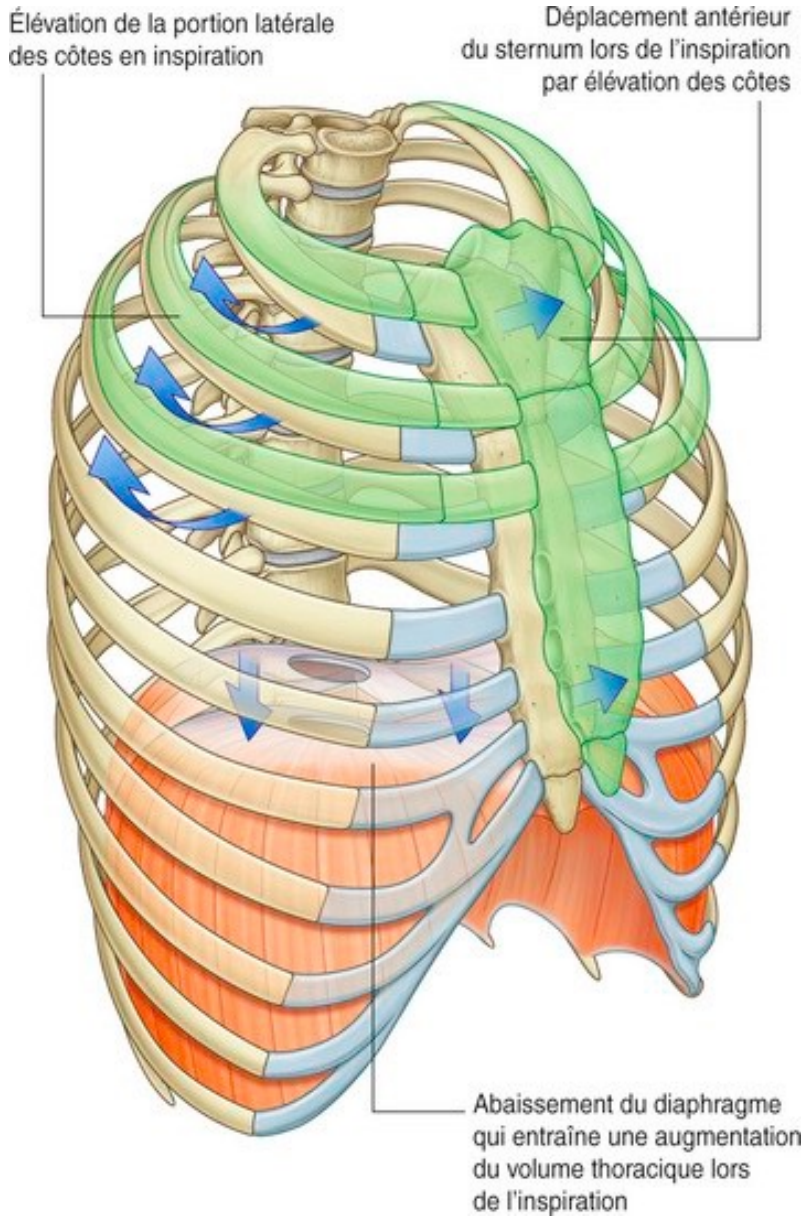
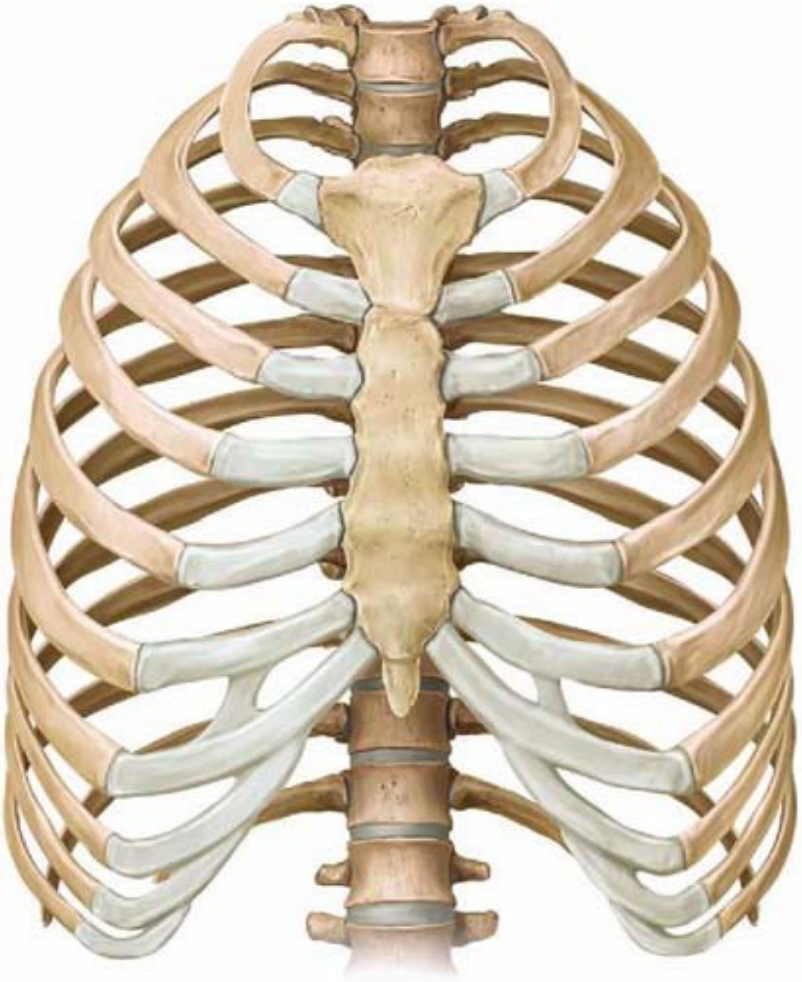
Mécanique ventilatoire

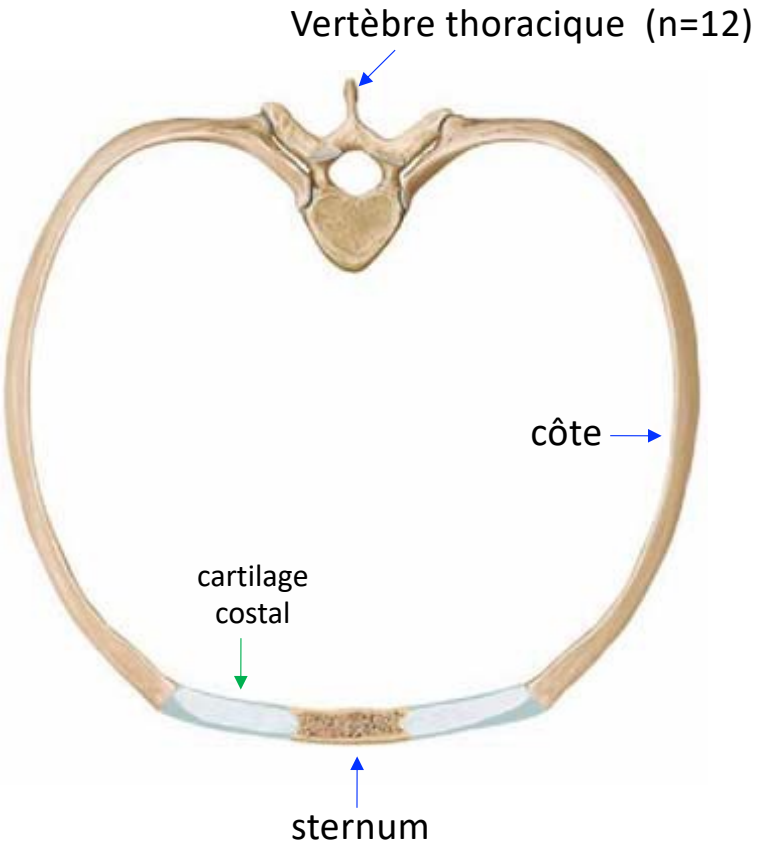
Variation du volume thoracique



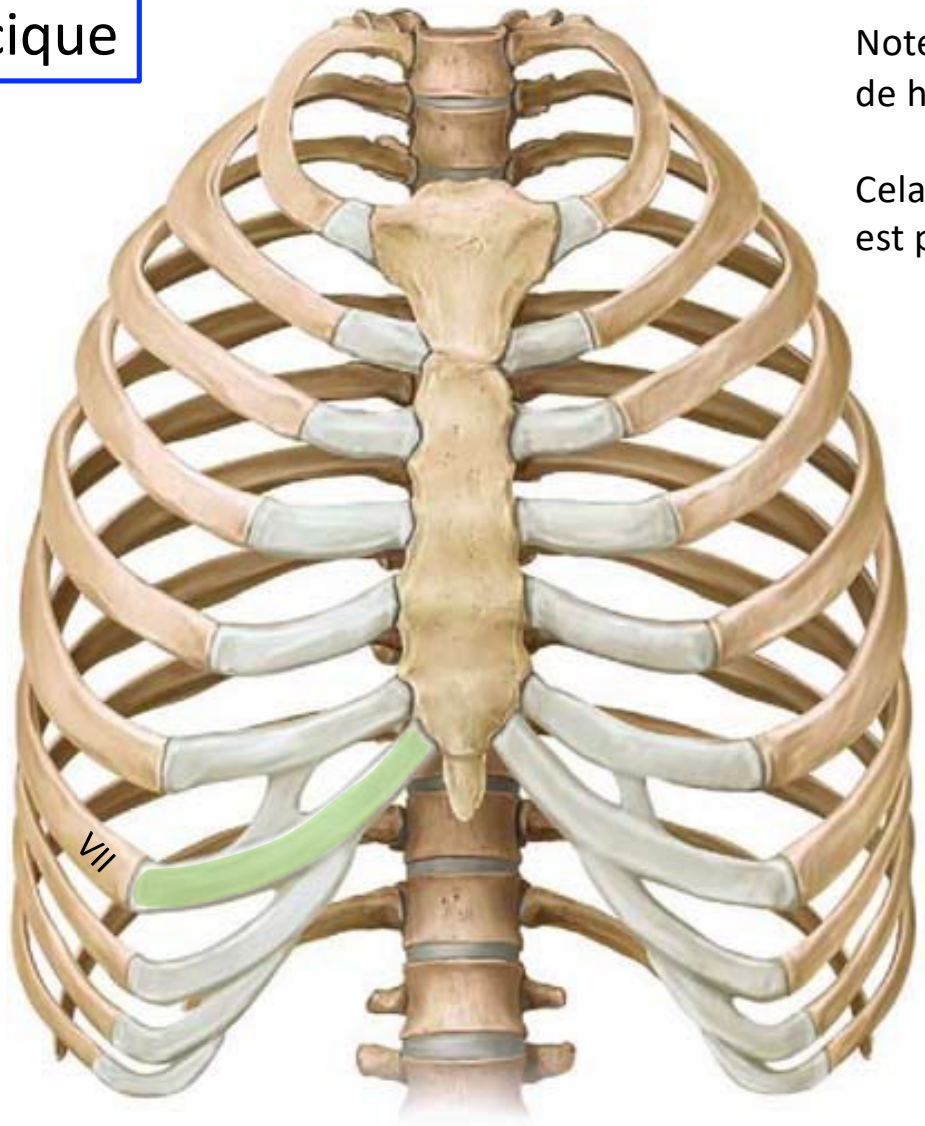
Squelette axial

La cage thoracique





Cage thoracique

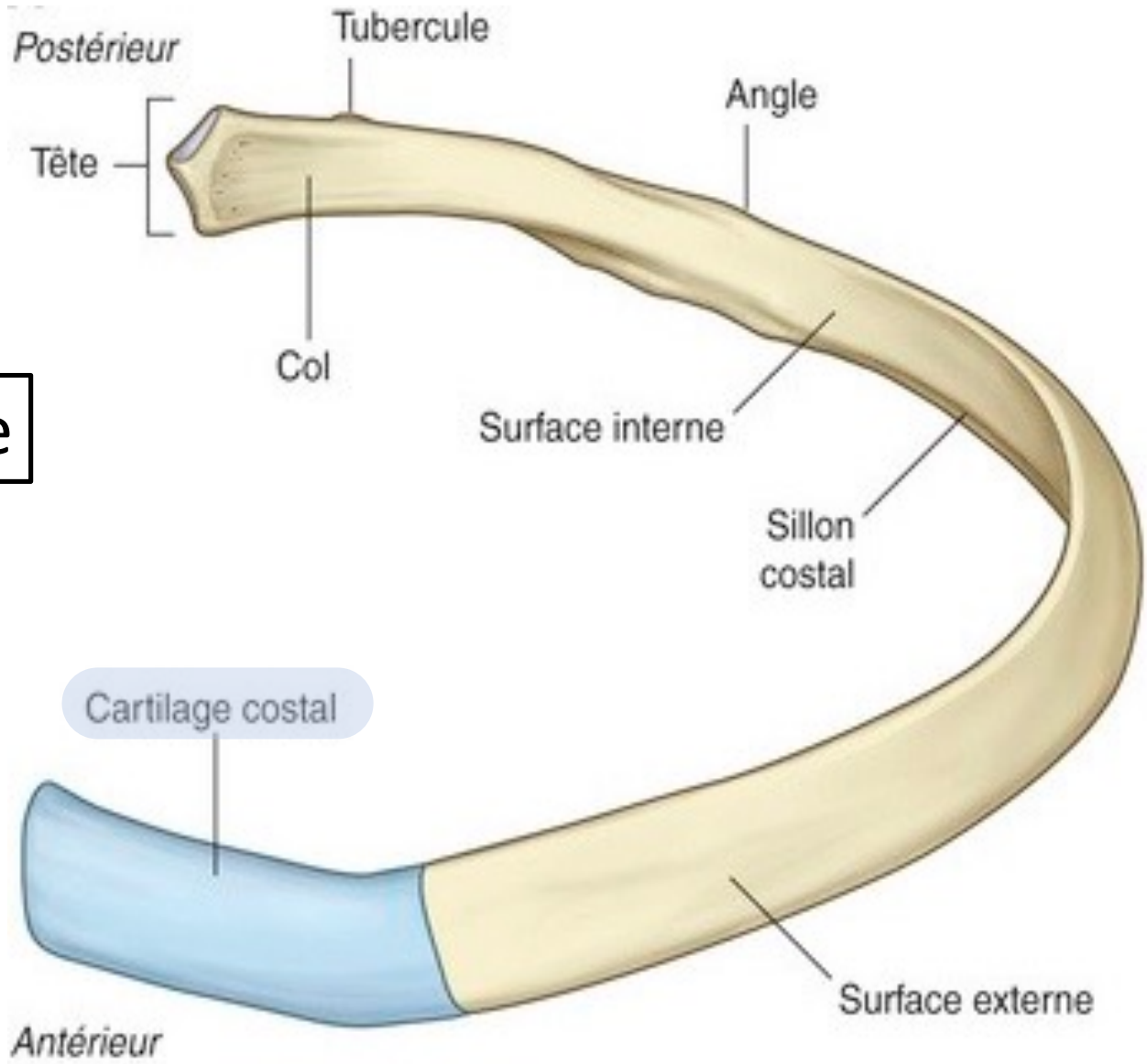


Vue antérieure

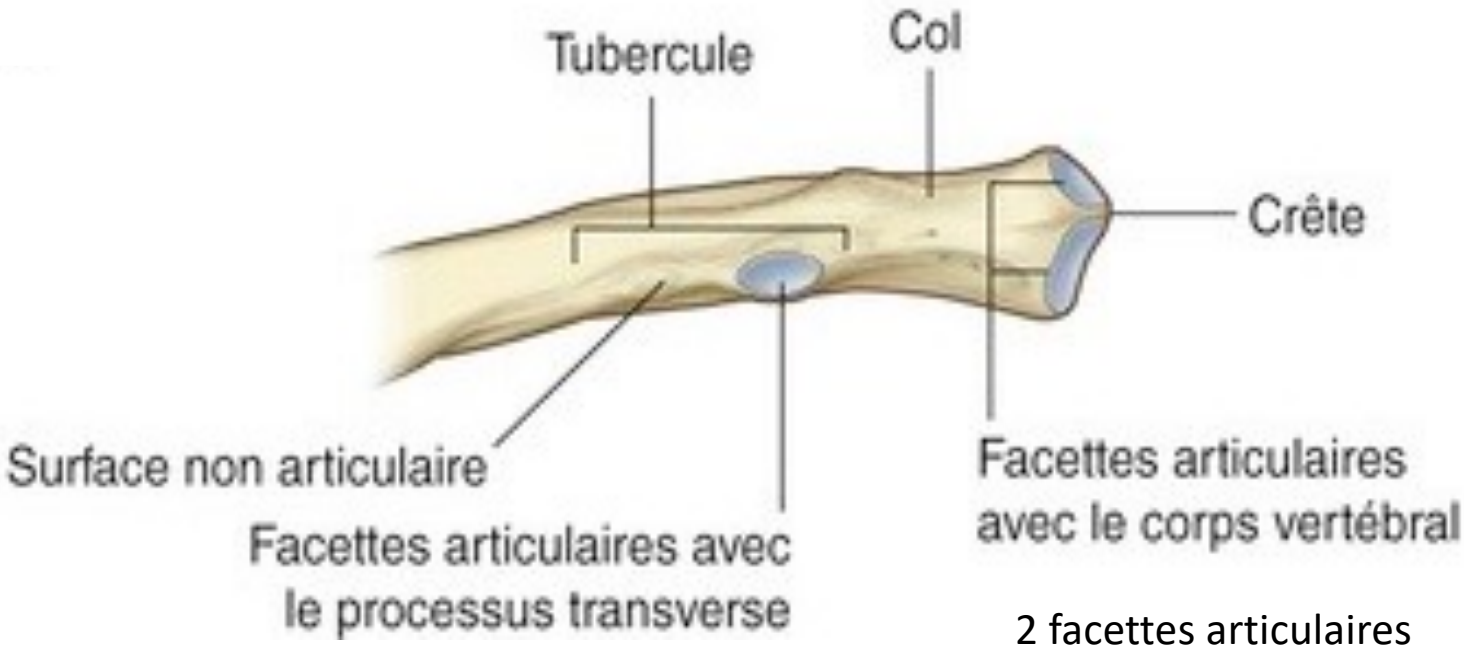
Notez que les côtes sont **obliques** de haut en bas et d'arrière en avant.

Cela signifie que l'arrière d'une côte est plus haut que son cartilage costal.

Une côte

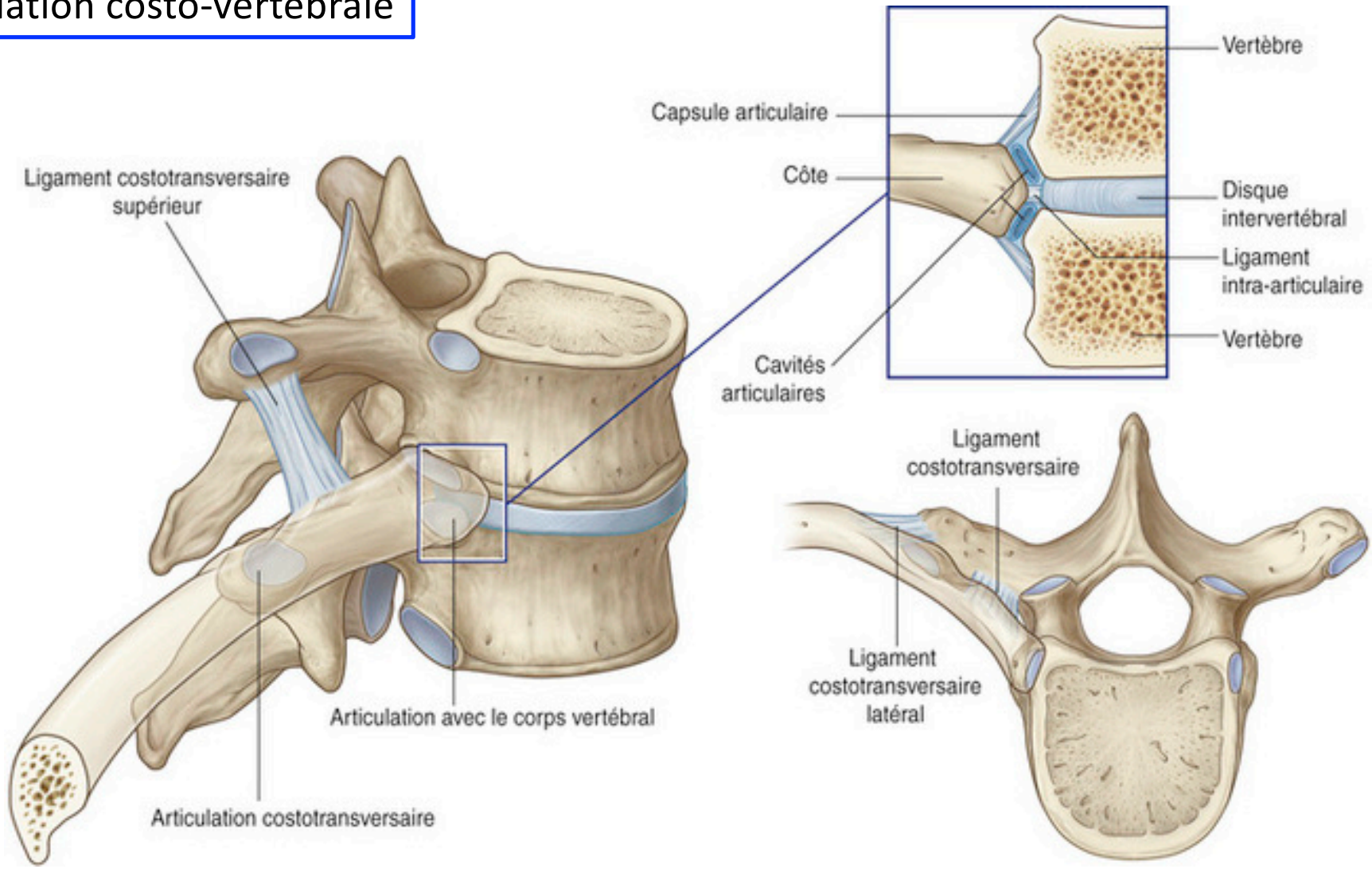

Postérieur
Tubercule
Angle
Tête
Col
Surface interne
Sillon
costal
Cartilage costal
Surface externe
Antérieur

Côte : extrémité postérieure

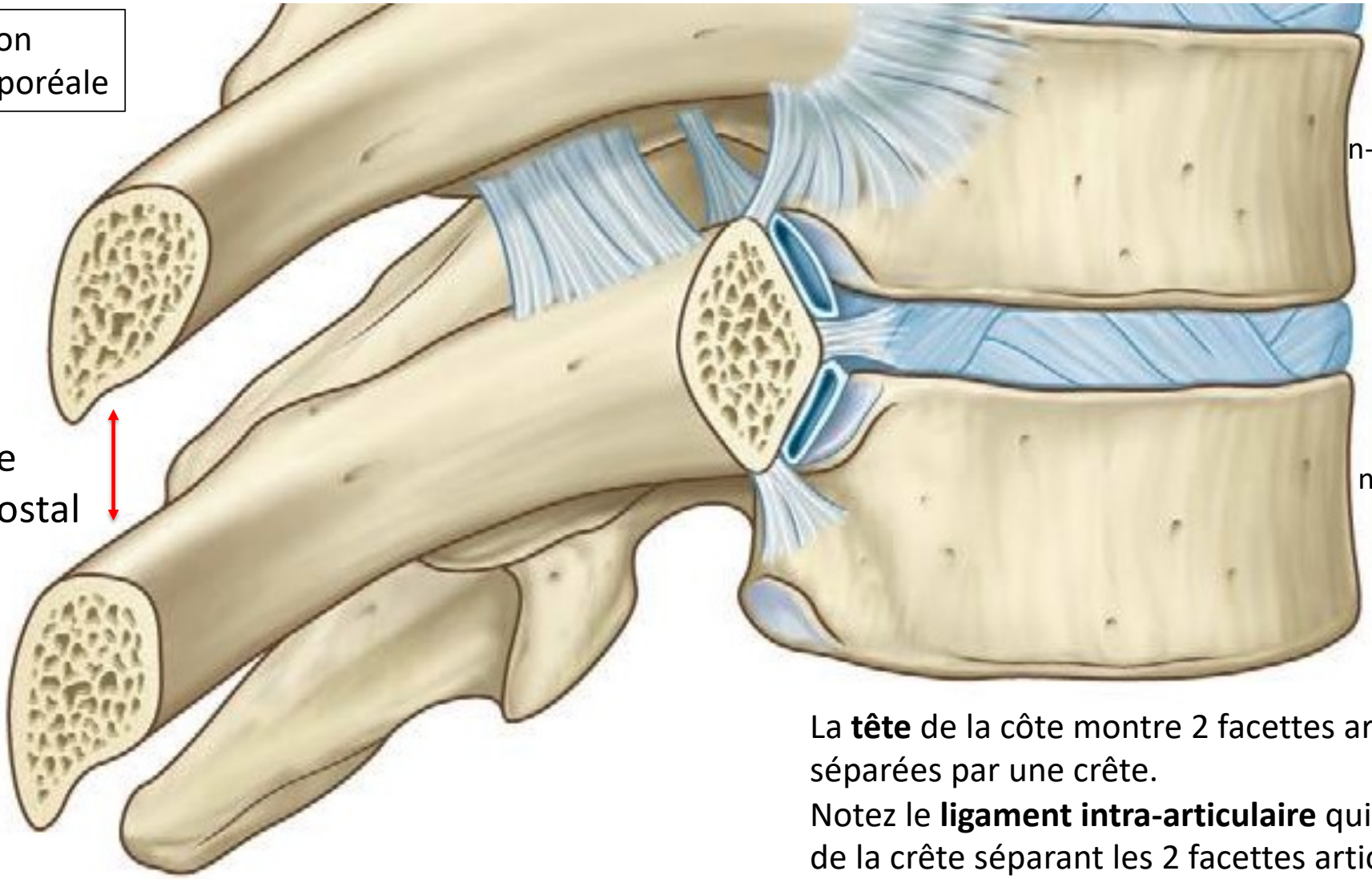


2 facettes articulaires
séparées par une crête

Articulation costo-vertébrale



Articulation
costo-corporéale



n-1ème vertèbre
thoracique

Espace
intercostal

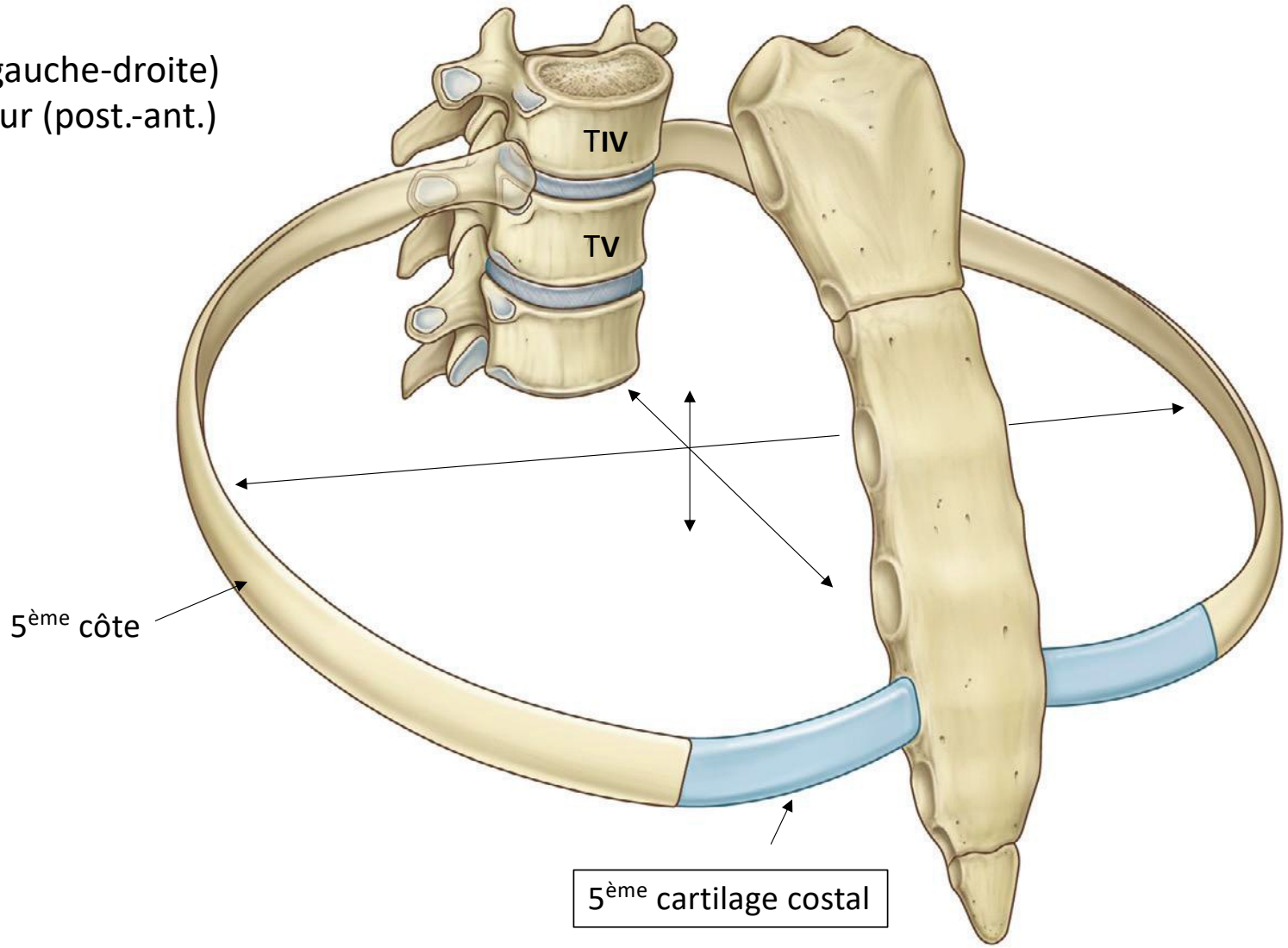
nème vertèbre
thoracique

nème côte

La **tête** de la côte montre 2 facettes articulaires séparées par une crête.
Notez le **ligament intra-articulaire** qui va de la crête séparant les 2 facettes articulaires vers le disque intervertébral.

