جامعة المستقبل
كلية التقنيات الصحية والطبية
قسم تقنيات الاشعة

الفحوصات الشعاعية الخاصة
المرحلة الثالثة

Lecture 7

Methods of imaging the respiratory system

اعداد
م.م. مرتضى عبد الامير محمد

الأهداف السلوكية

- يتمكن الطالب في نهاية المحاضرة على تعداد أجهزة فحص الجهاز التنفسي
- معرفة مكان تزويد الشريان الرئوي بالصبغة وموقعه
- ان يكون الطالب قادر على تسمية اهم المناطق المحيطة بالشريان الرئوي على التشريح الشعاعي الخاص بفحص الصدر بالمفراس الحلزوني مع الصبغة
- ان يميز الطالب بين الفحص المثالي من الفحص الغير مثالي
- ان يميز الطالب بين الفحص التلقائي والفحص اليدوي والفحص بالتوقيت للشريان الرئوي

Subject	Time min
Method of imaging	1
Introduction questions	5
Blood circulation	2
Review CT anatomy of normal CTPA	3
Example of normal CT and good quality CTPA exam	2
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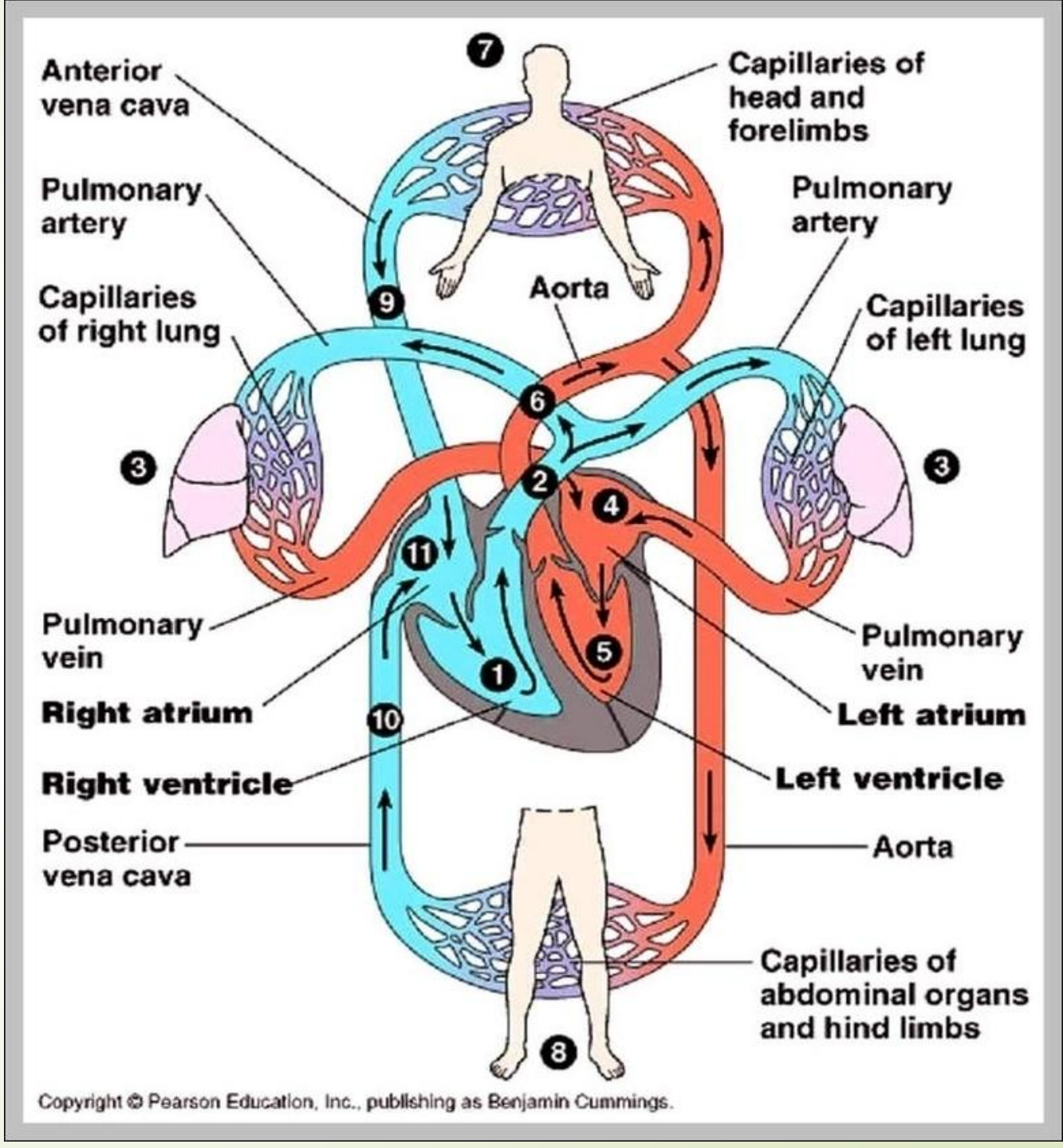
Methods of imaging the respiratory system

