



TUTTO QUELLO  
CHE AVRESTE VOLUTO SAPERE  
SULL'RX  
TORACE STANDARD  
E NON AVETE MAI OSATO CHIEDERE

# *Questo torace è negativo: il giovane, l'adulto e l'anziano*

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# 1° CORSO DI AGGIORNAMENTO POST-UNIVERSITARIO IN RADIOLOGIA TORACICA

Chieti 18-24 settembre 1977  
sotto l'egida della SIRM



## COMITATO ORGANIZZATORE

ALDO ROMAZZI, Presidente  
Pasquale MARANO, Direttore del Corso  
Luigi BASILICO, Mario DI EDDIO, Giuseppe MUTOI, Ivano SALOMONI, Raimo SBRATELLO,  
Sergio TERA, Lorenzo BONOMO, Francesco RENGA, Istituto di Radiologia dell'Università GD RR,  
SS, Assicurazione - CHIETI tel. 85281 tel. 247.287

## DOCENTI DEL CORSO

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Il Corso sarà articolato in lezioni rotonde ed in lezioni; per queste ultime i Corsisti saranno divisi in gruppi.

## ARGOMENTI DELLE LEZIONI

- Problemi di tecnica radiologica nelle situazioni polmonari
- Anatomia radiologica del polmone e del mediastino
- Meccanica della respirazione: statica
- Meccanica della respirazione: dinamica
- Alveoli ed alveoli respiratori
- Tensioattivo polmonare
- Malattie alveolari-polmonari
- Malattie interstiziali e granulomatosi del polmone
- Malattie polmonari croniche ostruttive
- Malattie vascolari polmonari: dinamica circolazione
- Malattie vascolari polmonari: tromboembolia
- Malattie polmonari in neonatologia e nell'infanzia
- Radiologia e funzione polmonare: correlazioni e discrepanze
- Malattie polmonari da inalazione
- Diagnostica polmonare con radioterapi
- La strategia assiale computerizzata nella patologia polmonare.

Alle scopo di stabilire un patto tra docenti e partecipanti si affiderà una commissione collegiale di carattere da parte dei partecipanti al Corso; il Comitato Organizzatore si riserva il diritto di selezionare i materiali inviati.

Gli interessati sono pregati di prendere accordi con la Segreteria sotto il 364.1977.

Il Corso si terrà presso la Facoltà di Medicina e Chirurgia dell'Università. Le lezioni ufficiali saranno gratuite e i viaggi con trasferta saranno a carico dei partecipanti. La quota di partecipazione è di L. 100.000, salvo il 20 Aprile 1977. Per ulteriori informazioni il numero del 364 è valido.

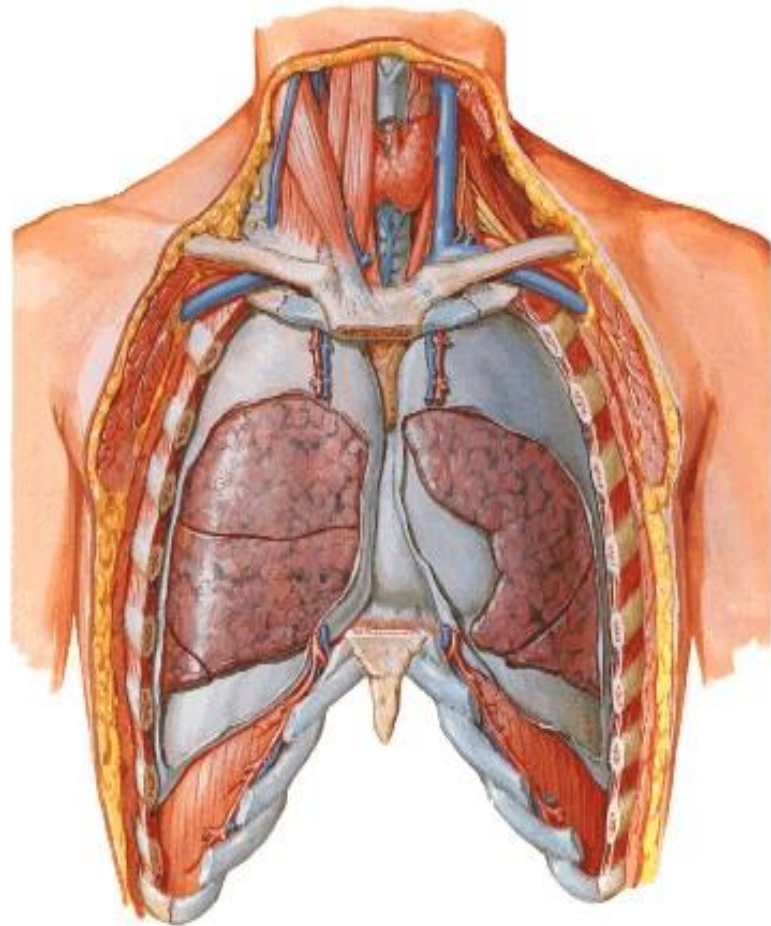
# 1° CORSO DI AGGIORNAMENTO POST-UNIVERSITARIO IN RADIOLOGIA TORACICA

Chieti 18-24 settembre 1977  
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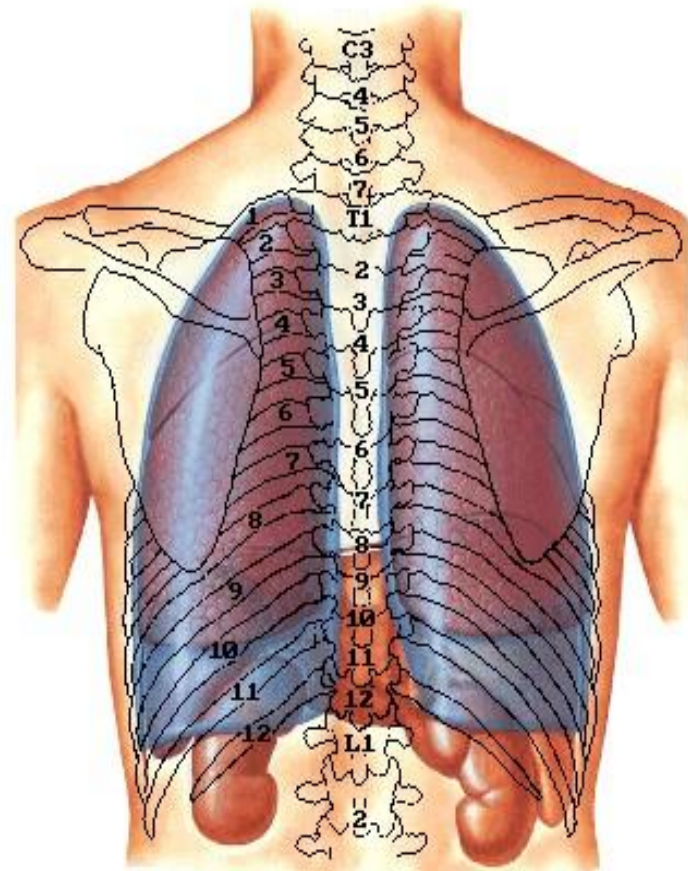


## COMITATO ORGANIZZATORE

Anterior View



Posterior View



*parete toracica (strutture muscolari-coste-rachide),  
pleura, polmoni, vasi polmonari, mediastino*

# RX TORACE

## *Strutture anatomiche da analizzare*

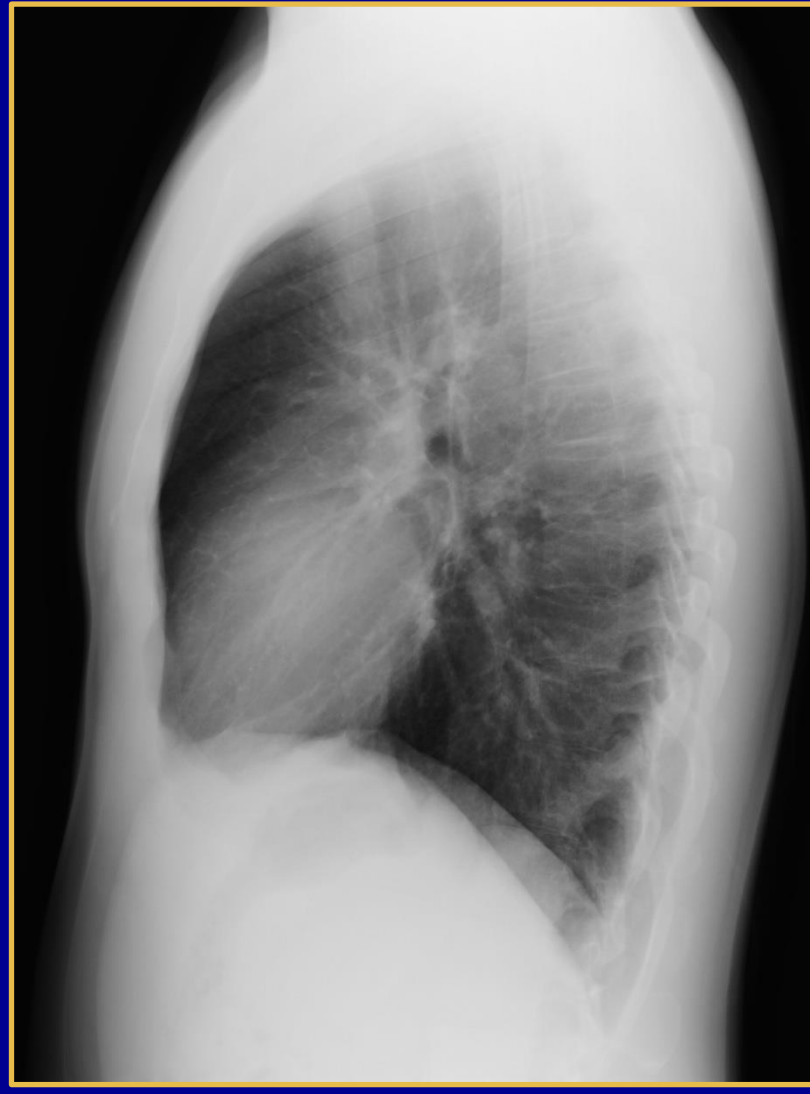
- *Parenchima polmonare*
- *Vie aeree*
- *Vascolarizzazione*
- *Immagine cardio-mediastinica*
- *Diaframma*
- *Gabbia toracica*



*Questi elementi subiscono delle modificazioni fisiologiche e para-fisiologiche legate alla crescita, maturazione ed all'invecchiamento dell'individuo.*