Les 3 dimensions de la cavité thoracique:

- largeur (gauche-droite)
- profondeur (post.-ant.)
- hauteur

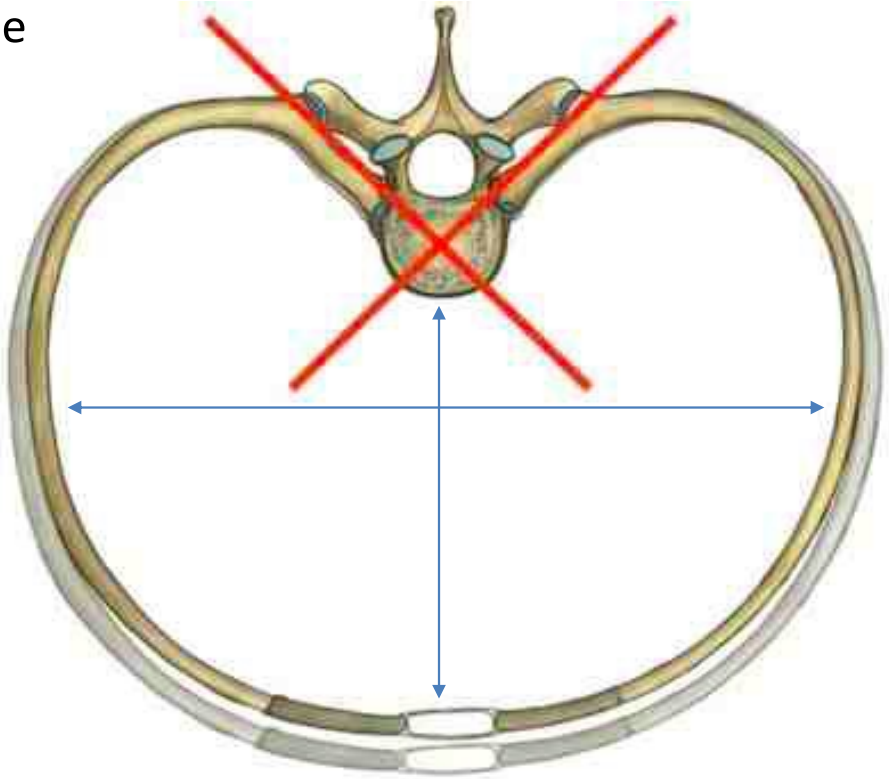


L'extrémité postérieure d'une côte participe à 2 articulations :

- articulation costo-corporéale
- articulation costo-transverse

Mouvement : rotation au tour d'un axe

Axe du mouvement



Diamètre transversale (droite – gauche)

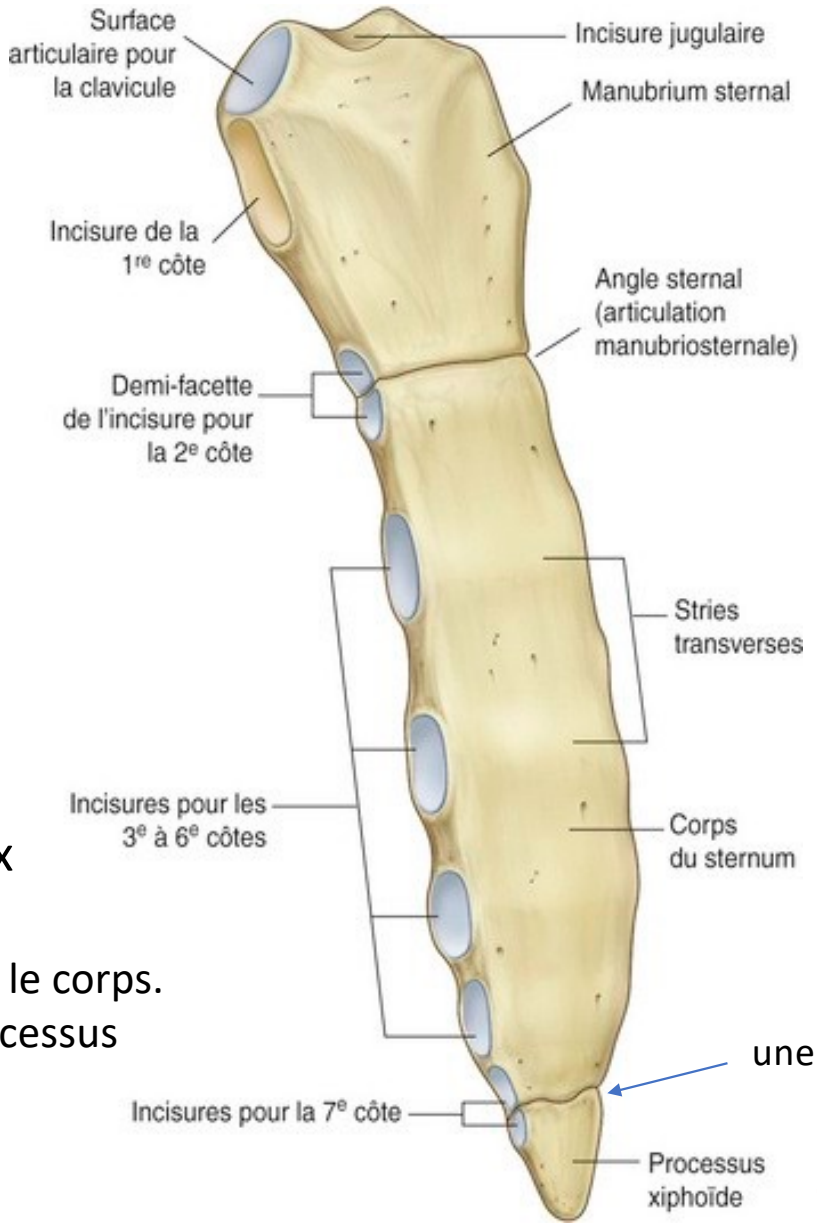
Diamètre antéro-postérieur

Analogie du seau et de son anse

Le sternum

3 parties :
- ◊ manubrium
- ◊ corps
- ◊ processus xiphoïde

2 articulations :
- manubriosternale
- xyphosternale



une symphyse

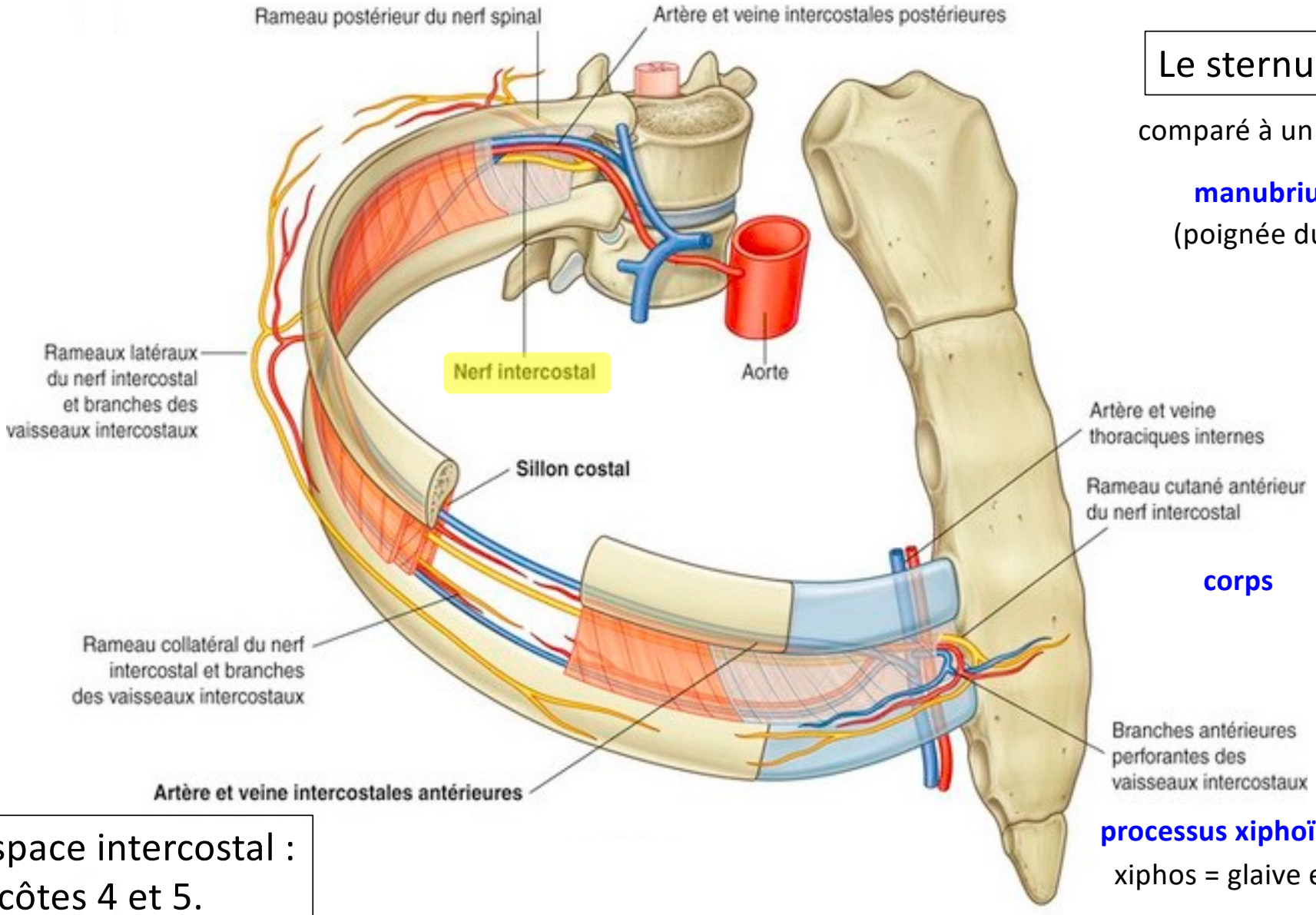
une synchondrose

ici complètement ossifié

Les 7 premiers cartilages costaux contactent le sternum.

La 2ème côte contacte le manubrium et le corps.

La 7ème côte contacte le corps et le processus xyphoïde



Le sternum

comparé à un glaive

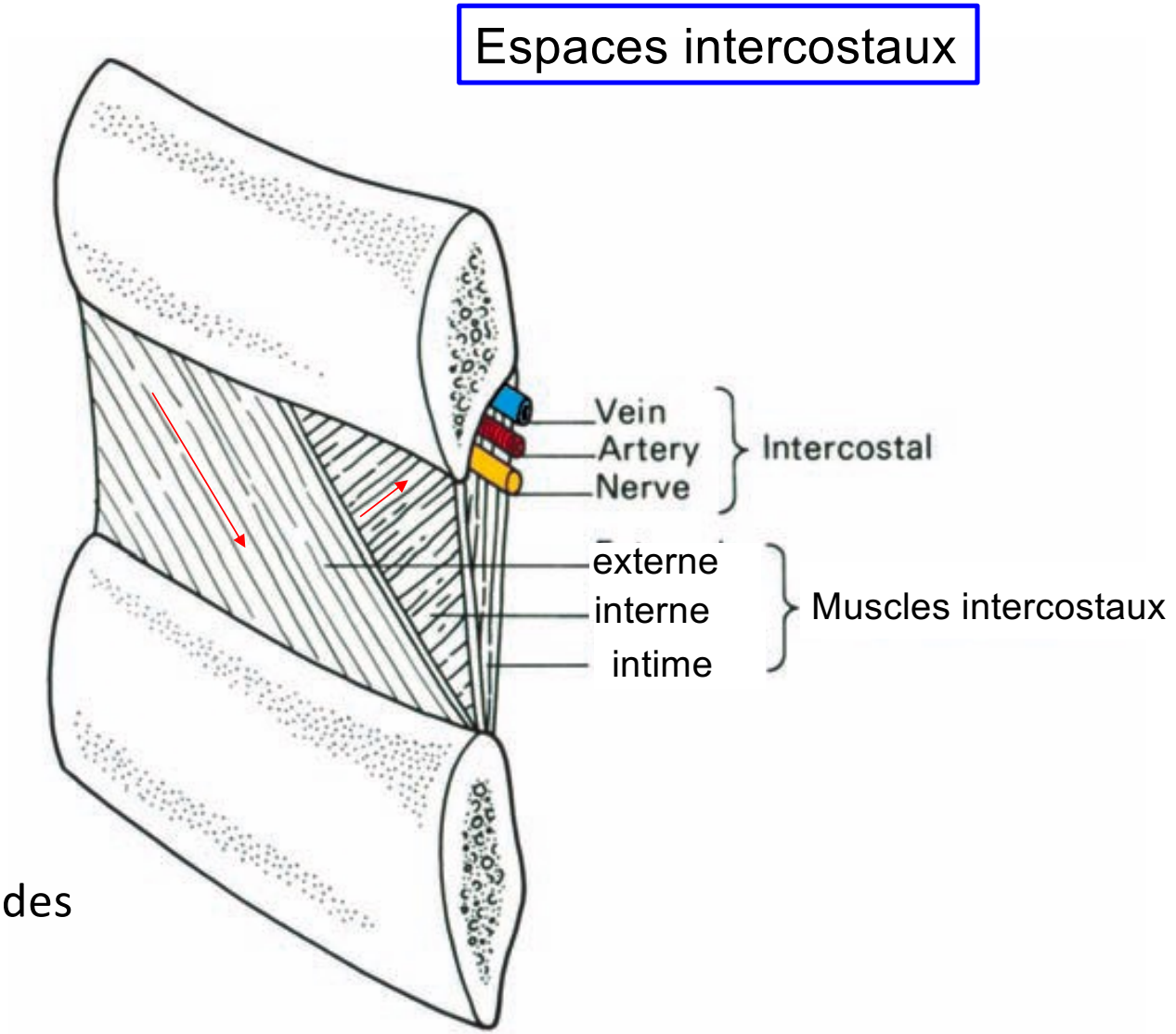
manubrium
(poignée du glaive)

corps

processus xiphoïde
xiphos = glaive en grec

Le 4ème espace intercostal : entre les côtes 4 et 5.

Espaces intercostaux

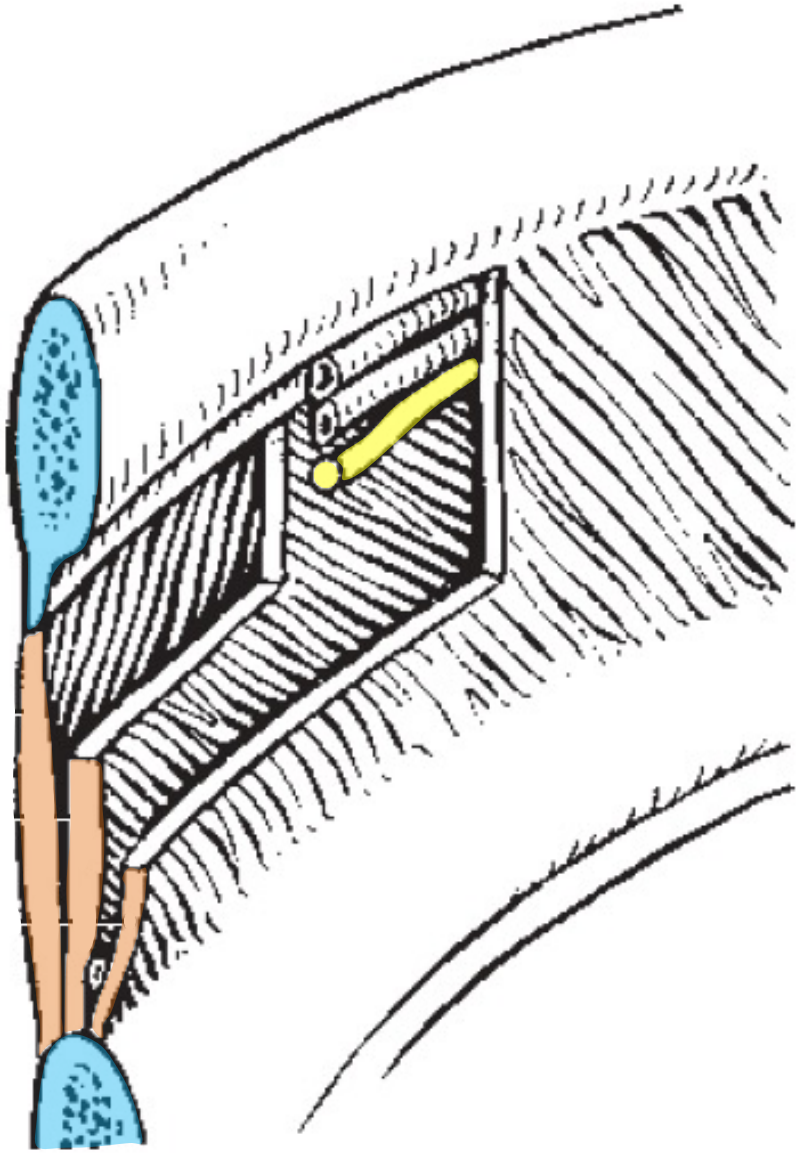


Notez l'orientation des fibres musculaires.

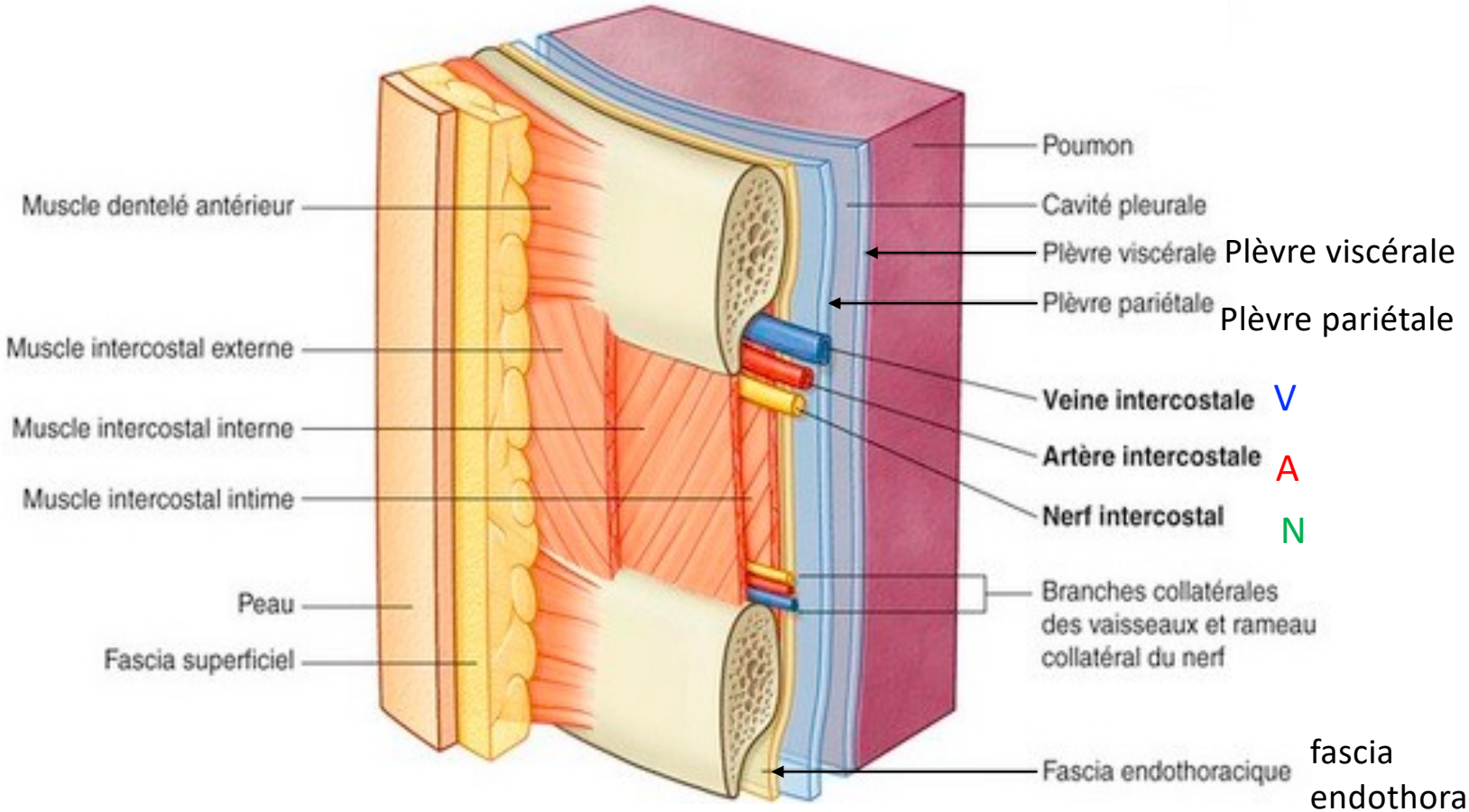
Espace intercostal

3 muscles intercostaux ;
muscles respiratoires accessoires

Muscle intercostal externe
muscle inspiratoire
Origine :
bord inférieur de la côte sus-jacente
Insertion
bord supérieur de la côte sous-jacente



Espaces intercostaux



Plèvre viscérale

Plèvre pariétale

V

A

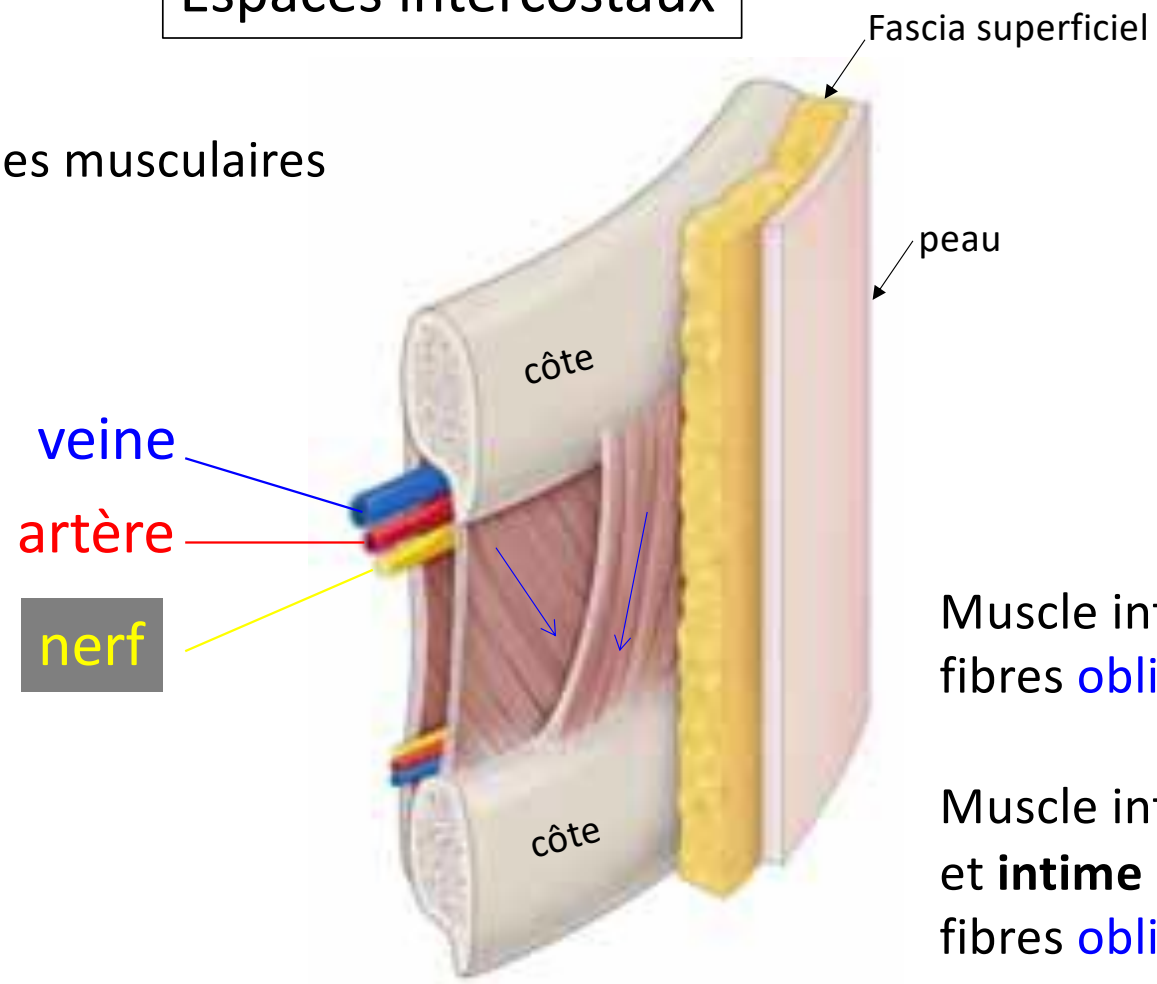
N

fascia endothoracique

Le fascia endothoracique et la plèvre pariétale sont accolés.

Espaces intercostaux

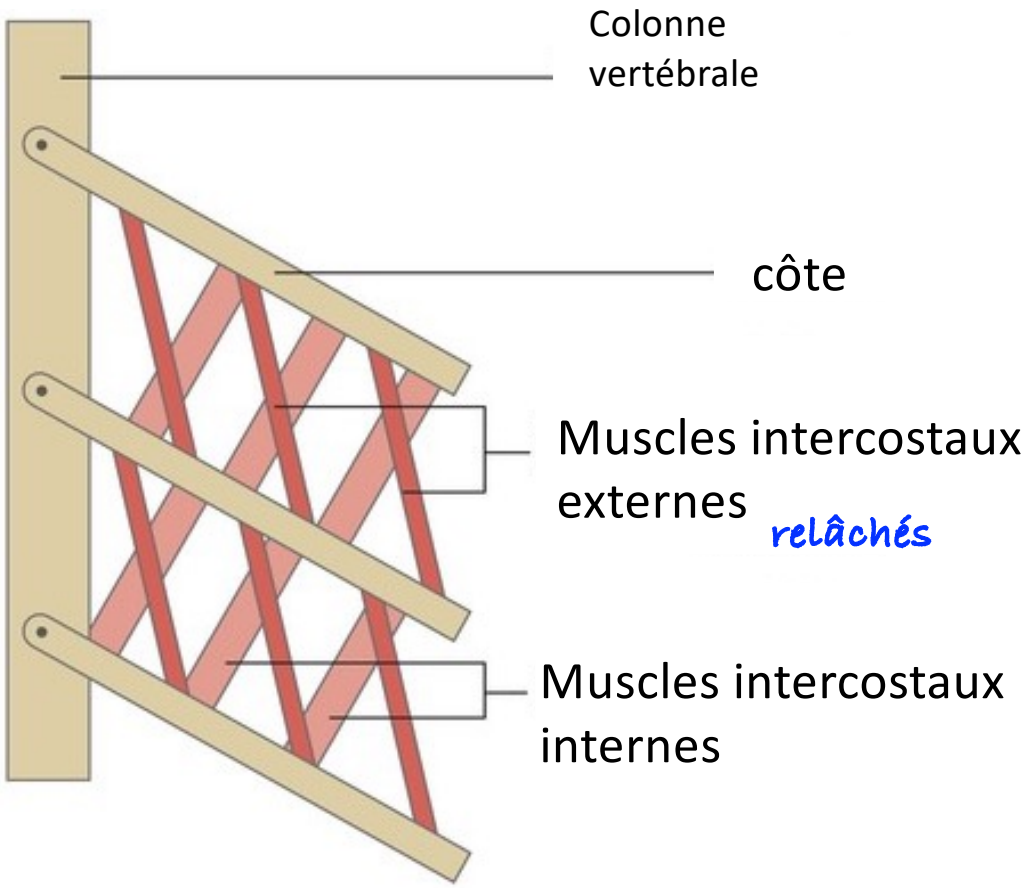
3 couches musculaires



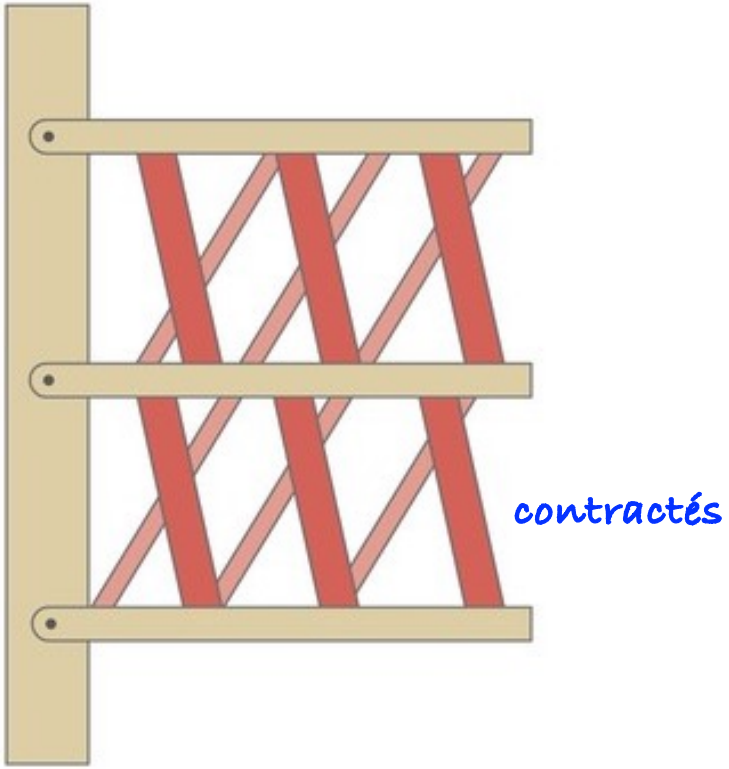
Muscle intercostal **externe** :
fibres obliques vers l'avant.

