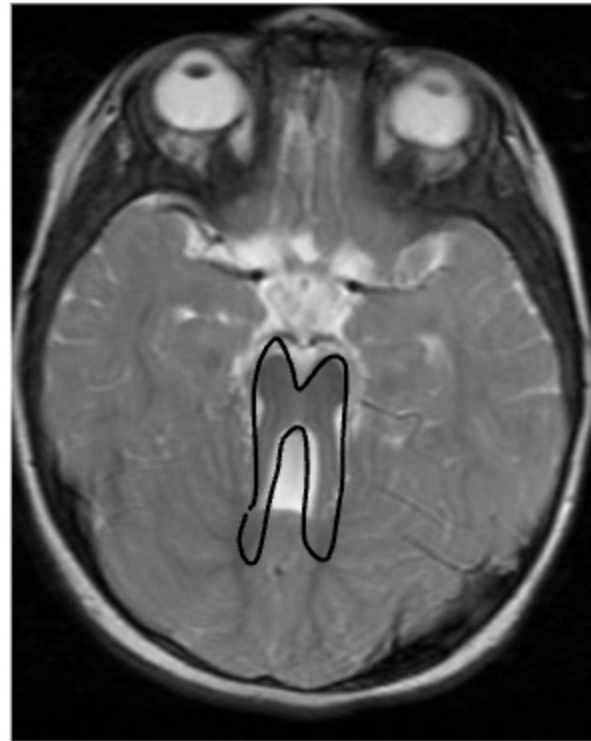
eye of tiger sign
|
Hallerordan - Spatz /
PKAN (panthothenate
kinase)
|
'Fe'



TIGROID signs
|
MLD | Pezileus-
Mergbacher



Face j-ganda
|
+
Wilson D
|
(sarcoid : Gallium)



Molar tooth
|
↓
Joubert Sr

RT/ NUCEAR MEDICINE

Effects of Radiation

STOCHASTIC	CHANCE	DETERMINISTIC
No threshold	. prob of dose	<u>Threshold exists</u> severity of dose
Delayed		Immediate
<u>Cancer, Genetic mutations</u> "All or none"		<u>Skin erythema (MC), Cataracts,</u> <u>Epilation</u>

MOA of radiation: ds DNA breaks > free radicals

Ionisation power / linear energy transfer: Max- α rays Min- γ rays

Penetration: Max- Neutrons > γ rays Min- α rays

RADIATION BASICS

	Occupational Exposure	Public Exposure
Overall	20 mSv/ year averaged-5 year 30 mSv in any single year	1 mSv/y
Lens	150 mSv/y	15 mSv/y
Skin, Extremities	500 mSv/y	50 mSv/y
Pregnant female	2 mSv/y	1 mSv/y
Fetus	1 mSv/y	0.5 mSv/y