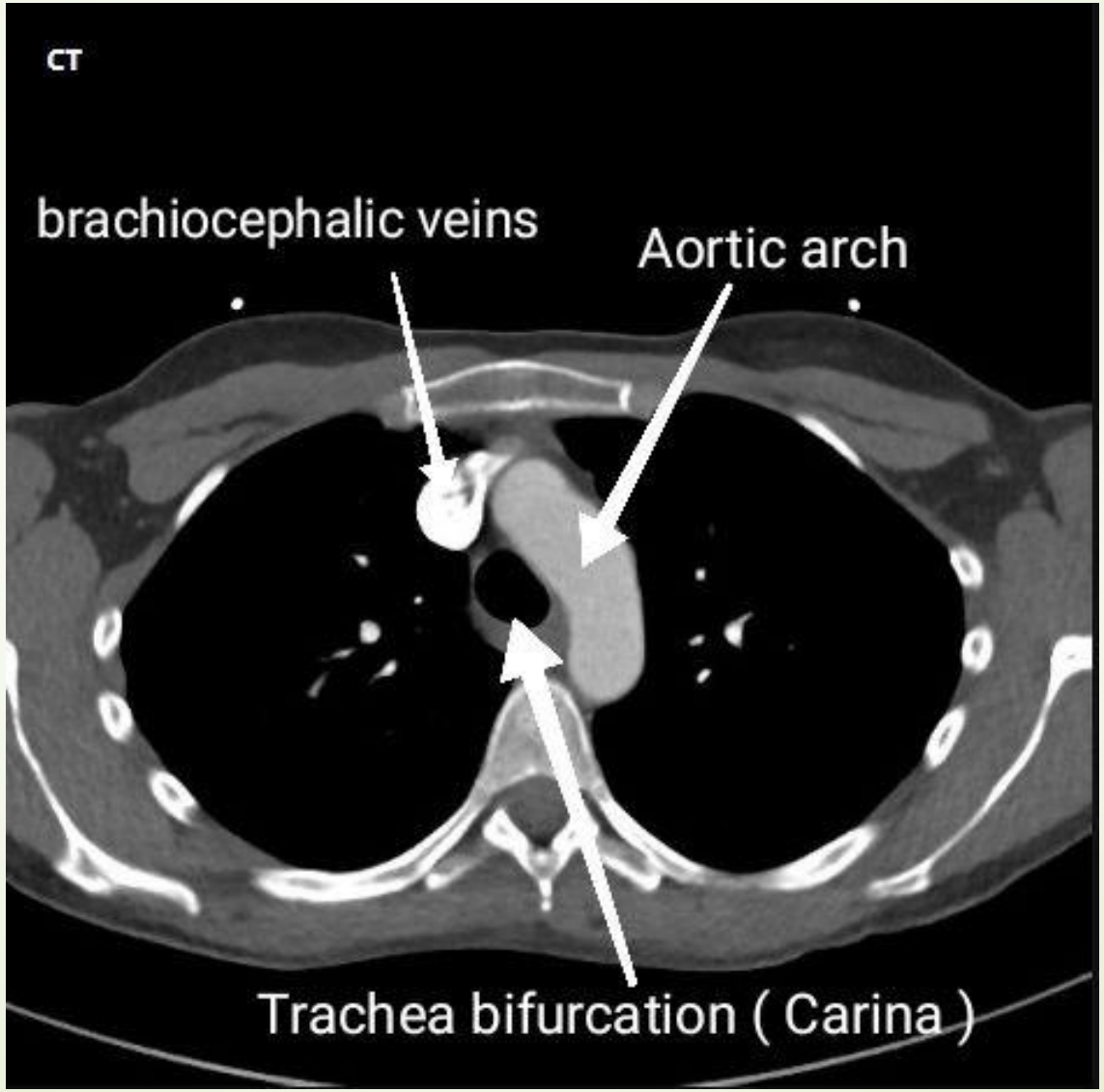
- 1. Plain films (X-ray)
- 2. Radionuclide imaging (PET scan)
- 3. CT (HRCT ,angio)
- 4. US (for pleural disease)
- 5. MRI
- 6. Bronchoscopy