Muscle intercostal **interne**
et **intime** :
fibres obliques vers l'arrière.

Actions des muscles intercostaux



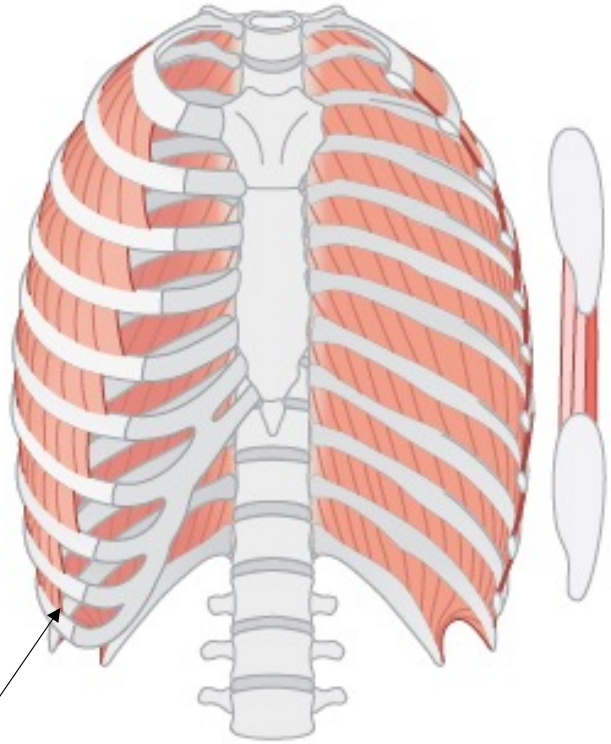
expiration



inspiration

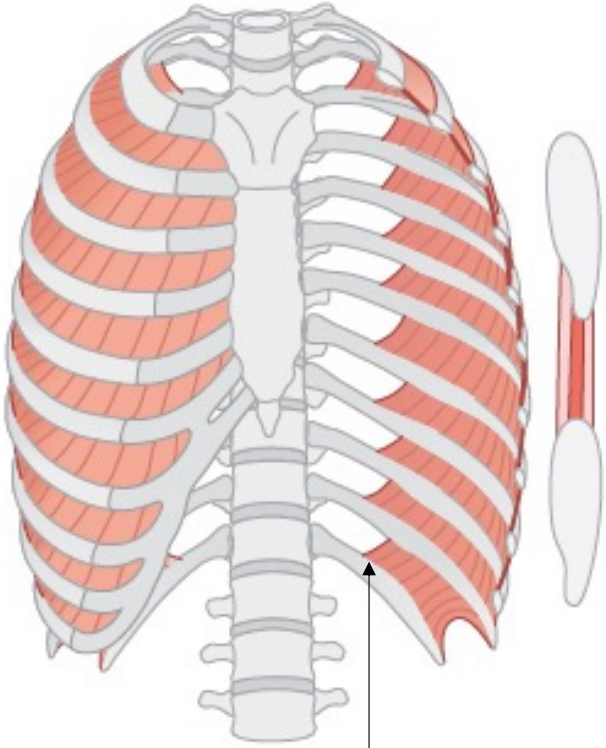
Muscles intercostaux

externe



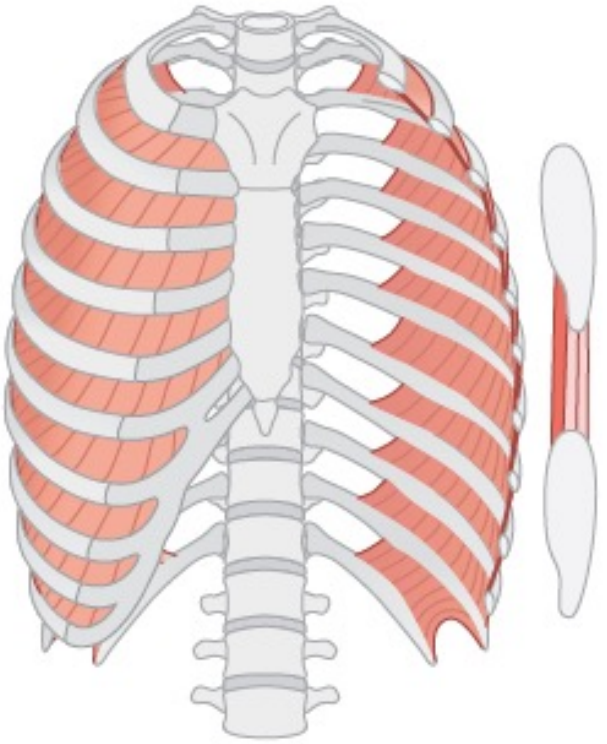
La partie charnue
s'arrête ici !

interne



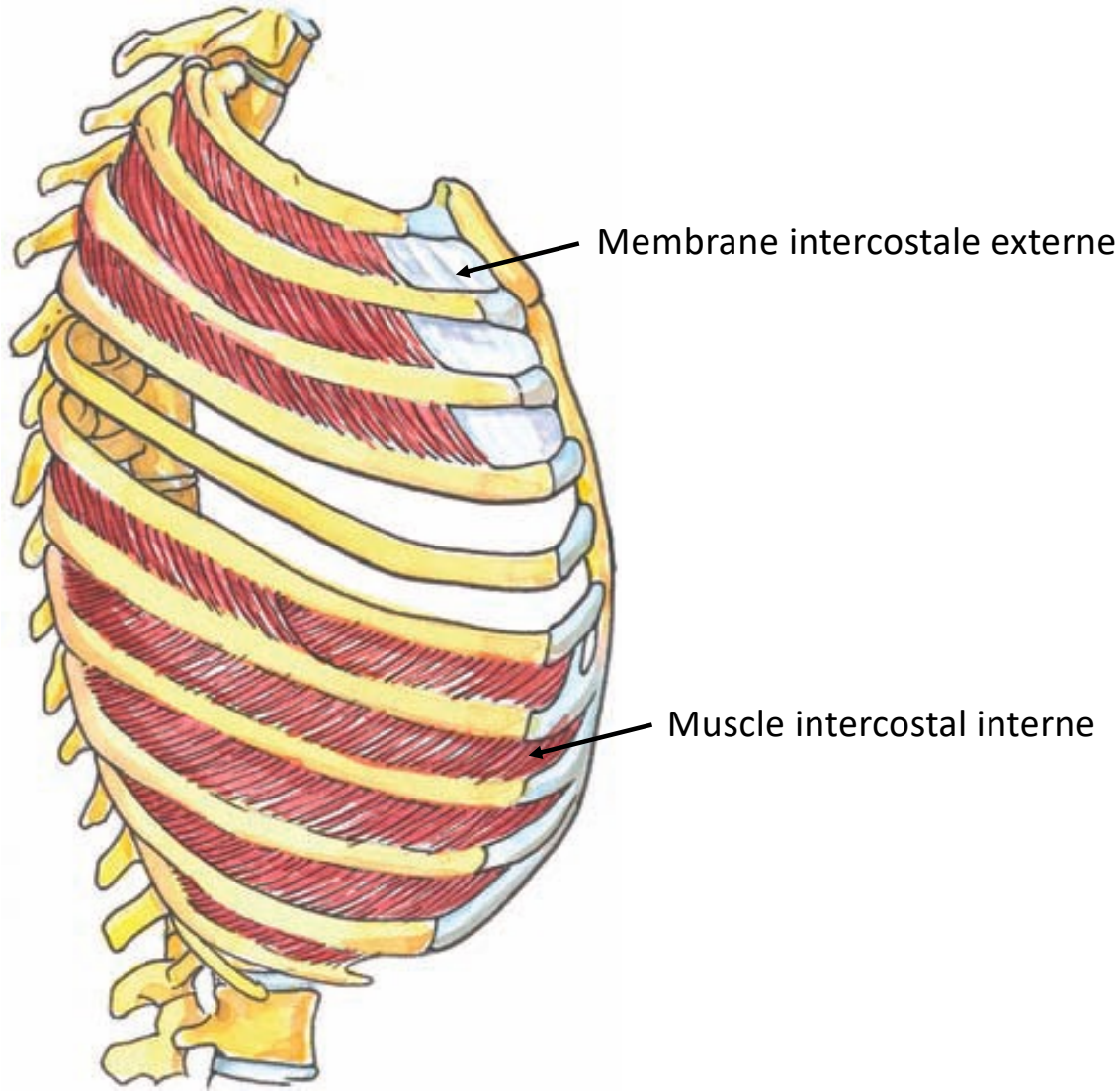
Commence ici !

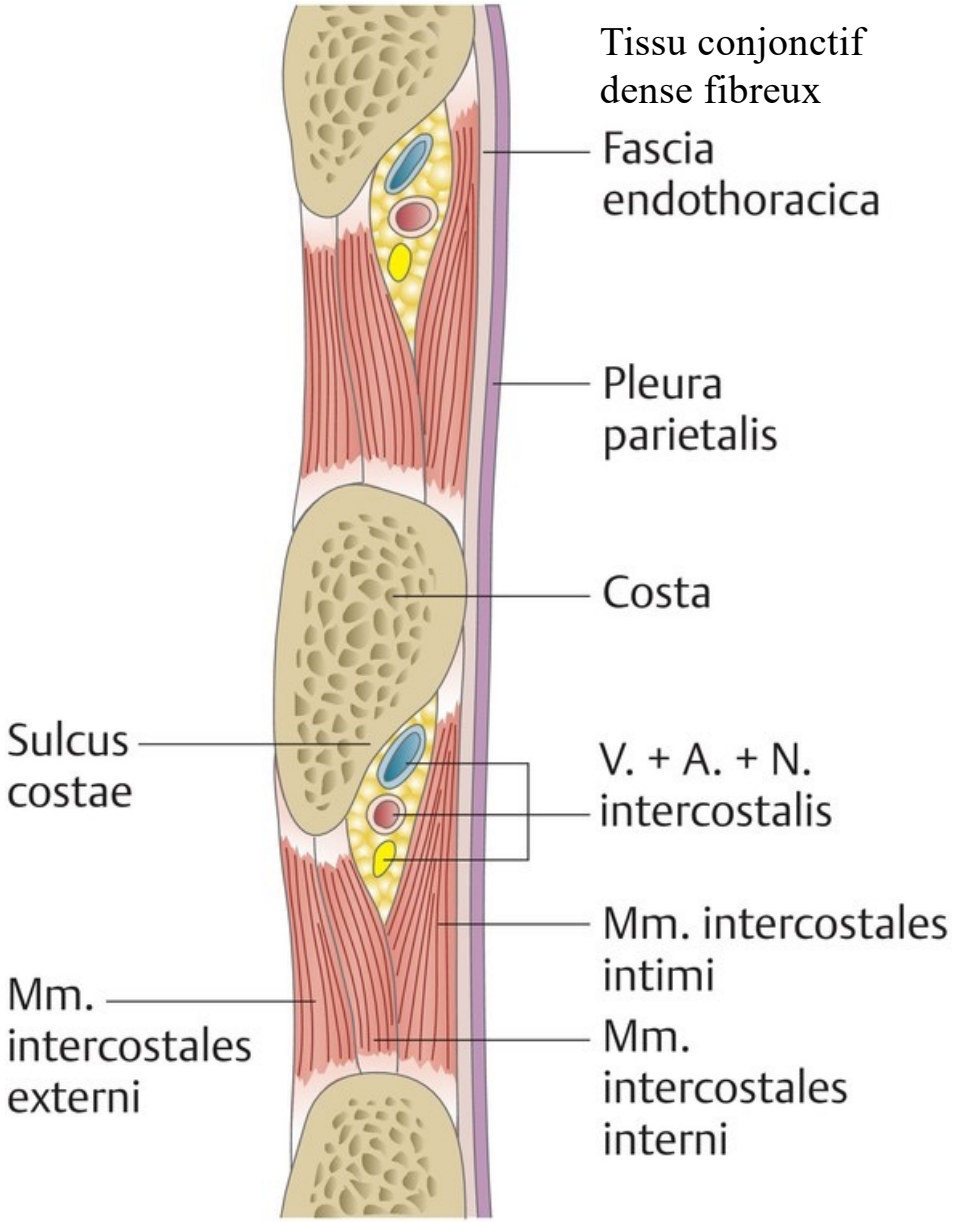
intime



Muscles intercostaux

Notez l'orientation des fibres musculaires.

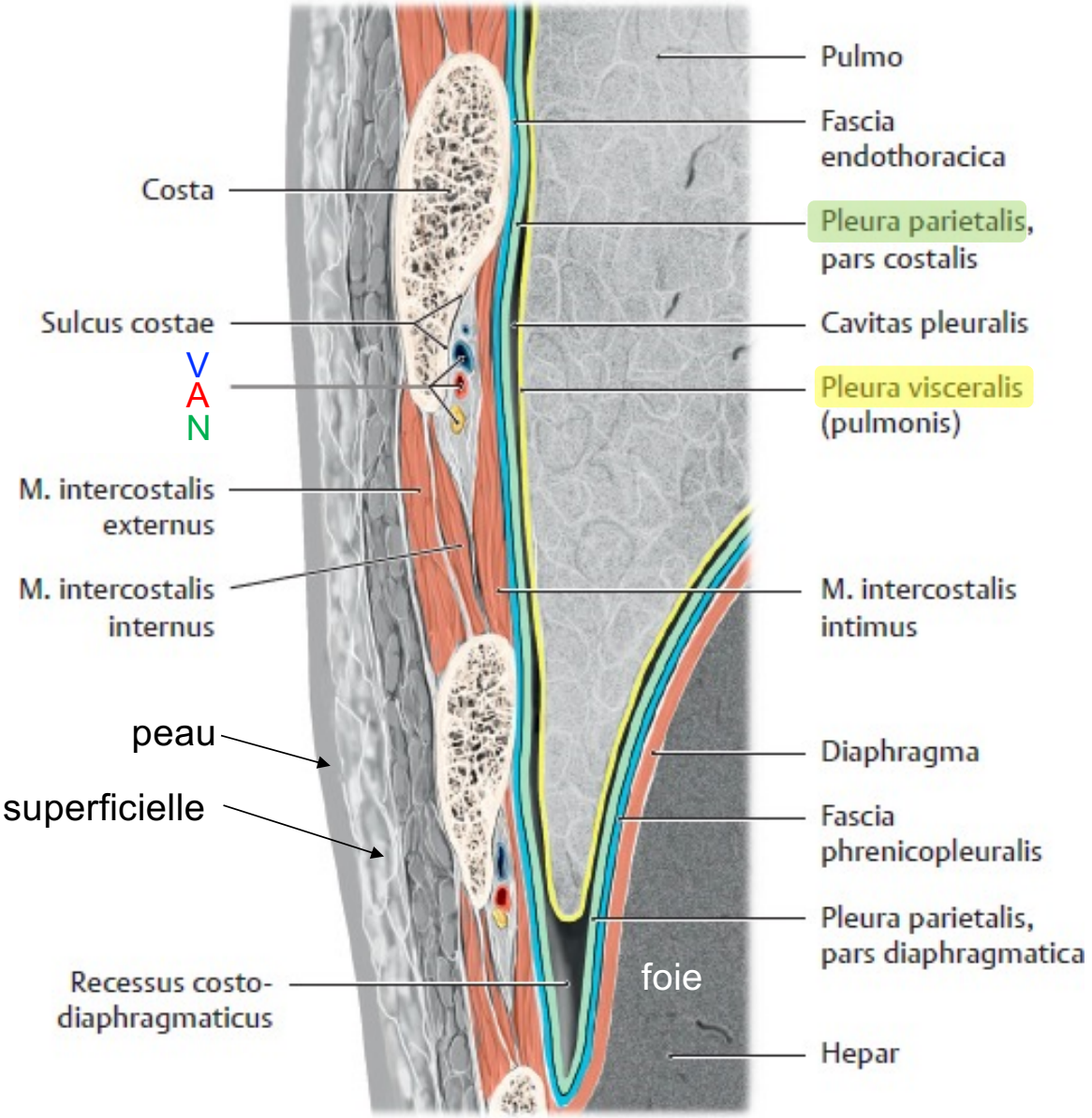




Sillon costal

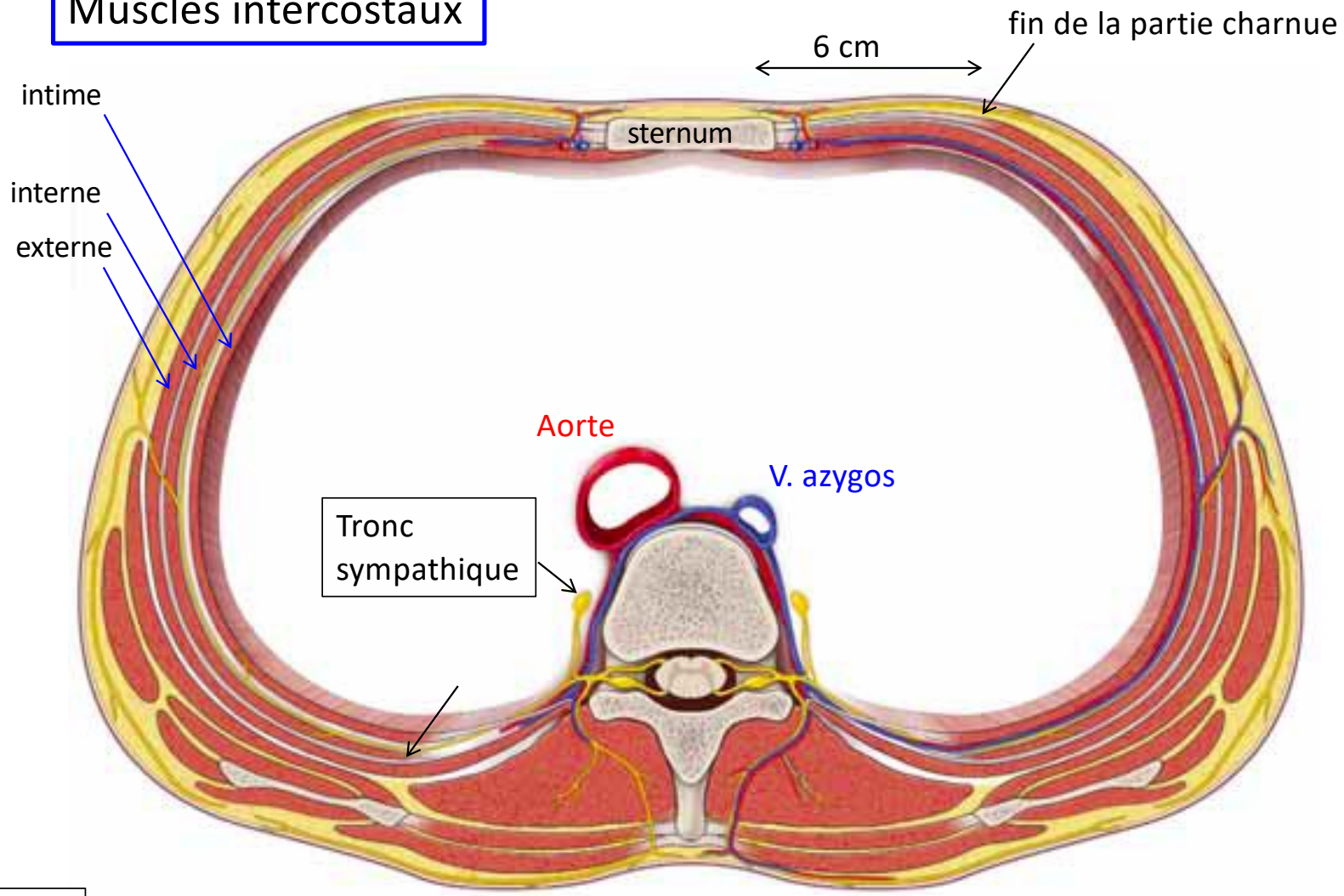
Le **fascia endothoracique** et la **plèvre pariétale** sont accolés.

Coupe coronale



Recessus costo-diaphragmatique

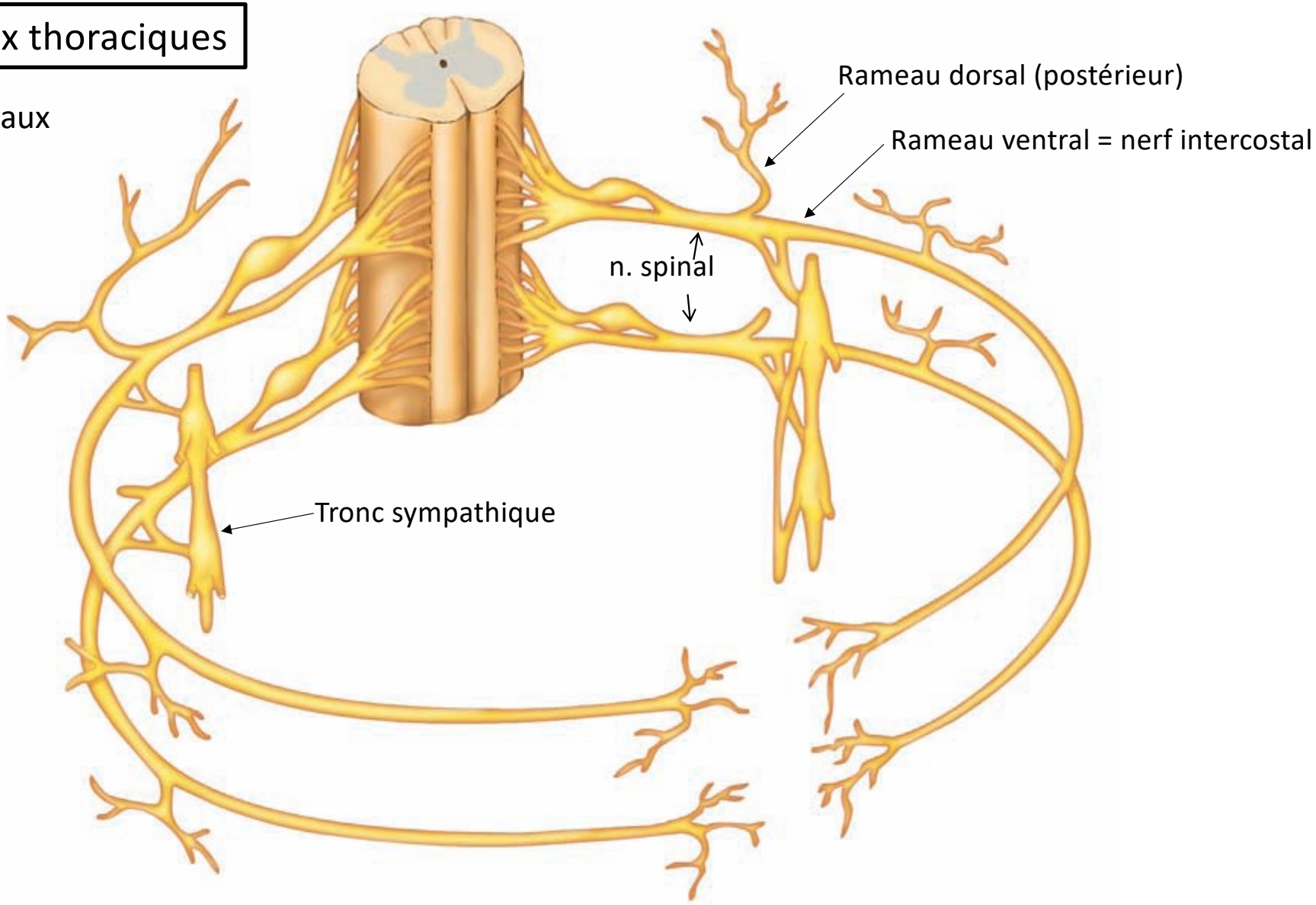
Muscles intercostaux



Coupe transverse

12 nerfs spinaux thoraciques

11 nerfs intercostaux
1 nerf subcostal

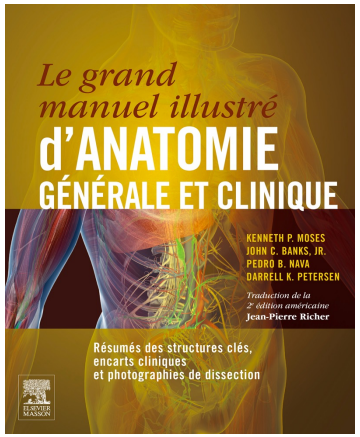


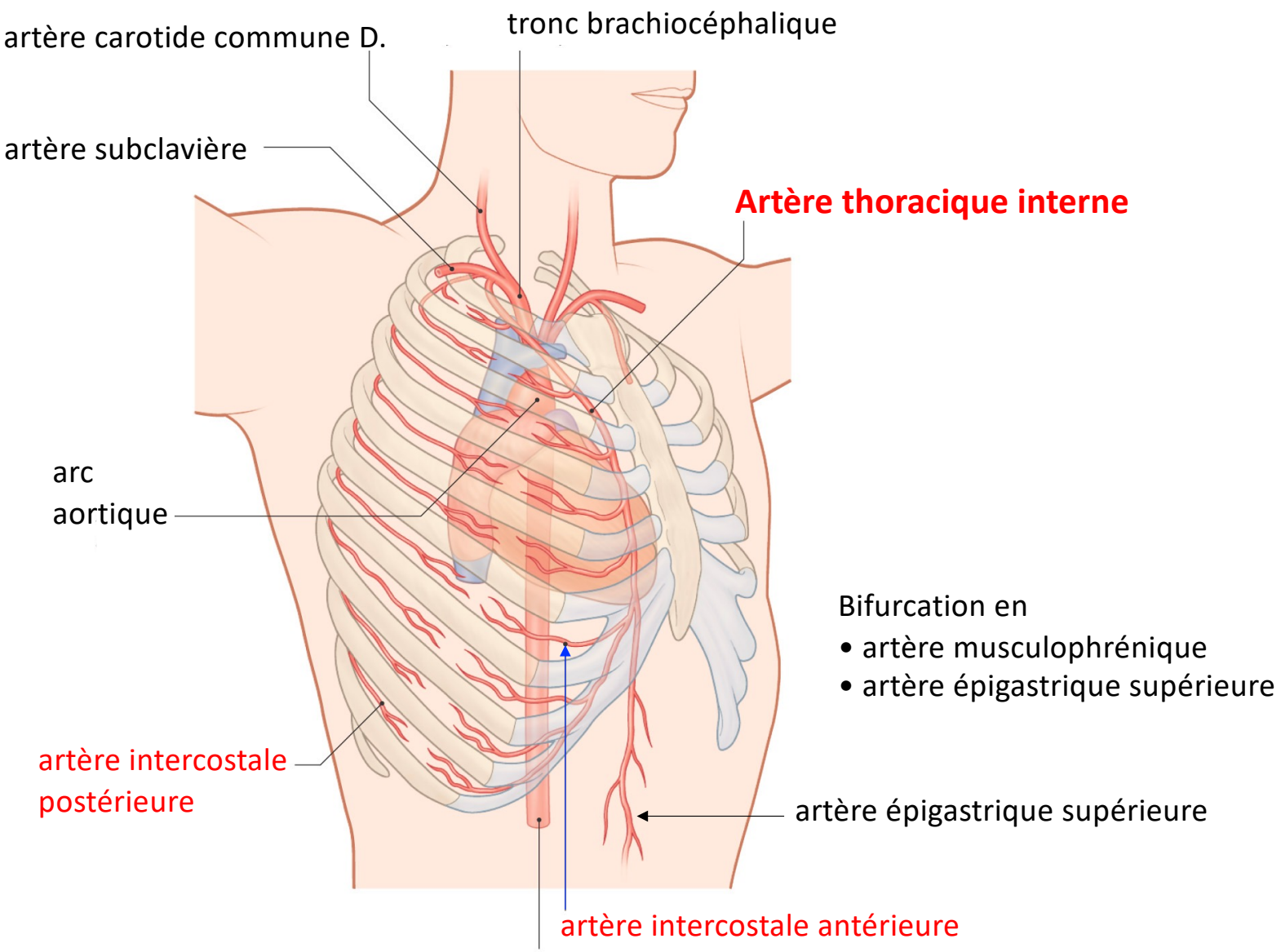
Espaces intercostaux :