Max permissible : AERB



- Thermoluminescent dosimeter

- 3 months

- CaSO_4 : Dysprosium

- chest - below Pb apron

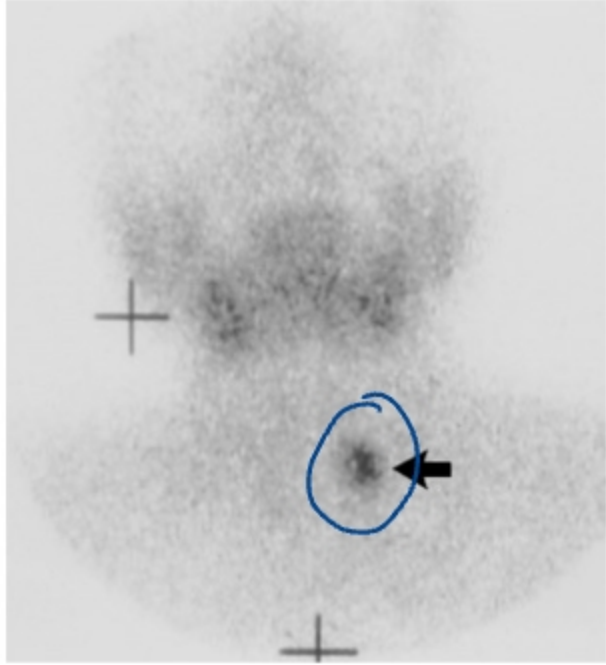


Pb apron

mc : 0.5 mm

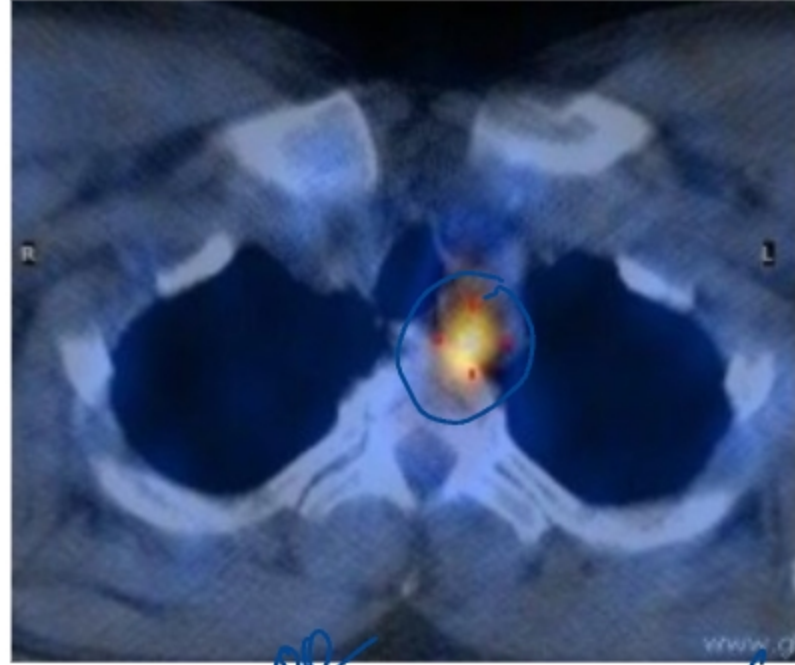
min : 0.25 mm

Nuclear medicine



Scintigraphy

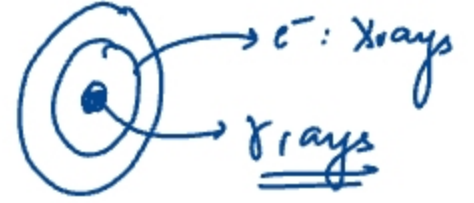
Tc^{99m} → γ rays



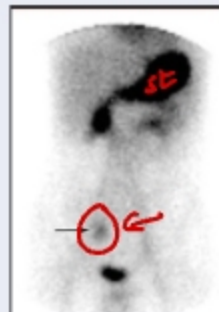
~~SP~~ SPECT
Single PHOTON (better)

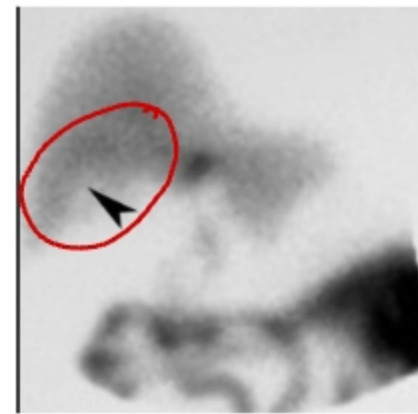
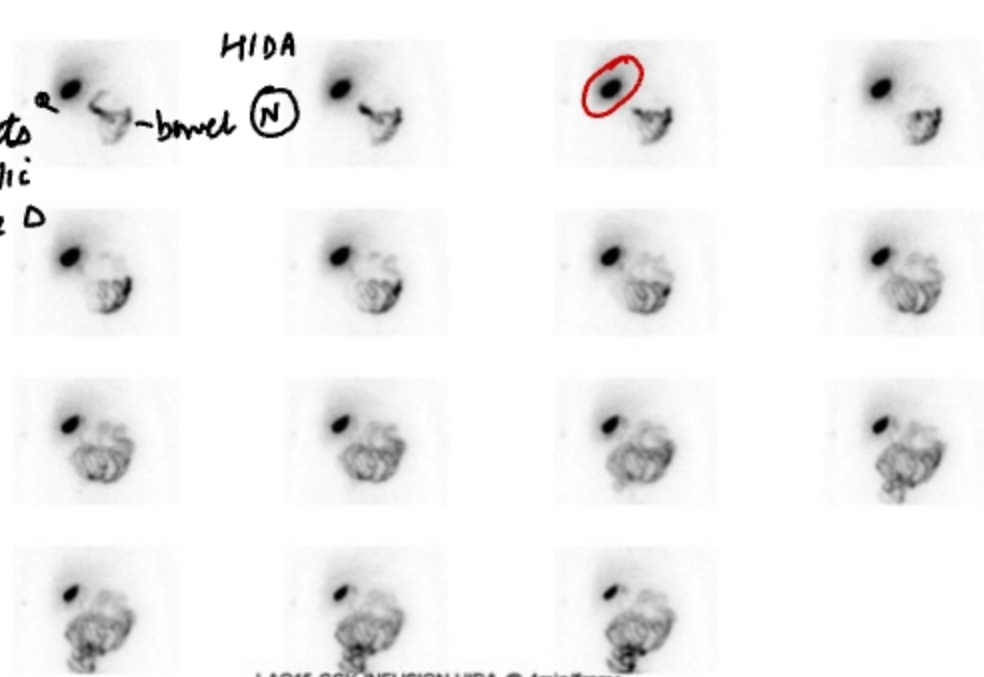
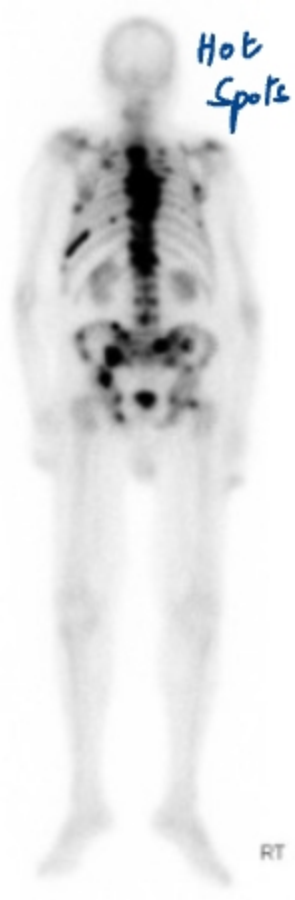
+ sestamibi