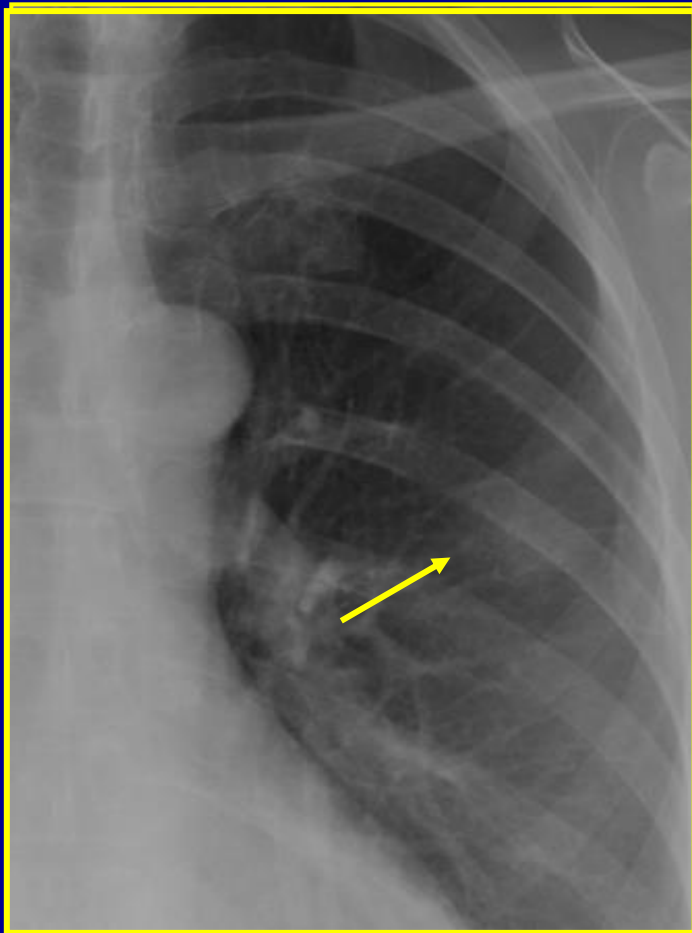
# RX TORACE NELL'ADULTO

*RX Torace negativo*



# RX TORACE

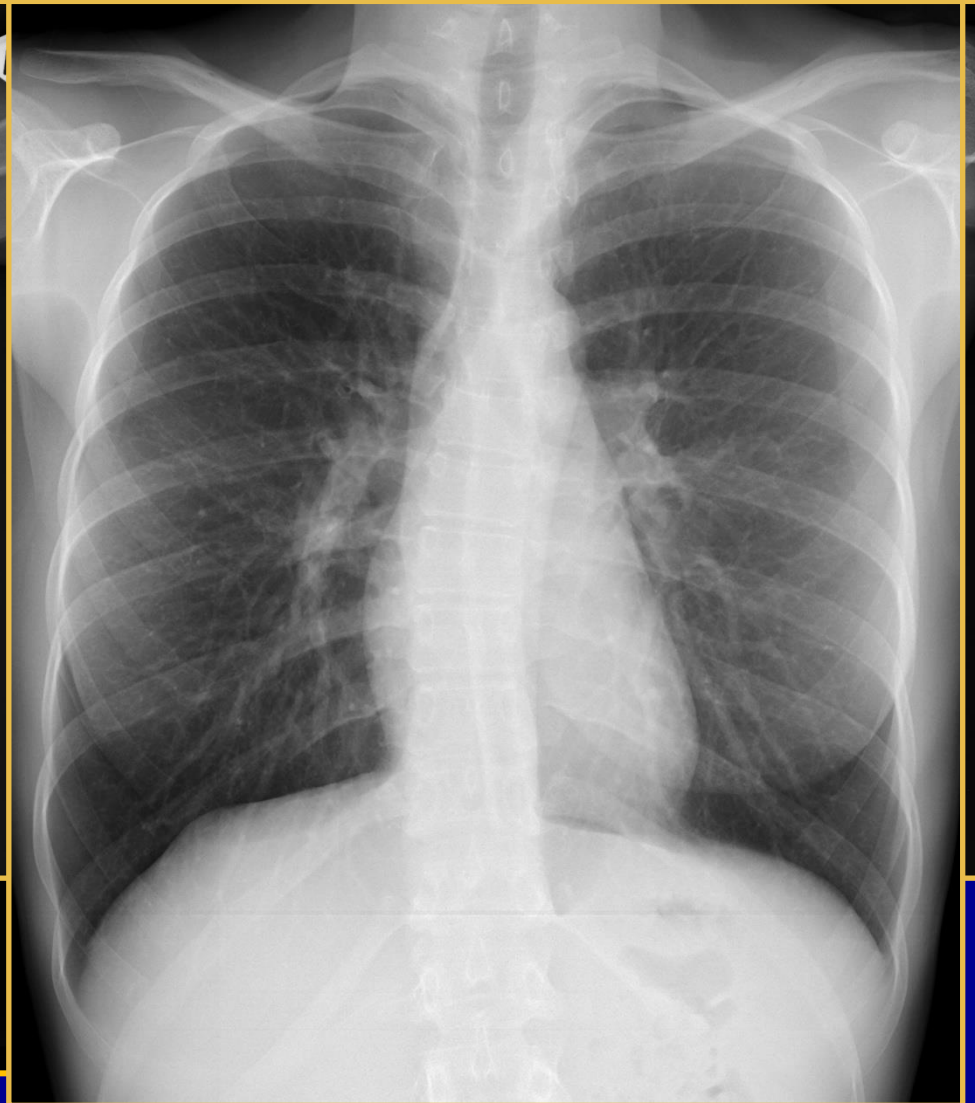
*oltre il 30% di piccole opacità non è  
identificato all'RX*



- *dimensioni (visibili per  $\varnothing \geq 0.9$  cm)*
- *sede*
- *sovrapposizione di strutture normali*
- *radiopacità*

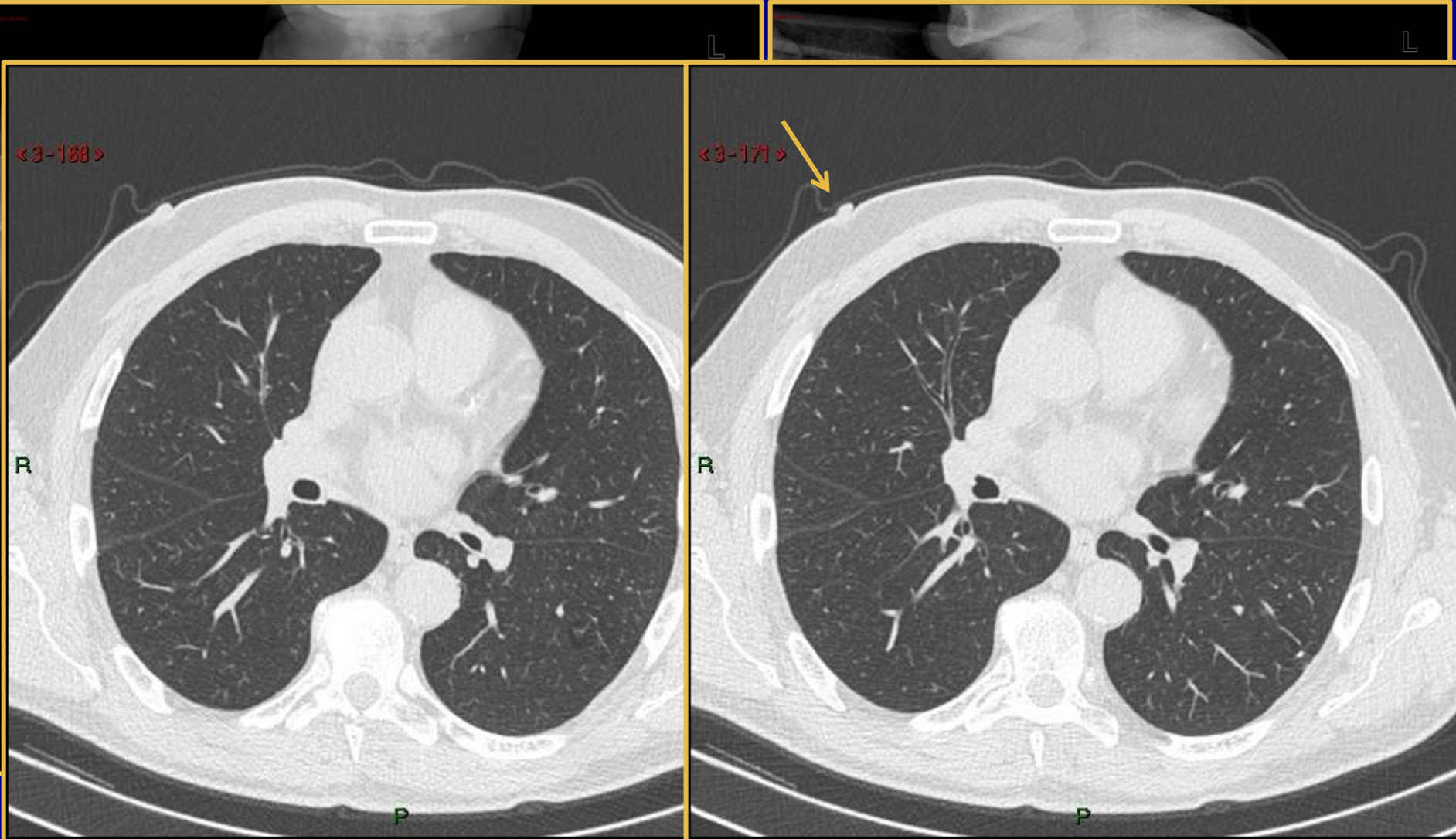
# RX TORACE NELL'ADULTO

## *Piegatura*



# RX TORACE NELL'ADULTO

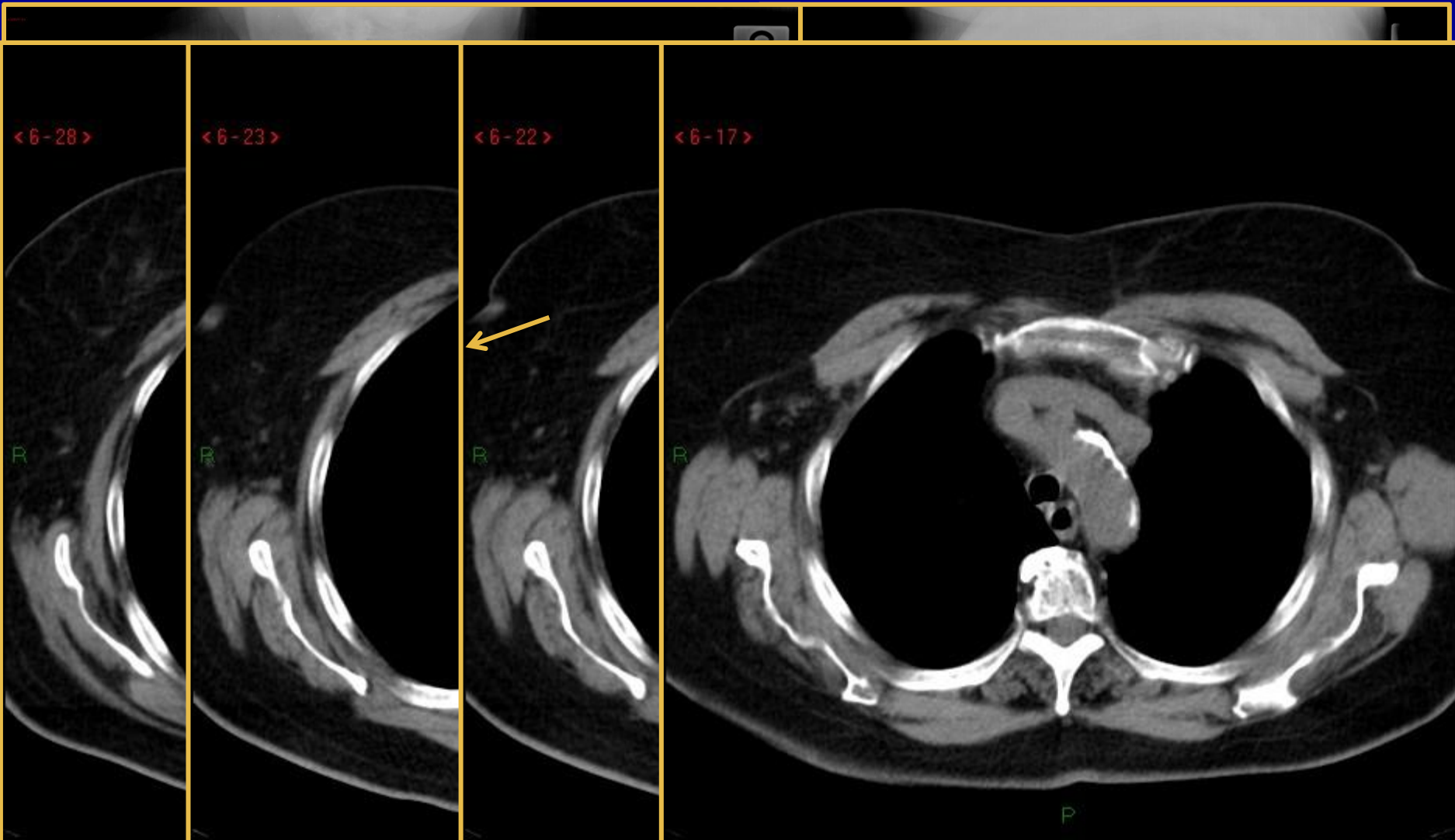
*Immagine di composizione del capezzolo*





# RX TORACE NELL'ADULTO

*Vena Cava superiore in persistente*



# RX TORACE NEL NEONATO

## 1) *Tecnica di esecuzione dell'esame*

→ *Rx in AP ed in clinostatismo:*

- *l'immagine cardio-mediastinica proiettivamente ingrandita*
- *vasi hanno un calibro maggiore*

## 2) *Scarsa/assente collaborazione del piccolo paziente*

→ *movimenti continui, pianto, colpi di tosse*

### *RX TORACE*

- *non correttamente eseguito in una elevata percentuale di casi*
- *assenza di apnea inspiratoria*

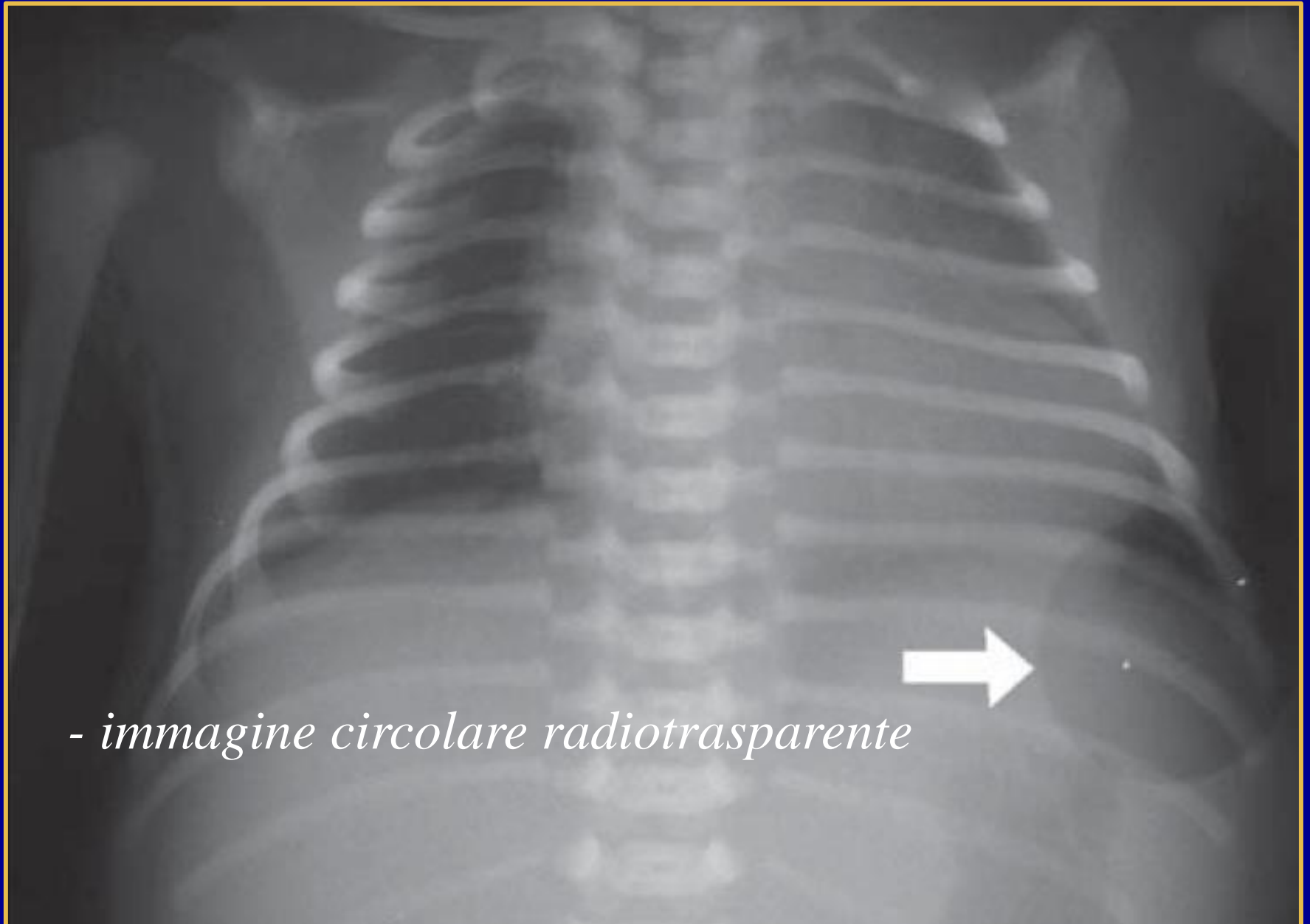
***Il torace del bambino che assume la stazione eretta e collabora nella fase inspiratoria non è dissimile da quello dell'adulto***