Blood circulation

يجب على الطالب معرفة طريق مرور الصبغة داخل الاوردة والشرايين



The normal anatomy necessary to the respiratory system angiography



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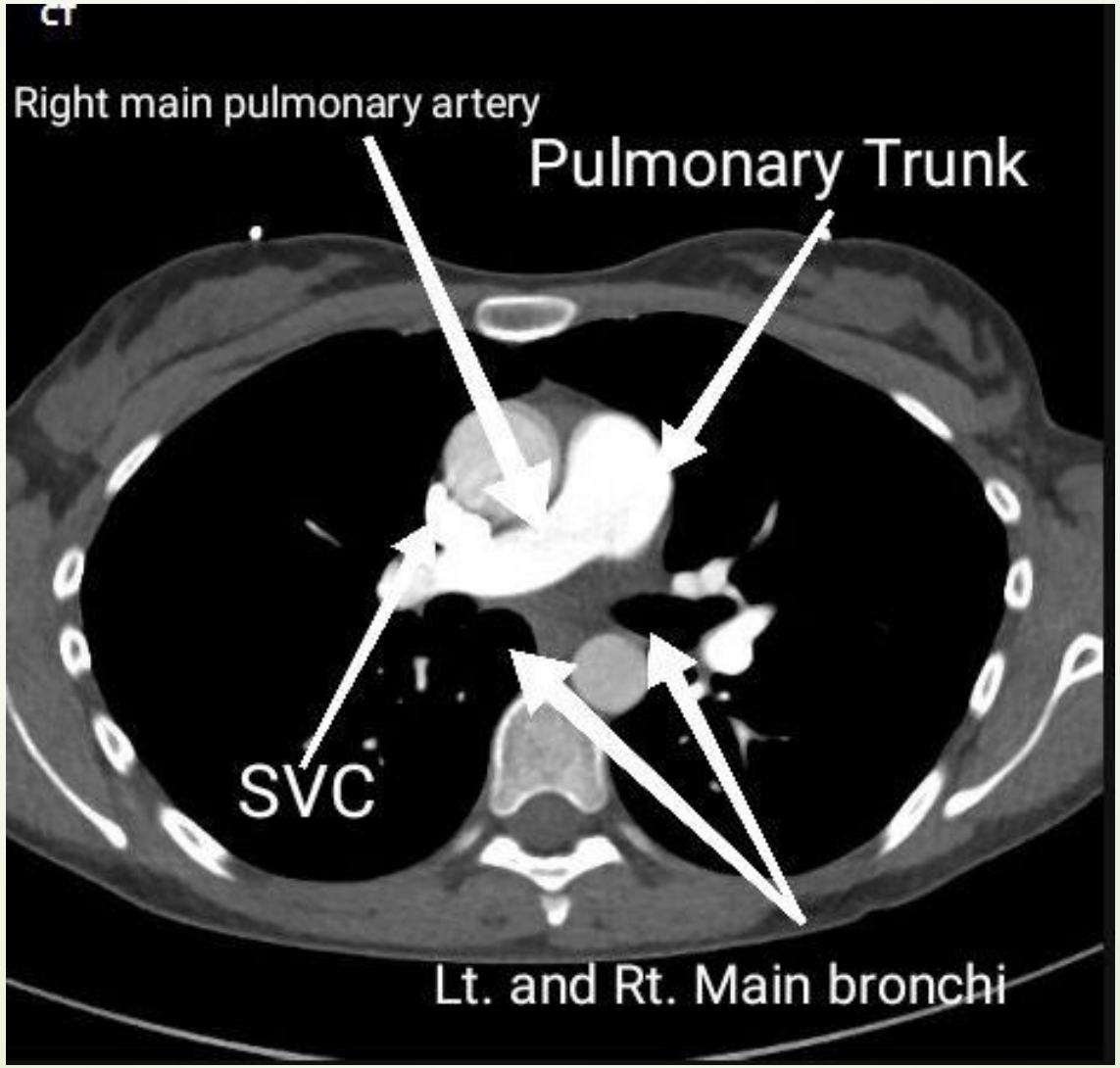
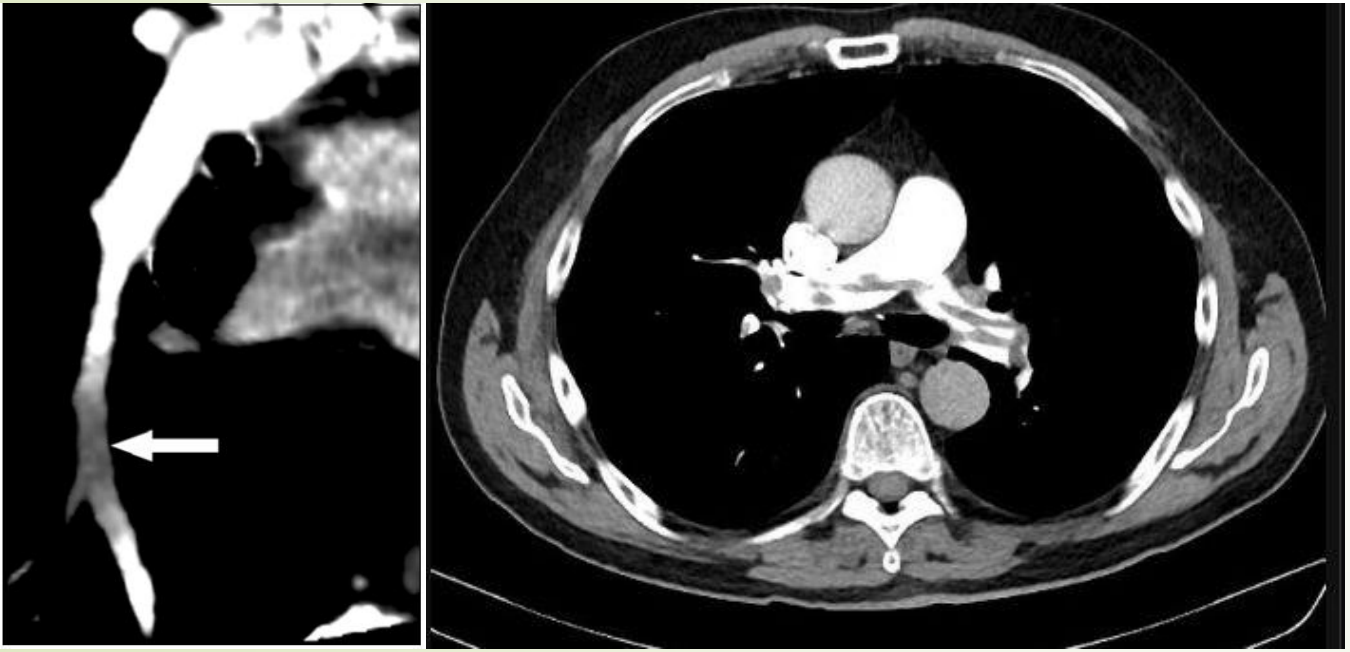