PTH adenoma

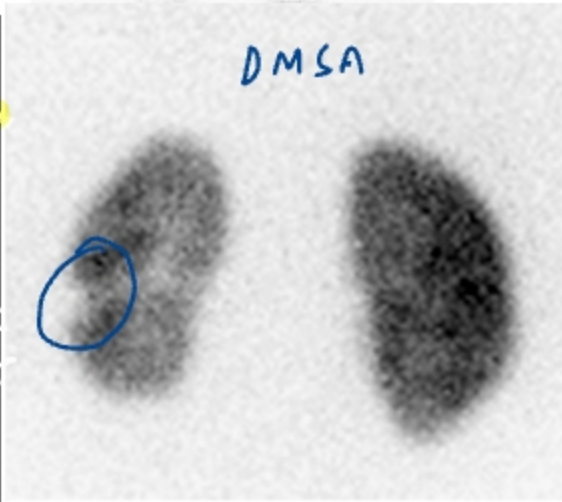
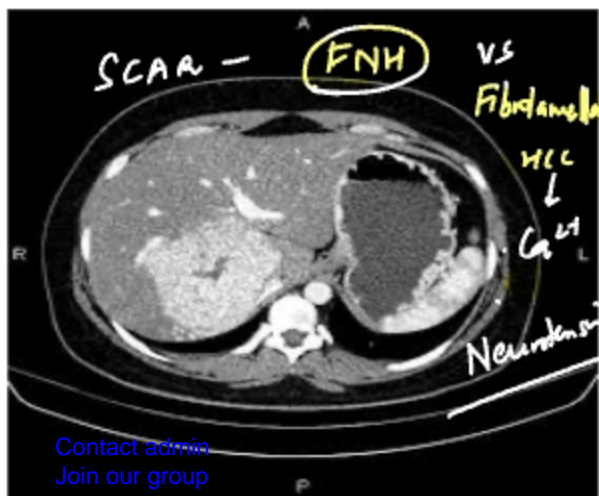
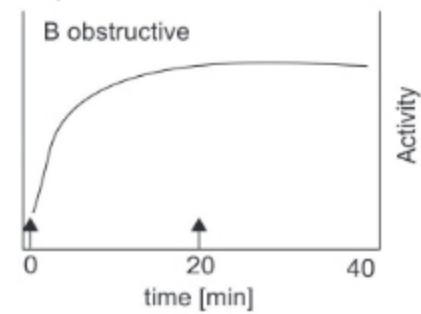
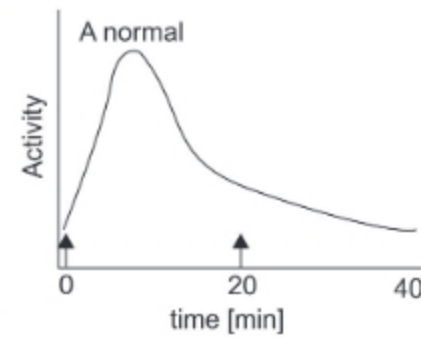