# RX TORACE NEL NEONATO

*Scarsa collaborazione da parte del piccolo paziente*



# RX TORACE NEL NEONATO



- immagine circolare radiotrasparente

# RX TORACE NEL NEONATO

## IMMAGINE CARDIACA

- ❖ *ingrandita nel neonato (rapporto cardio/toracico = 0.6 circa, mentre nell'adulto è normalmente < 0.5)*

### 1) Fattori tecnici

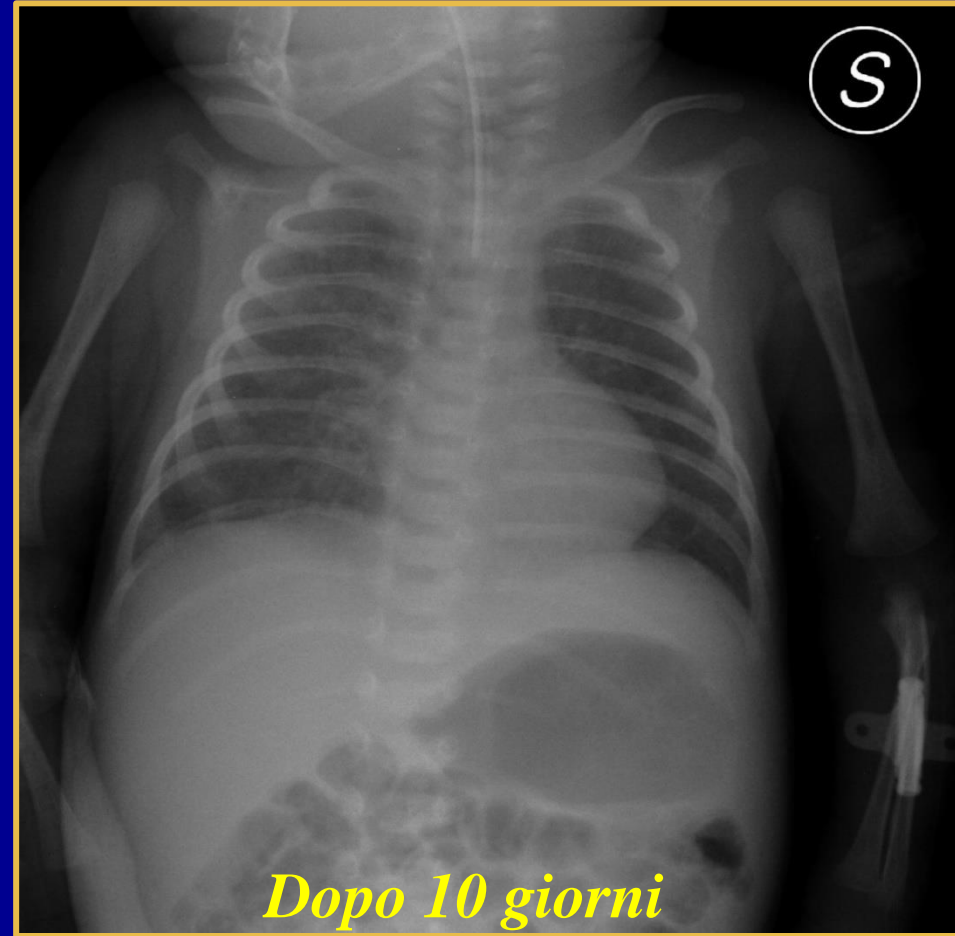
- ❖ *torace in AP e in clinostatismo*

### 2) Fattori anatomo-fisiologici

- ❖ *ipervolemia fisiologica nelle prime 3 ore dopo la nascita*
- ❖ *presenza di shunt fra circolo sistemico e polmonare:*
  - *forame ovale*
  - *Dotto arterioso di Botallo*

# RX TORACE NEL NEONATO

*Modifiche dell'immagine cardio-mediastinica nei giorni successivi alla nascita*



# RX TORACE NEL NEONATO

## 1) *Ductus Bump*

2



*Questi stessi fattori sono responsabili dell'aumento di calibro dei vasi polmonari e dell'aspetto «pseudocongesto» che alcune radiografie sembrano suggerire*

# RX TORACE NEL NEONATO/BAMBINO

## *TIMO*

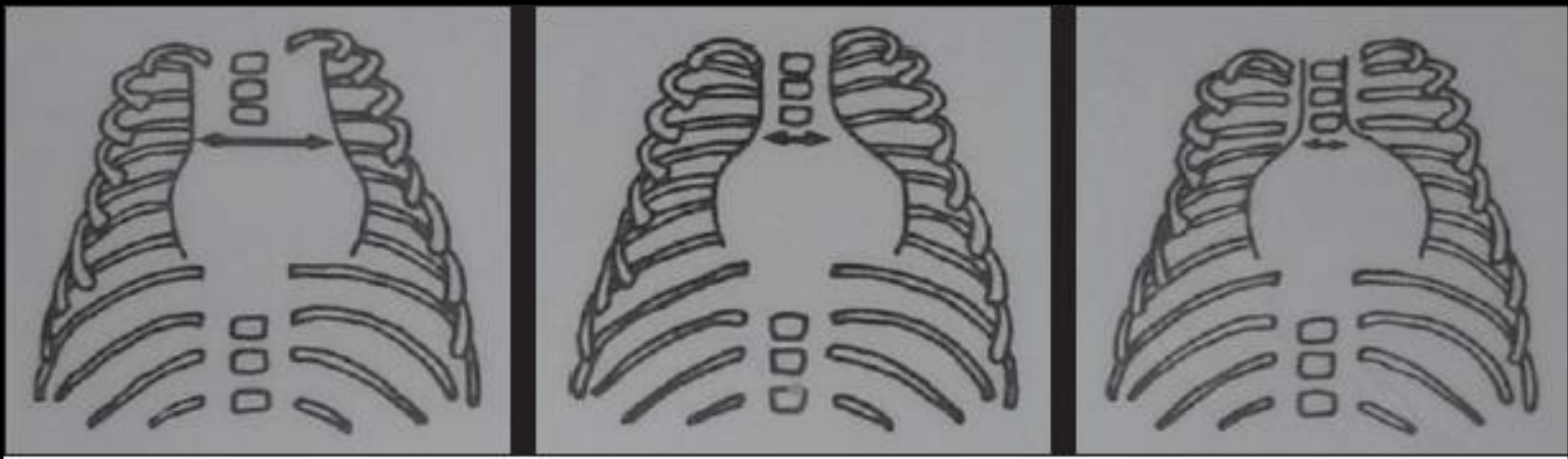
*Organo ben rappresentato nel neonato e nel bambino*

*partecipa alla costituzione dell'immagine cardio-mediastinica, determinando slargamento del III medio-superiore del mediastino*



# RX TORACE NEL NEONATO/BAMBINO

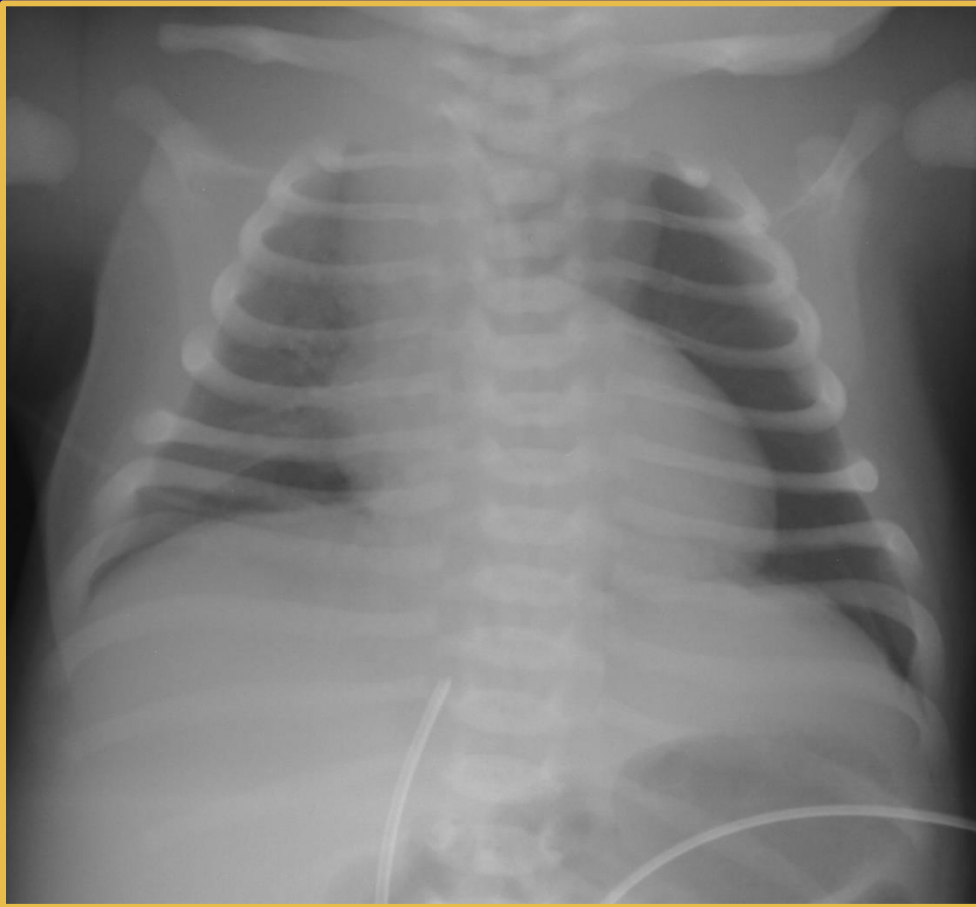
## TIMO



*Va incontro a progressiva atrofia, sino a non essere più visualizzabile nella silhouette cardiomediastinica (solitamente dopo gli 8-13 anni di età)*

# RX TORACE NEL NEONATO/BAMBINO

Neonato



Bambino 3 anni di età



# RX TORACE NEL NEONATO/BAMBINO

## TIMO

*Come riconoscere il timo sulla radiografia del torace?*

*Il timo determina uno slargamento del III superiore del mediastino, ma esistono alcuni segni radiografici che devono essere conosciuti e riconosciuti:*

**WAVE SIGN**

**NOTCH SIGN**

**SAIL SIGN**

# RX TORACE NEL NEONATO/BAMBINO

## TIMO

*Come riconoscere il timo sulla radiografia del torace?*

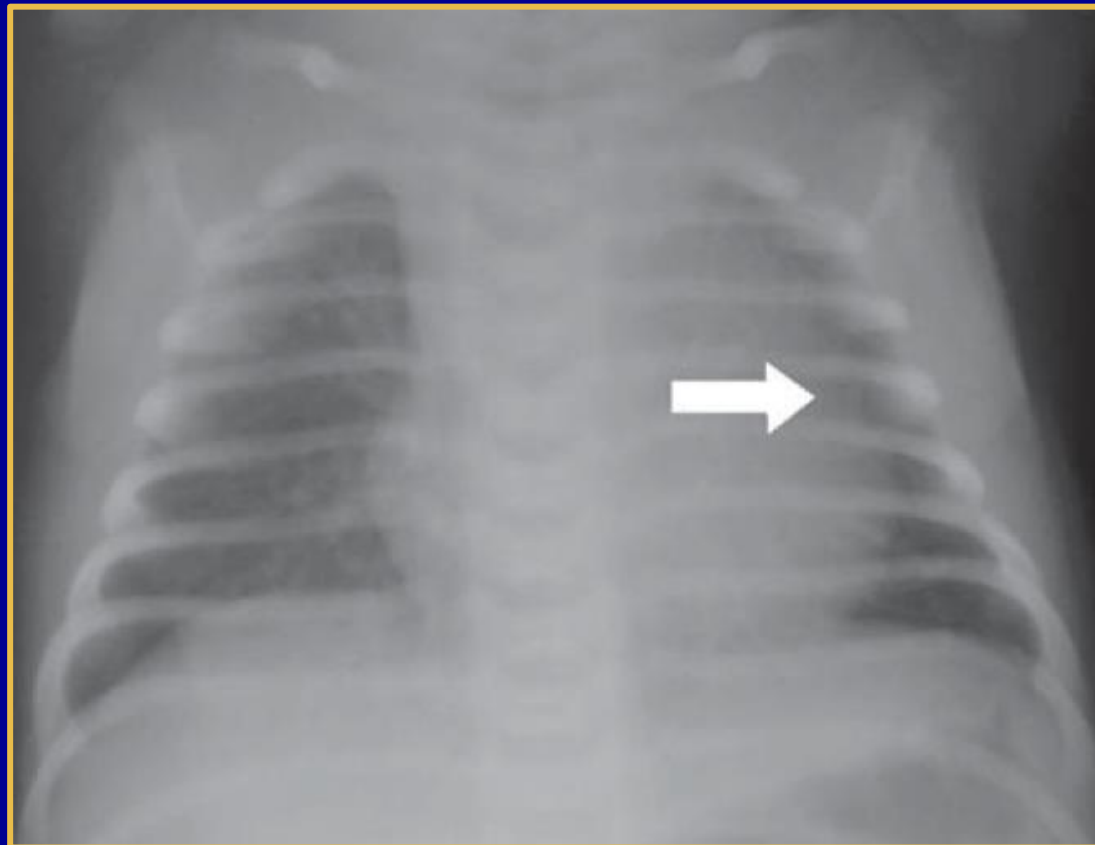
*Il timo determina uno slargamento del III superiore del mediastino, ma esistono alcuni segni radiografici che devono essere conosciuti e riconosciuti:*