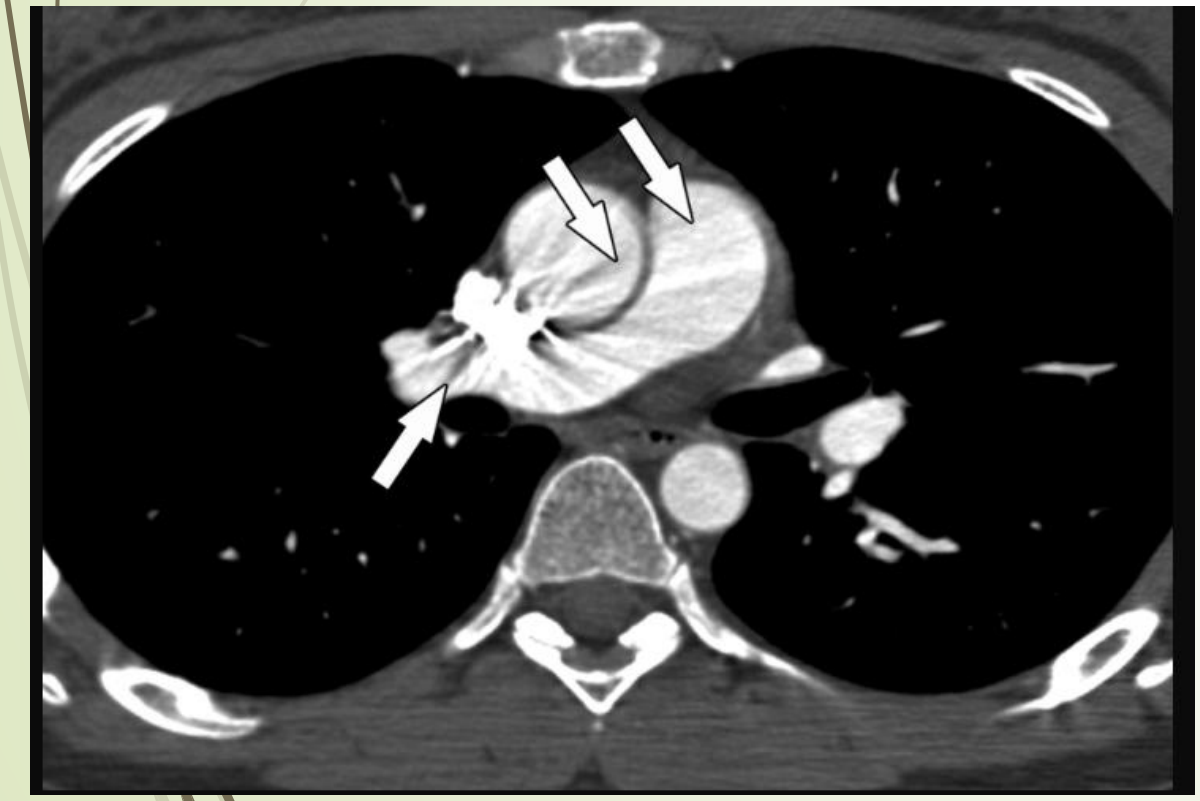
Abnormal Pulmonary angiography
pulmonary embolism (PE)



Normal Pulmonary angiography
CTPA

Artifact on the main Pulmonary artery

Poor quality



Pulmonary angiography

excellent quality

Pulmonary arteriography is the “gold standard” and will detect most pulmonary emboli.

Technique

- 1. Unenhanced scan of thorax - to detect any other clinical abnormality which might account for symptoms.
- 2. Enhanced scan of pulmonary arterial system

Patient preparation

- Check : the D-dimer blood test (normal <500)
- Check : Blood urea + serum creatinine
- Patient position: supine with their arms above their head : to avoid upper extremities artifact
- Remove metals attached to the clothes
- Place Blue canula or pink in the right arm to avoid contrast artifact from the subclavian artery , make the allergy test and test the canula in the same time