Artères intercostales

◊ postérieures

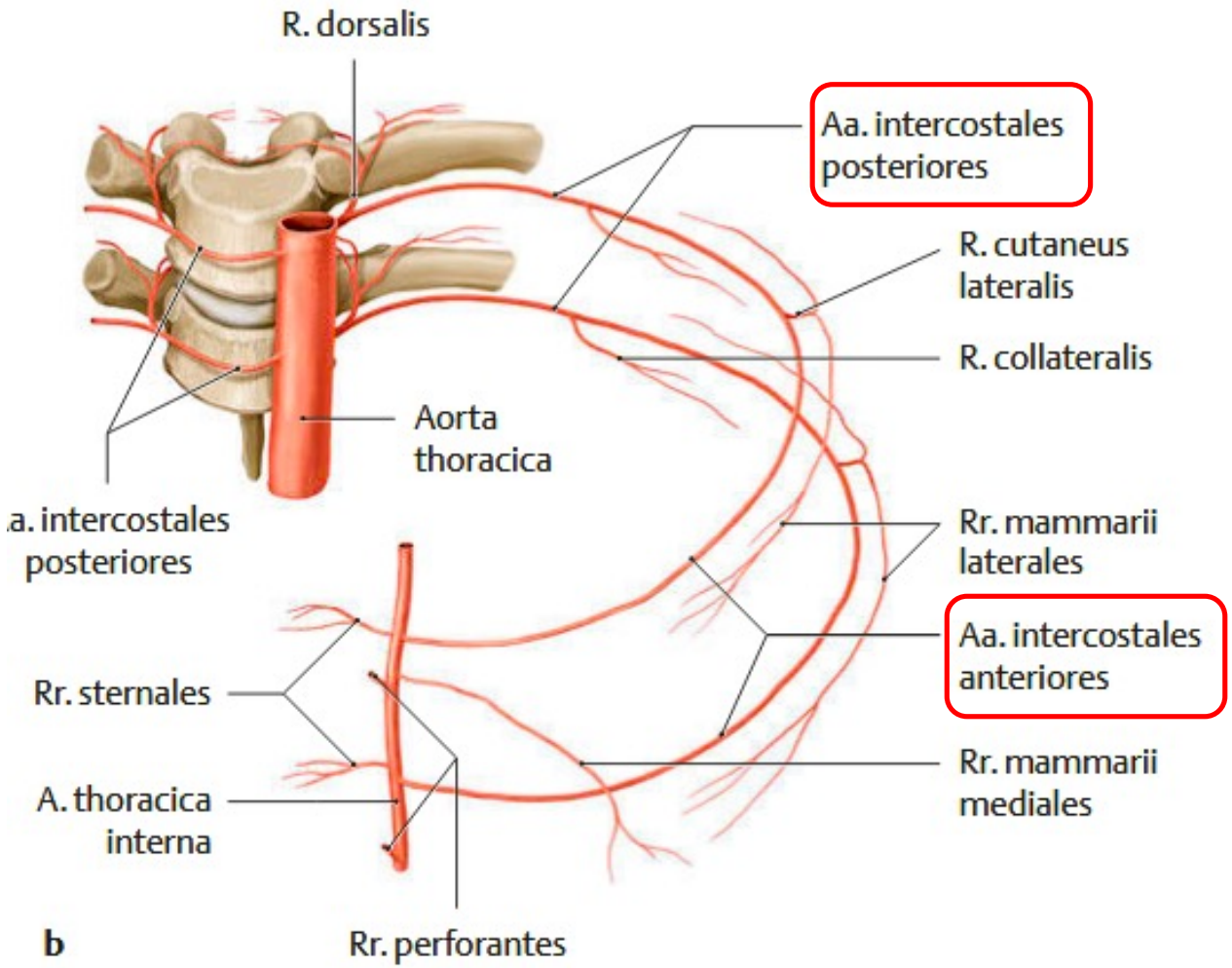
◊ antérieures



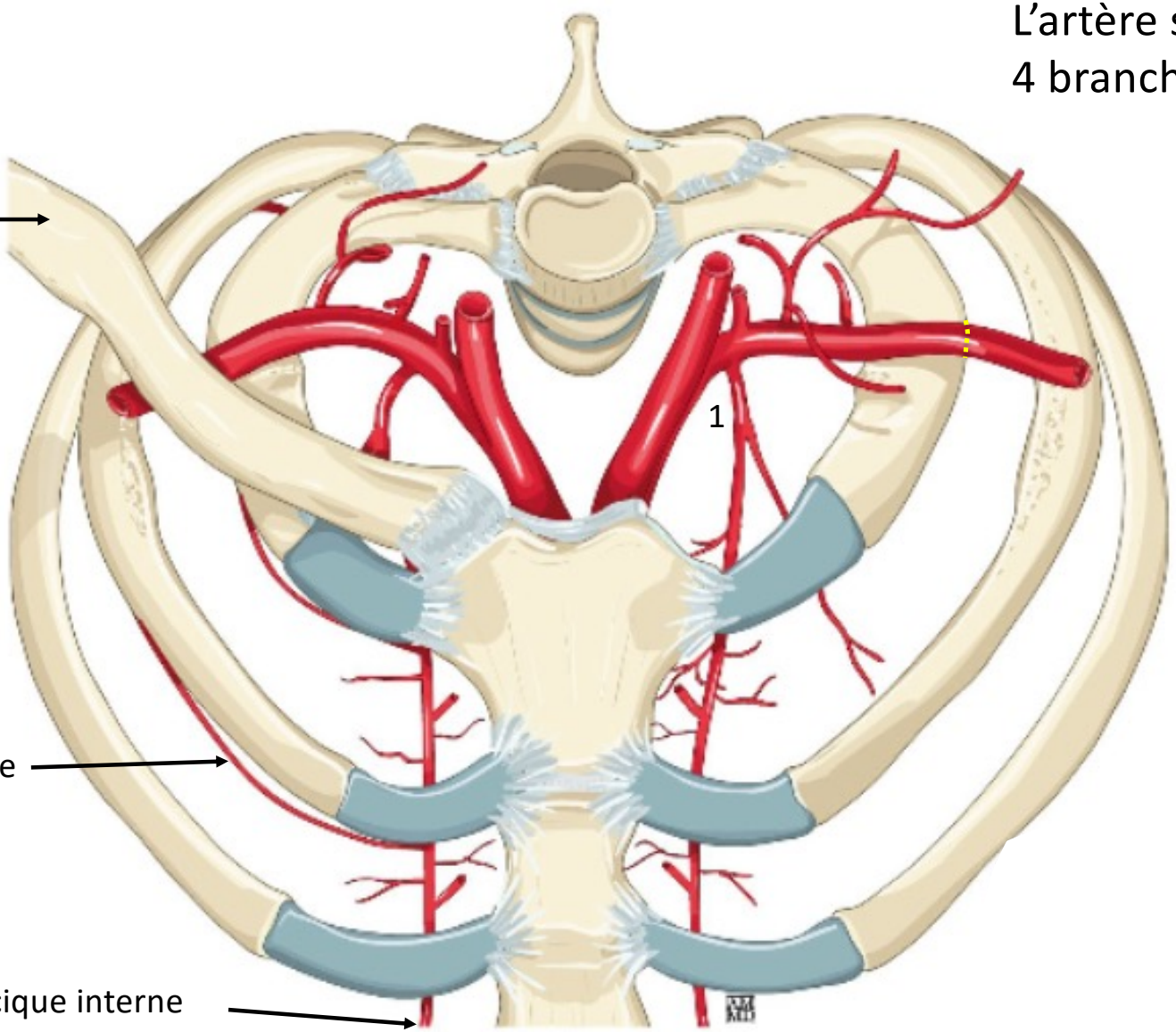


Bifurcation en

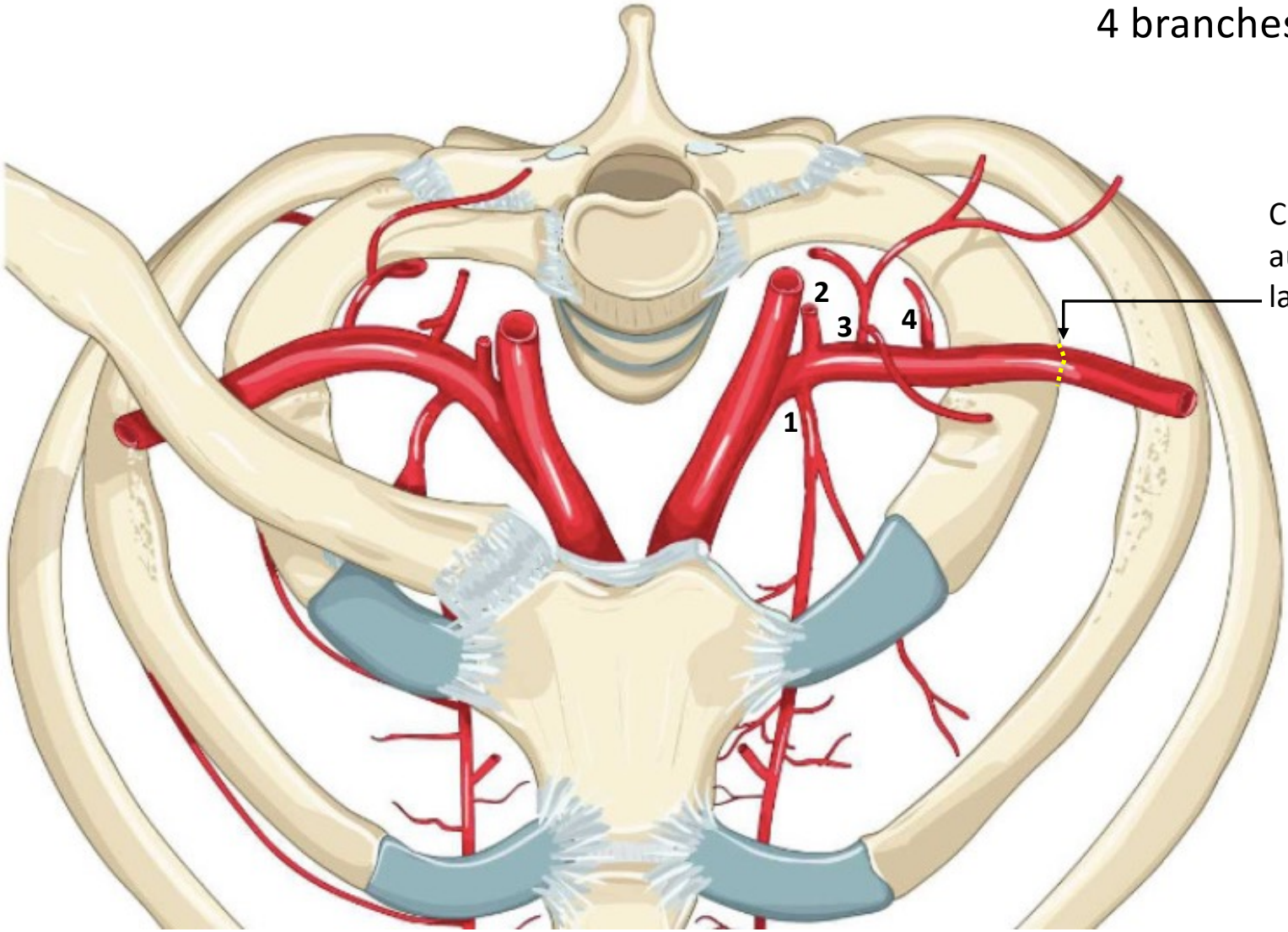
- artère musculophrénique
- artère épigastrique supérieure

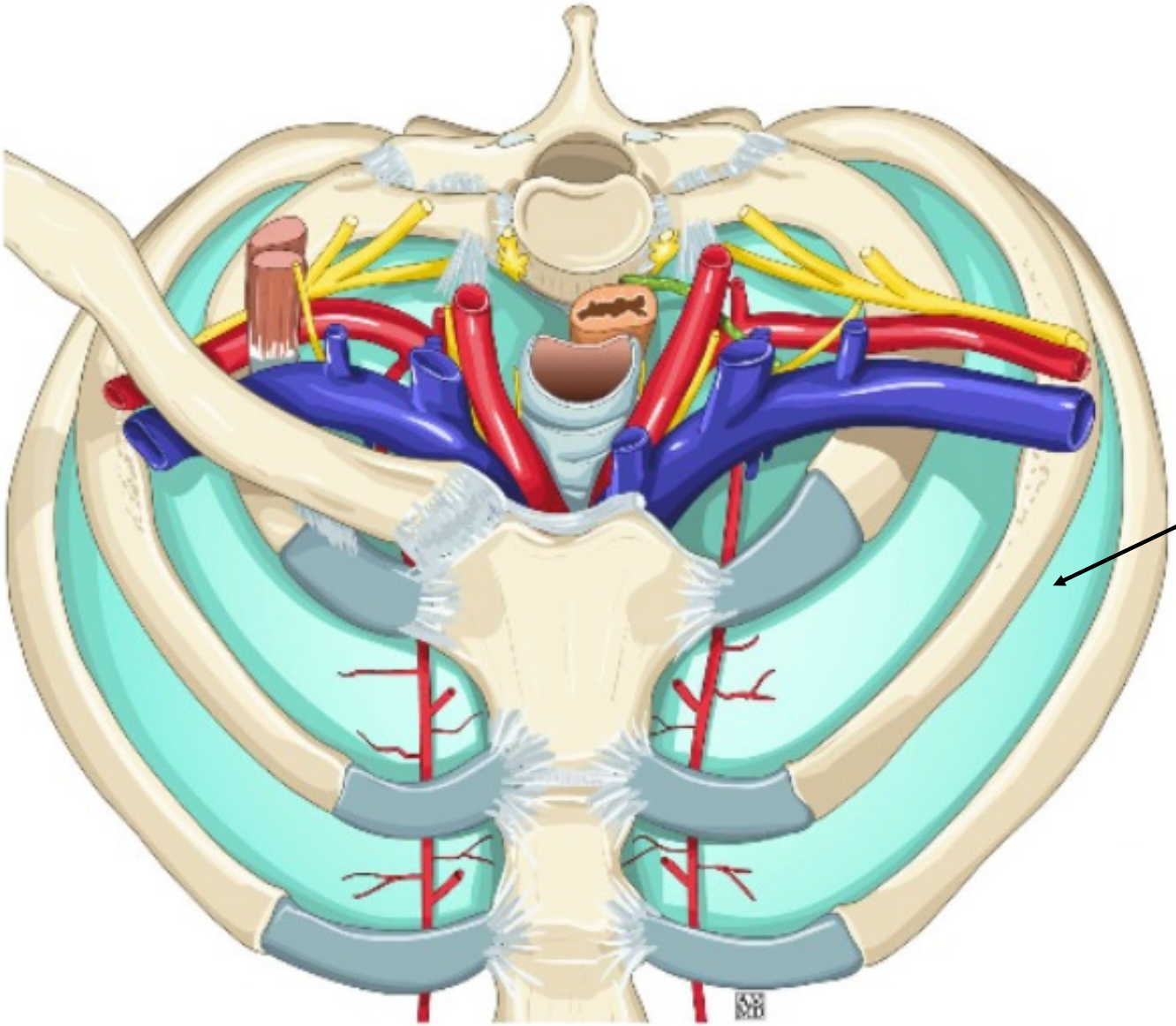

R. dorsalis
Aa. intercostales posteriores
R. cutaneus lateralis
R. collateralis
Aorta thoracica
a. intercostales posteriores
Rr. mammarii laterales
Aa. intercostales anteriores
Rr. sternales
Rr. mammarii mediales
A. thoracica interna
Rr. perforantes
b

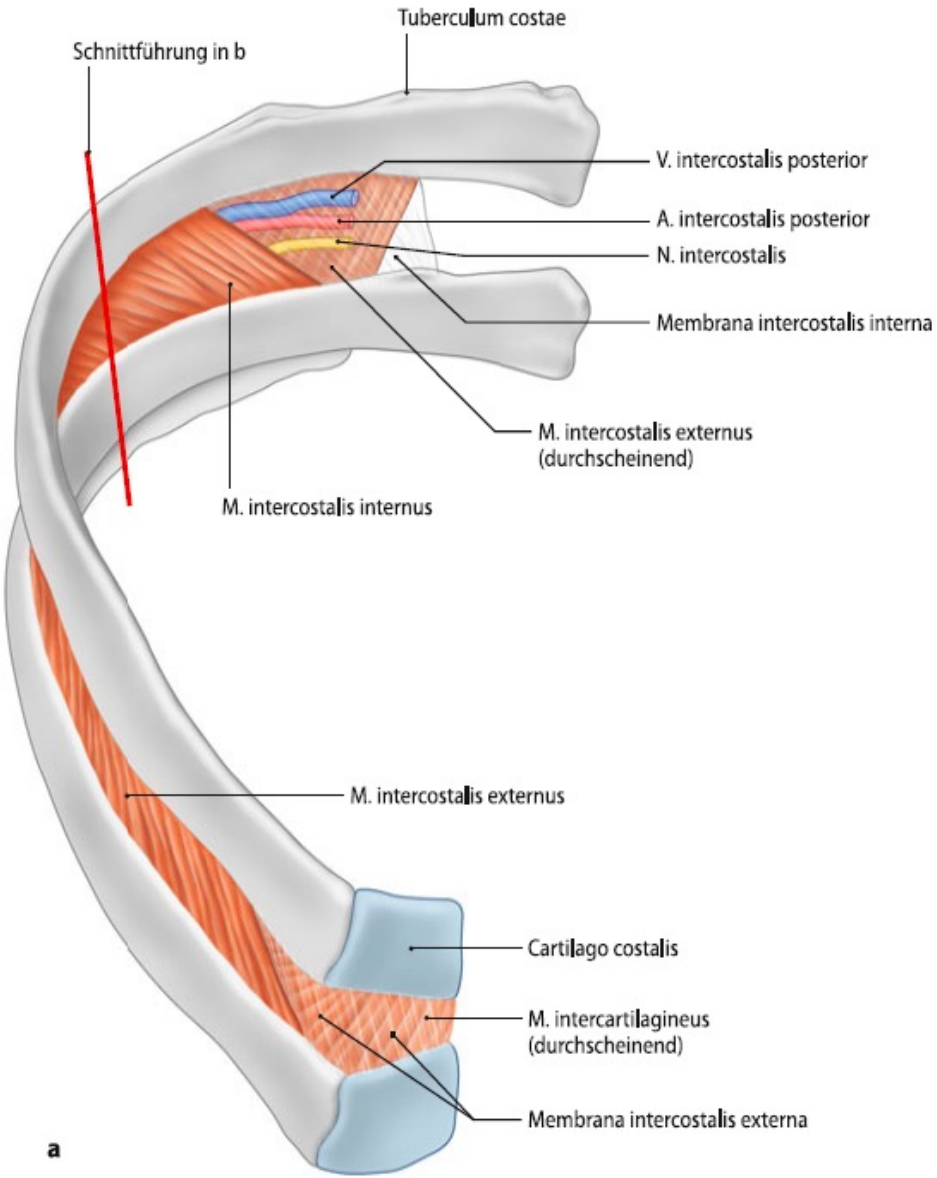
L’artère subclavière donne
4 branches collatérlaes :



L’artère subclavière donne
4 branches collatérlaes :

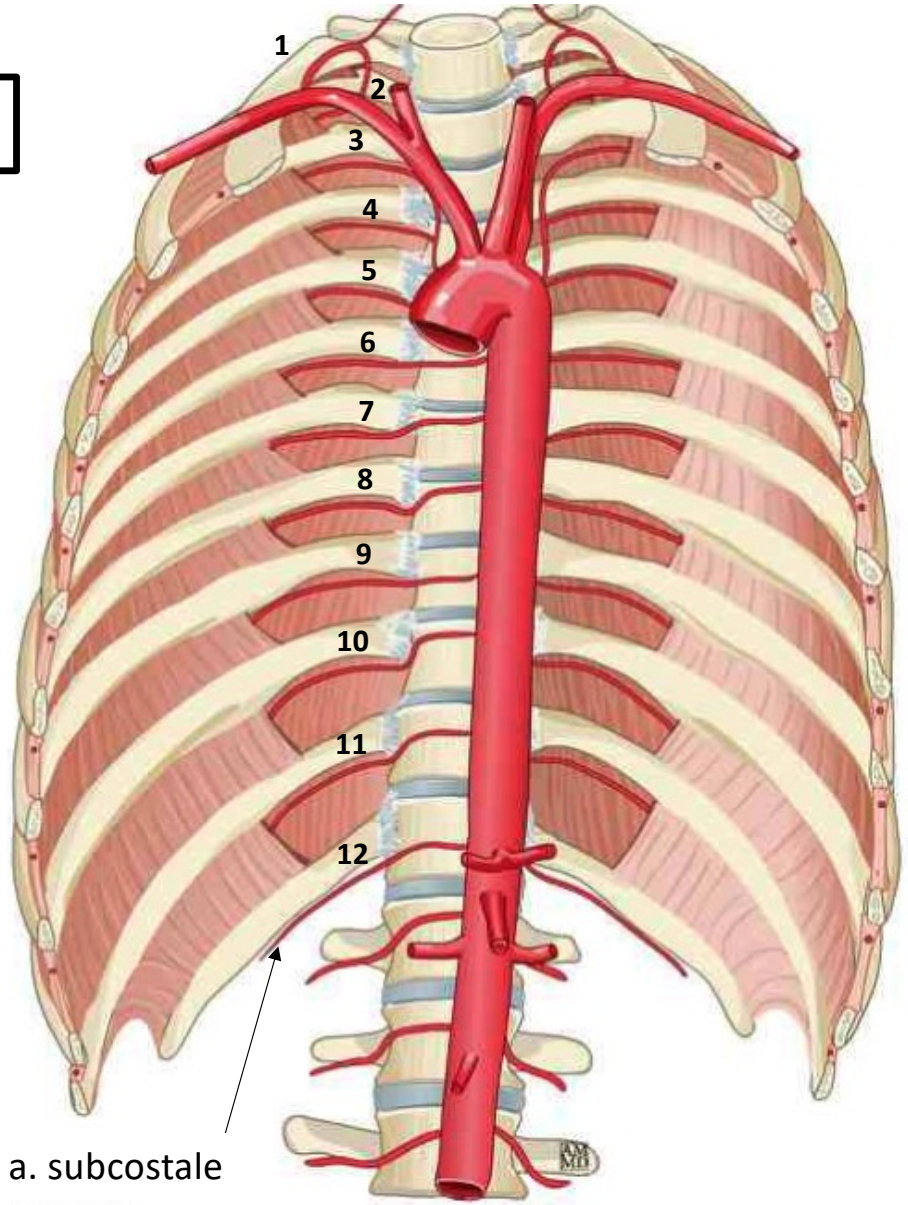


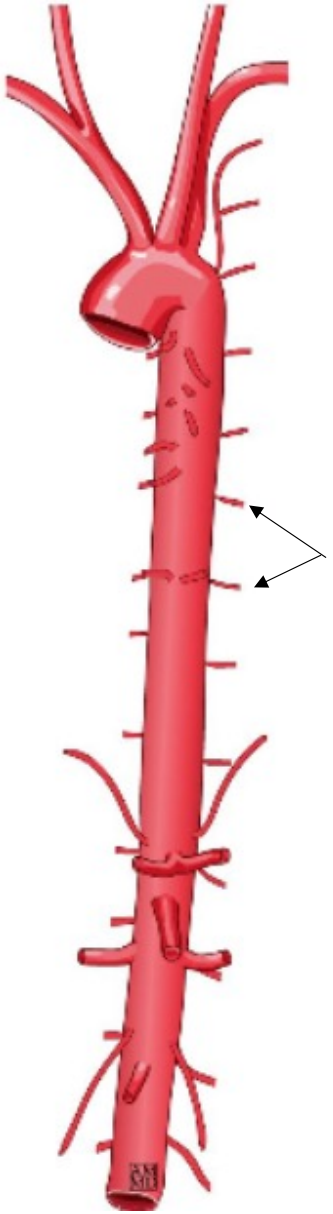

Plèvre pariétale



Membrane intercostale interne

L'aorte



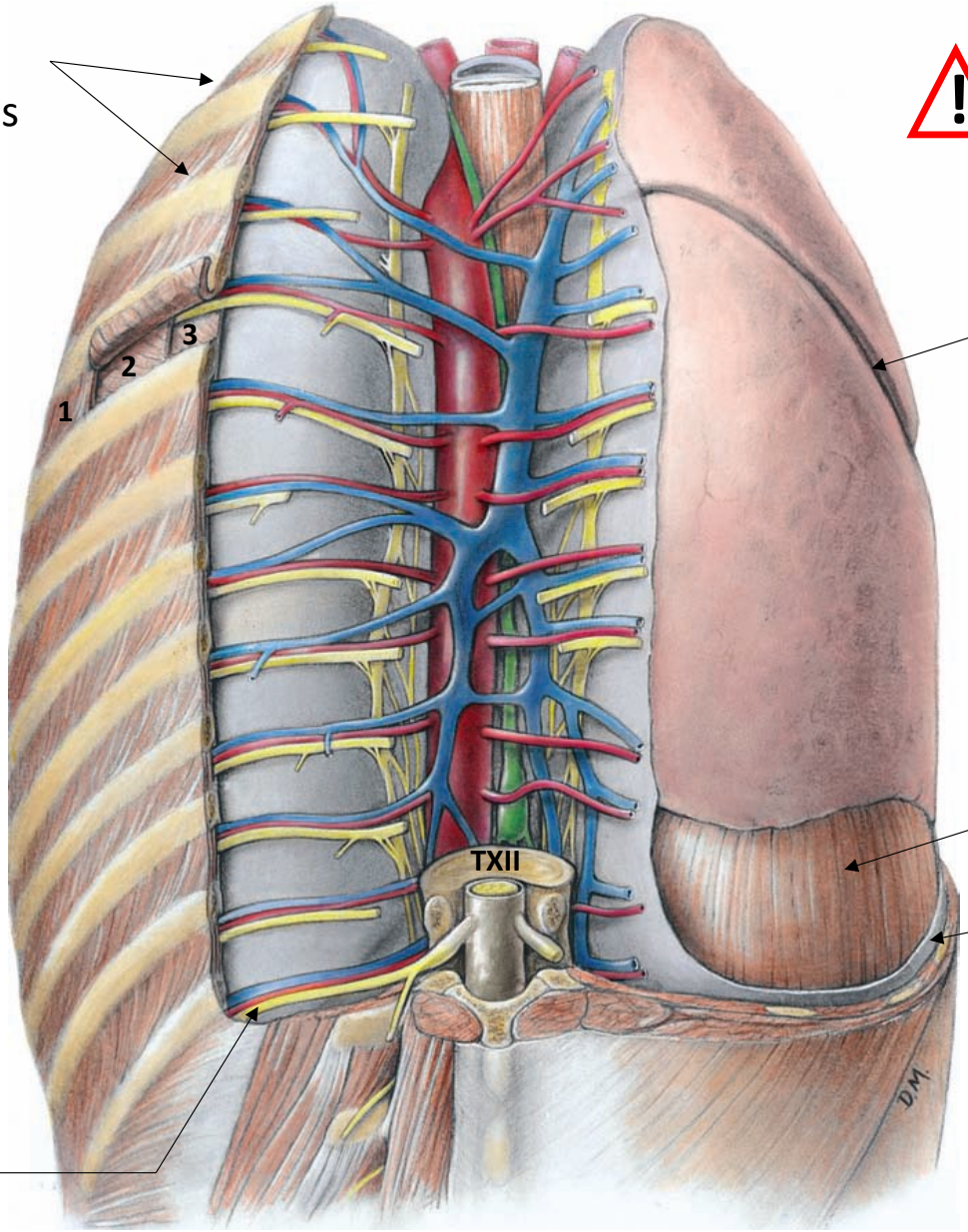


Les **artères intercostales postérieures** sont des branches de **l'aorte thoracique descendante**.

Les 2 premiers espaces intercostaux font exceptions

3 couches musculaires

Les **artères intercostales postérieures** sont des branches de **l'aorte thoracique descendante**.



Fissure oblique

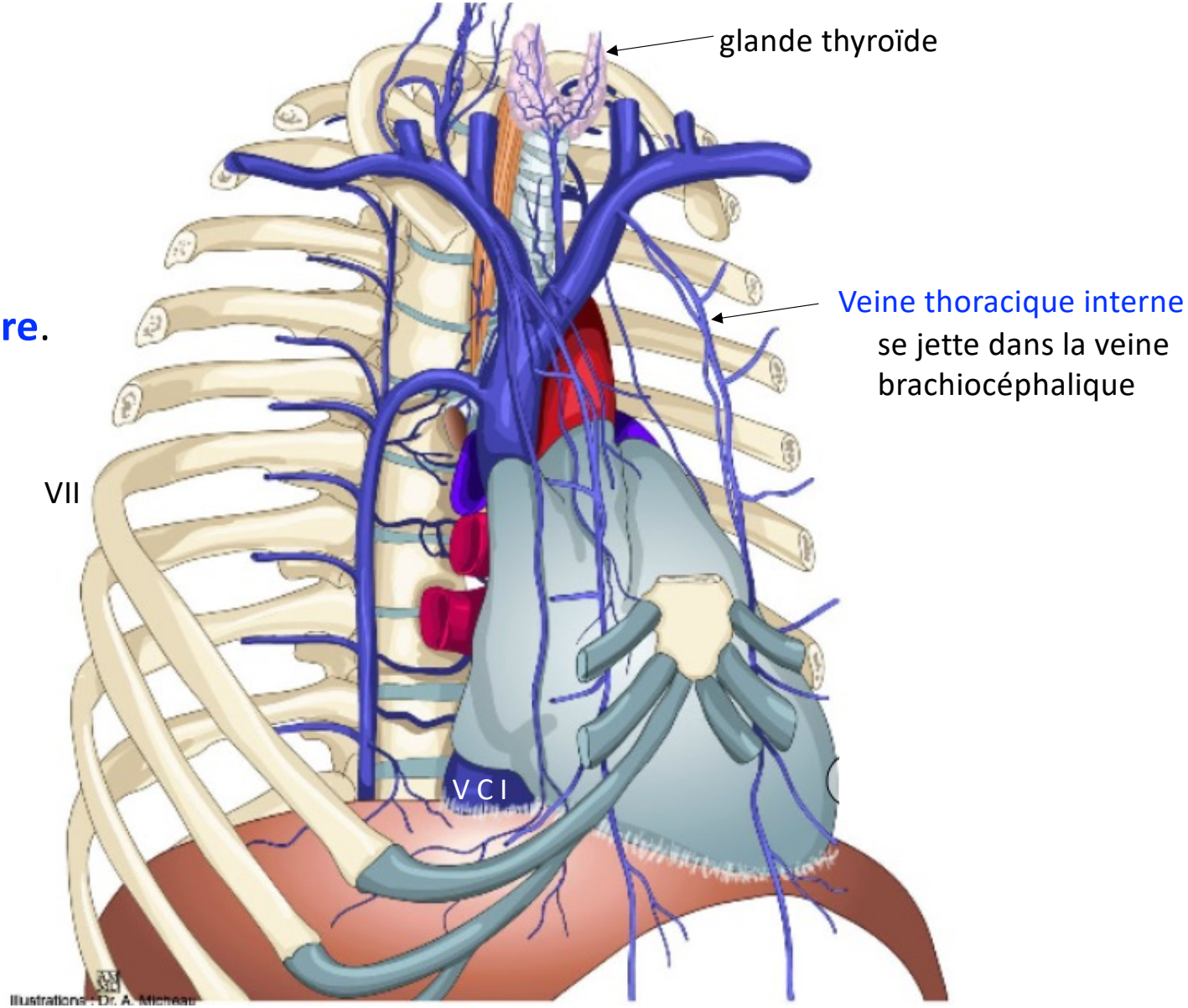
Diaphragme

Plèvre pariétale

Nerf subcostal

Vue postérieure

La **veine azygos** collecte le sang des veines intercostales postérieures, puis se jette dans la **veine cave supérieure**.