**WAVE SIGN**

**NOTCH SIGN**

**SAIL SIGN**

*1) WAVE SIGN: “dolce ondulazione” del contorno timico dovuto all’interdigitazione del tessuto timico “molle” tra gli spazi intercostali*



# RX TORACE NEL NEONATO/BAMBINO

## TIMO

*Come riconoscere il timo sulla radiografia del torace?*

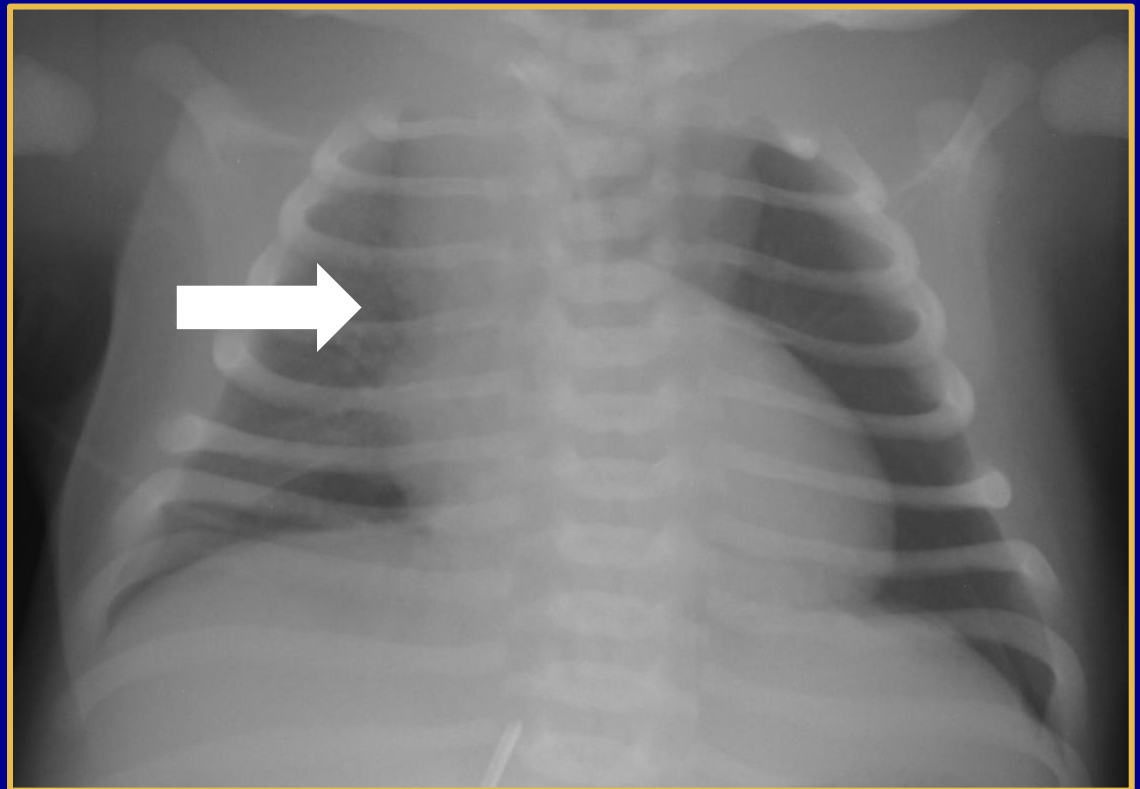
*Il timo determina uno slargamento del III superiore del mediastino, ma esistono alcuni segni radiografici che devono essere conosciuti e riconosciuti:*

**WAVE SIGN**

**NOTCH SIGN**

**SAIL SIGN**

2) **NOTCH SIGN**: il margine inferiore del timo si perde nella silhouette cardiaca



# RX TORACE NEL NEONATO/BAMBINO

## TIMO

*Come riconoscere il timo sulla radiografia del torace?*

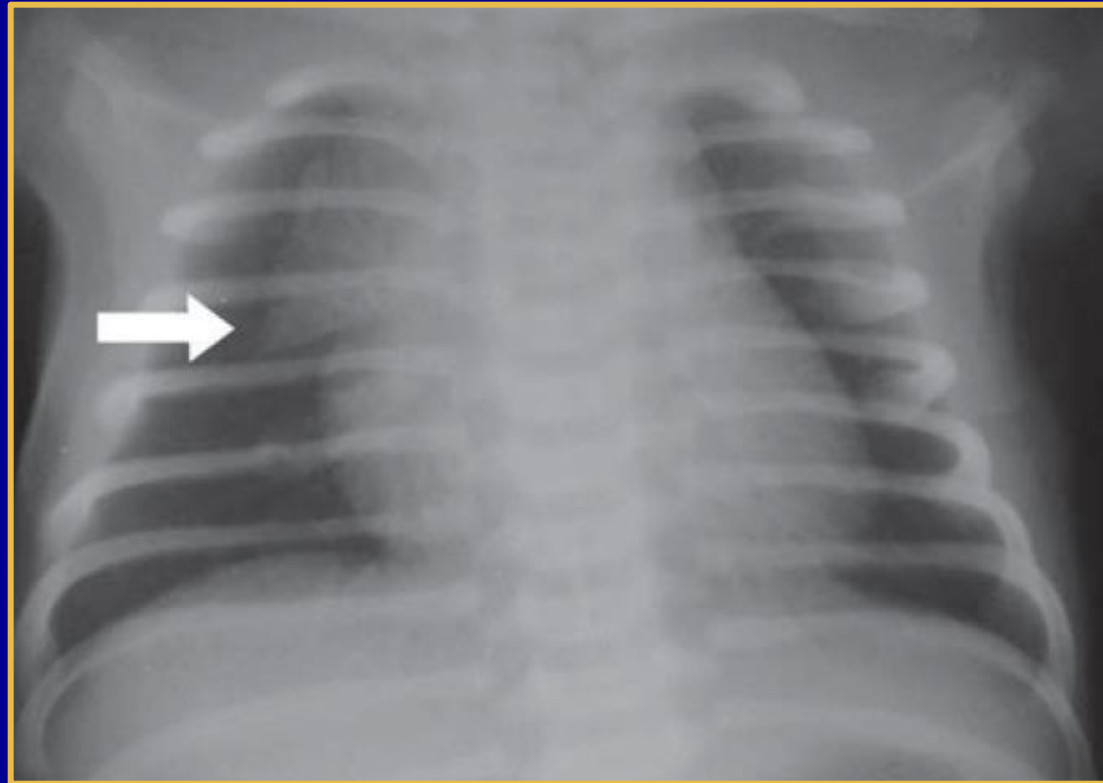
*Il timo determina uno slargamento del III superiore del mediastino, ma esistono alcuni segni radiografici che devono essere conosciuti e riconosciuti:*

**WAVE SIGN**

**NOTCH SIGN**

**SAIL SIGN**

*3) SAIL SIGN: a volte può apparire come una struttura a forma di “vela”, più spesso orientata verso l’emitorace dx, piuttosto che come un semplice slargamento del mediastino superiore*



# RX TORACE NELL'ANZIANO

## *1) Tecnica di esecuzione dell'esame*

→ *RX TORACE 2Pr*

→ *RX TORACE A LETTO*

- l'immagine cardio-mediastinica risulta proiettivamente ingrandita
- i vasi hanno un calibro maggiore

## *2) Scarsa collaborazione da parte del paziente*

soprattutto per i pazienti con demenza senile o gravi patologie debilitanti

(inadeguata inspirazione e mancata simmetria tra i due emitoraci)

*Questi caratteristiche fanno sì che il paziente anziano torni “bambino”*

# RX TORACE NELL'ANZIANO



*Chest Wall*

## *Dorsal Spine*

- Osteoporosis
- Kyphosis, vertebral soma height reduction, «barrel chest»

## *Ribs*

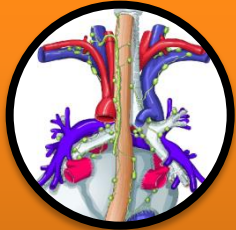
- Costochondral calcifications
- Costovertebral and costosternal osteoarthritis

## *Diaphragm*

- Diaphragm bumps; diaphragmatic hernia

## *Muscles*

- Atrophy of the chest wall muscles



*Mediastinum*

## *Heart*

- Cardiac enlargement
- Valve and coronary calcifications

## *Aorta*

- Parietal calcifications
- Enlargement and elongation

## *Trachea/ bronchi*

- Chondral calcifications



*Lung  
Parenchyma*

## *Bronchi/Bronchioles*

- Non-specific bronchial wall thickening

## *Distal parenchyma*

- Lamellar atelectasis
- Reticular interstitial thickening
- Elastic component reduction



# RX TORACE NELL'ANZIANO



*Chest Wall*

## *Dorsal Spine*

- Osteoporosis
- Kyphosis, vertebral soma height reduction, «barrel chest»

## *Ribs*

- Costochondral calcifications
- Costovertebral and costosternal osteoarthritis

## *Diaphragm*

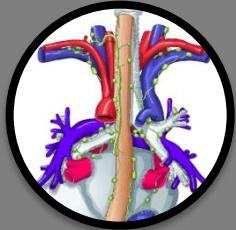
- Diaphragm bumps; diaphragmatic hernia

## *Muscles*

- Atrophy of the chest wall muscles



*Chest Wall*



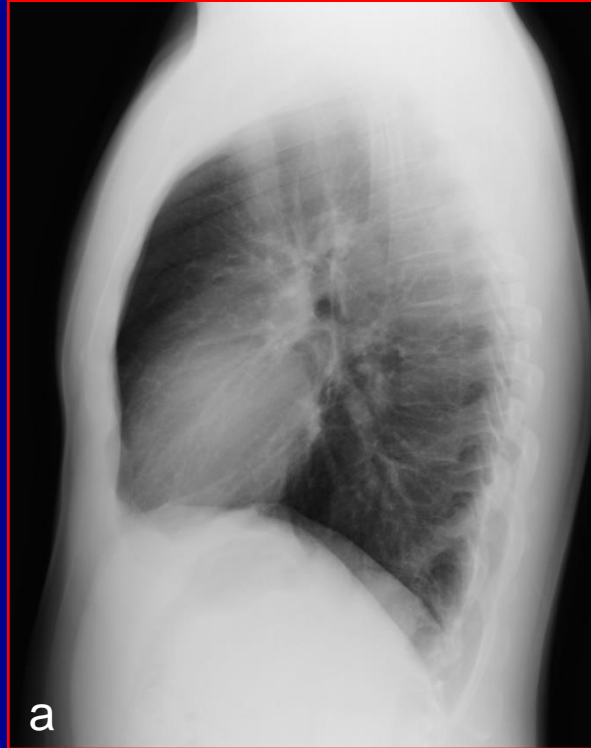
*Mediastinum*



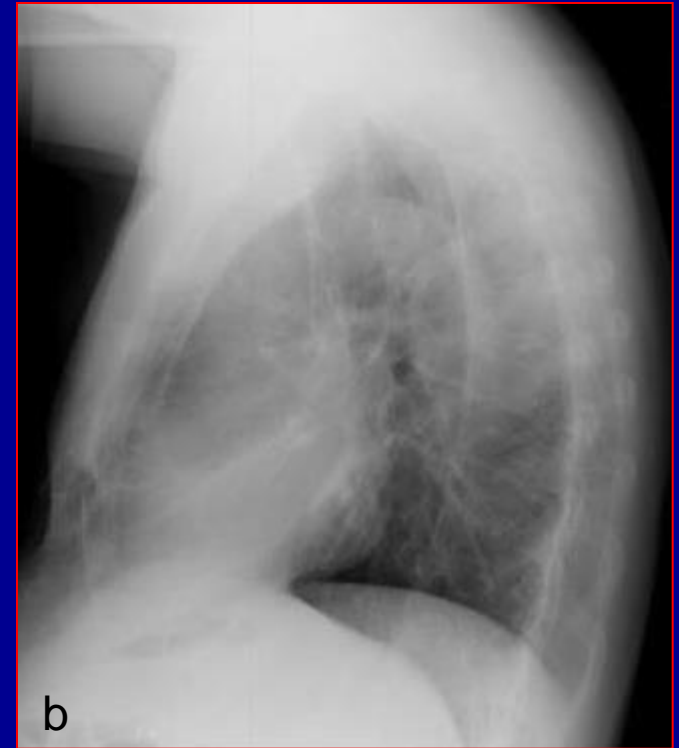
*Lung  
Parenchyma*

## *Dorsal Spine*

- Osteoporosis



a



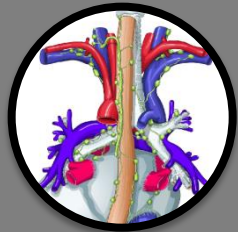
b

Frontal chest X-ray in a 30-year-old man (a) and in a 81-year-old man (b). In figure b is evident the radiolucency of vertebral bodies due to osteoporosis.