During exam

- Contrast injection (1or 2 ml per kg), (usually 75-85 ml)
- monitoring slice : below the carina (Trachea bifurcation)
- Respiration phase : inspiration
- FOV: scan from above the aorta to the lowest hemidiaphragm
- Use manual method to start the exam (look at the superior vena cava) or
- Use bolus method to stat the exam : ROI and threshold

or

- Sit your start exam time which is usually 15 second after injection

Important notes

** Choose the right hand for injecting contrast to avoid contrast artifact

** Before the radiation starts make sure the CT scan room door is closed

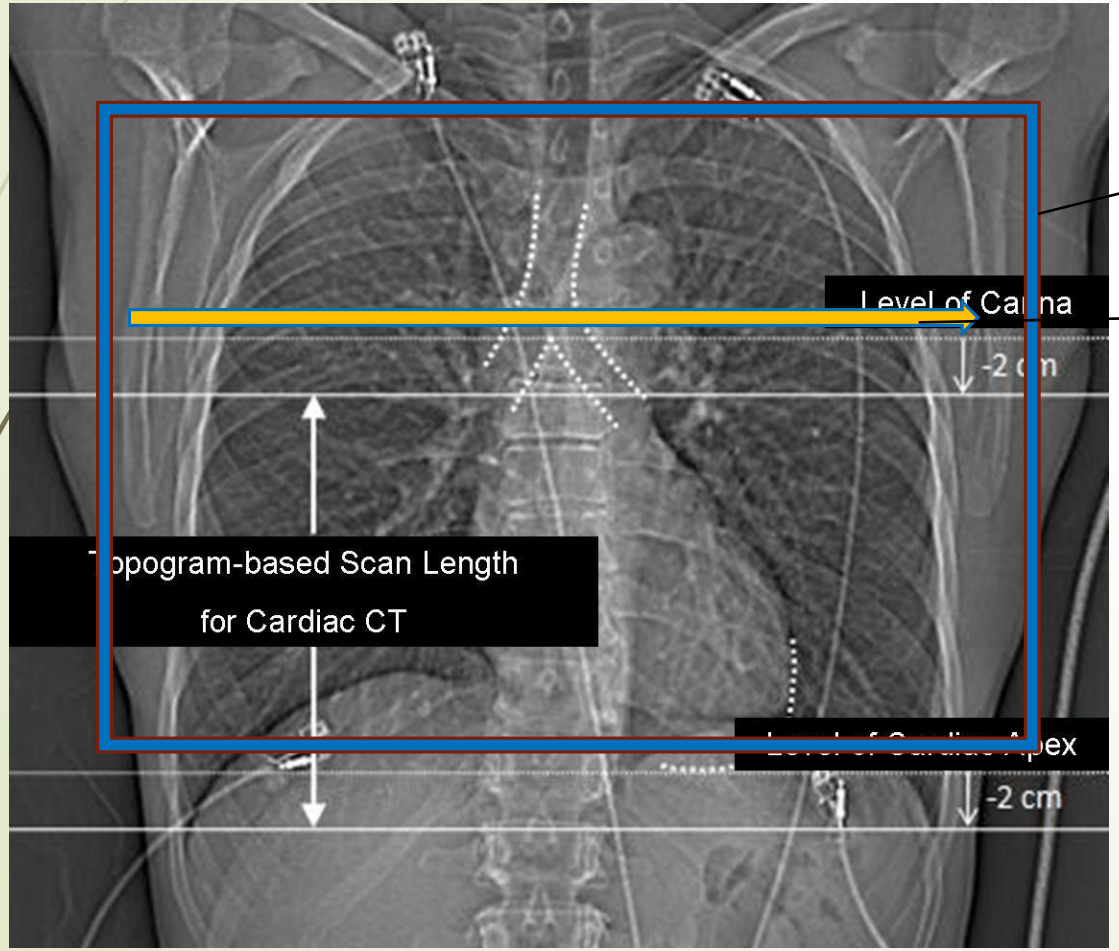
**During IV administration Look at the patient and your workstation screen to make sure that the cannula and the connection line is working properly during the exam

