Computed Tomography

- Chest CT
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Chest CT scanning

- is a noninvasive medical test that helps physicians diagnose and treat medical conditions.

- CT scan is better for chest

- CT it show many different types of tissue, including the lungs, heart, bones, soft tissues, muscle and blood vessels in short time.

Types of chest CT scan

▸ 1-Standard or conventional CT:

▸ 2- HRCT

▸ 3- Pathology (C+)

▸ 4- Pulmonary Embolism scan

1.Standard or conventional CT:

▸ Slice thickness: **3-10** mm

▸ Scans a large volume, very quickly

▸ Covers the full lung

▸ +/- contrast

▸ Indications

▸ Chest x- ray (CXR) abnormality

▸ Lung cancer staging

▸ F/U metastases

▸ Pleural and mediastinal abnormalities

▸ Empyema

▸ Chest trauma.

Contraindication

1. Pregnancy.

2. Hypersensitivity to iodinated contrast media(if contrast is used).

3. Renal failure.

4. Heart disorder

2- HRCT

- Without contrast.

- High kV, mAs & thin slices to produces a high spatial resolution and anatomic detail

- No preparation

- Sedation if needed.
- Narrow x-ray beam collimation: 1-1.3 mm vs. conventional 3-10 mm
- Cross sections are further apart: 10 mm
- High definition images of lung parenchyma: vessels, airspaces, airway and interstitium

HRCT Indications

- Diffusely abnormal CXR
- Baseline for patients with diffuse lung disease
- Solitary pulmonary nodules
- Reversible (active) vs. non-reversible (fibrotic) lung disease
- Hemoptysis
- Lung biopsy guide
- Follow up known lung disease

Patient position

▸ Supine, in the center of the table

▸ Head first in the gantry (child, head first to see the chest movement during the breathing after the sedation).

▸ Table height

▸ The arms are above the head.

▸ The external laser liner in the chine.

Scout Images:

▸ PA : plane 180º

▸

Scan parameters:

Type of scan	KV	MA	Scan delay	Slice thick	Recon	pitch	FOV	Recon. Algorithm
Spiral (axial) Inspiration	120	Auto M.A	0.7 sec	2.5 ×2.5	1.25 ×5	1.375 speed 27.5	Large 30-40	standard lung
Spiral Expiration & Prone	120 Axial	Auto m.A	0.7 sec	1.25 ×10	_	_	Large	Lung

Window

		window	level	
spiral 1	Standard	500	35	Soft tissue
spiral 2 & 3		1500	- 300	Lung widow

▶

▸ **Reformatting:** sagittal & coronal

▸ Note:

▸ FOV is as small as possible while still including all of the soft tissue and the upper abdominal part (to check the metastasis).

3- Pathology (C+)

Preparation:

- NPO 3-4 hours before the procedure.
- Not allergic or asthmatic.
- Renal function test normal
- Canulla in the Rt arm, size 18, 20 Gag.
- Sedation if needed

Procedure

▶ Inspiration technique: As HRCT

▶ Patient position:　　As HRCT

▶ IV Contrast media:

1.　Omnipaque

▶ Adult : 300
▶ Child: 250

Contrast media

|	The injector machine		Hand injection
	Adult	Child	Time delay
FR	5ml/sec	5ml/sec	15- 20 sec
V	100 ml	Weight × 2	C. in the Aorta

- **Scan parameters & Window :** as Inspiration HRCT

- 2nd Reconstruction: 1.25× 1.25

- **Axial & Sagittal – Soft window**
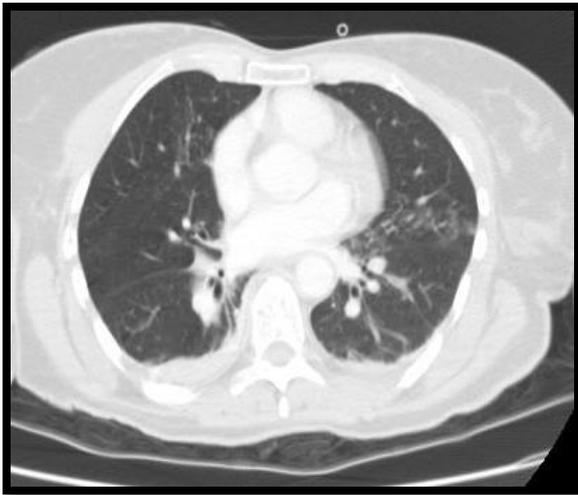
4- Pulmonary Embolism scan

▸ Fast helical CT scanning to visualization of the pulmonary vessels and lung parenchyma during the injection of a CM to detect any obstruction.