*Osteoporosis consistent with aging process is not associated with other disturbances and it is called «elderly osteoporosis»*



*Chest Wall*



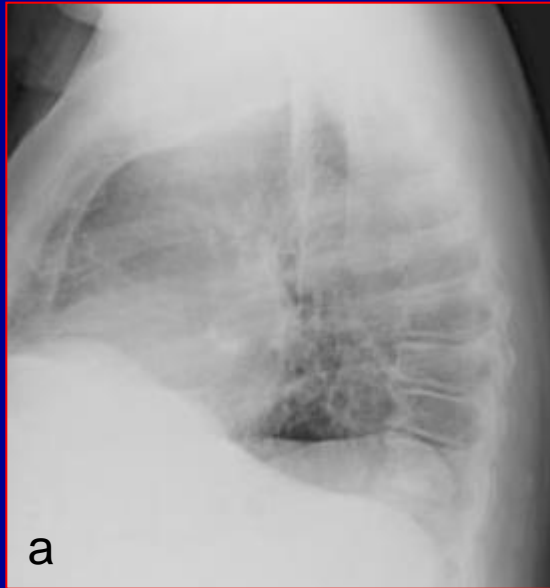
*Mediastinum*



*Lung  
Parenchyma*

*Dorsal Spine*

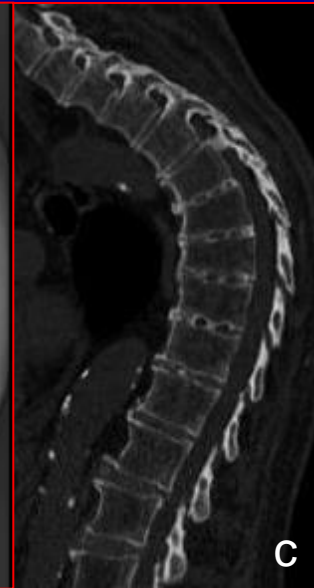
- Spondilosis, kyphosis, vertebral soma height reduction



a



b



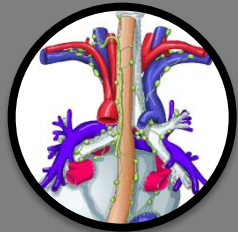
c

Lateral chest X-ray (a) in a 73-year-old man shows reduced intervertebral space, bone sclerosis adjacent to the intervertebral discs, and marginal vertebral osteophytes with minimal height reduction of vertebral bodies.

Lateral chest X-ray (b) and sagittal MPR reconstruction (c) in a 75-year-old man show more prominent degenerative changes of the spinal column with marked kyphosis.



*Chest Wall*



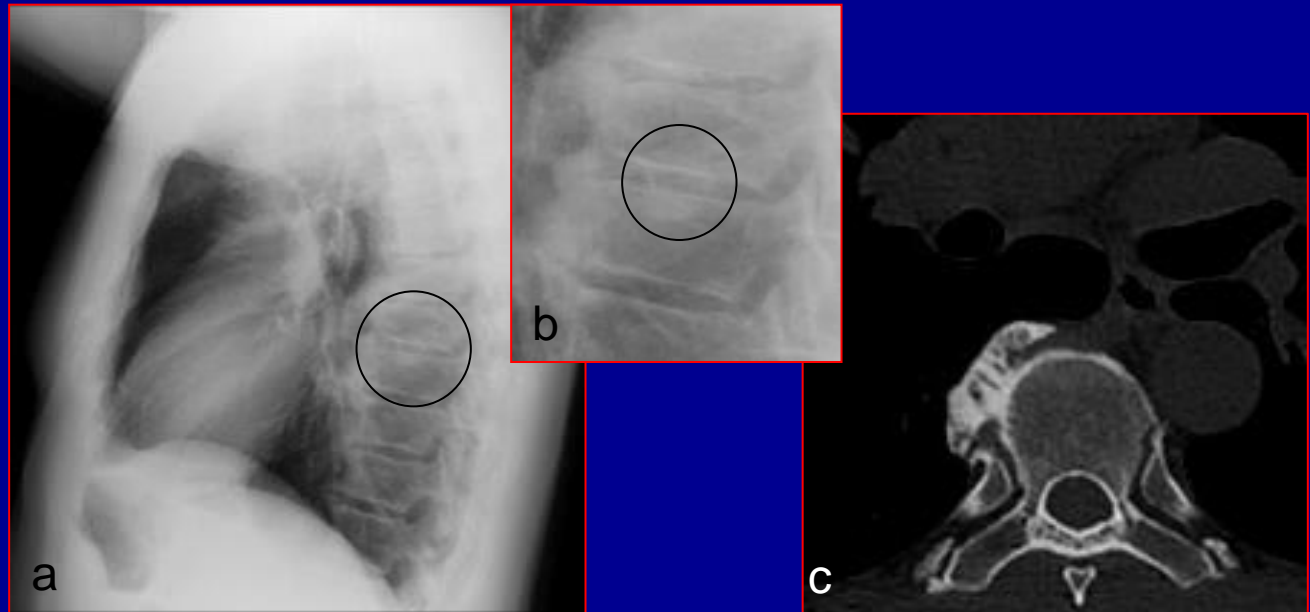
*Mediastinum*



*Lung  
Parenchyma*

## *Dorsal Spine*

- Somatomarginal osteophytosis

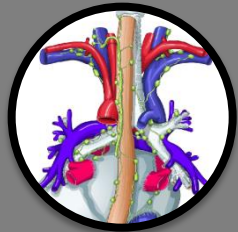


The chest radiograph in lateral projection (a) and magnification (b) show a doubtful pulmonary nodular lesion projecting against the spinal column (black circles). CT scan (c) subsequently performed reveals the degenerative nature of the radiographic finding.

*Osteophytosis are more generally pronounced on the right side of the vertebral column because of the projection of the aorta in the left side.*



*Chest Wall*



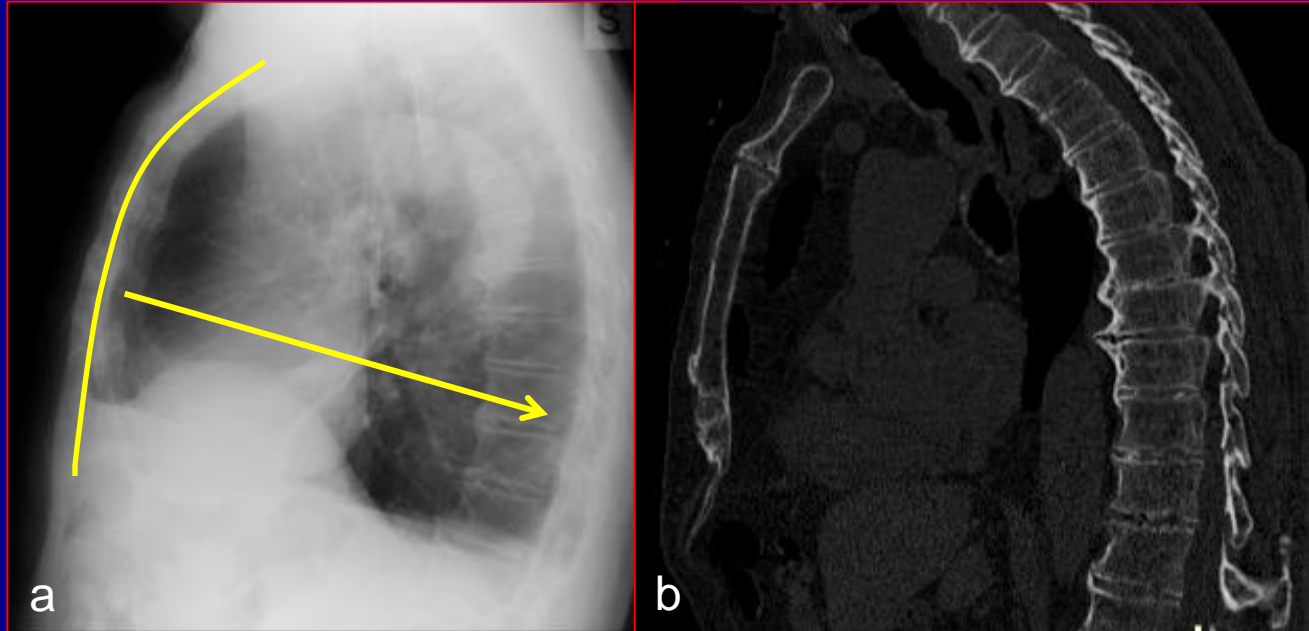
*Mediastinum*



*Lung  
Parenchyma*

*Dorsal Spine*

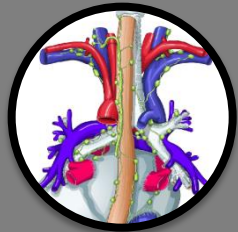
- «Barrel chest» due to pronounced dorsal kyphosis with a more convex sternum (1)



Lateral chest X-ray (a) and MPR sagittal reconstruction (b) show a «barrel chest» deformity with increase in the antero-posterior diameter (yellow arrow in a).



*Chest Wall*



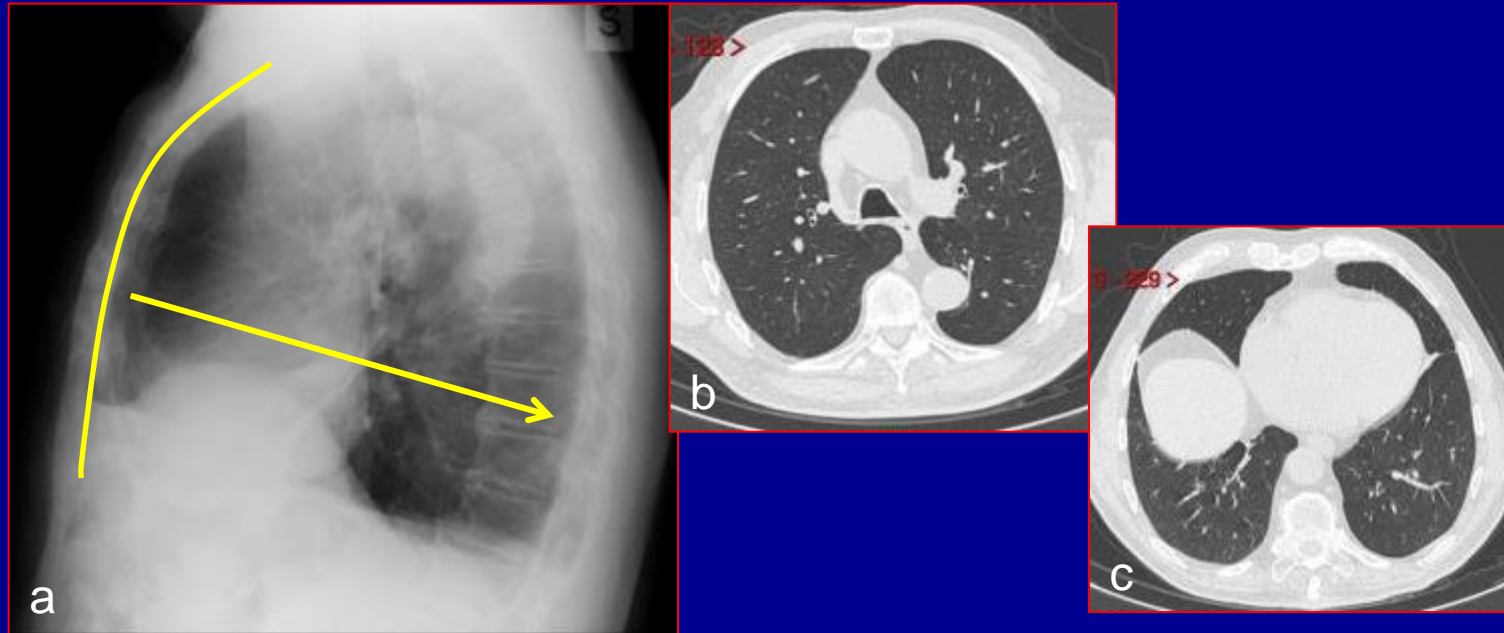
*Mediastinum*



*Lung  
Parenchyma*

## *Dorsal Spine*

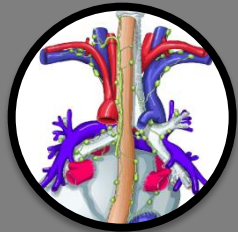
- «Barrel chest» due to pronounced dorsal kyphosis with a more convex sternum (2)



Barrel chest (a) is an imaging finding that is typically (but not exclusively) seen in elderly individuals. The differential diagnosis should be made primarily with COPD. The diagnosis of COPD should be based on other findings, such as pulmonary emphysema, bronchial wall thickening and bronchiectasis. In this patient chest CT scans (b,c) subsequently performed don't show any signs of pulmonary emphysema.



*Chest Wall*



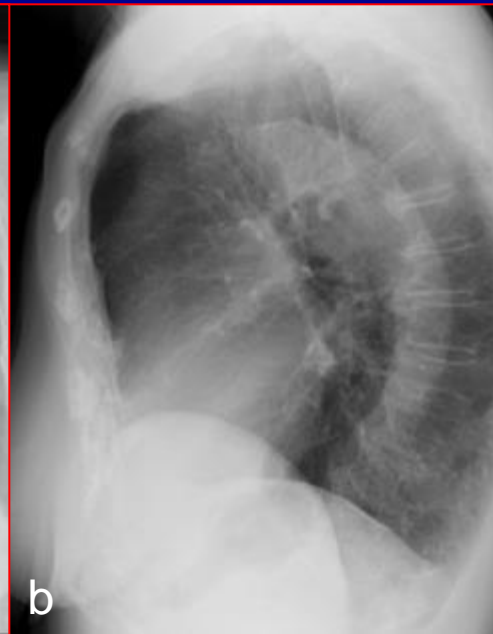
*Mediastinum*



*Lung  
Parenchyma*

*Ribs*

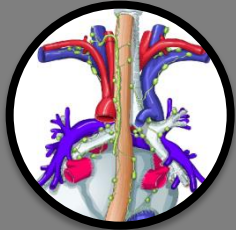
- Costochondral calcifications



Chest X-ray (a,b) in a 82-year-old woman showing fairly widespread costochondral calcifications. MIP reconstruction (c) confirms the presence of the diffuse condral calcifications.