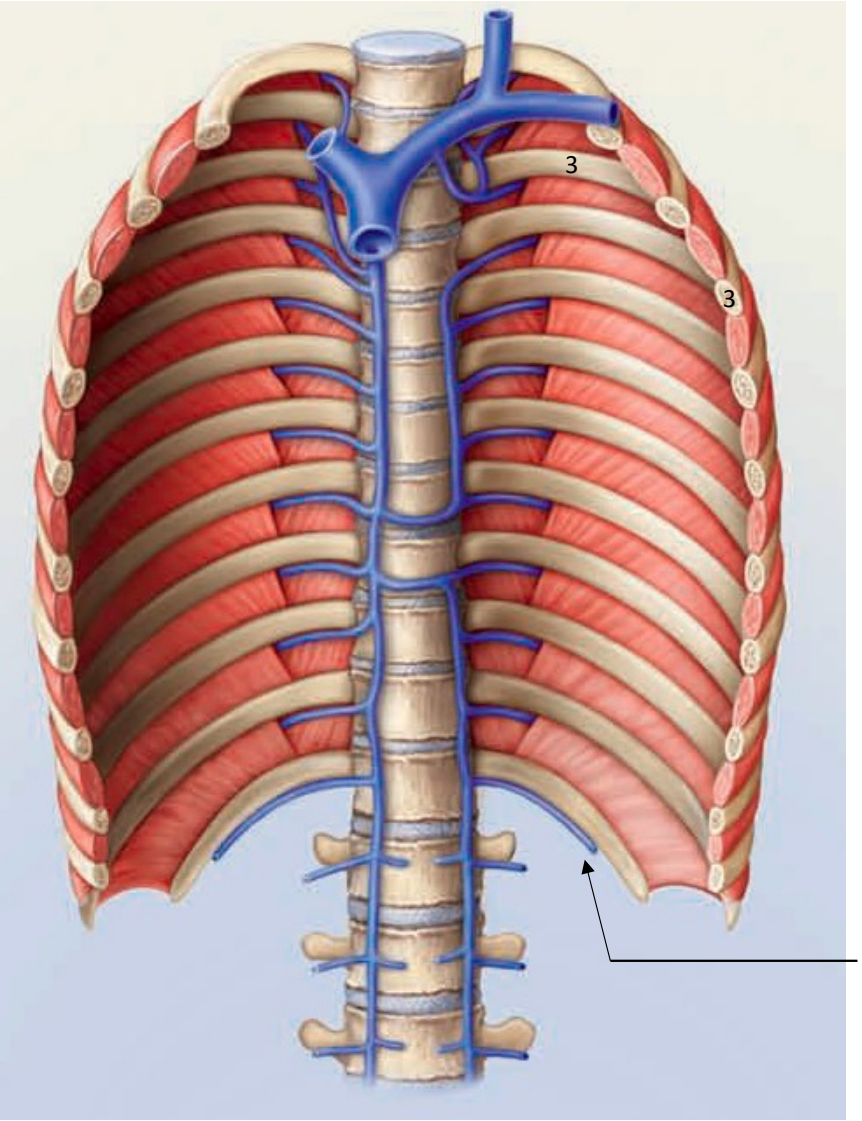


Veines intercostales postérieures

Côté droit :

Veine azygos

une veine impaire
(seulement é droite)

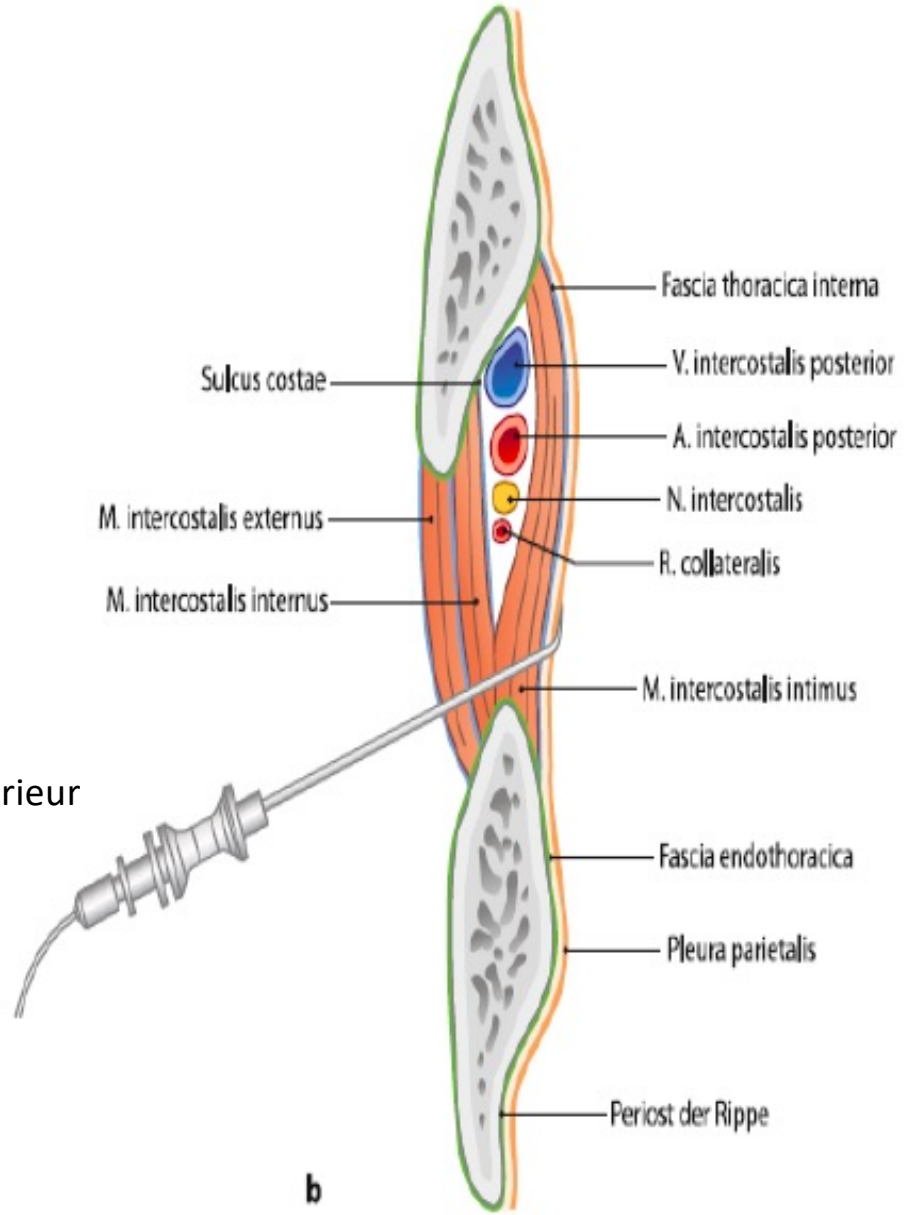


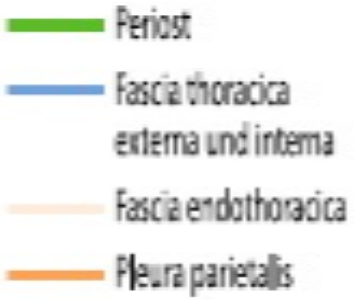
Côté gauche :

Veine hémiazygos accessoire

Veine hémiazygos

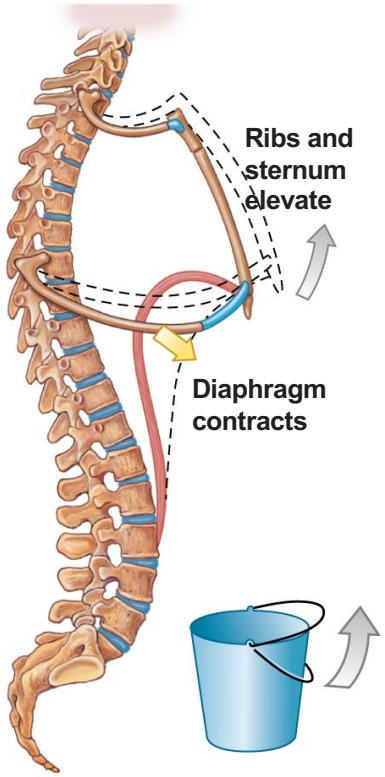
1/3 postérieur



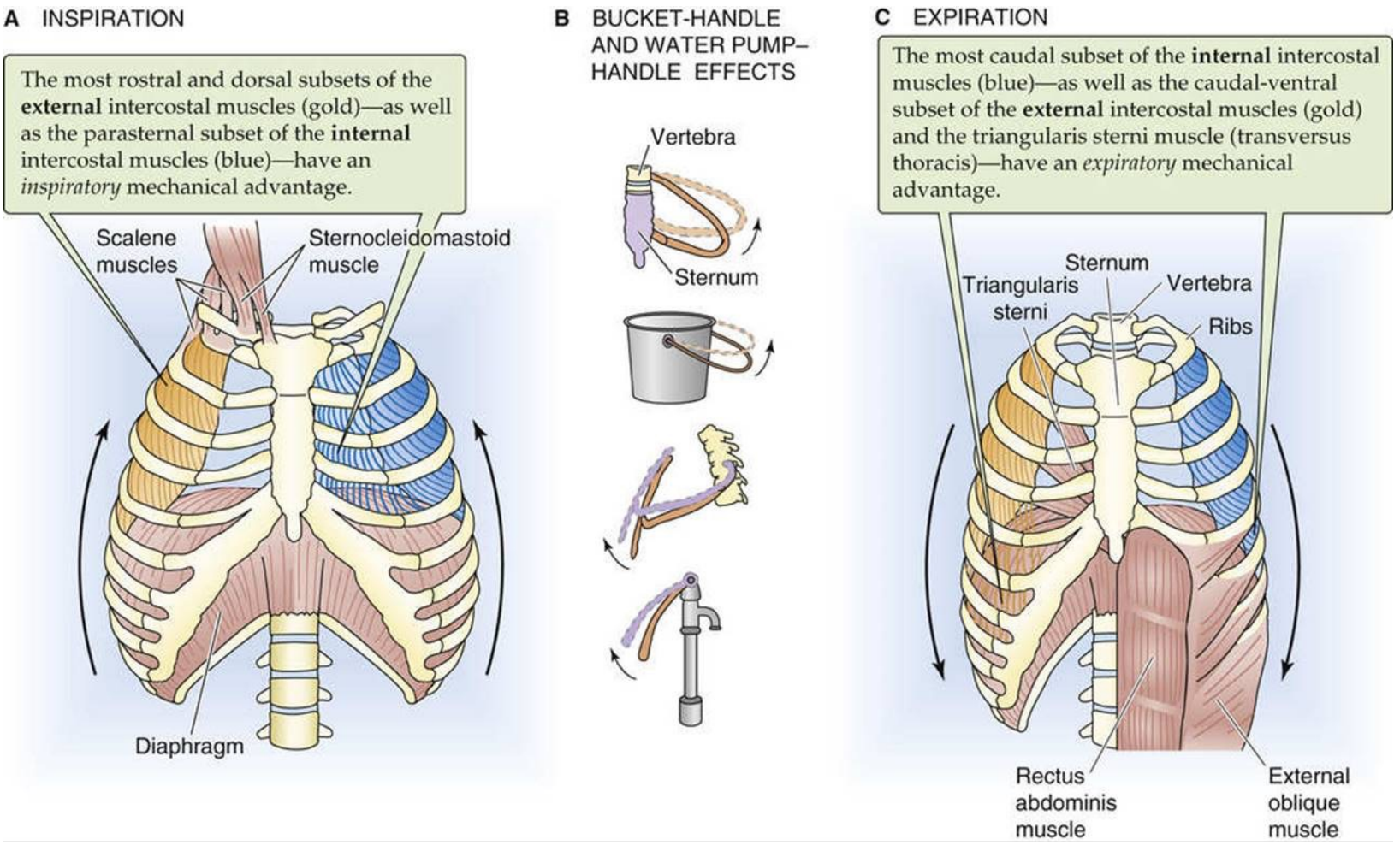


La mécanique de la ventilation

2 The Mechanics of Breathing

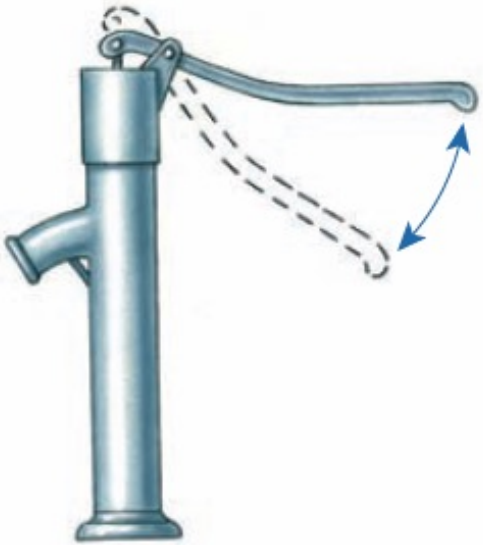


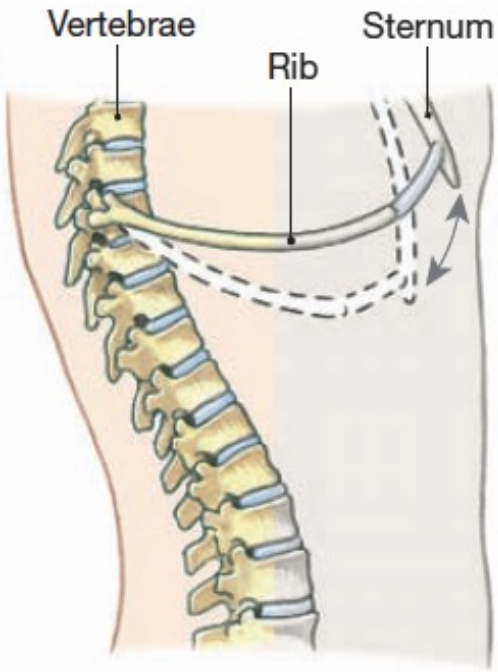
La mécanique de la ventilation



Boron

Levier de la pompe

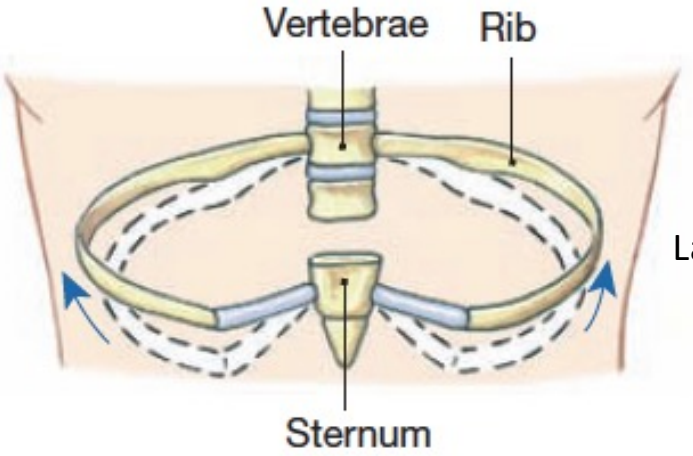




La profondeur du thorax augmente

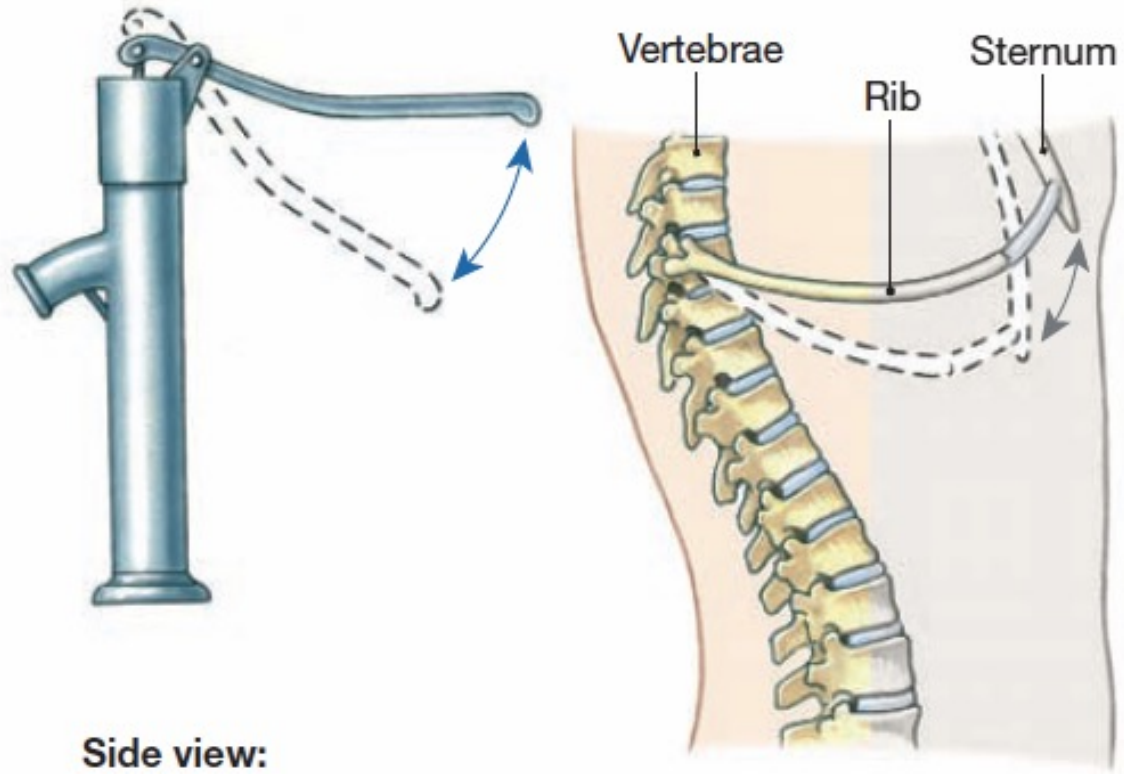
Side view:

Anse du sceau

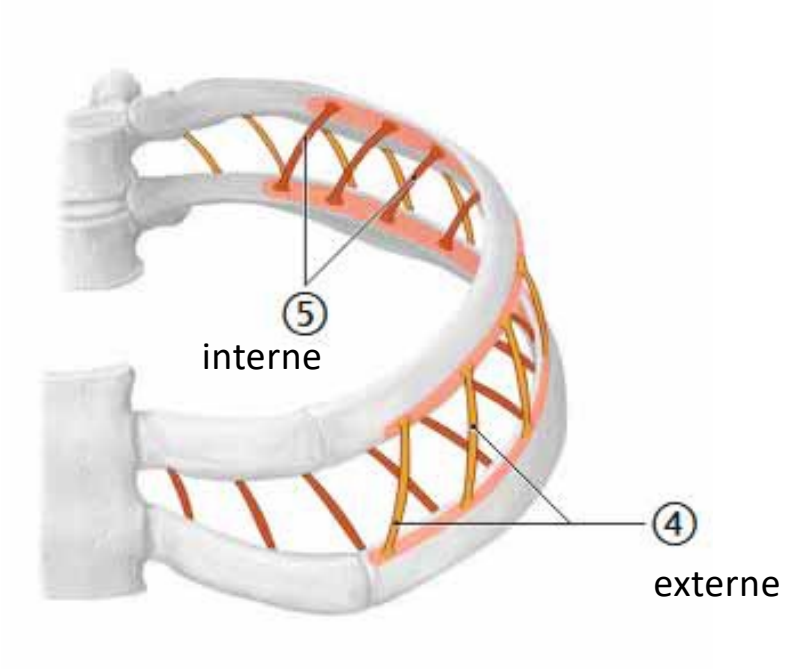


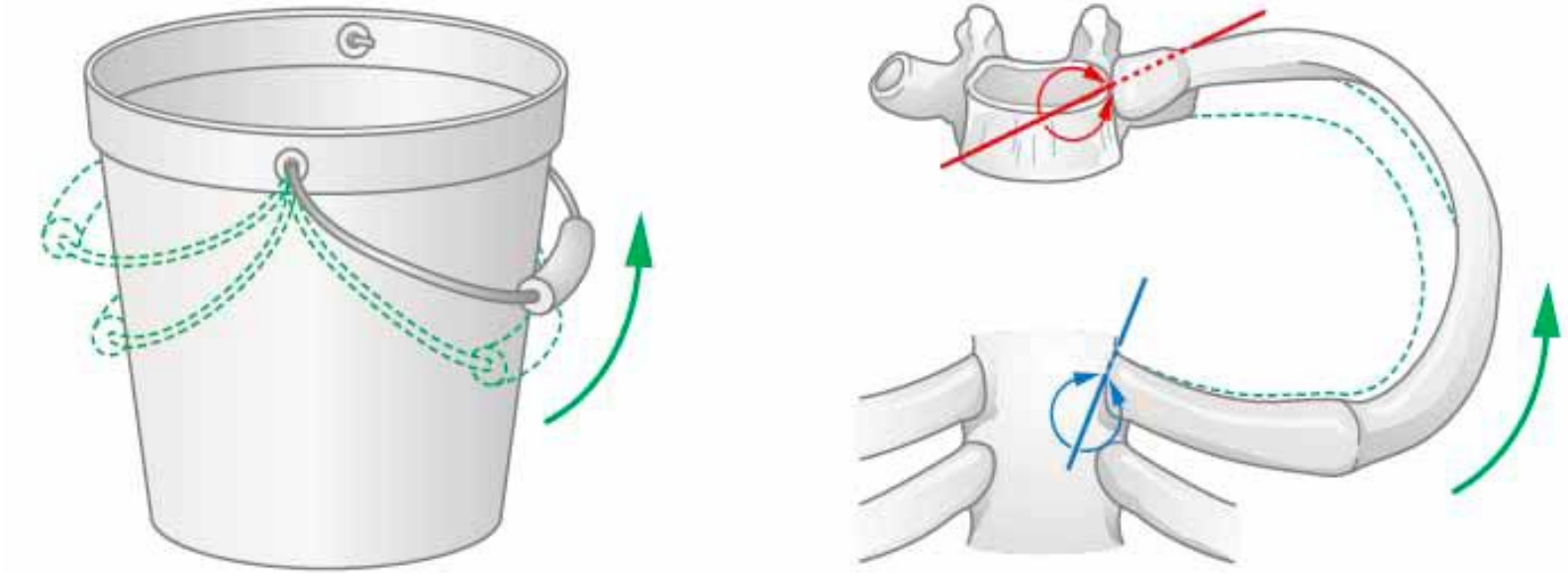
La largeur du thorax augmente

Front view:

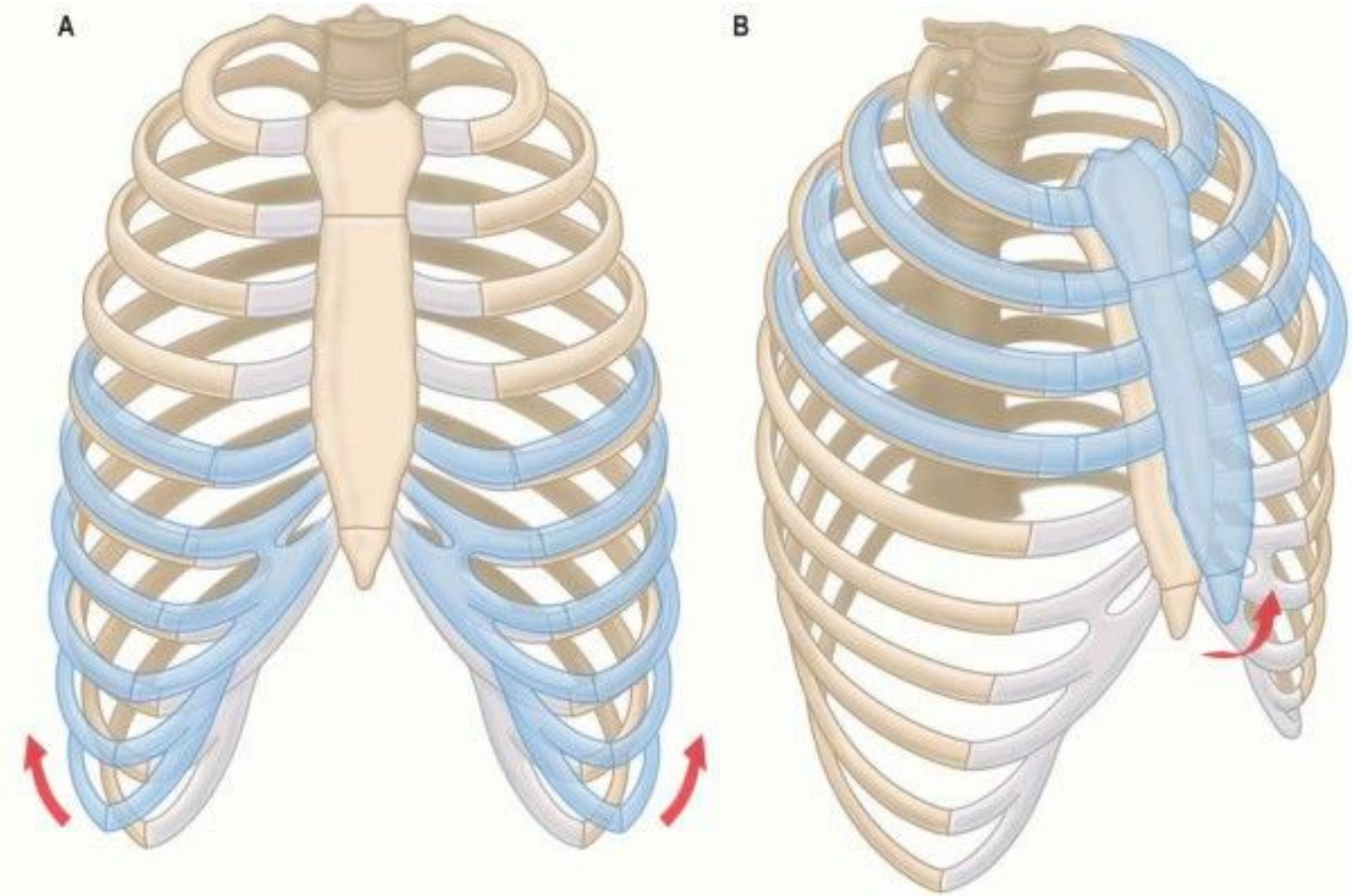


“Pump handle" motion increases **anterior-posterior dimension** of rib cage. Movement of the handle on a hand pump is analogous to the lifting of the sternum and ribs.