▸ Optimal contrast should be in the pulmonary arteries, but not in the pulmonary veins.

▸ Patient Preparation & position: As 2nd tech.

▸
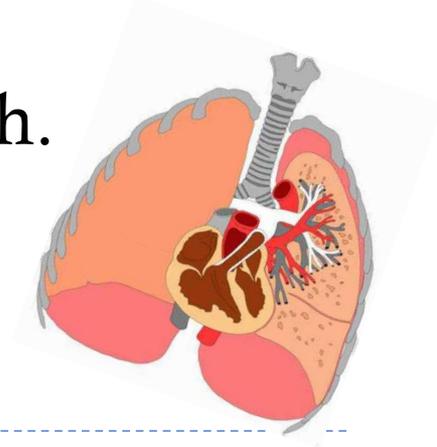
▸ Main thing: calculate the contrast time that start from the injection until it will enter in the
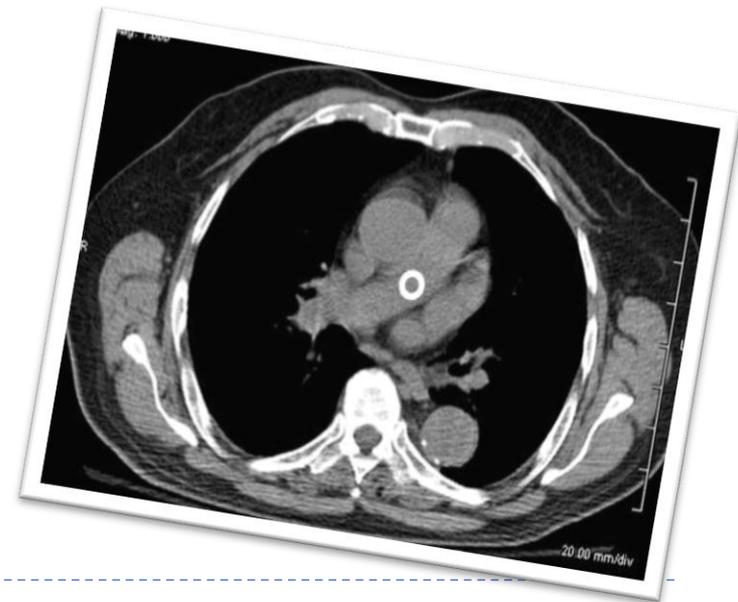
 main pulmonary artery

▸ Two ways to calculate the timing:
1. Smart Prep
2. Bolus timing

▸ Then selected in the computer.

A- Smart Prep

▶ In case if:

1. The heart rate abnormal (above 110-140)
2. Obese patient (above 110 Kg).

Scan parameters

Type of scan	KV	MA	Scan delay	sec	S.T	Recon.	pitch	FOV	Recon. Alga.
Helical spiral	120 - 140	auto	0.7 sec	0.7 sec	1.25 ×0.6	2.5 × 2.5	1.375 speed 27.5	large	- standard - lung

Window

		window	Level
spiral 1	soft tissue	800	100
spiral 2	lung window	1500	- 300

b- Bolus Timing

- In case if the heart rate normal (70-90)