*Chest Wall*



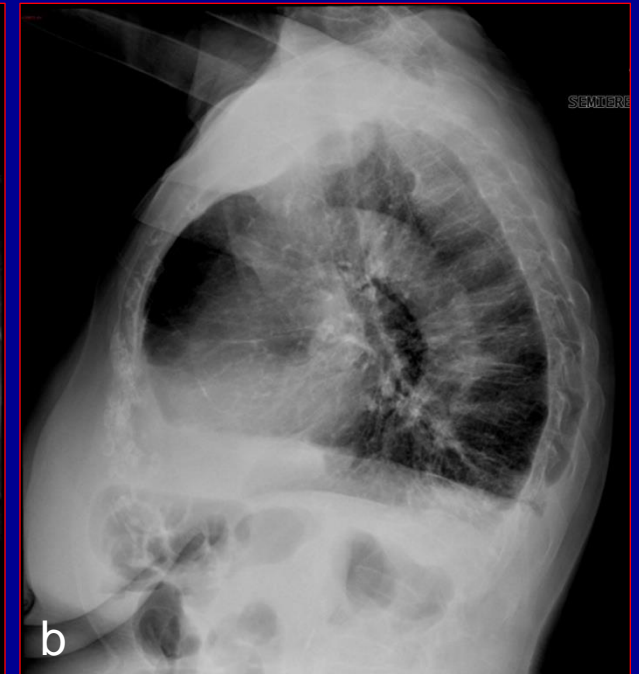
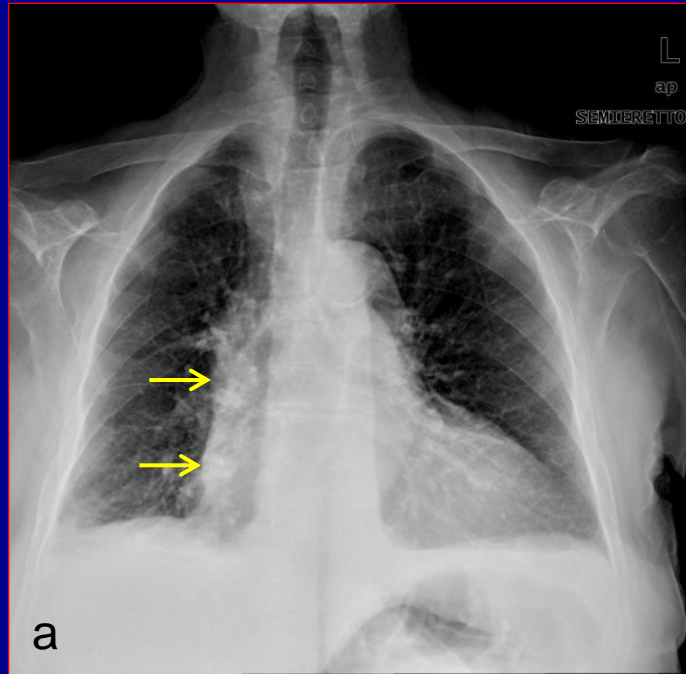
*Mediastinum*



*Lung  
Parenchyma*

*Ribs*

- Focal costochondral calcifications

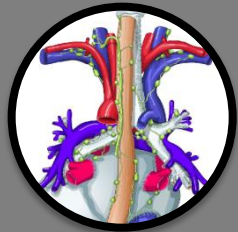


Chest X-ray (a,b) showing focal opacities in the right parasternal region (yellow arrows) sustained by focal costo-chondral calcifications.





*Chest Wall*



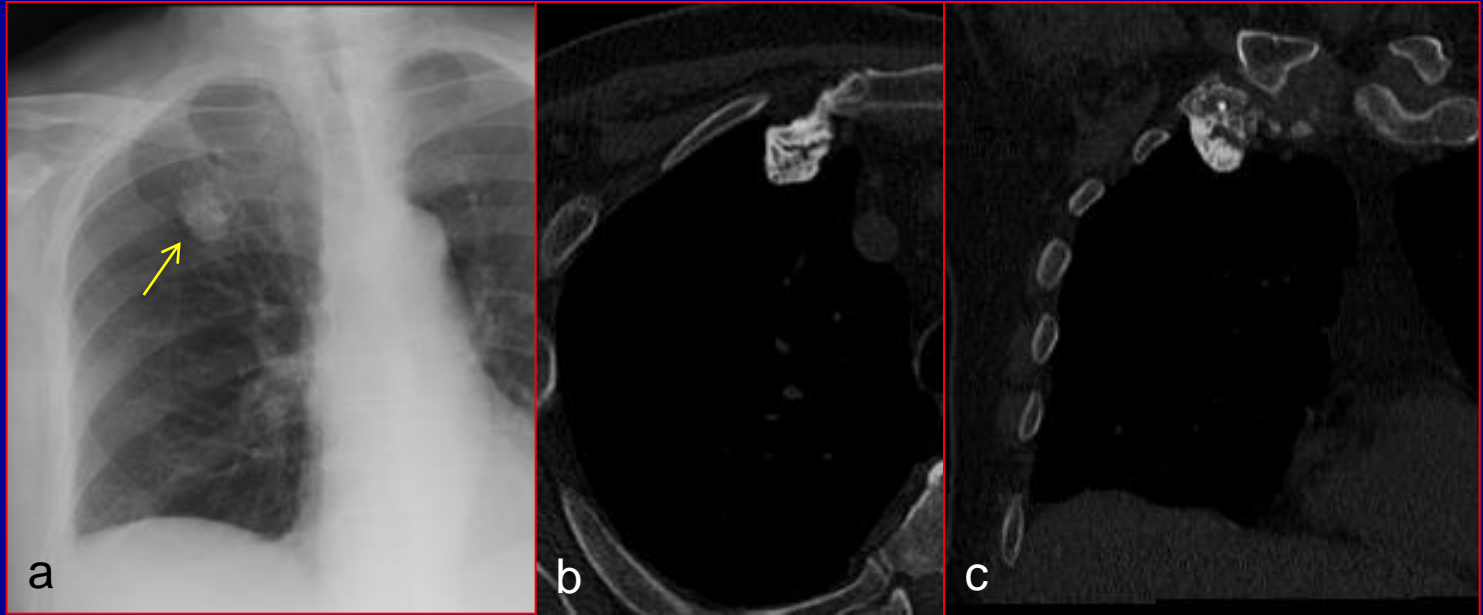
*Mediastinum*



*Lung  
Parenchyma*

*Ribs*

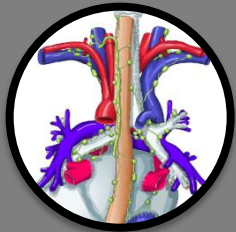
- Costosternal osteoarthritis



Frontal chest X-ray (a) shows a right infraclavicular well-defined round opacity (black arrow). CT scan (b) and coronal MPR reconstruction (c) demonstrate that the radiographic opacity is consistent with arthrosis of the first costo-sternal joint.



*Chest Wall*



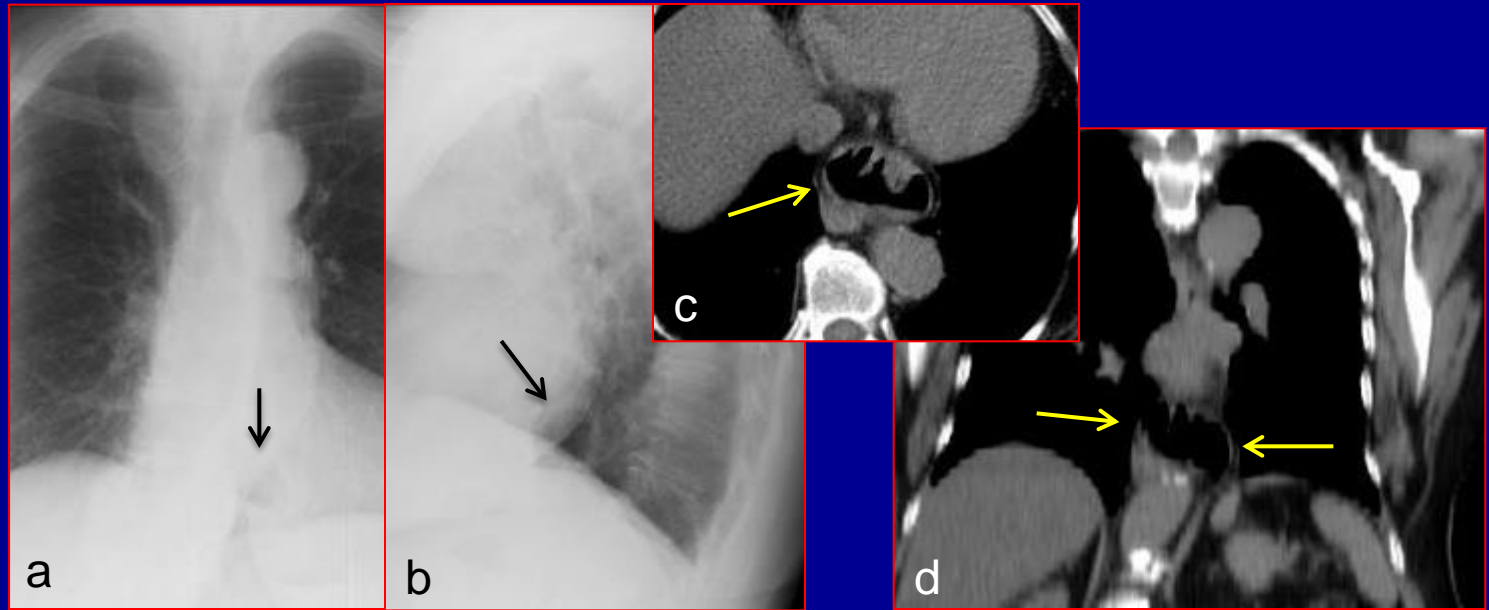
*Mediastinum*



*Lung  
Parenchyma*

## *Diaphragm*

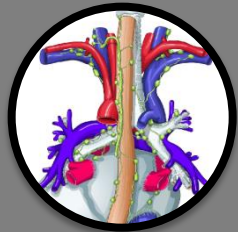
- **Diaphragmatic hernia:** due to widening of anatomic hiatus



Frontal (a) and lateral (b) chest X-ray in a 77-year-old woman showing a radiolucency area in the lower middle mediastinum. CT scan (c) and coronal MPR reconstruction (d) demonstrate that radiographic findings is consistent with a hiatal hernia (arrows).



*Chest Wall*



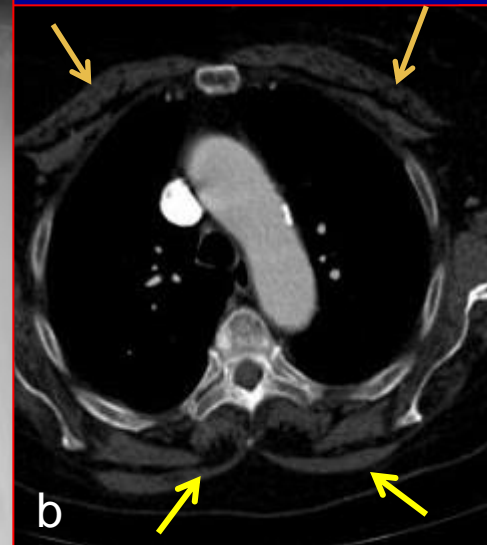
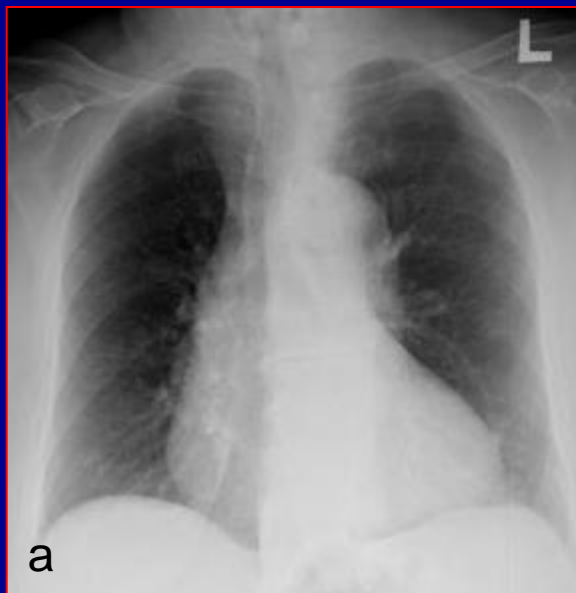
*Mediastinum*



*Lung  
Parenchyma*

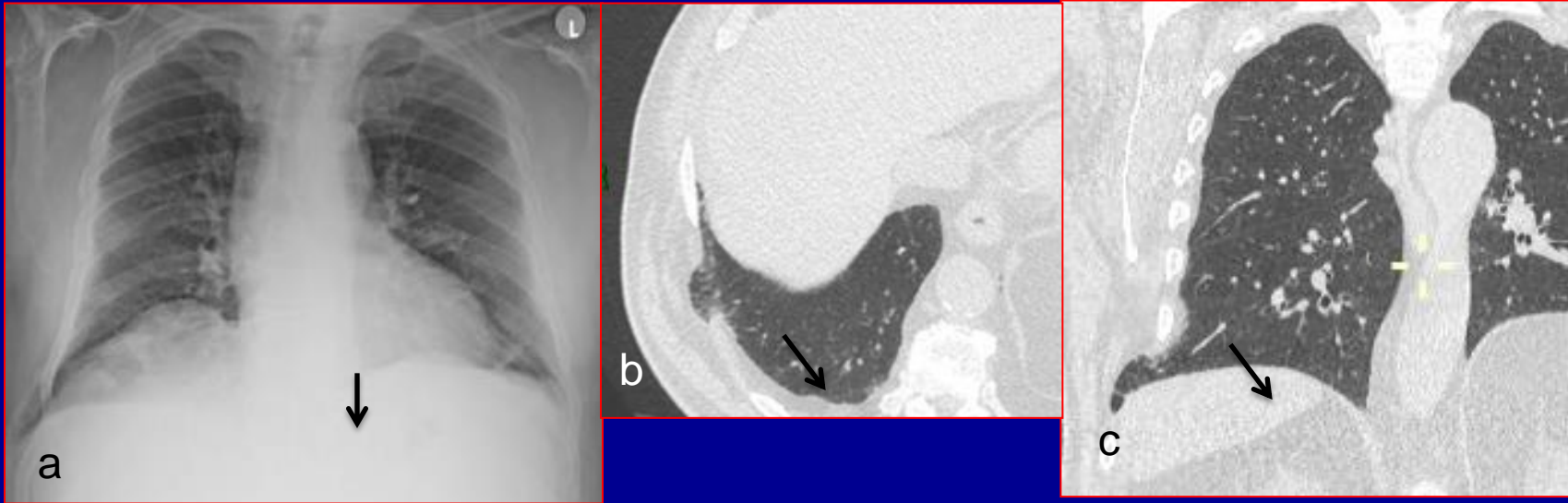
## *Muscles*

- **Atrophy of the chest wall muscles:** one of the most common findings in the elderly, that is due to aging-related muscle mass loss, becoming more pronounced with age.