⑤
interne
④
externe



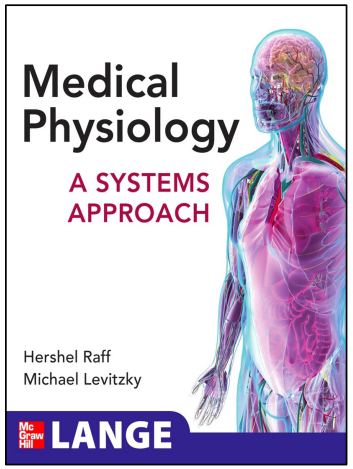
Inspiration

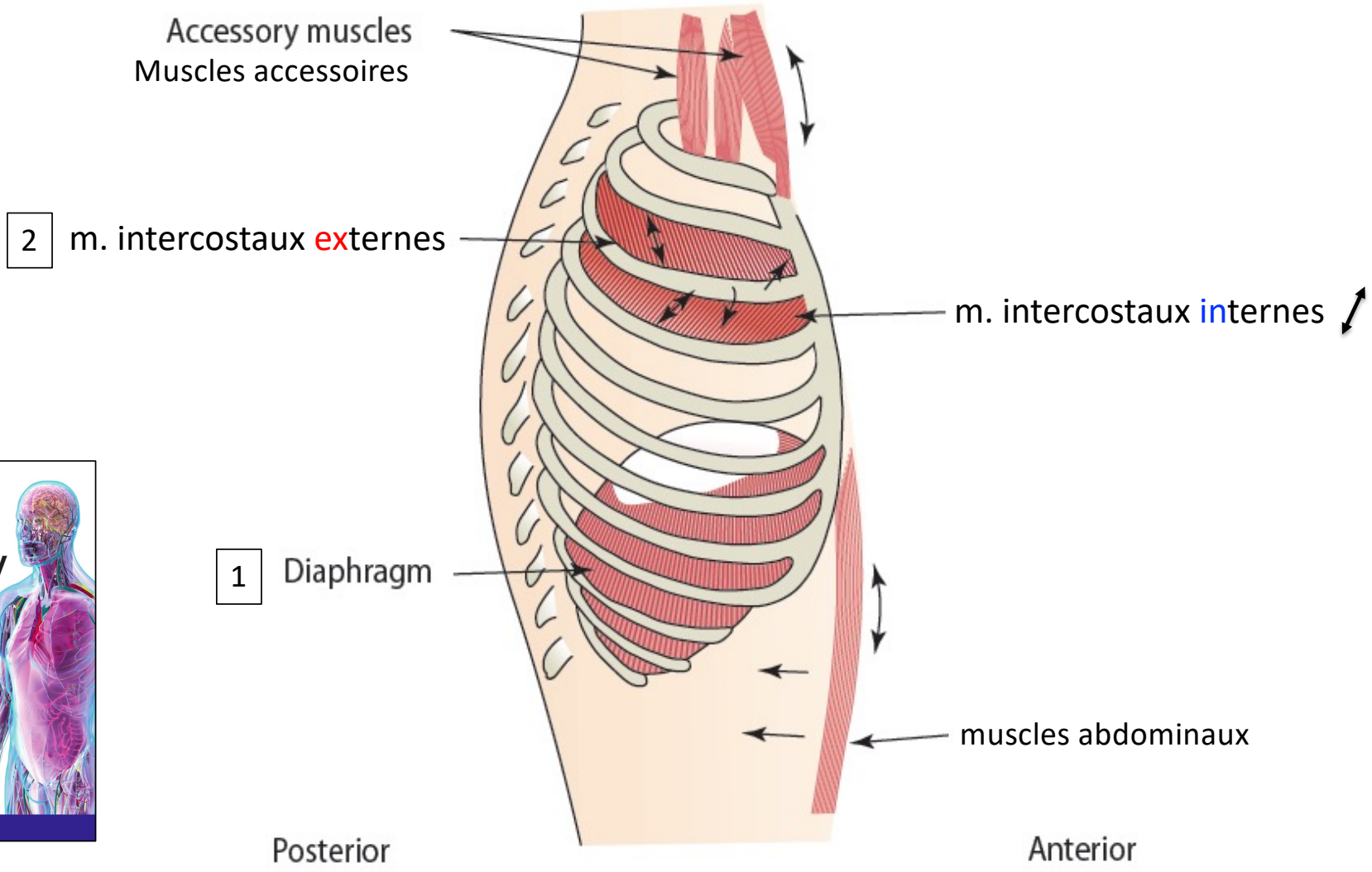


INSPIRATION

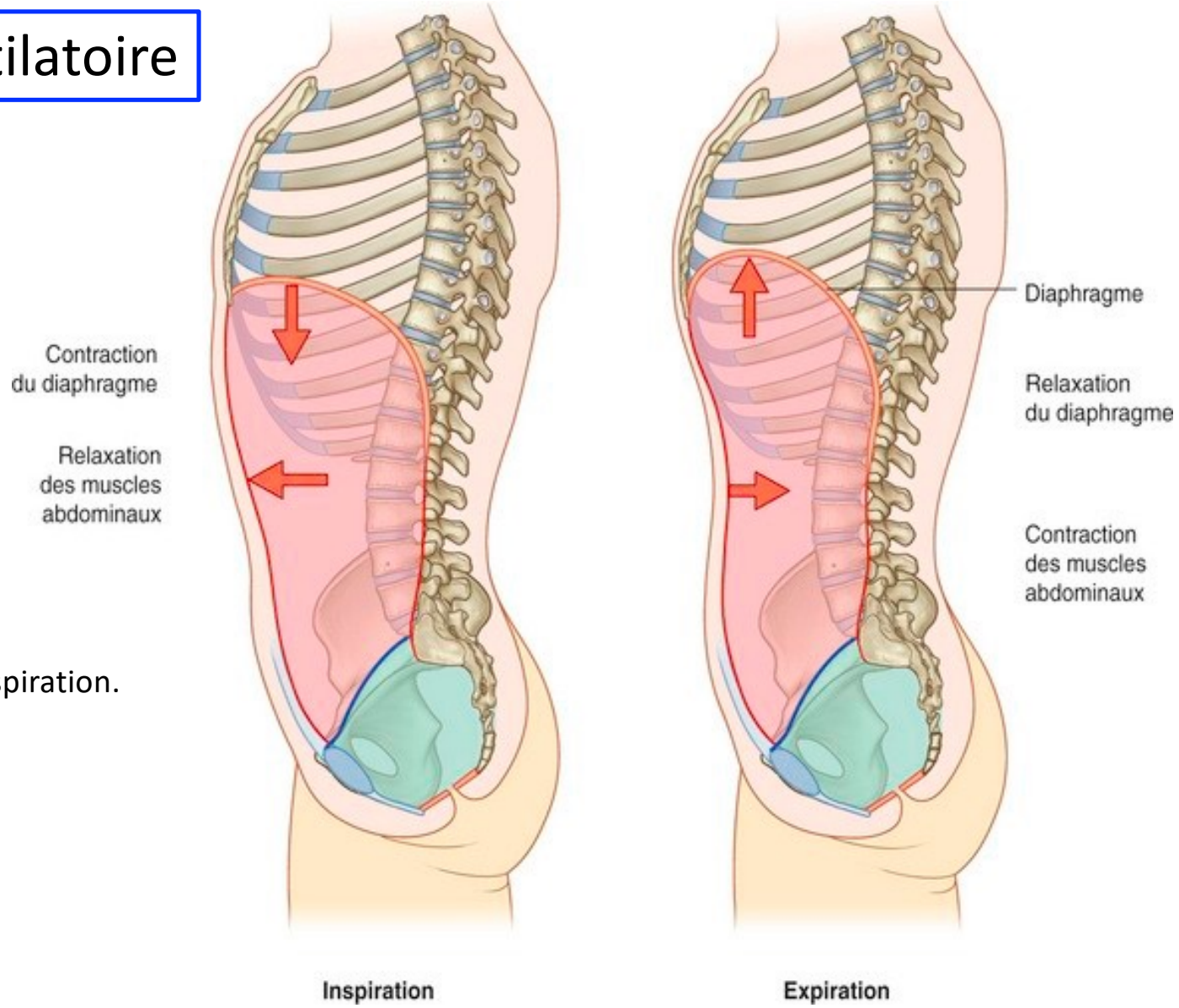
ACTIVE EXPIRATION

> 500 mL





Mécanique ventilatoire

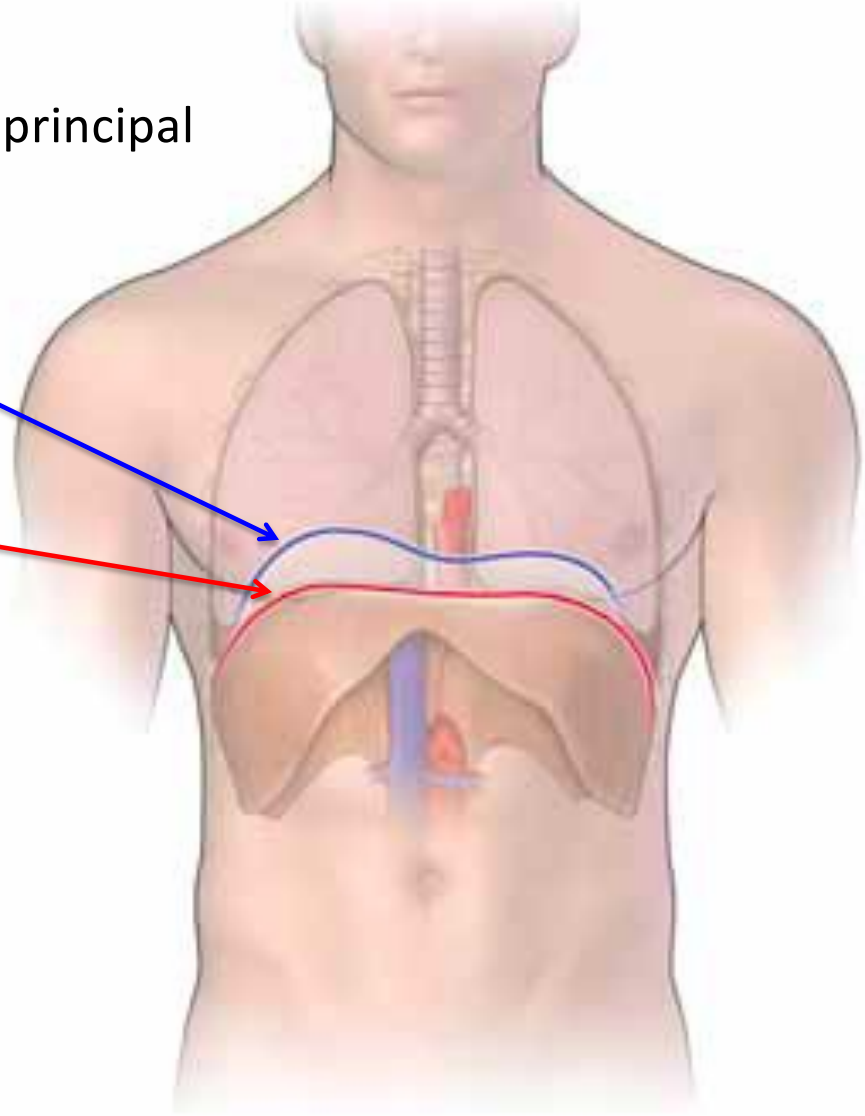


L’abdomen participe à la respiration.

Diaphragme :
muscle respiratoire principal

relâché
expiration

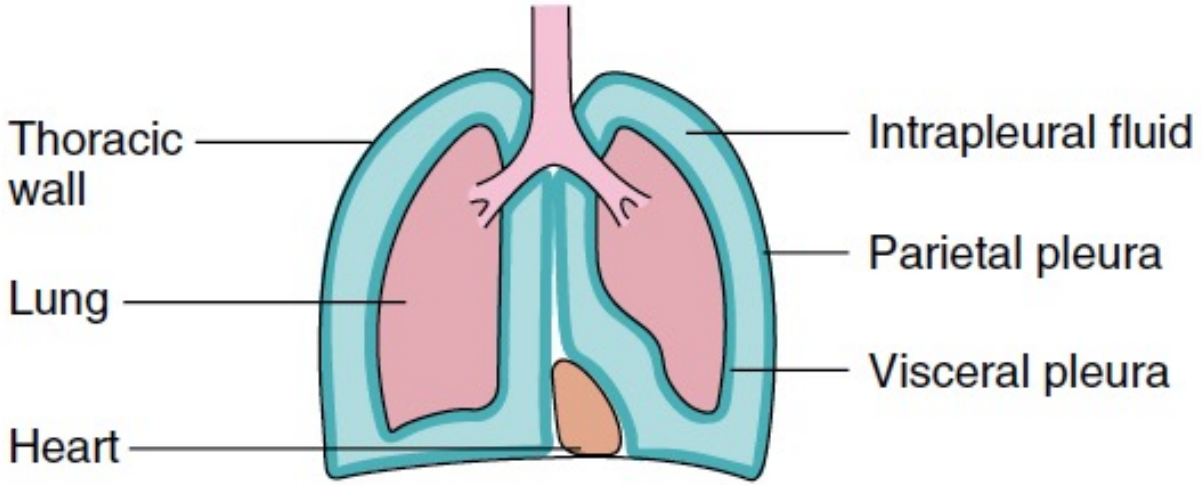
contracté
inspiration



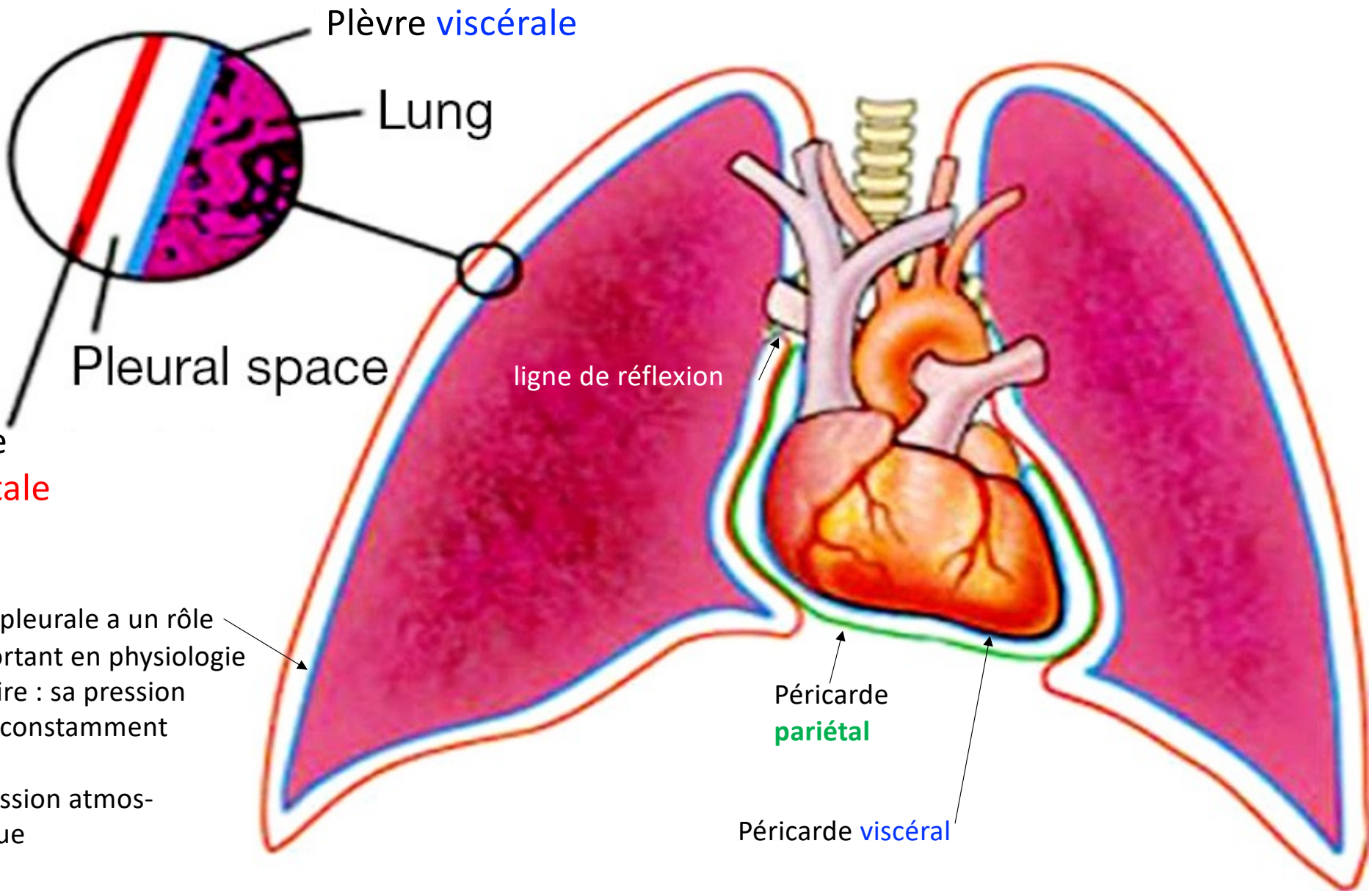
Amplitude :

au repos	à l'effort
2 cm	10 cm

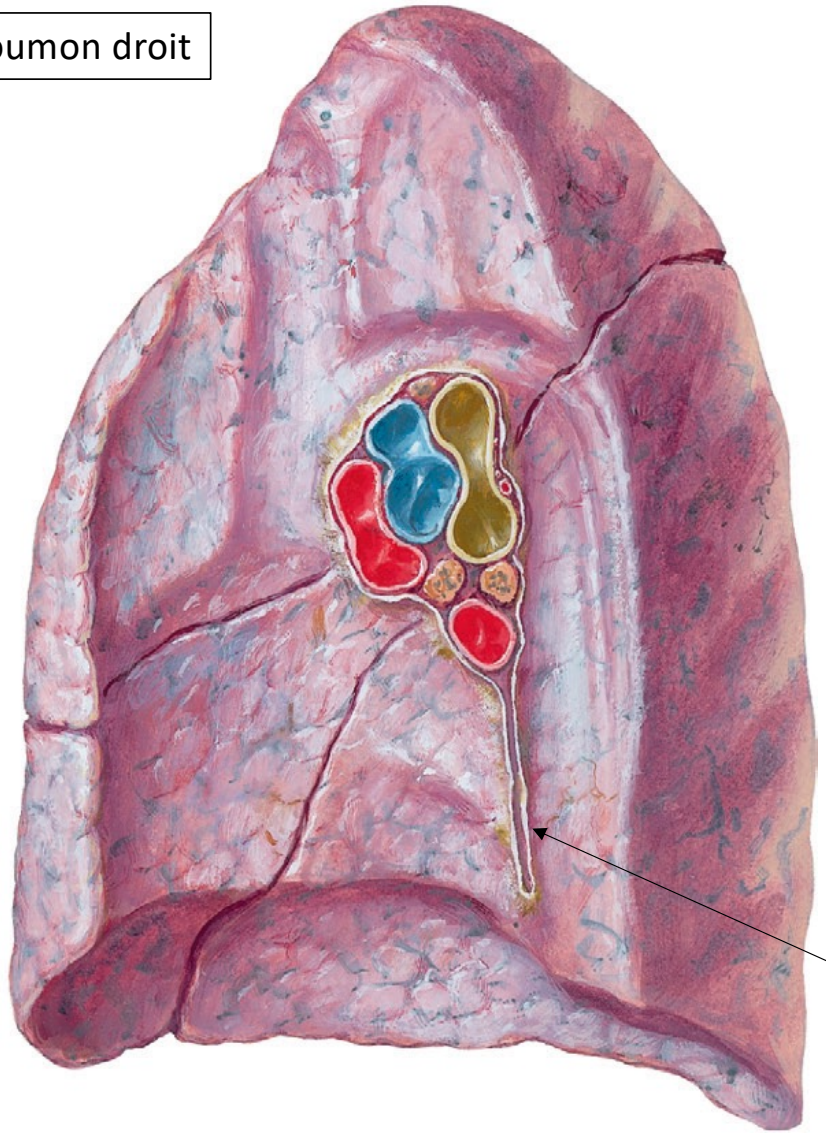
La plèvre



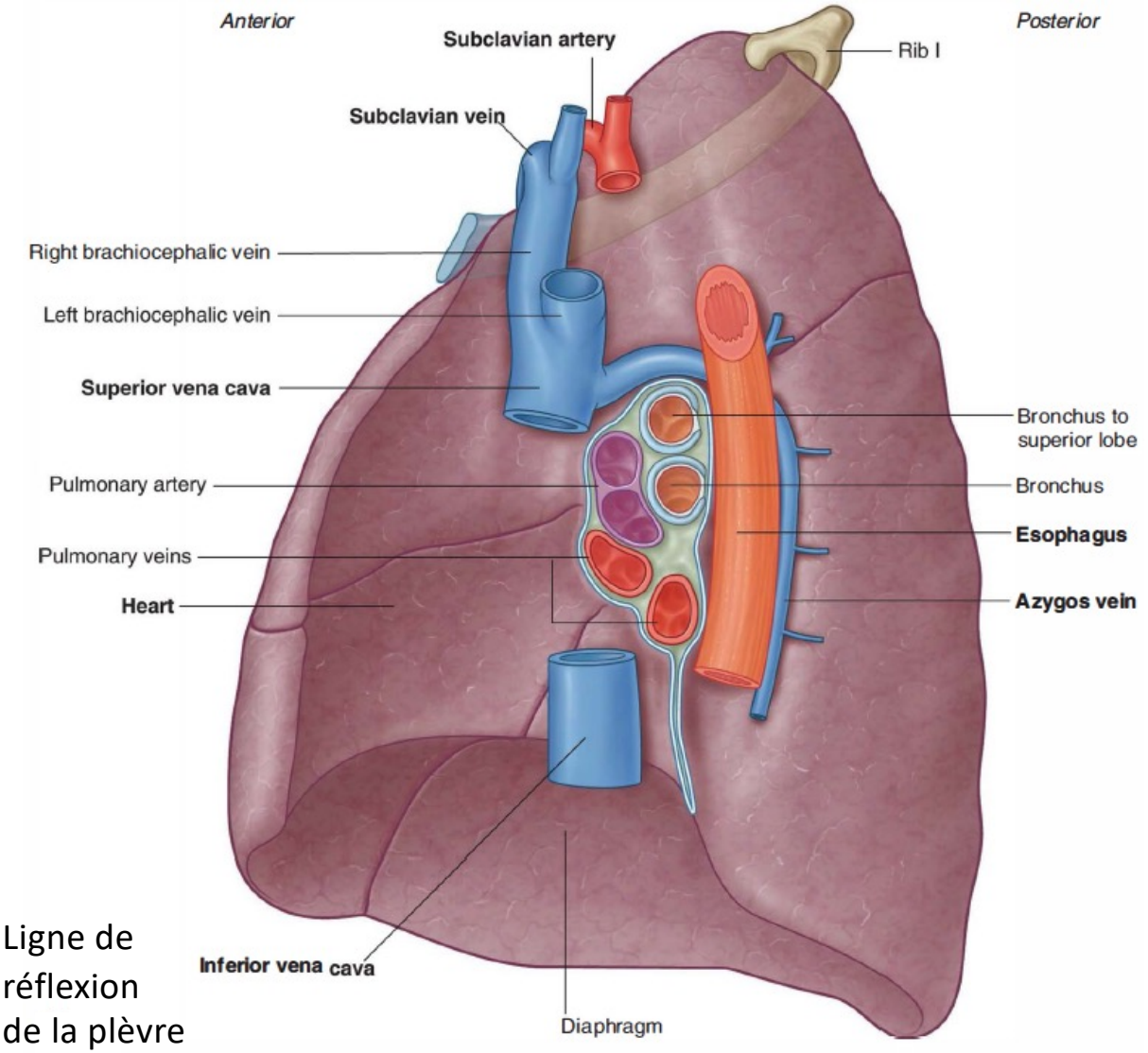
For purposes of illustration in this figure, the volume of intrapleural fluid is greatly exaggerated.


Plèvre viscérale
Lung
Pleural space
Plèvre pariétale
ligne de réflexion
La cavité pleurale a un rôle très important en physiologie respiratoire : sa pression doit être constamment négative
< à la pression atmos-phérique
Péricarde pariétal
Péricarde viscéral

Poumon droit



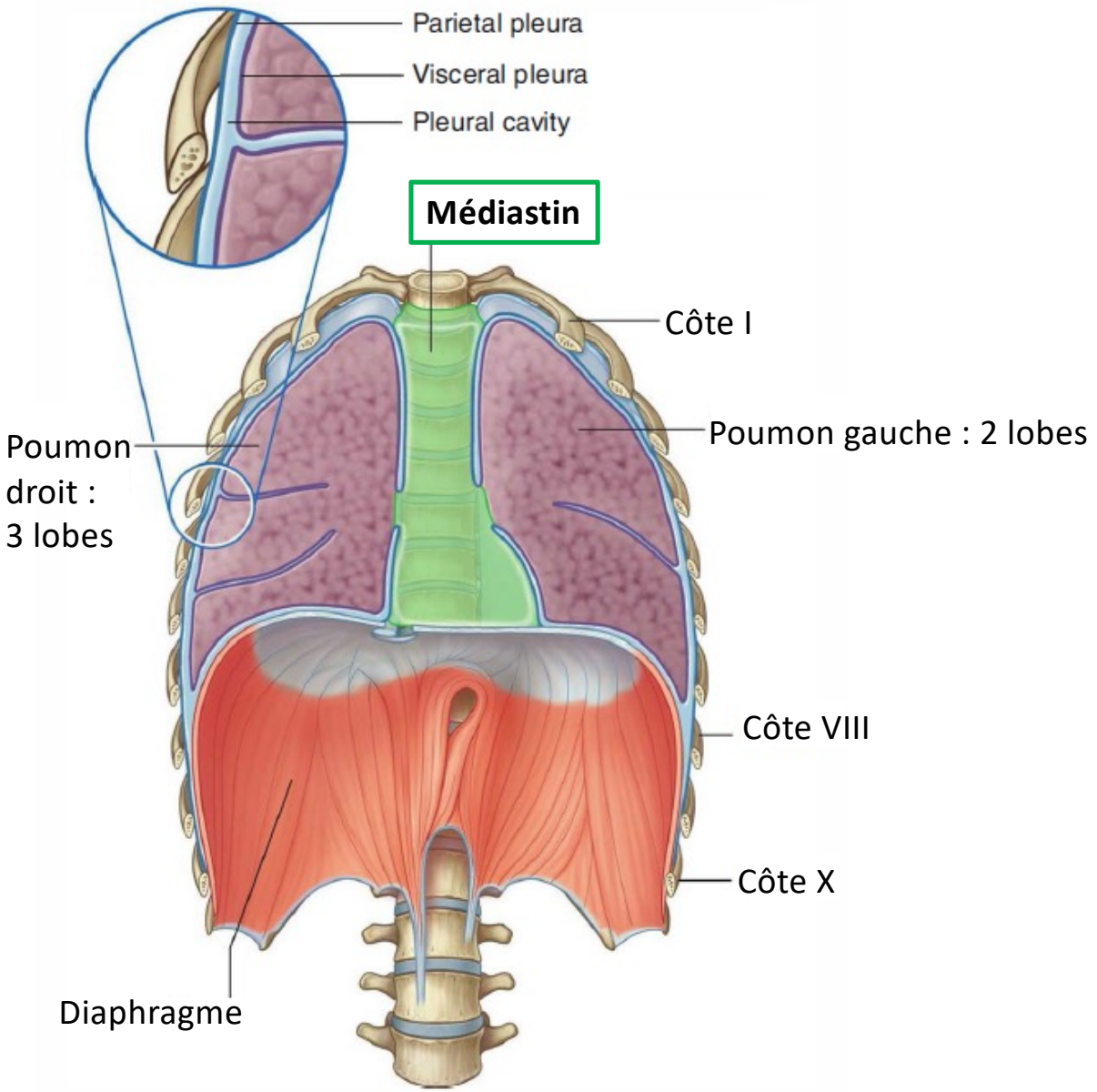
Ligne de réflexion de la plèvre viscérale



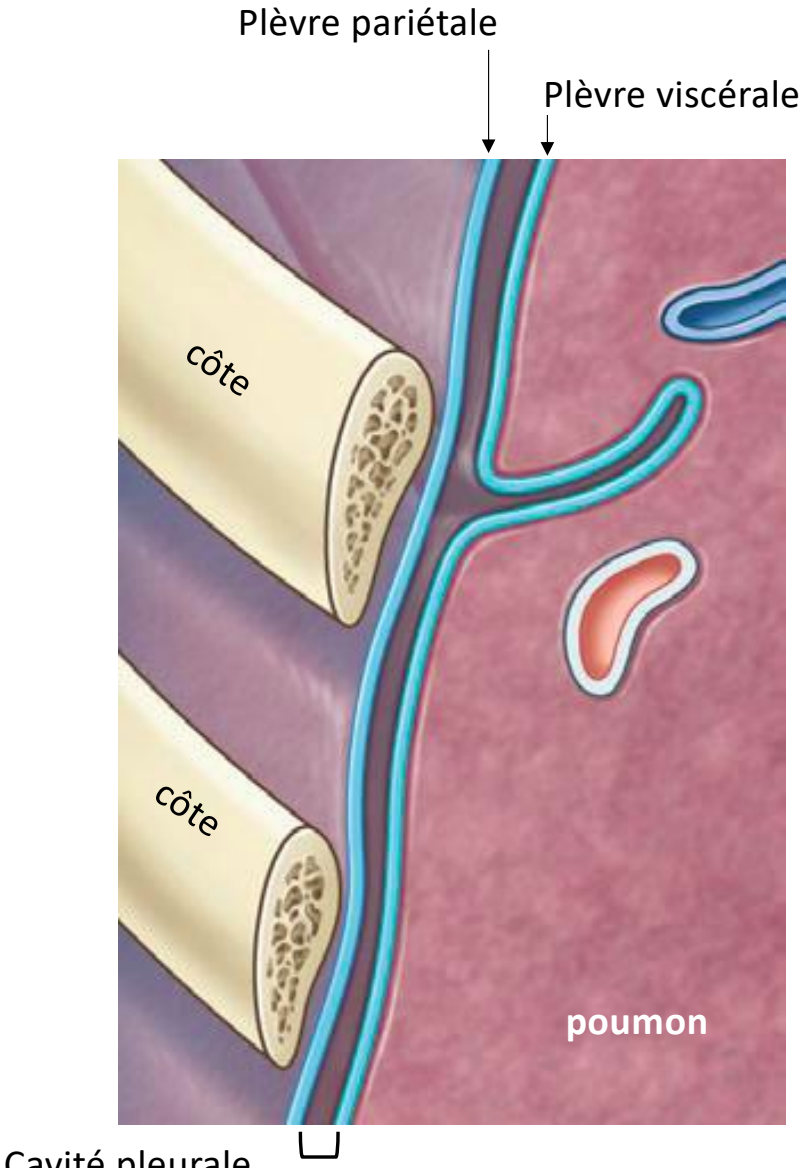
La plèvre

◊ plèvre pariétale
◊ plèvre viscérale

Cavité pleurale



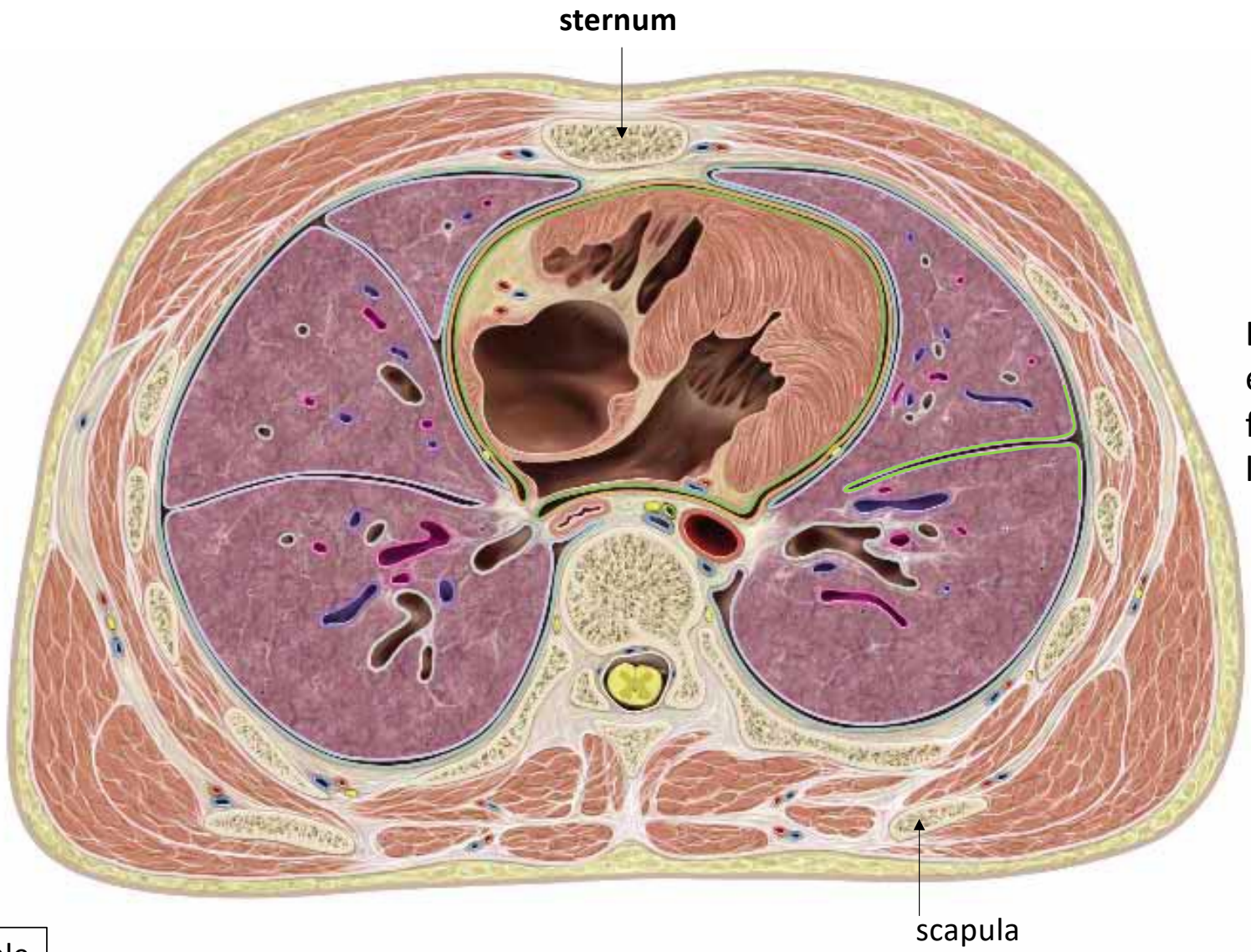
La plèvre



Coupe coronale

La plèvre viscérale entre dans les fissures entre les lobes.