**In the perfect scan the contrast should not reach the descending aorta to avoid contrast artifact

** Do not perform the scan too early to avoid missing the Pulmonary artery

Exam procedure
respiratory system angiography

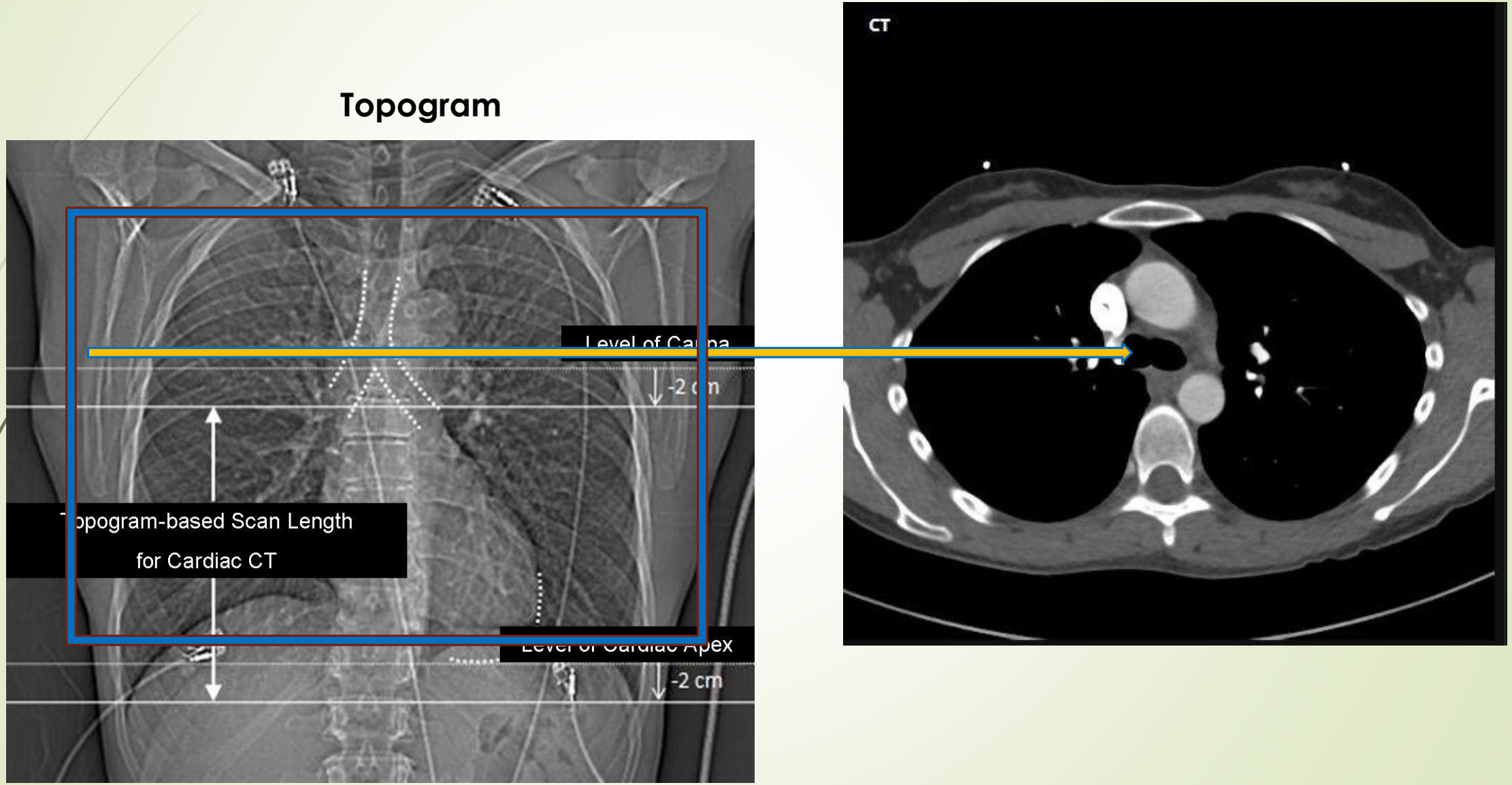
Topogram / scout view



FOV exam area

Scan and view area

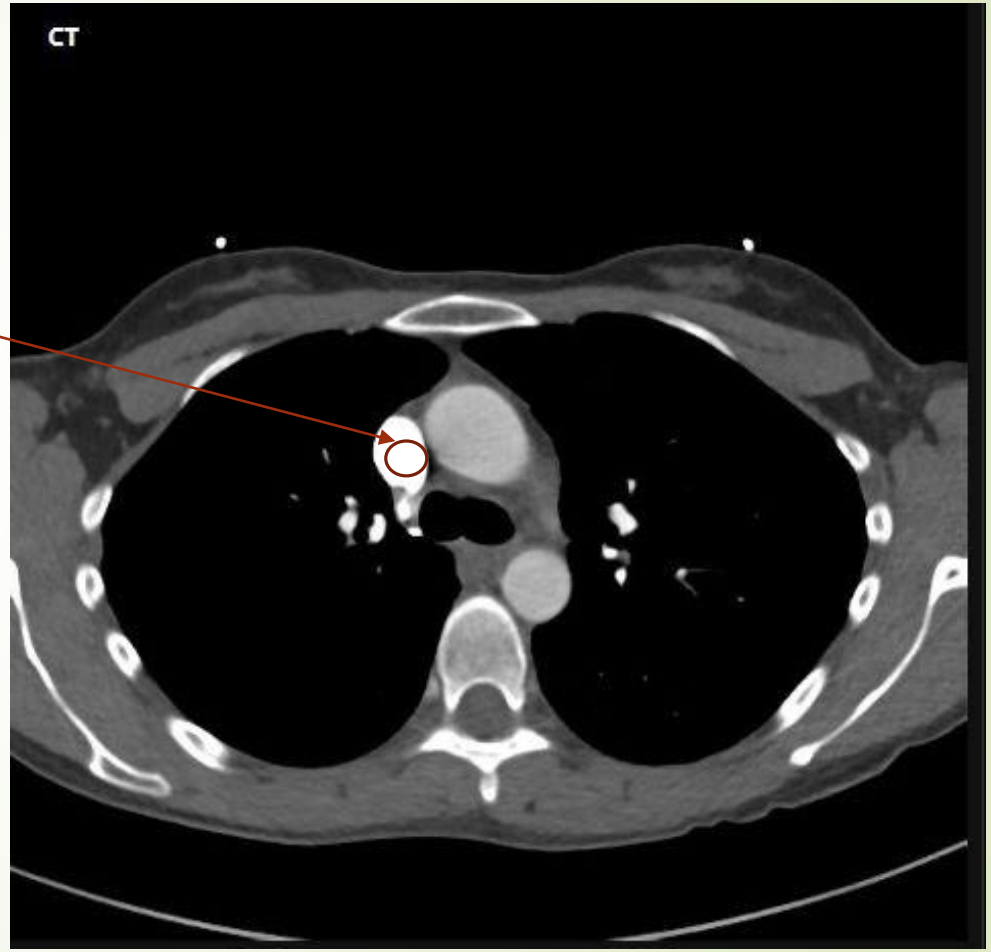
Exam procedure
respiratory system angiography