Frontal chest X-ray (a) in a 73-year-old woman showing an apparent increase in lung transparency. CT scan (b) shows muscular atrophy of pectoral muscles (light blue arrows) and posterior wall muscles (yellow arrows), responsible for the hyperlucency of lung parenchyma. CT scan (c) in a 38-year-old woman shows good tropism of the parietal muscles.

**Weakness of the chest wall muscles**



Frontal chest X-ray (a) in 75-year-old man shows a focal radiolucency projecting beyond the profile of the lower right ribs (black arrow). CT scan (b) and coronal MPR reconstruction (c) demonstrate that this radiolucency is substained by a focal erniation of lung parenchyma through the right eight intercostal space, due to weakness of intercostal muscles.

# RX TORACE NELL'ANZIANO



*Chest Wall*

## *Dorsal Spine*

- Osteoporosis
- Kyphosis, vertebral soma height reduction, «barrel chest»

## *Ribs*

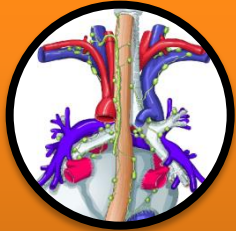
- Costochondral calcifications
- Costovertebral and costosternal osteoarthritis

## *Diaphragm*

- Diaphragm bumps; diaphragmatic hernia

## *Muscles*

- Atrophy of the chest wall muscles



*Mediastinum*

## *Heart*

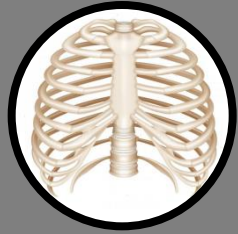
- Cardiac enlargement
- Valve and coronary calcifications

## *Aorta*

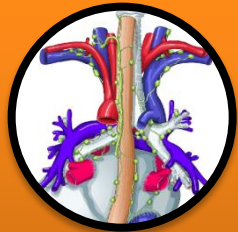
- Parietal calcifications
- Enlargement and elongation

## *Trachea/ bronchi*

- Chondral calcifications



*Chest Wall*



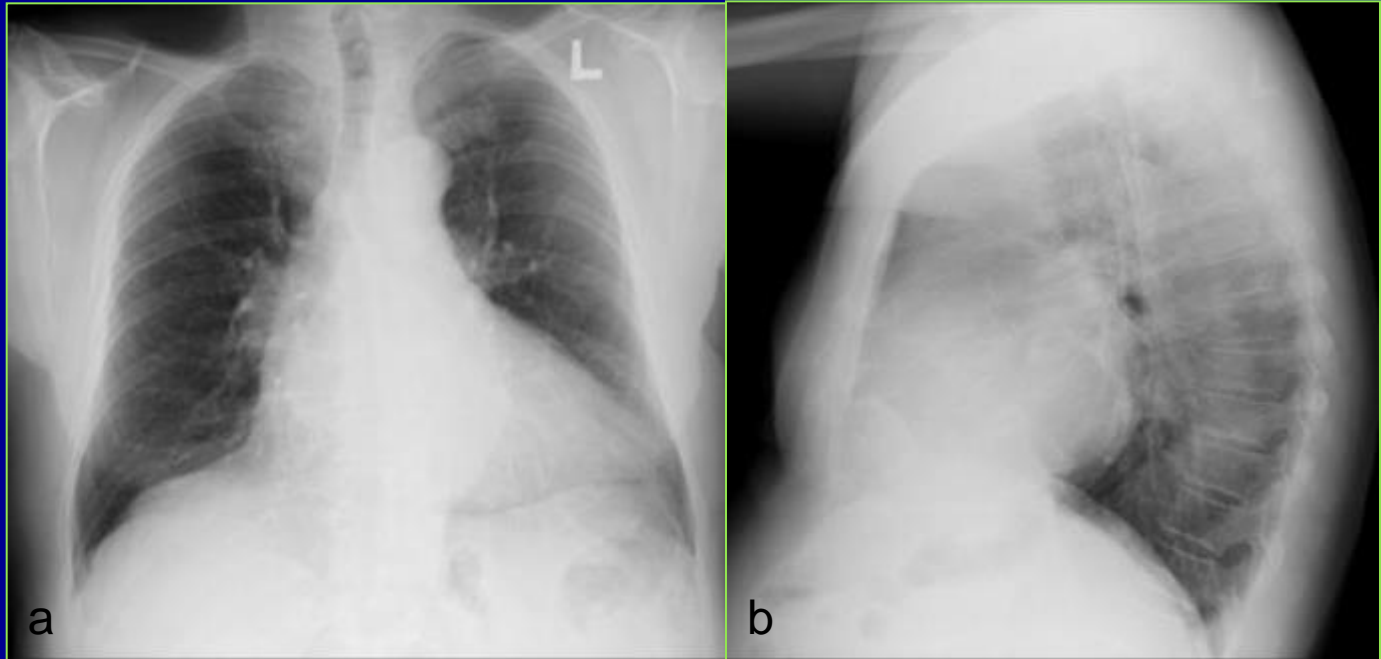
*Mediastinum*



*Lung  
Parenchyma*

### *Hearth*

- Cardiac enlargement

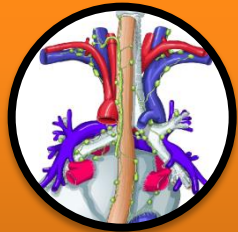


Frontal (a) and lateral chest X-ray (b) in a 78-year-old man show enlargement of left ventricle and tortuosity of the descending thoracic aorta.

*The enlargement of left ventricle frequently found in elderly patient is due to an increase of cardiac mass and the thickness of myocardium with hypertrophy of residual myocytes and to an increase in the matrix of connective tissue.*



*Chest Wall*



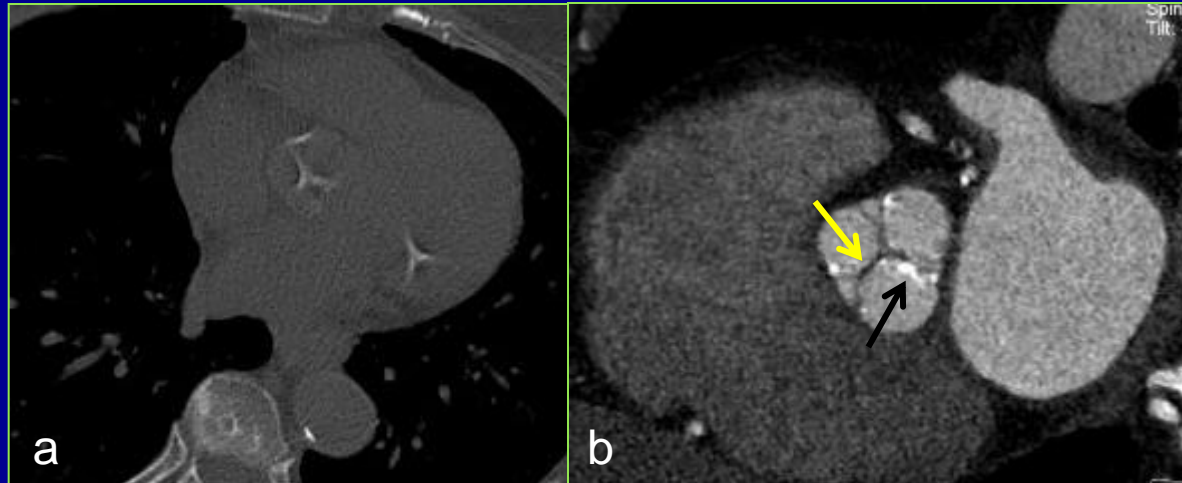
*Mediastinum*



*Lung  
Parenchyma*

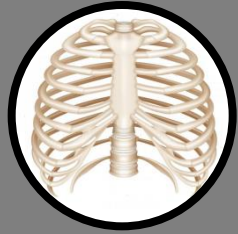
## *Hearth*

- Valve calcifications

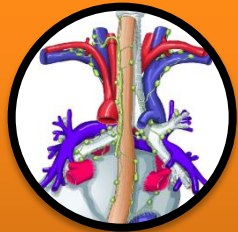


Chest CT scan (a) without contrast medium shows calcification of aortic valve. Cardiac CT scan (b) with reconstruction of an aortic valve during systole, showing thickening (yellow arrow) and calcifications (black arrow) of the valve leaflets in an 77-year-old patient with no history of cardiovascular disease.

*Valve leaflets thickening is a finding that is considered to be characteristic of normal cardiovascular aging.*



*Chest Wall*



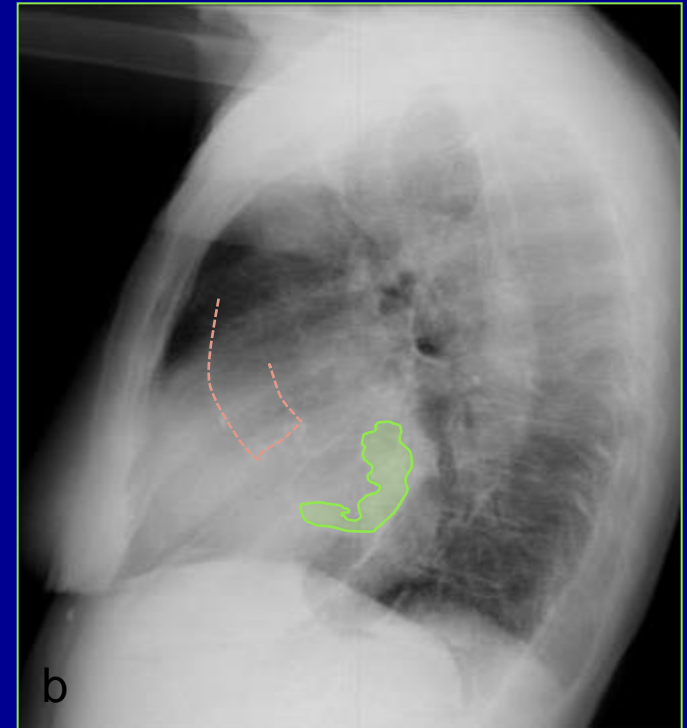
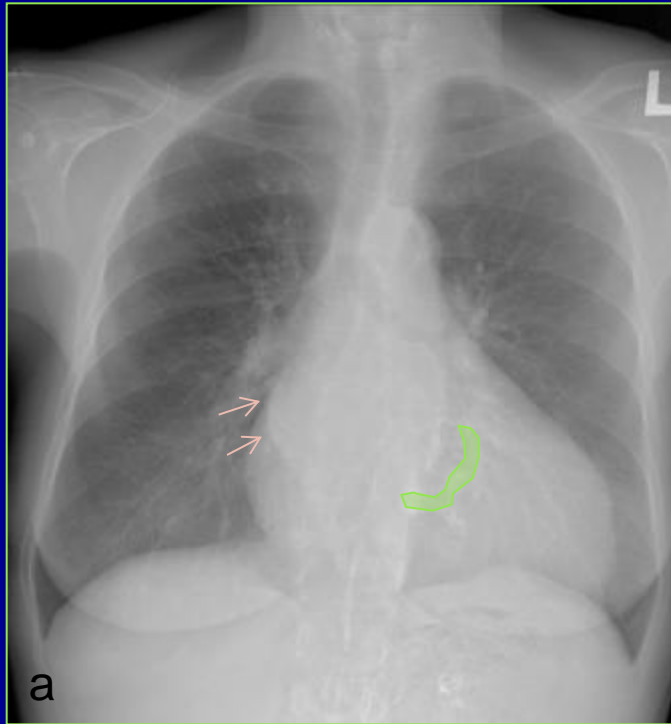
*Mediastinum*



*Lung  
Parenchyma*

*Heart*

- Valve calcifications

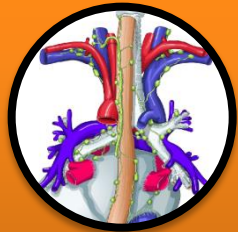


Chest X-ray in a 85-year-old woman show presence of calcifications of the mitral annulus (green area) and enlargement and calcification of ascending aorta (pink arrows in a, pink dot line in b)