Le plèvre pariétale passe droit.



Le plèvre pariétale passe droit.

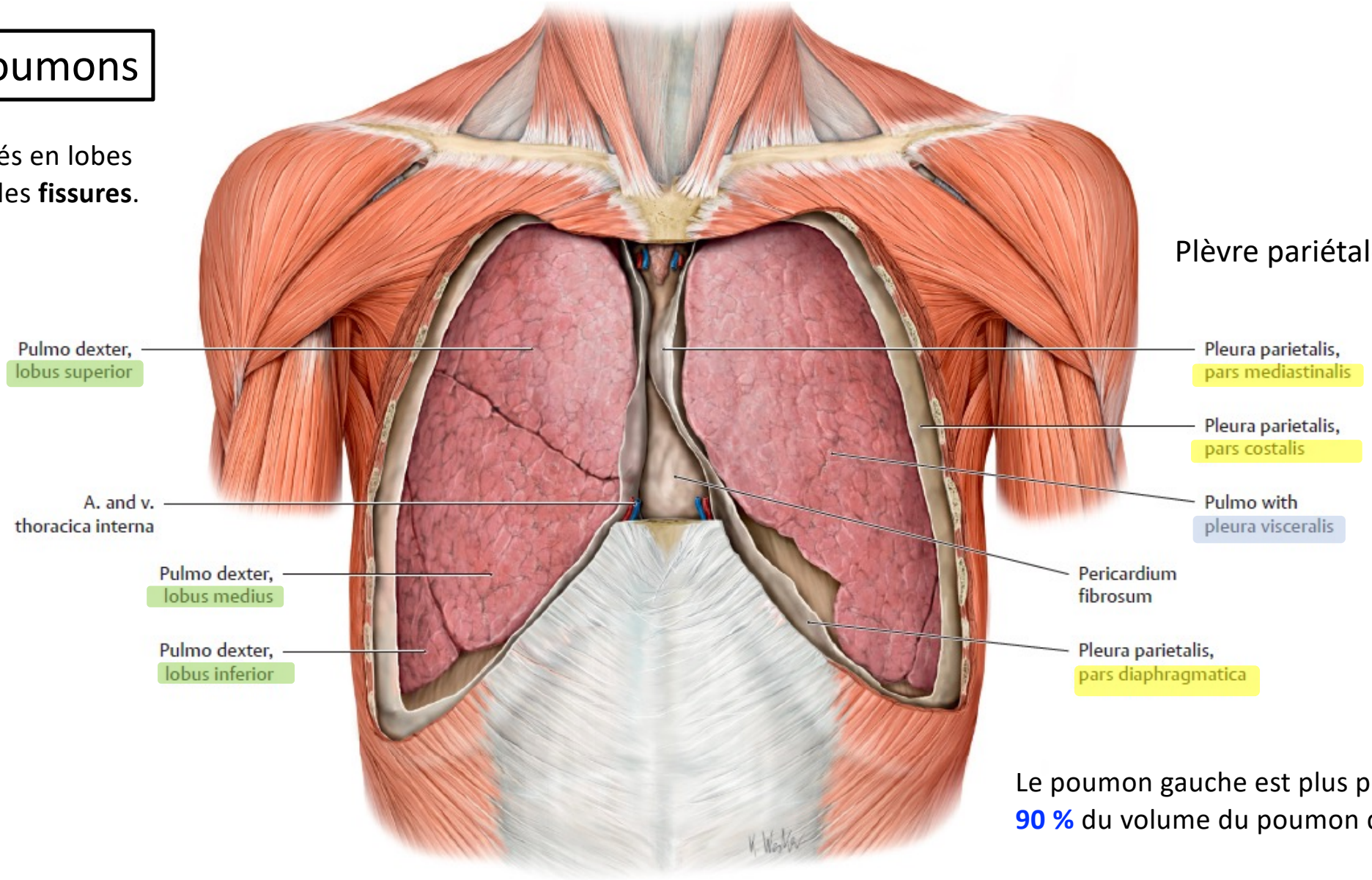
La plèvre viscérale entre dans les fissures entre les lobes.

Coupe transversale

Poumons

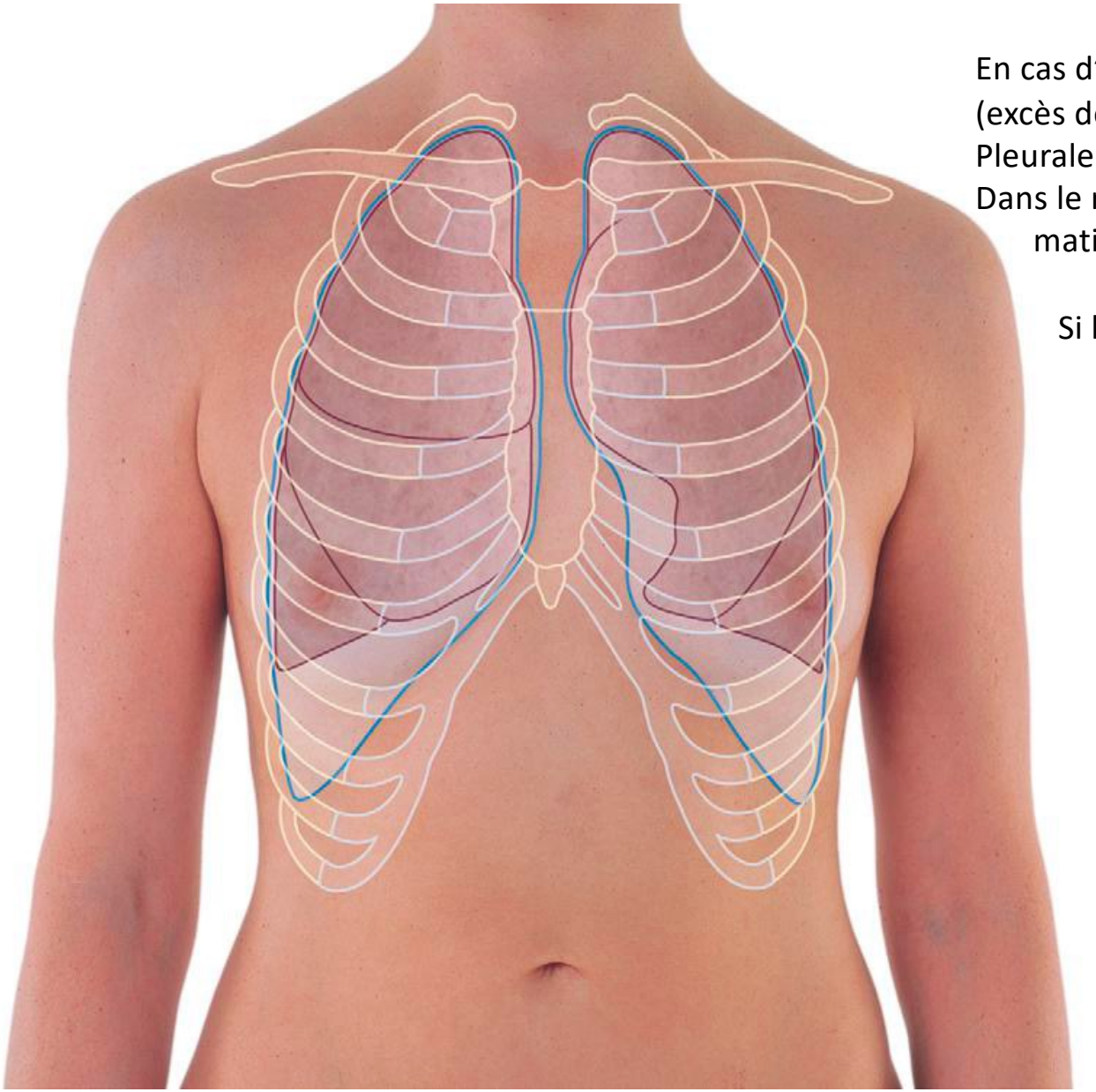
divisés en lobes
par des **fissures**.

Plèvre pariétale



Le poumon gauche est plus petit :
90 % du volume du poumon droit.

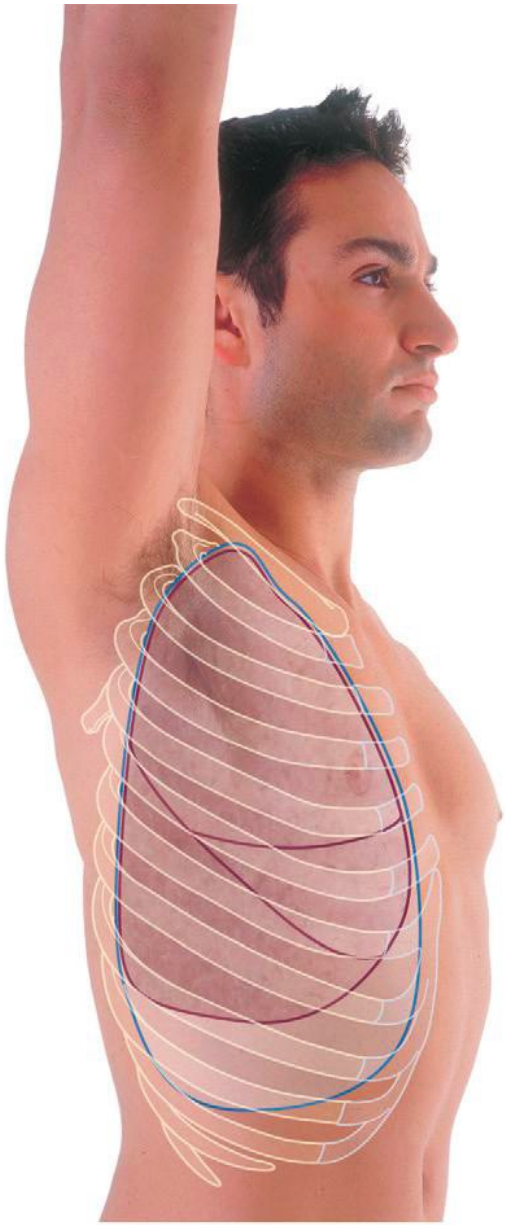
La plèvre pariétale
descend plus bas
que la plèvre viscérale :
récessus
costo-diaphragmatique



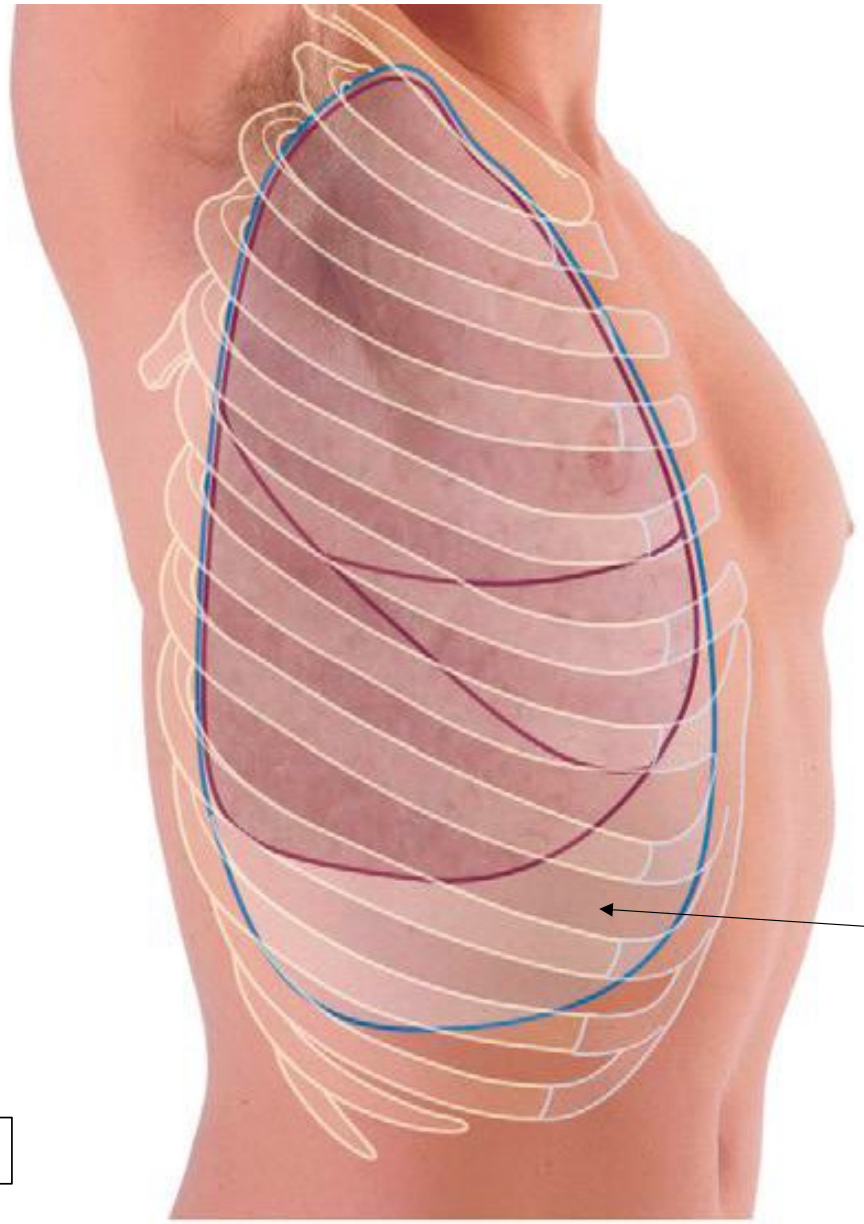
Vue antérieure

En cas d'épanchement pleural (excès de liquide dans la cavité Pleurale), le liquide s'accumule Dans le récessus costo-diaphrag-matique par gravité.

Si la personne est debout.

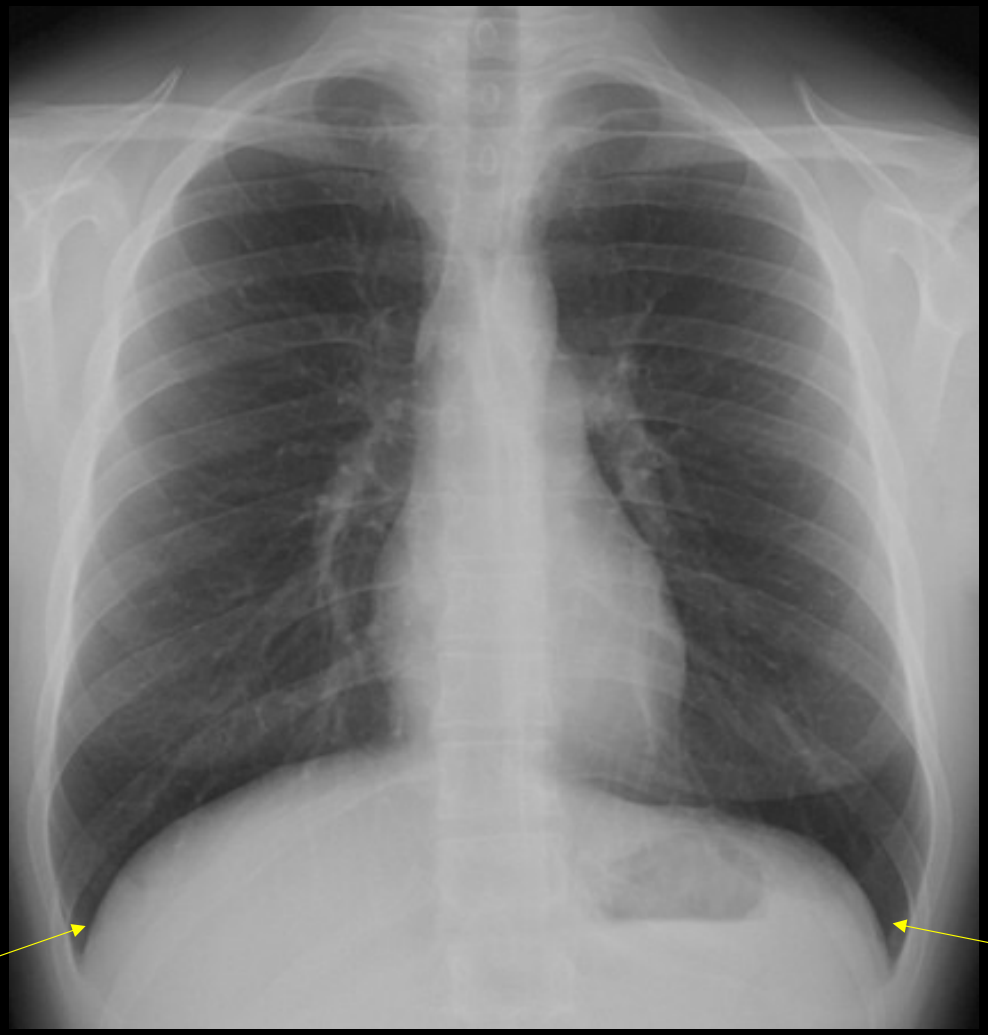


Vue latérale droite



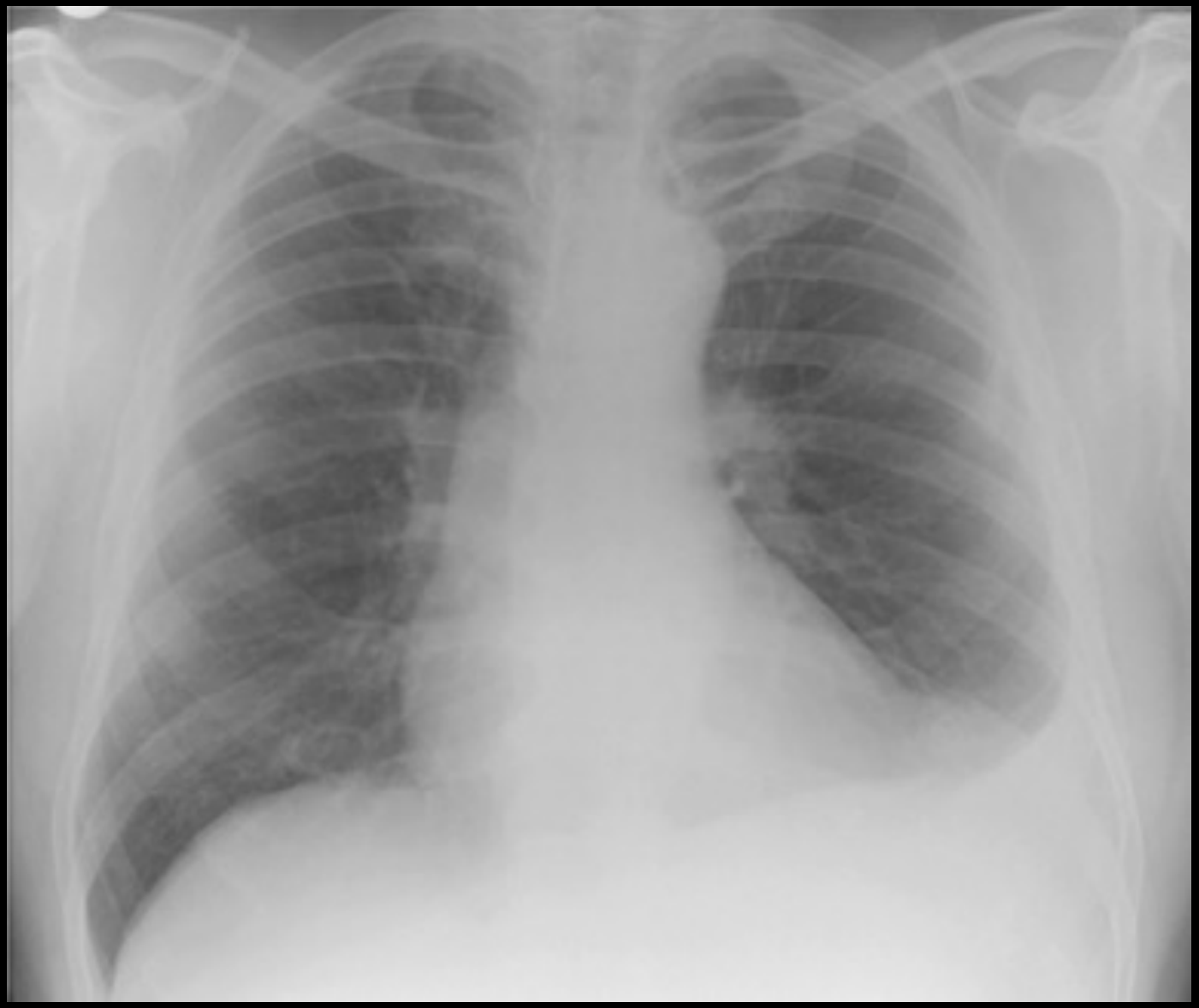
Récessus
costo-diaphrag-
matique

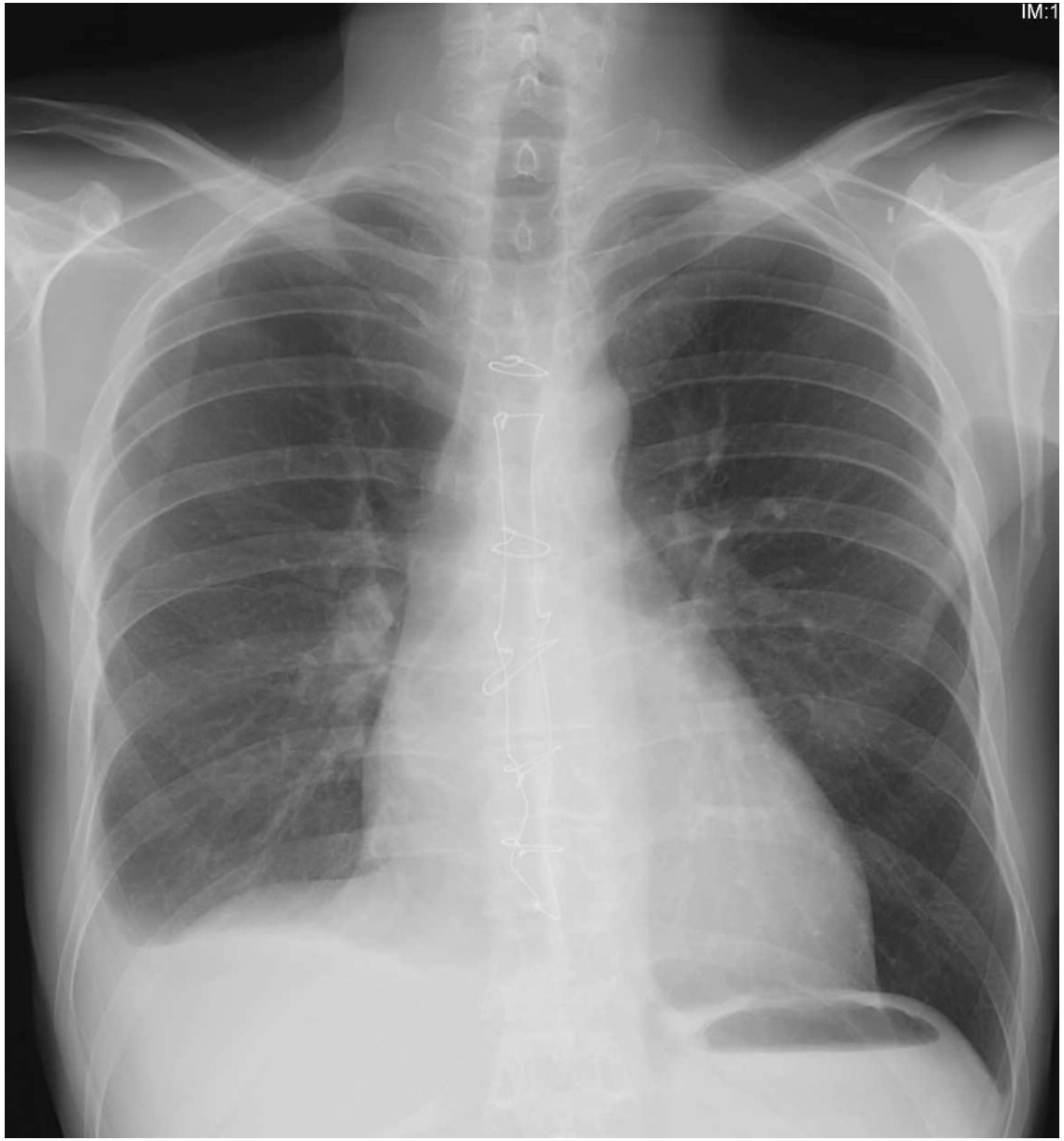
Radio normale,
pas d'épanchement pleural