- Procedure

1. PA scout (to localize the pulmonary trunk).
2. FOV only in the **bifurcation** of the trachea and take CT images.
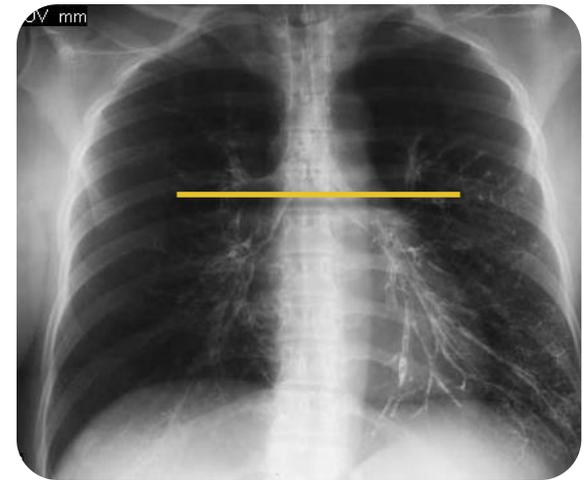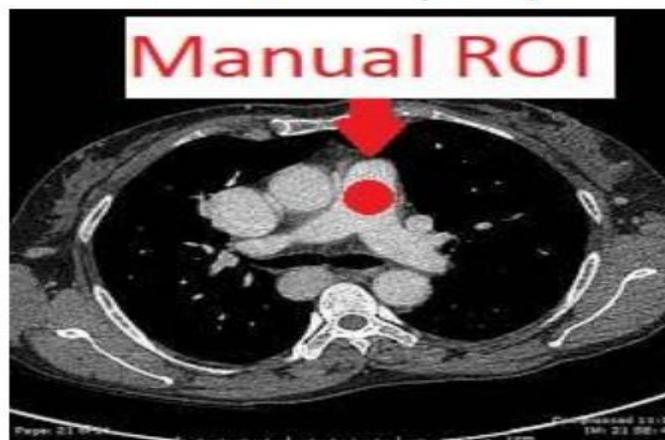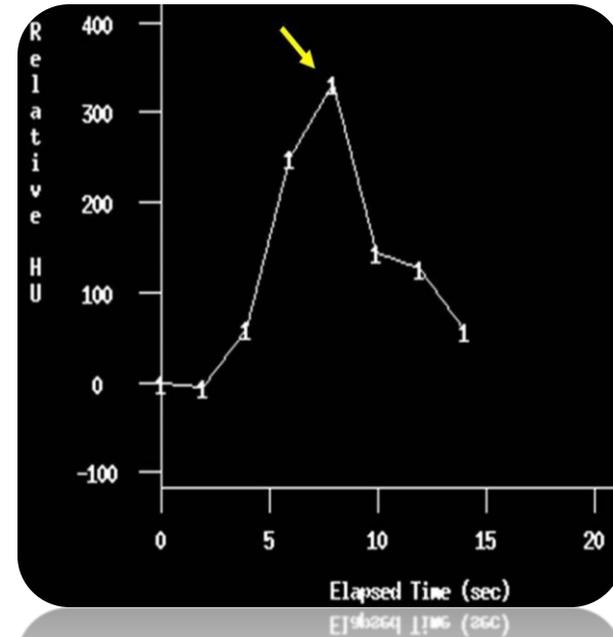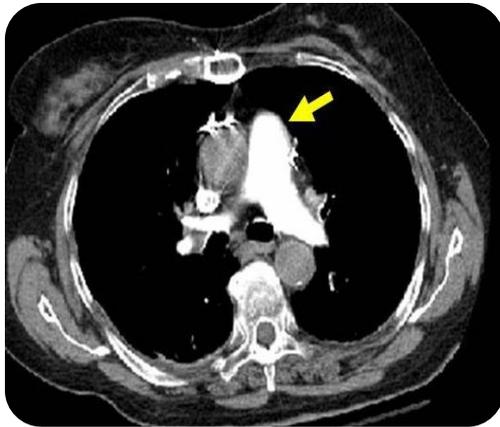
1 - Serview

2 - Locator

4 - Helical CTA

3 - Tracker (ROI)

▸ Then do the normal image from down- up with same before and fixed the scan time manually.

▸ This graph shows that the contrast injected into the vein reached the pulmonary trunk in 8 seconds.

I.V. Contrast

1. Smart Prep: Adult: 100 ml – 5 ml/ sec
2. Bolus timing: Scan time × 5 = volume

Head first
70 cc contrast
4 cc/sec flow rate

The bolus timing is Better than the Smart Prep

▸ Less C. dose, so there is chance to repeat the scan again if there is any mistake (the max dose is 100 ml/ day).

▸

After care

▶ Pt. can eat or drink as normal.

▶ Drink fluids to flush the contrast.

▶ Bandaged contrast injection site.

▶ Watch the patient for adverse contrast reactions.

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