*Chest Wall*



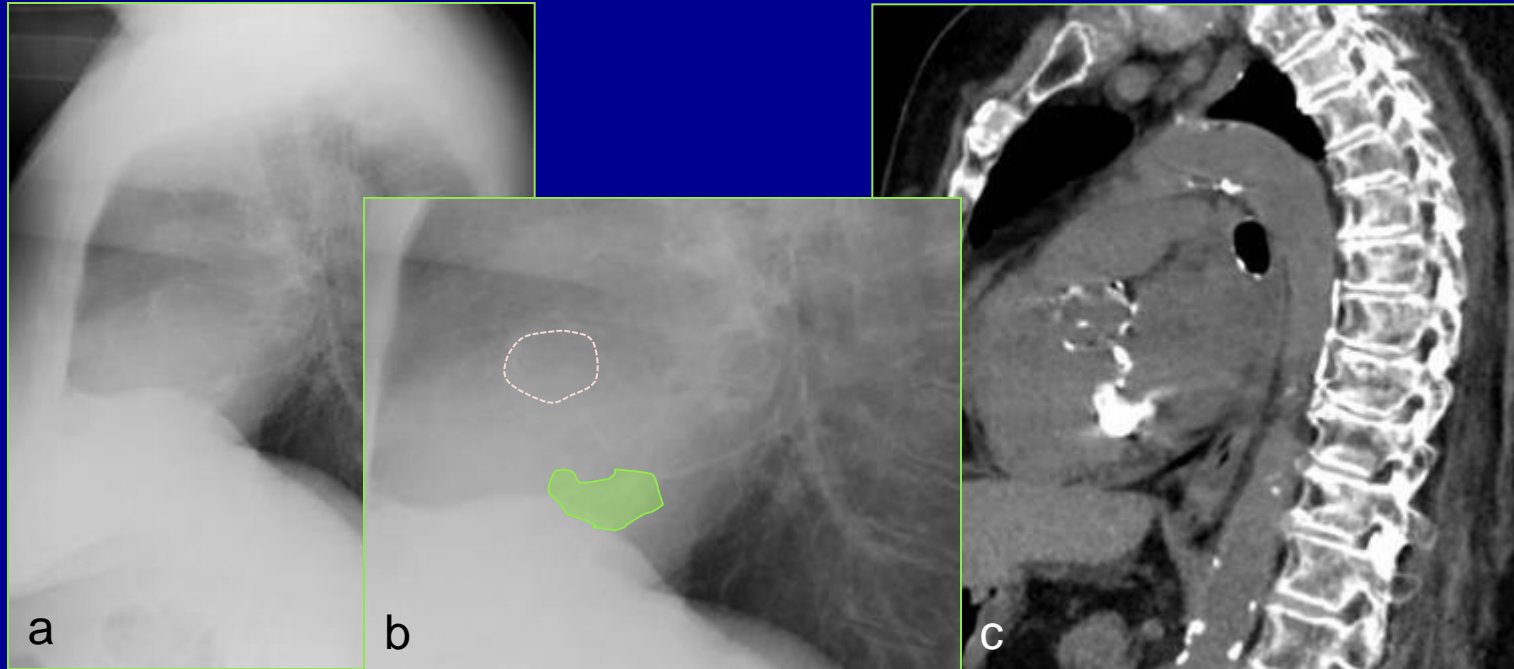
*Mediastinum*



*Lung  
Parenchyma*

*Heart*

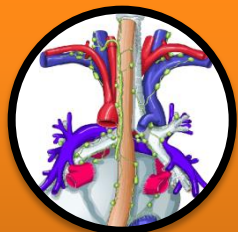
- Valve calcifications



a  
b  
c  
Lateral chest X-ray (a) and magnification (b) show dense calcifications of mitral annulus (green area in b) and aortic valve calcifications (pink dot line in b). MPR sagittal reconstruction confirm the radiographic findings.



*Chest Wall*



*Mediastinum*



*Lung  
Parenchyma*

*Heart*

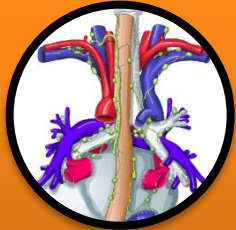
- Coronary calcifications



Magnification of frontal chest x-ray (a) showing a curvilinear calcification (black arrows) below the left main bronchus. Coronal MPR reconstruction reveals that the radiographic finding is consistent with left coronary calcifications.



*Chest Wall*



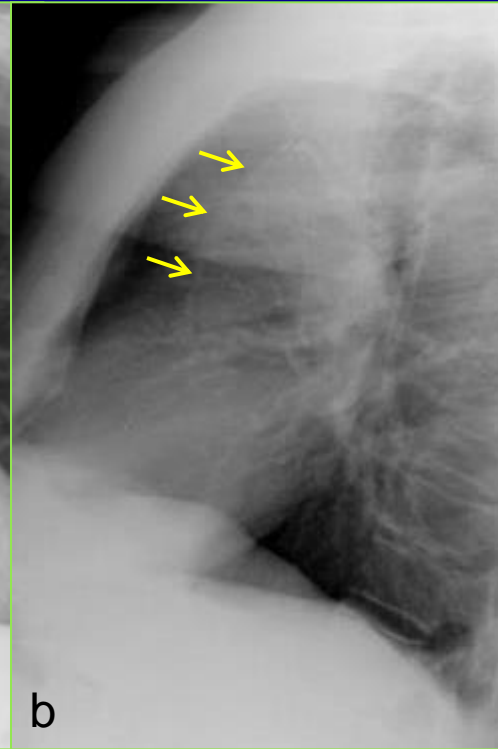
*Mediastinum*



*Lung  
Parenchyma*

*Aorta*

- Parietal calcifications



Frontal (a) and lateral (b) chest x-ray showing parietal calcifications of the thoracic aorta (black arrows in a, yellow arrows in b). Coronal MPR reconstruction confirms calcifications of the aorta and aortic valve.



*Chest Wall*



*Mediastinum*



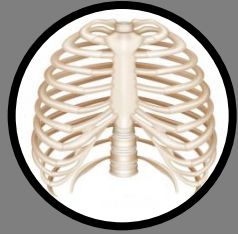
*Lung  
Parenchyma*

*Aorta*

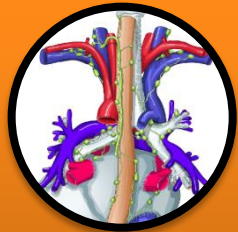
- Enlargement and tortuous course



Chest X-ray (a,b) in a 70-year-old-man showing enlargement and elongation of the thoracic aorta. Coronal (c) and sagittal MPR reconstructions (d) confirm elongation and enlargement of aorta. In this patient also coexist a hiatal hernia (black arrows in a).



*Chest Wall*



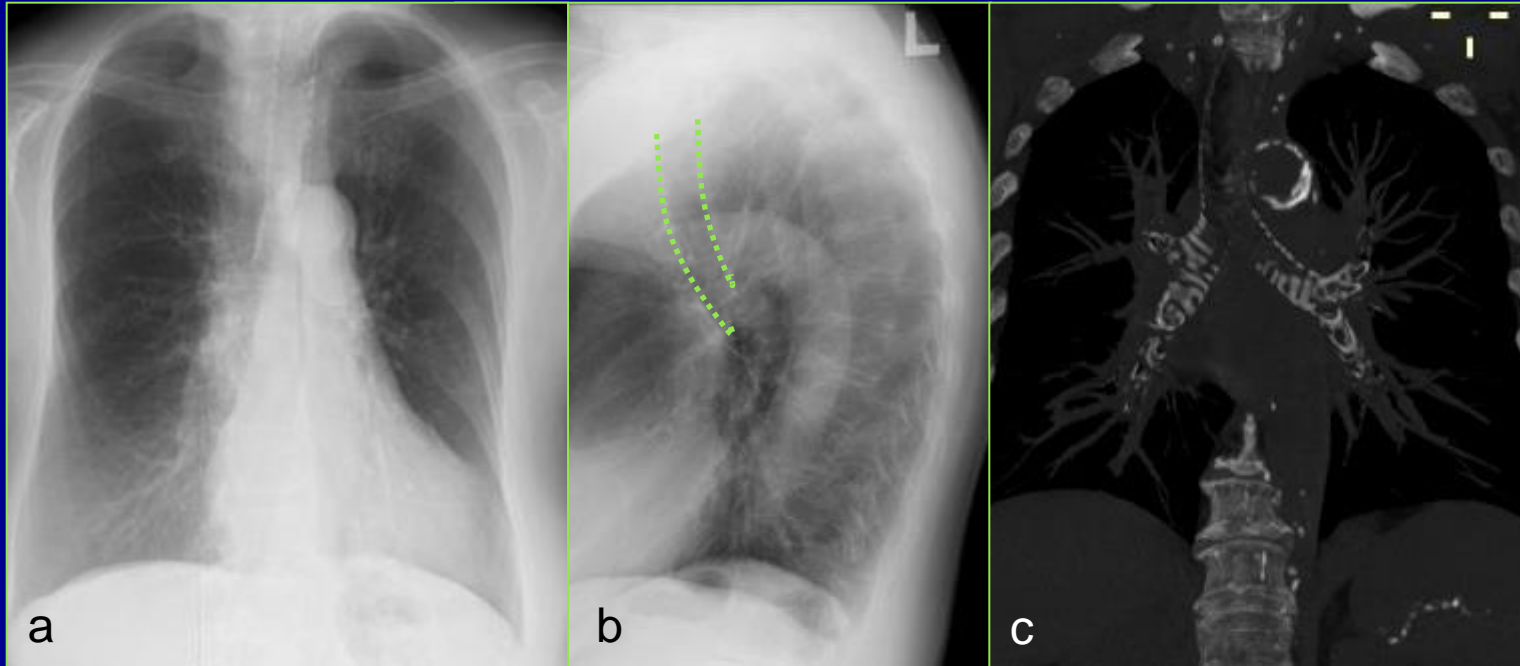
*Mediastinum*



*Lung  
Parenchyma*

*Trachea/bronchi*

- Chondral calcifications



Chest X-ray (a) in 76-year-old man show diffuse tracheo-bronchial calcifications which can be better delineated on MIP reconstructions (c).

# RX TORACE NELL'ANZIANO



*Chest Wall*

## *Dorsal Spine*

- Osteoporosis
- Kyphosis, vertebral soma height reduction, «barrel chest»

## *Ribs*

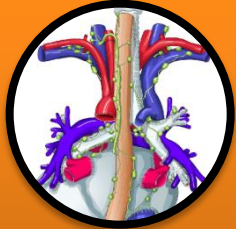
- Costochondral calcifications
- Costovertebral and costosternal osteoarthritis

## *Diaphragm*

- Diaphragm bumps; diaphragmatic hernia

## *Muscles*

- Atrophy of the chest wall muscles



*Mediastinum*

## *Heart*

- Cardiac enlargement
- Valve and coronary calcifications

## *Aorta*

- Parietal calcifications
- Enlargement and elongation

## *Trachea/ bronchi*

- Chondral calcifications



*Lung  
Parenchyma*

## *Bronchi/Bronchioles*

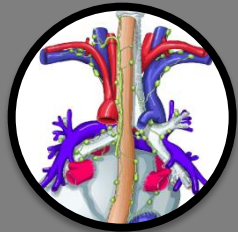
- Non-specific bronchial wall thickening

## *Distal parenchyma*

- Lamellar atelectasis
- Reticular interstitial thickening
- Elastic component reduction



*Chest Wall*



*Mediastinum*

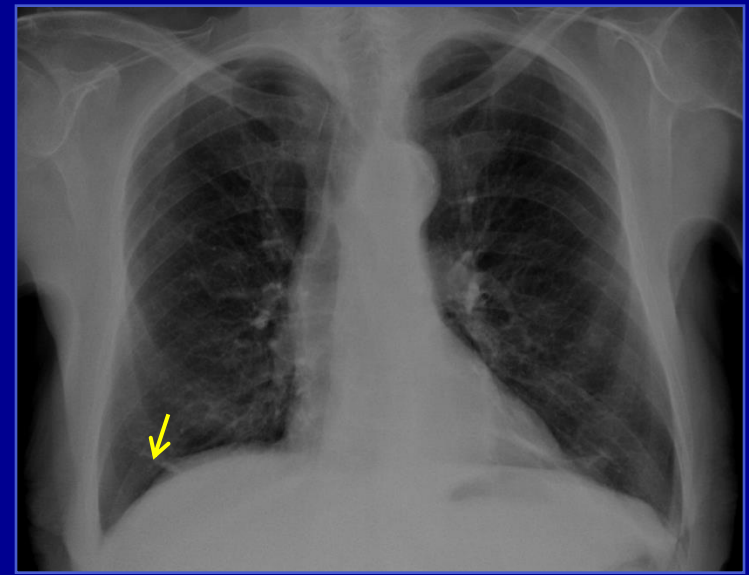
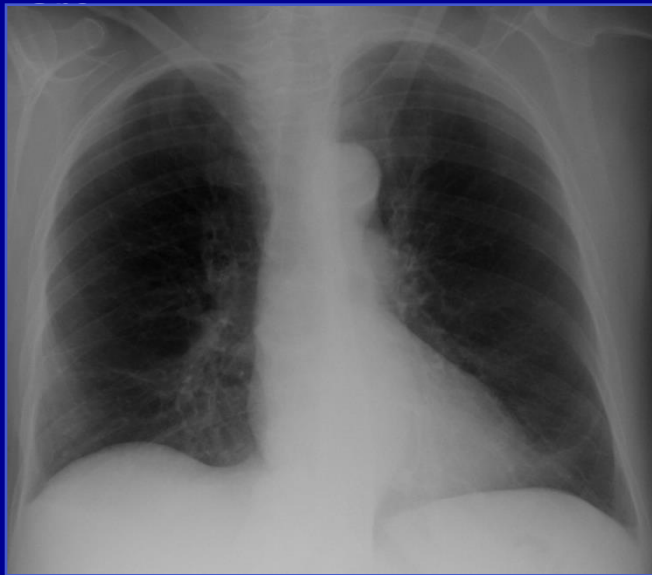


*Lung  
Parenchyma*

## *Bronchi/Bronchioles/Parenchyma*

- Elderly lung (2)

...Therefore, the most frequent radiographic findings in the elderly



- “Barrel chest”
- Increased bilateral hyperlucency
- Lamellar atelectasis (arrow)
- Homogeneous reduction of vascularization (DD with emphysema in which there is a disomogeneous reduction of vascularization)
- Bronchial wall thickening

**Grazie per la vostra attenzione**