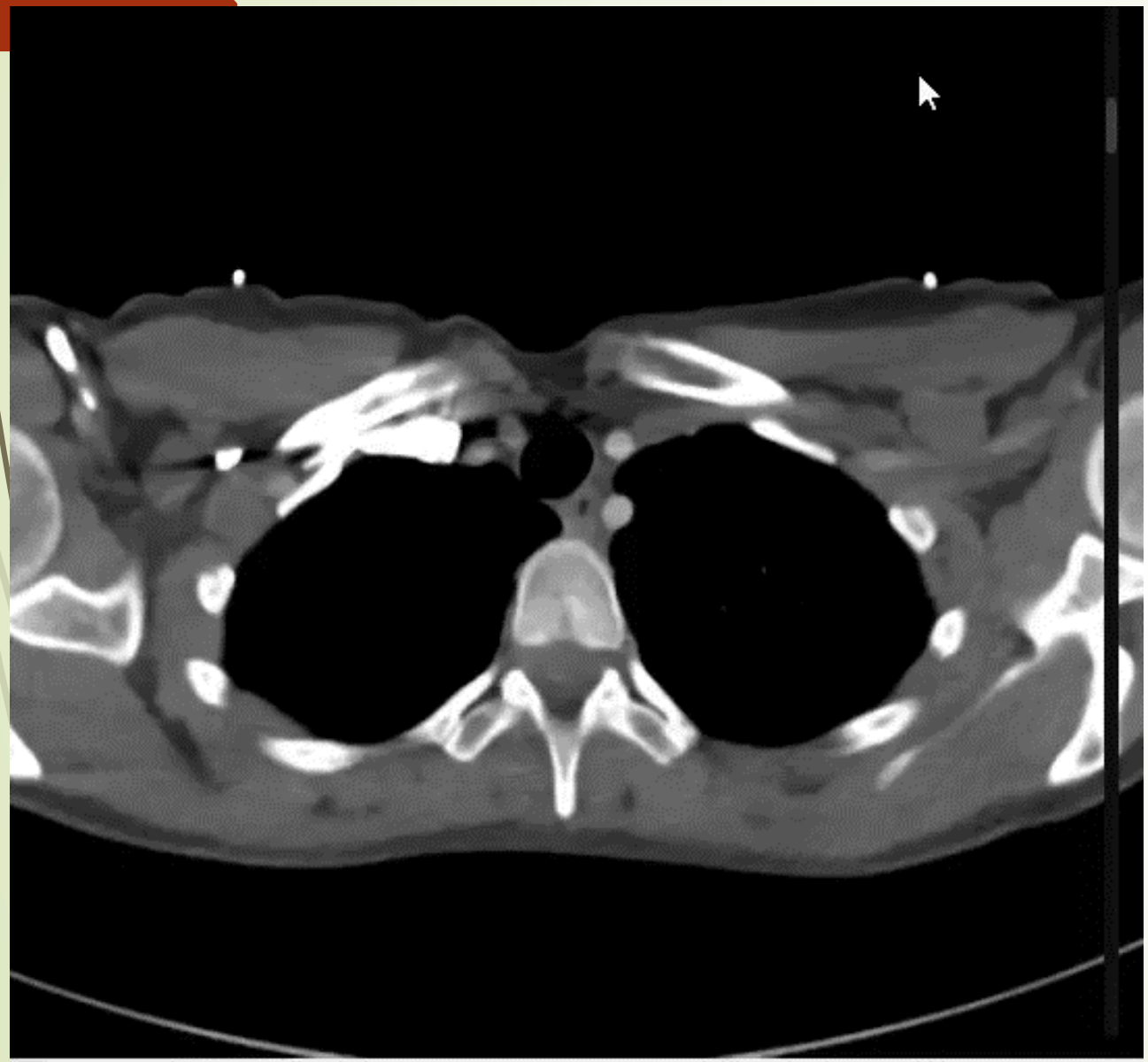
Exam procedure
respiratory system angiography