Radioisotope	Test
Tc99m-MDP (methylene diphosphonate)	Hot spot: METS / TUMOR Triple phase (flow, blood pool, bone): Acute OM ^R / Cold spot: MM
Tc99m-HIDA	Bile leaks- most seen in (site / type) EHBA - 100 / ↑↑ NPV (non visualization of bowel) Acute cholecystitis- non visualization of GB (most accurate)
Tc99m Sulphur colloid	FNH (Kupfer cell)
Tc99m pertechnetate	Meckel's diverticulum: 100% Red currant jelly stool + painless Rule of 2: 2%, 2 mucosa stomach, 2 inches, 2 ft IC junction TRVE Thyroid imaging (I-123) Salivary gland hot spot: WARTHIN TUMOR
Tc99m DMSA	Renal scar (VUR)
Tc99m DTPA / MAG3	Functional renal scan
Captopril renography	Renal artery stenosis



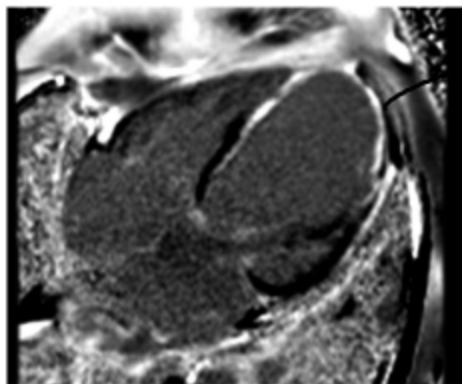
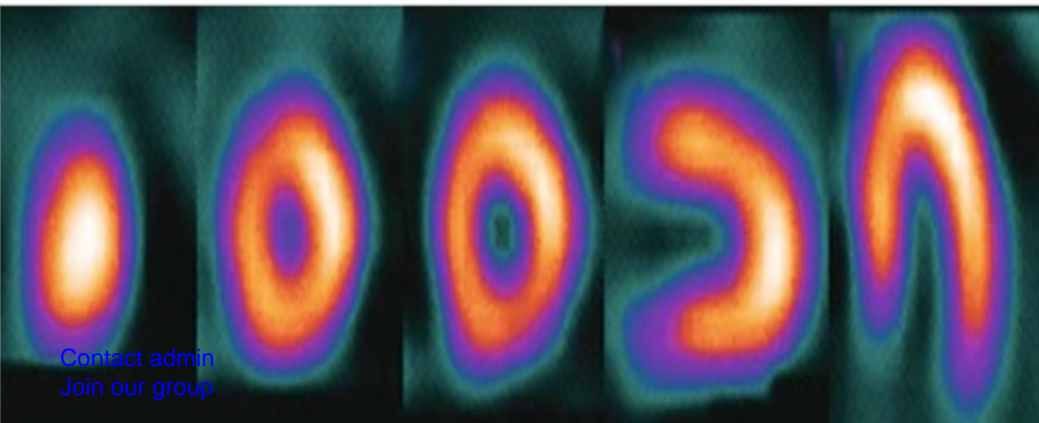


LAO15 CCK INFUSION HIDA @ 4min/frame



Cardiac imaging

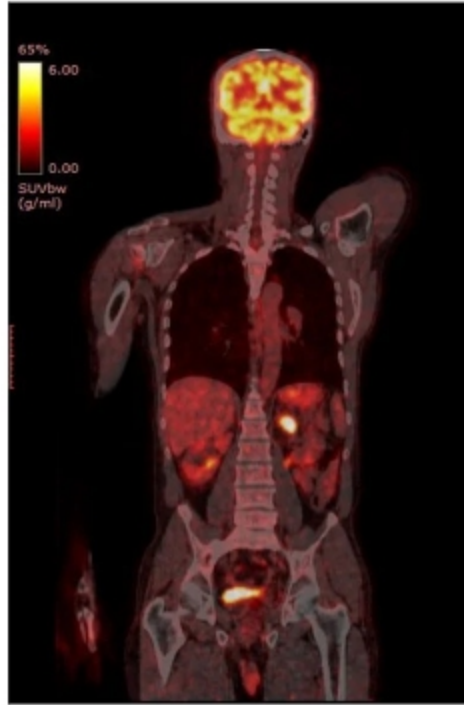
Scan	USE
Thallium-201 Tc99m-tetrafosmin Tc99m-Sestamibi	Myocardial perfusion =
Tc99m-pyrophosphate scan	'HOT SPOT' - Infarct
18-FDG PET	Myocardial viability
MRI → 10L Tc99m-MUGA ECHO	♡ fr