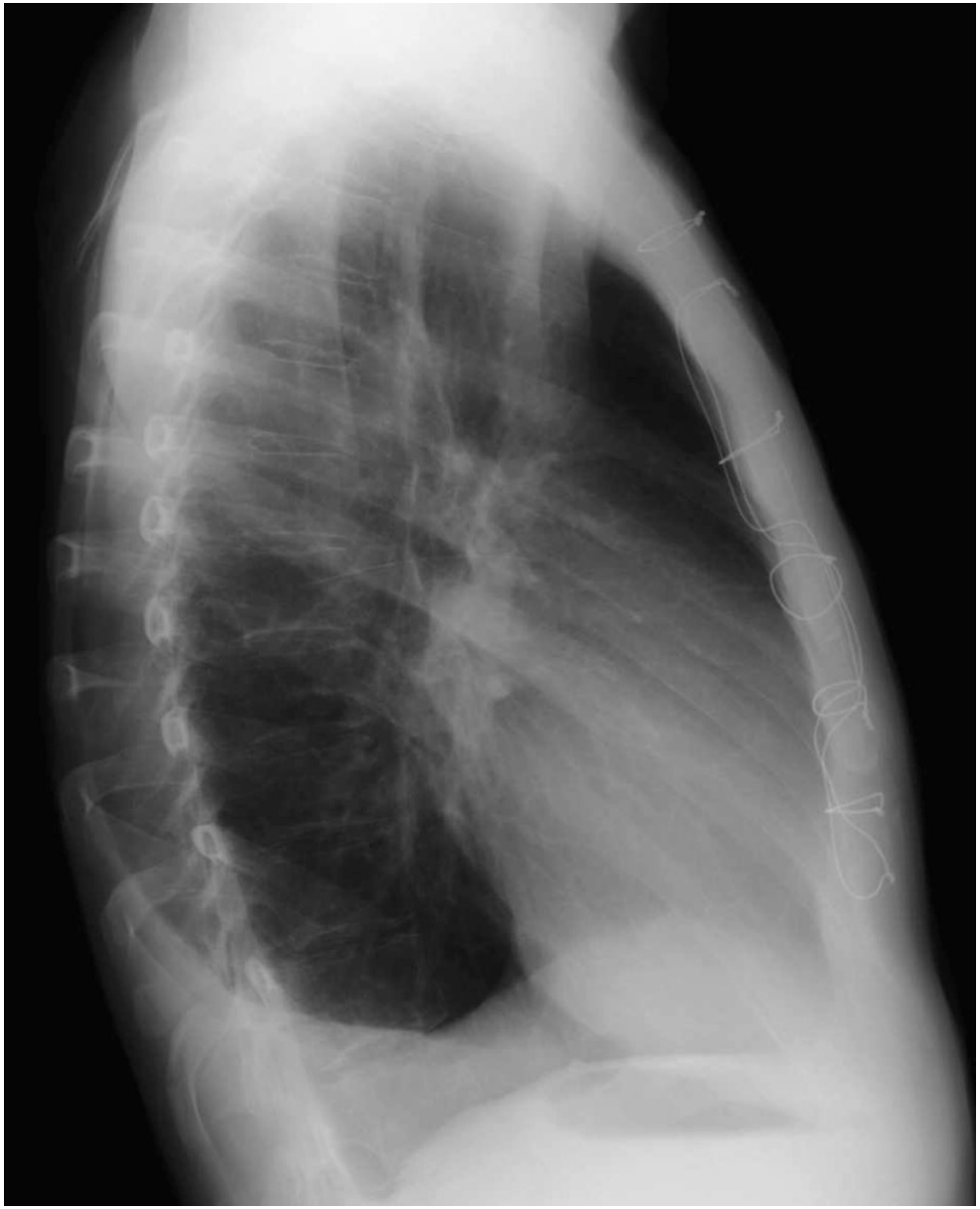


Angle costo-phrénique

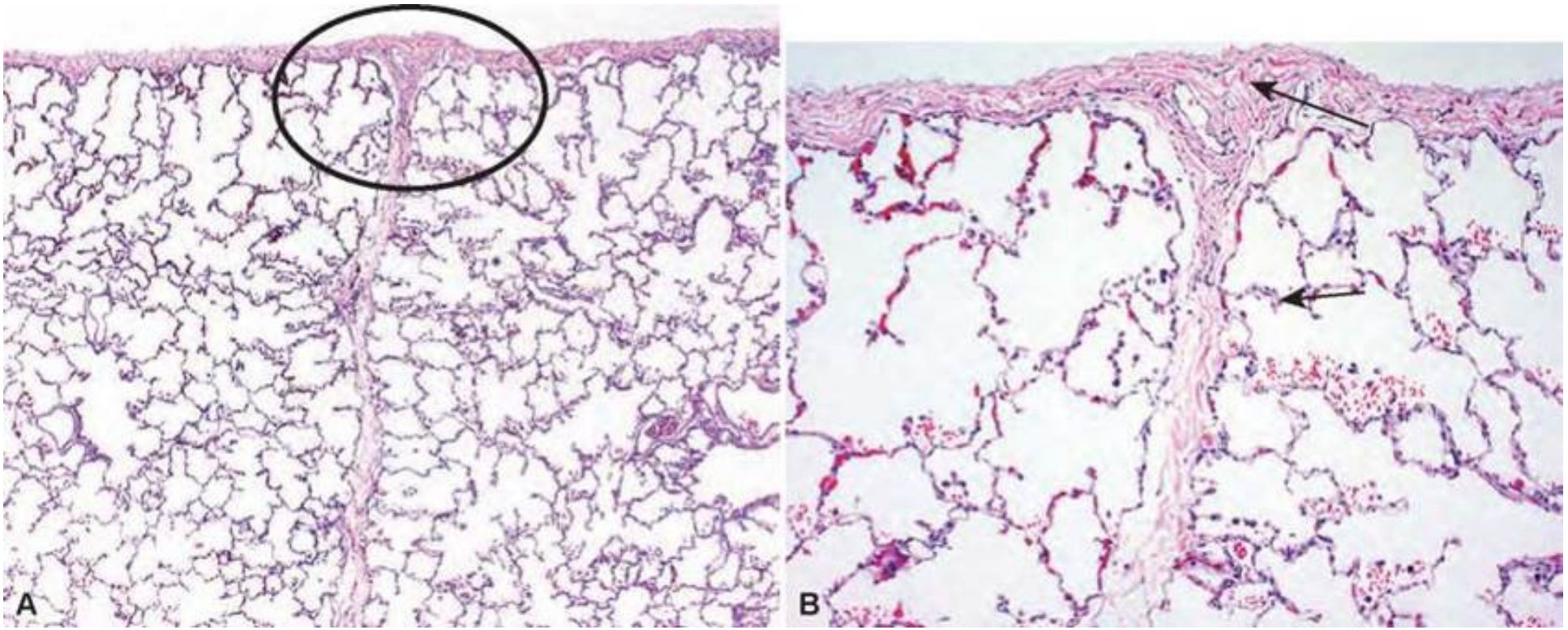
Angle costo-phrénique




IM:1



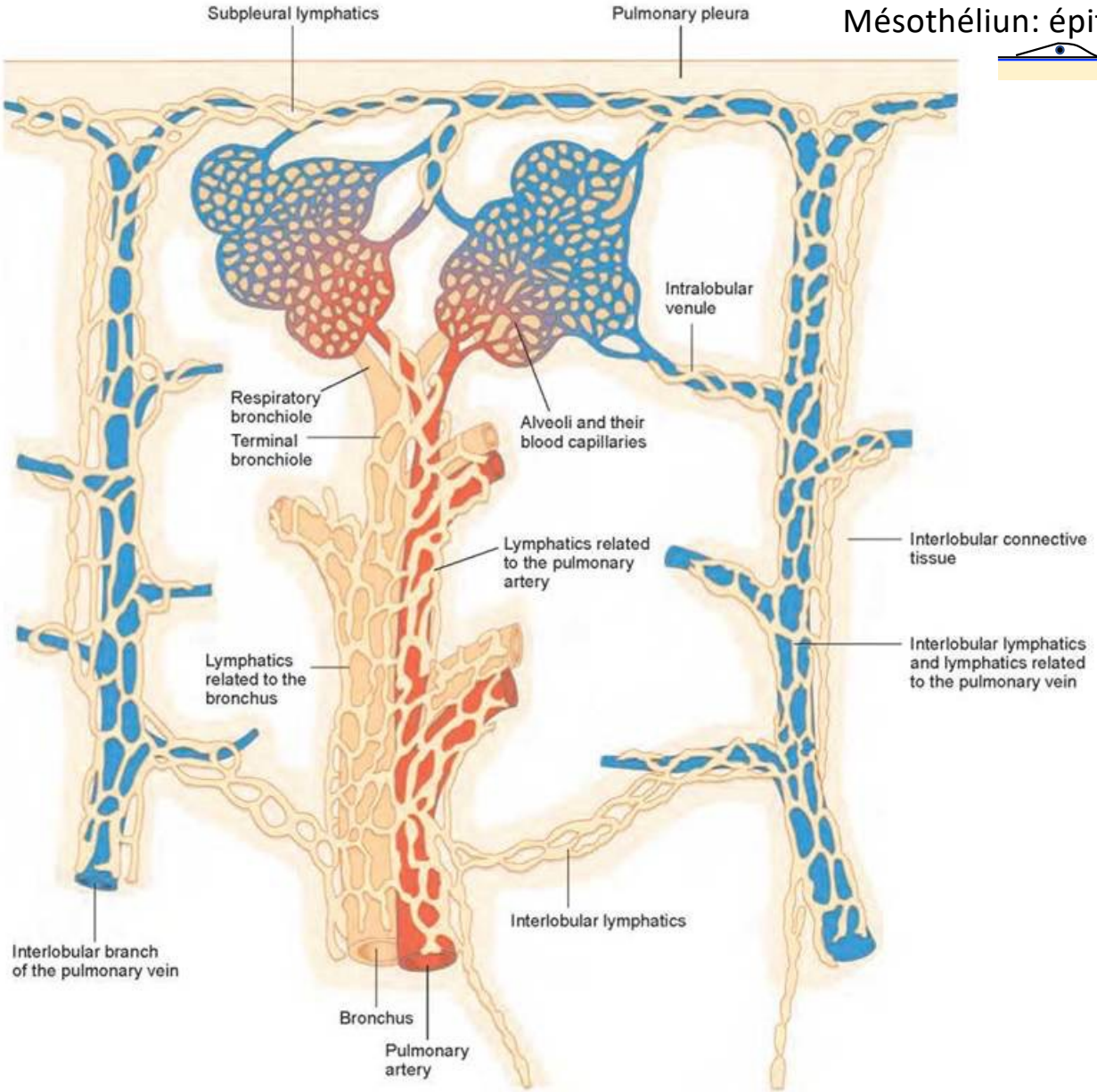
La plèvre viscérale est microscopique.



Comparez le diamètre moyen des alvéoles avec l'épaisseur de la plèvre viscérale.

Mésothéliun: épithéium simple pavimenteux

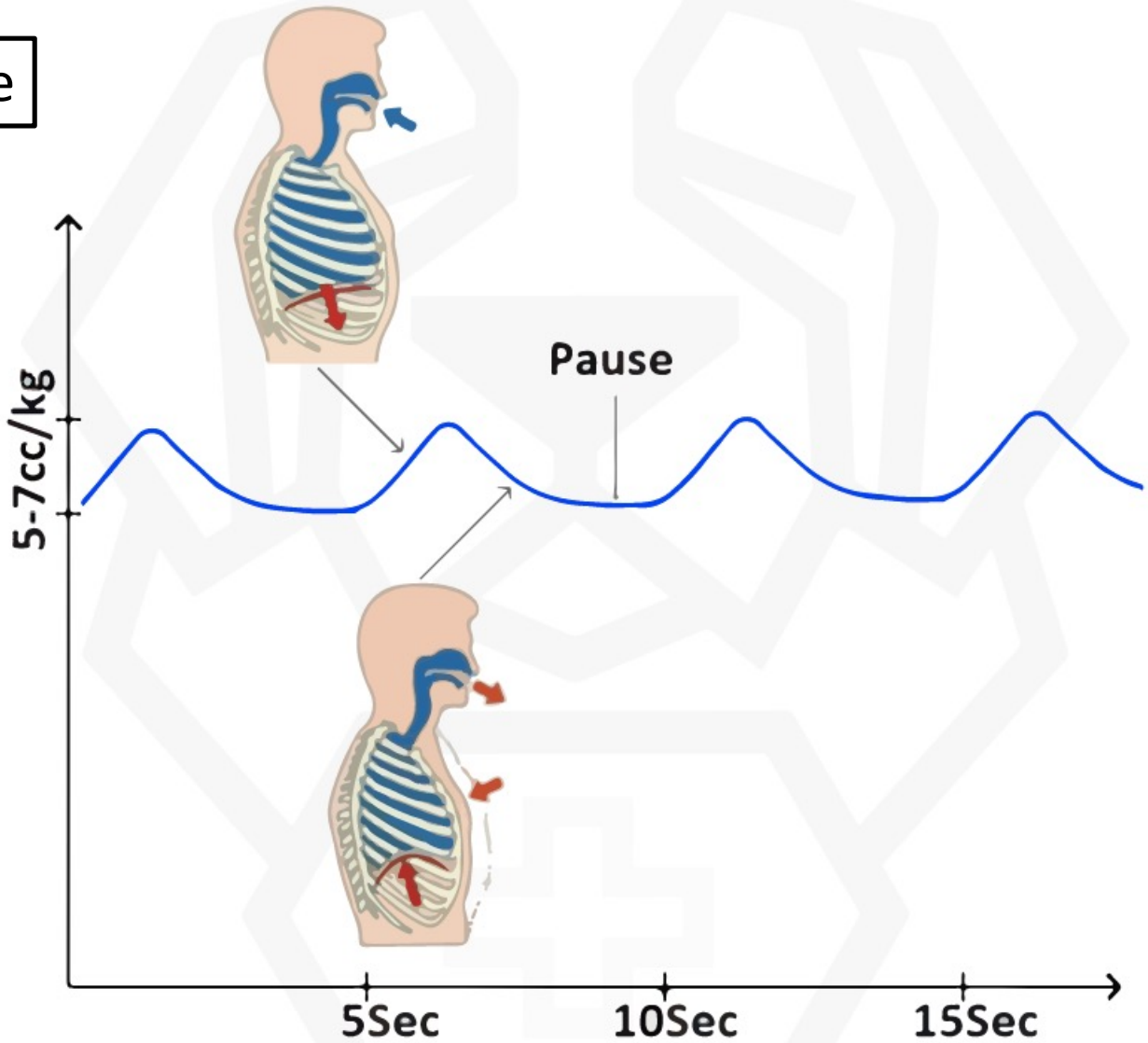
membrane basale



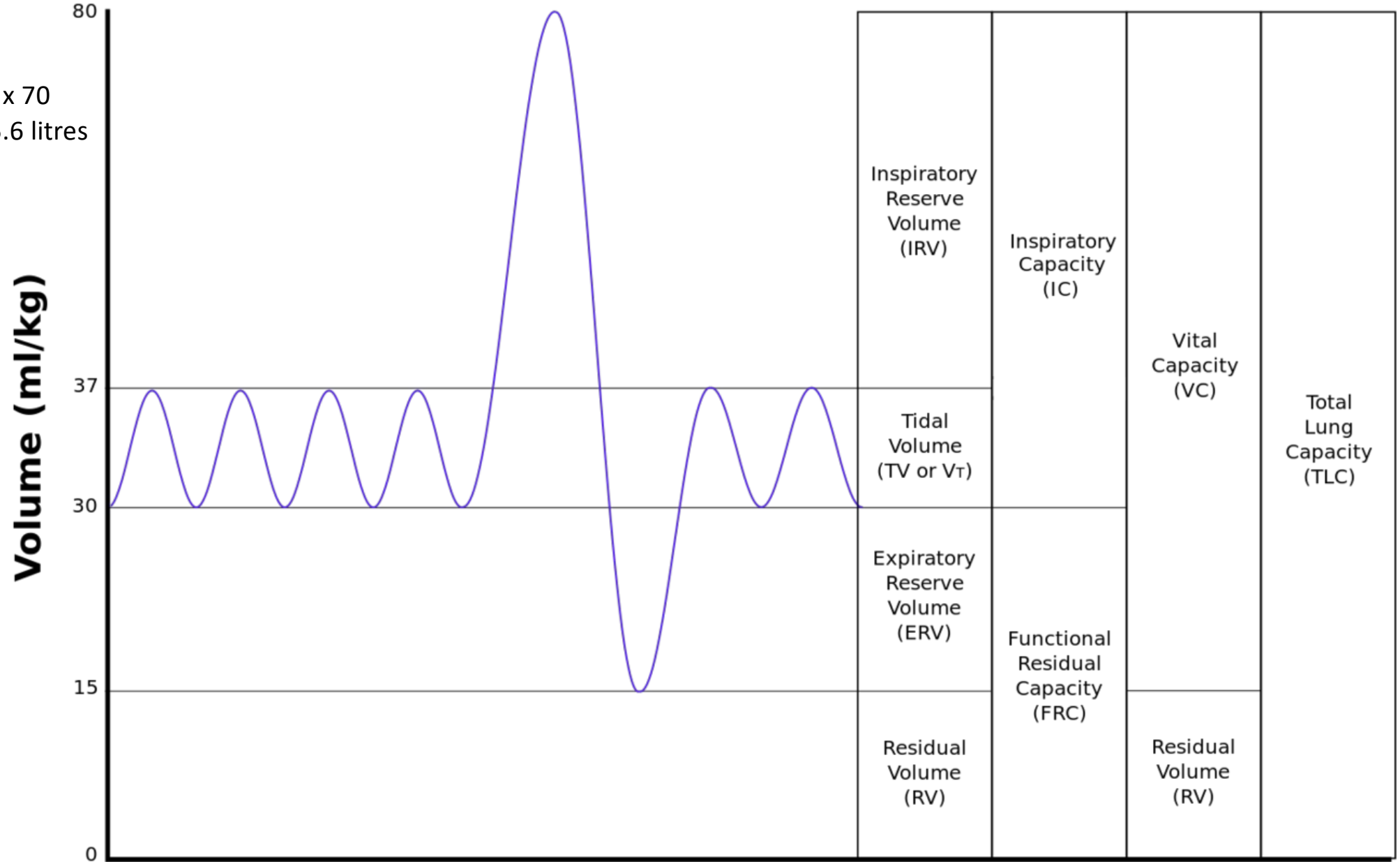
Cycle respiratoire

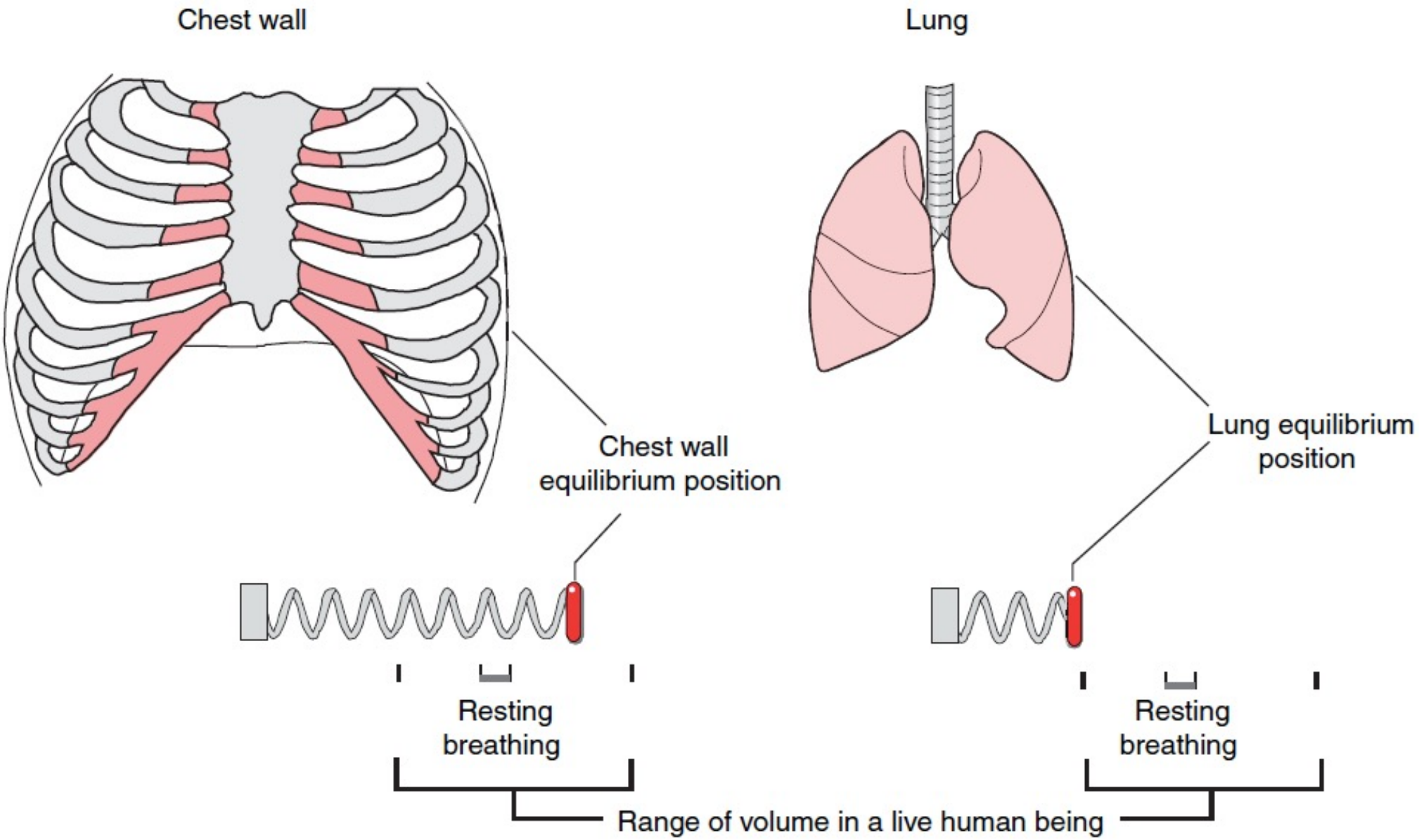
au repos

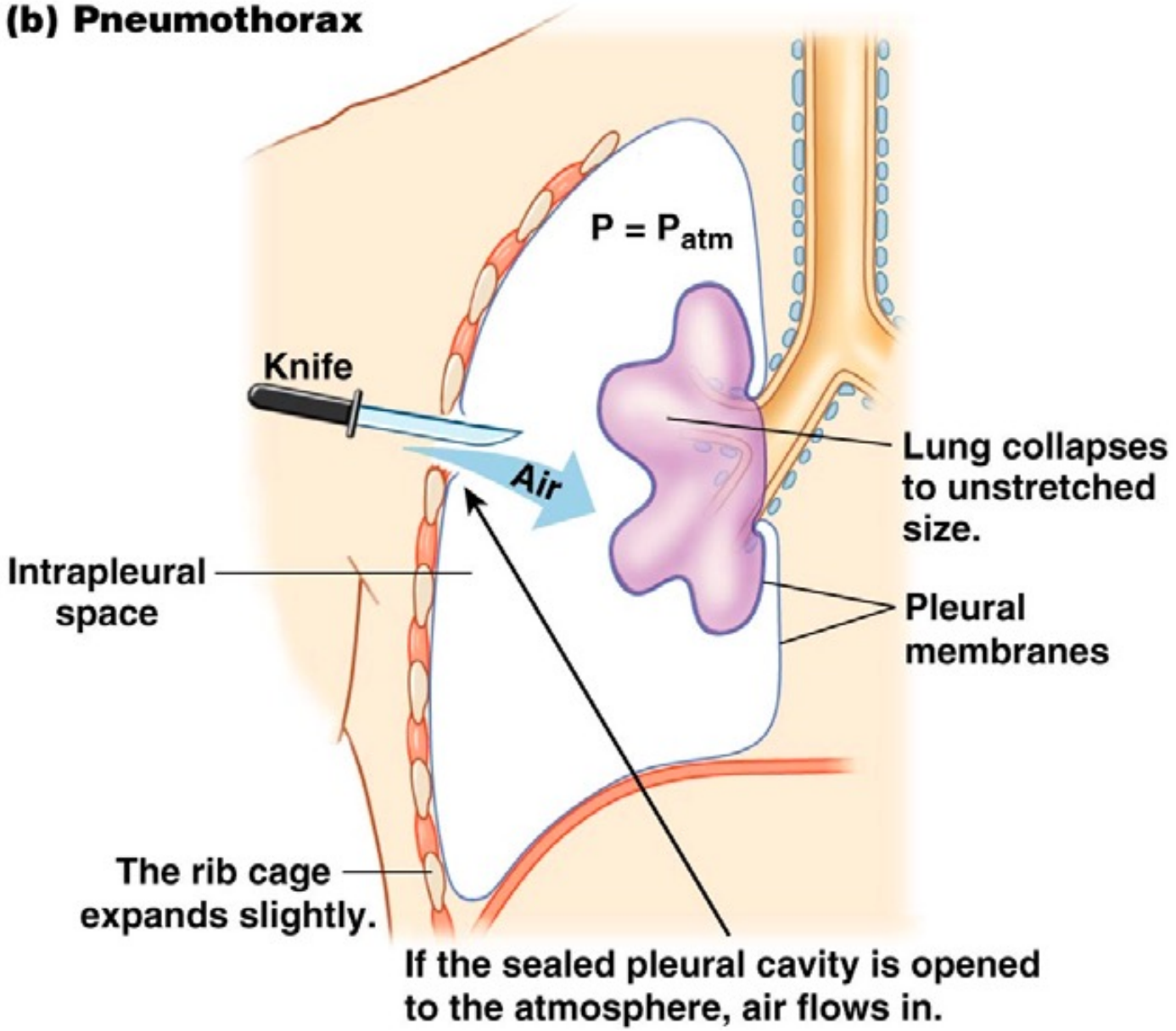
Pour une personne
de 70 kg :
7 mL x 70 = 490 mL

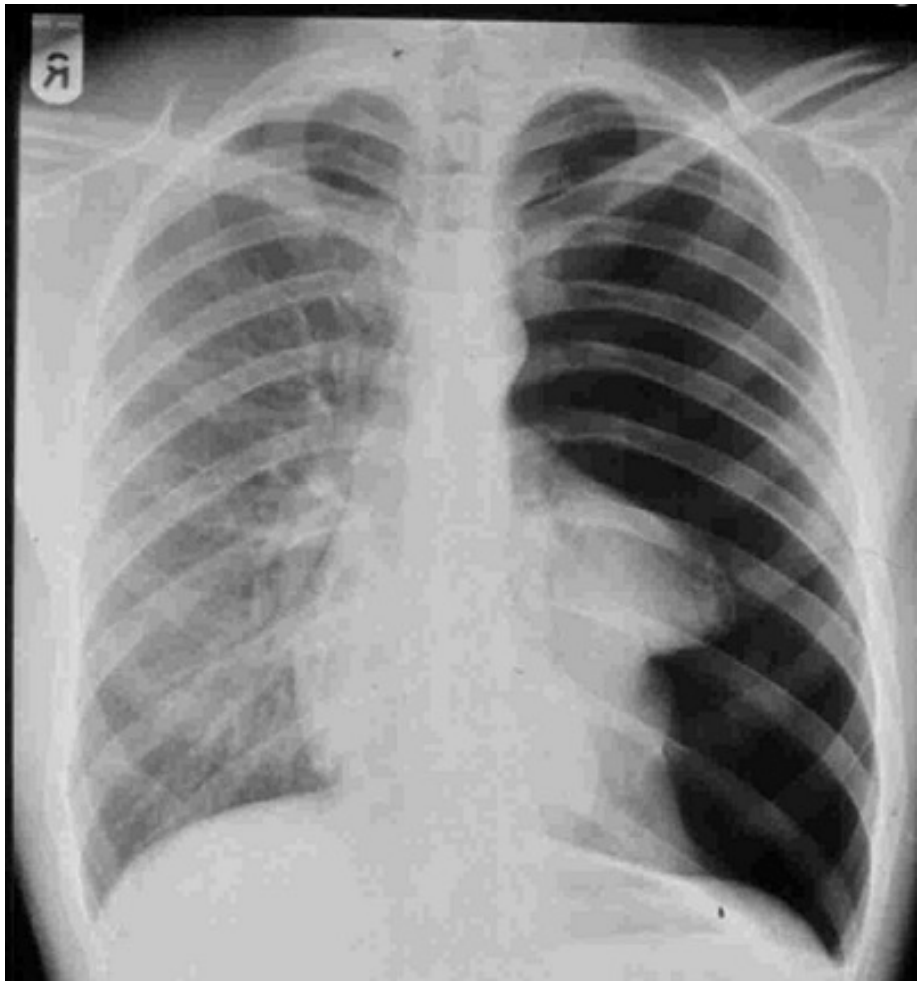


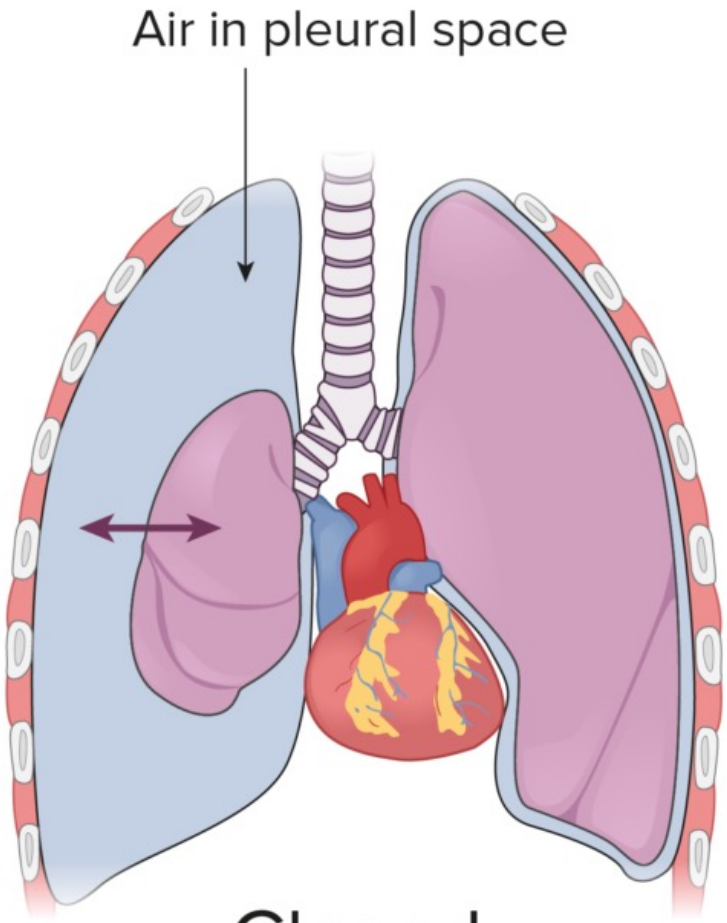
80 x 70
= 5.6 litres



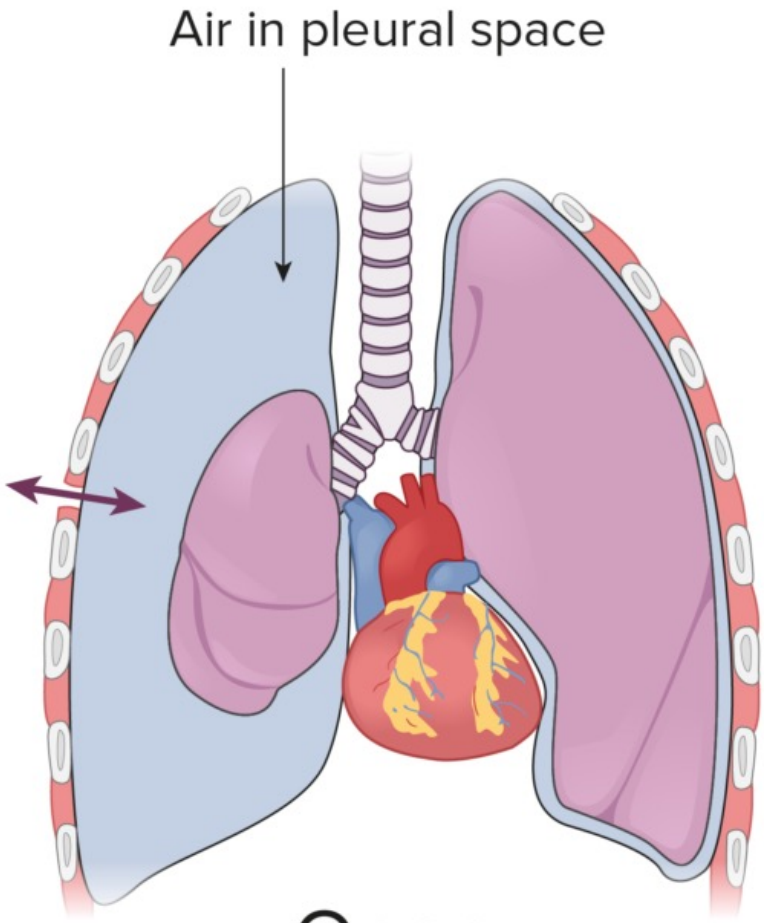

Chest wall
Lung
Chest wall equilibrium position
Lung equilibrium position
Resting breathing
Resting breathing
Range of volume in a live human being


(b) Pneumothorax
P = Patm
Knife
Air
Lung collapses to unstretched size.
Intrapleural space
Pleural membranes
The rib cage expands slightly.
If the sealed pleural cavity is opened to the atmosphere, air flows in.


R



Closed pneumothorax



Open pneumothorax