ROI : Threshold of 175

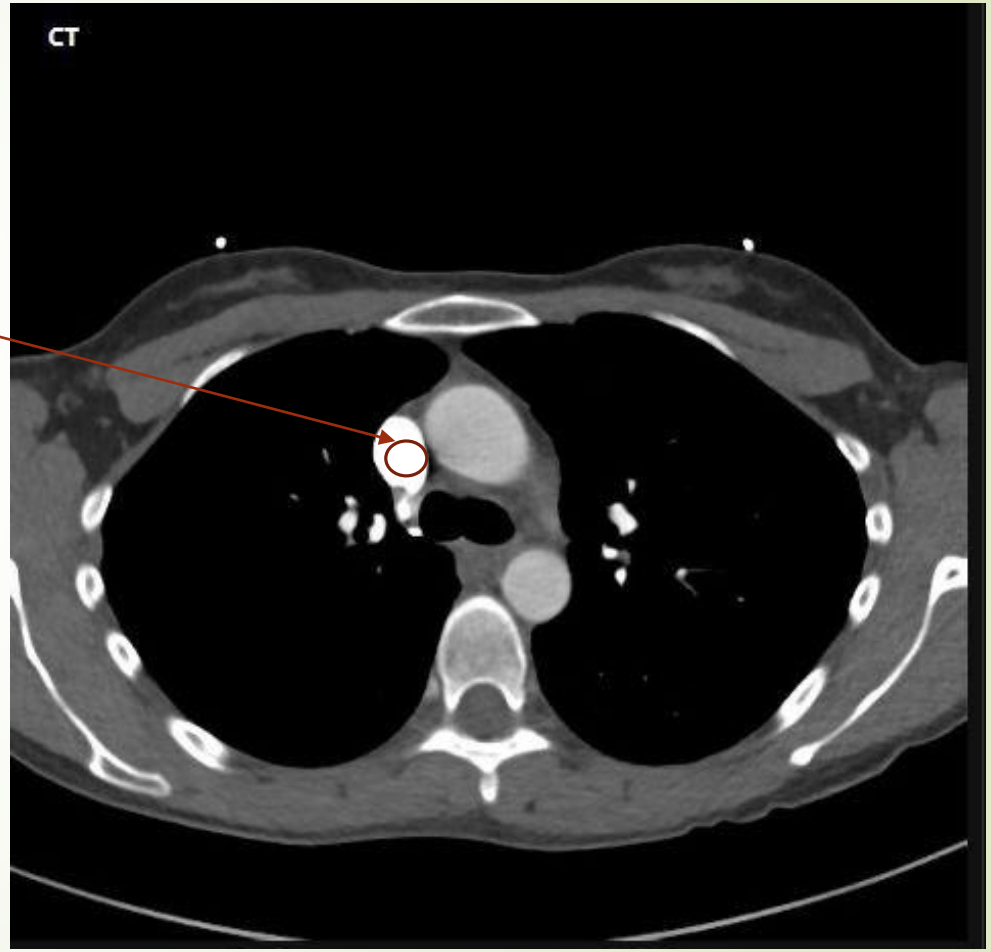
Scan and view area



Exam procedure
respiratory system angiography



Scan and view area



A GUIDE TO CT pulmonary angiogram (CTPA) procedure **(Manual method)**

- The injector : Rate of injection 4-5 ml/s

Volume of contrast medium - 80 ml Contrast

Flashing with normal saline 20 ml .

- Start the CM injection and look at the SVC to click to start the exam if you see the contrast in the vein
- Collimation - 3 mm
- Pitch - 1.8
- Start point - just above the aortic arch
- End point - the lowest hemidiaphragm.

A GUIDE TO CT pulmonary angiogram (CTPA) procedure **(Bolus technique method)**

- The injector : Rate of injection 4-5 ml/s

Volume of contrast medium - 80 ml Contrast

Flashing with normal saline 20 ml .

- ROI circle and threshold

  - If on the main pulmonary artery : threshold HU = 100

  - If on the Superior Vena Cava: threshold HU = 175

- Start point - just above the aortic arch
- End point - the lowest hemidiaphragm.

quiz

- Q1- In which hand we should inject the C.M in the pulmonary artery angiography ?
- Q2- IF we place the ROI on the SVC the threshold level should be …. HU.
- Q3 - Numerate 3 methods of start examining the CTPA
- Q4- on which level scan and view image should be taken in CTPA
- Q5 : What is the perfect CTPA looks like ?
- Q6: What is the given anatomy pointed by the brown arrow ?
- Q7- which exam picture has an good quality image :

Left

right

Home work : write your notes regarding this video of the exam

- Practical CTPA , Toshipa (Canon) 64 slice CT scan

References

- Further reading Klein, J.S. (ed) (2000) Interventional Chest Radiology. Radiol. Clin. N. Am. 38 (2). Macklem P.T. (1998) New methods of imaging the respiratory system. Respirology 3, 101-102.
- PIOPED Investigators. (1990) Value of ventilation/perfusion scanning in acute pulmonary embolism. JAMA 263 , 2753-2759. Robinson, P.J. (1989) Lung scintigraphy. Clin. Radiol. 4 0 , 557-560.
- Further reading Remy-Jardin, M., Artaud, D., Fribourg, M. & Beragi, J.P. (i 998) Spiral CT of pulmonary emboli: diagnostic approach, interpretative pitfalls and current indications. Eur. Radiol. 8, 1376-1390.

THANKS FOR LISTENING