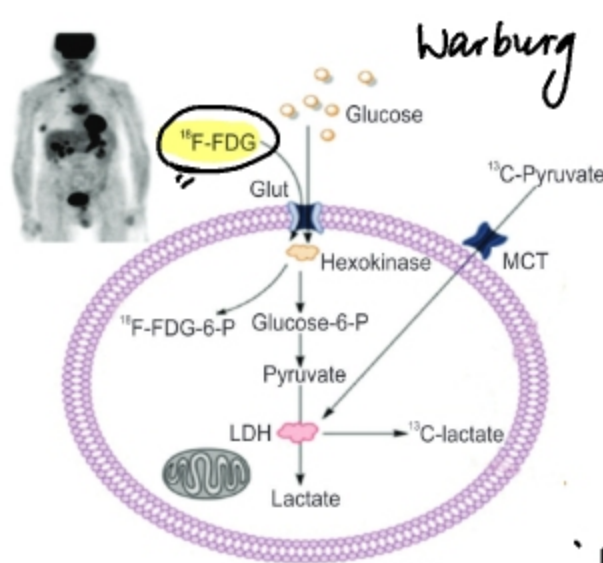
Delayed Gd
enhancement
↳
Ischemic

PET SCAN

Positron emission tomography

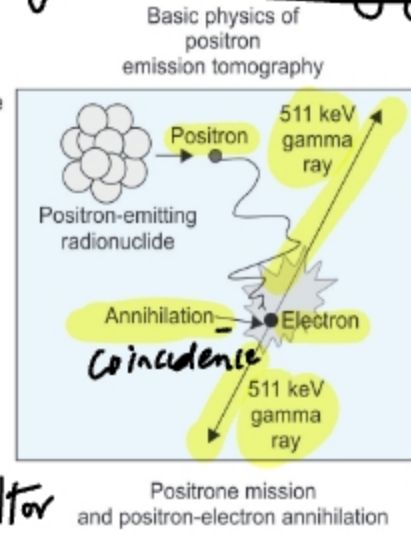


PET-CT

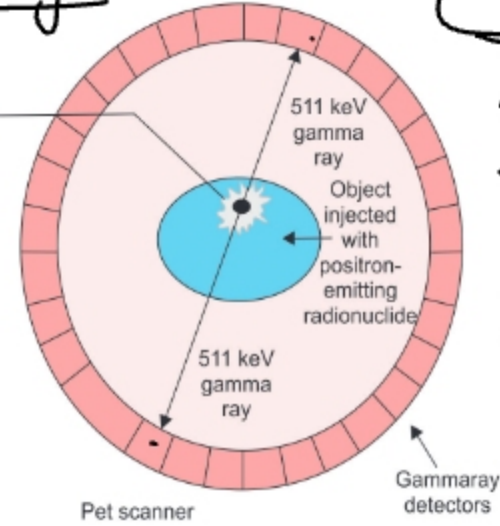


Warburg effect: aerobic glycolysis

^{18}F - positron emitter (e⁺)



Positron emission and positron-electron annihilation



Pet scanner
Gamma-ray detectors

false -ve:

- typical carcinoid
- mucinous adenocarcinoma

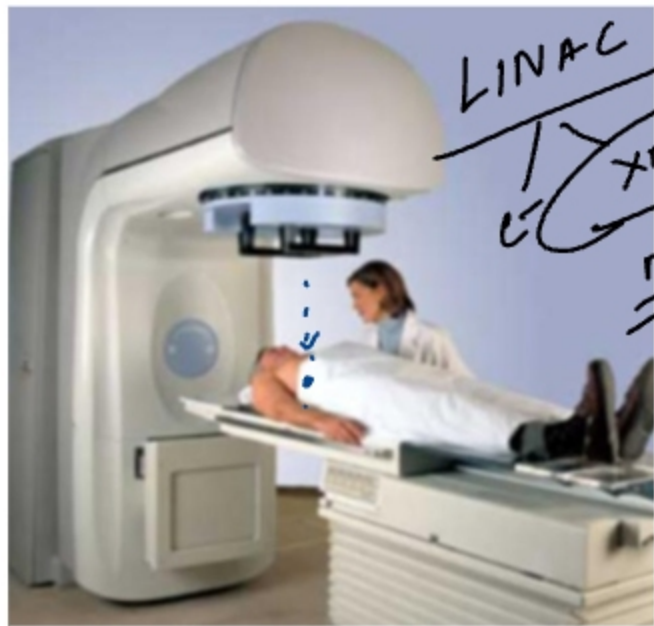
false true:

TB

Prerequisite: Sugar (N)

Radioisotope	Test
18-FDG PET	100 - mets
NaF PET	bone mets
Choline PET, PMSA PET	prostate mets
DOPA-PET	Pheo
DOTANOC PET	NET Pancreas
C11 Pittsburgh compound b PET	Alzheimer dementia

RADIOTHERAPY

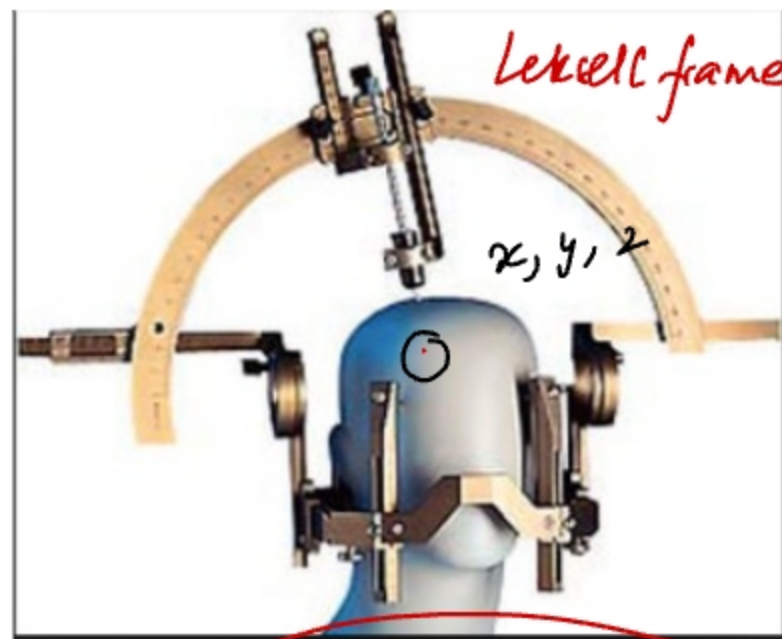


LINAC
 X-rays
 mc
 e



brachytherapy

remote afterloading



Leksell frame

x, y, z

Gamma knife

Co-60

- Vestibular schwannoma < 3cm
- Pit adenoma
- Trug neuralgie Refractory

'Cyber-knife : frame-less'

Cyclotron: PROTON

IMRT: Intensity modulated RT

FRACTIONATED RT:



Repopulation, Reoxygenation, Repair, Redistribution, Radiosensitivity

'5R'



PERMANENT IMPLANT:

GOLD

HYPCI

Yt

PALLADIUM

CS 131

I-125

PURE B-EMITTER

P-32 - systemic RT - PCX

Sr - bone mets

Yt

Element	HALF LIFE
18-FDG	110 min
Tc 99	6 hrs
I-123	13 hrs
I-124	4 d
I-125	60 d
I-131	8 d
Co-60 (Q)	5.2 yrs
Cs-137	30 yrs
Radium-226 (d)	1622 yrs

Handwritten notes on the table:
 A bracket groups I-123, I-124, and I-125 with the note "γ only".
 Next to I-131 is the note "β + γ → (R) (1+3+1+3)".
 Next to Radium-226 is a circled alpha symbol "α".

Most common side effect of RT- *erythema*
 MC RT-induced malignancy- *AML*
 MC brain tumor after cranio-spinal RT- *meningioma*
 MC RT-induced thyroid carcinoma- *papillary ca*
 MC bone cancer after RT- *osteosarcoma*.

Type	Most sensitive	Least sensitive
Cell Type <i>Bergonie law</i>	rapidly ÷	Quiescent
Organ	Gonads	Vagina
Blood cell	Lymphocyte	Platelet
Cell cycle phase	G2-M	(S) <u>QP</u>
Tissue	Hematopoietic / BM	CNS
Structure of eye	Lens	Sclera
Tumors	WELMS: WT / ewing ^{QP} / Lymphoma / MM / seminoma	HOMP: HCC / ACC / osteosarcoma / <u>metanoma</u> / panc
Acute radiation syndrome <u>QQ</u>	Hematop → GI →	CVS - CNS > 10 Gy
Inverse square law	$I \propto \frac{1}{d^2}$	

