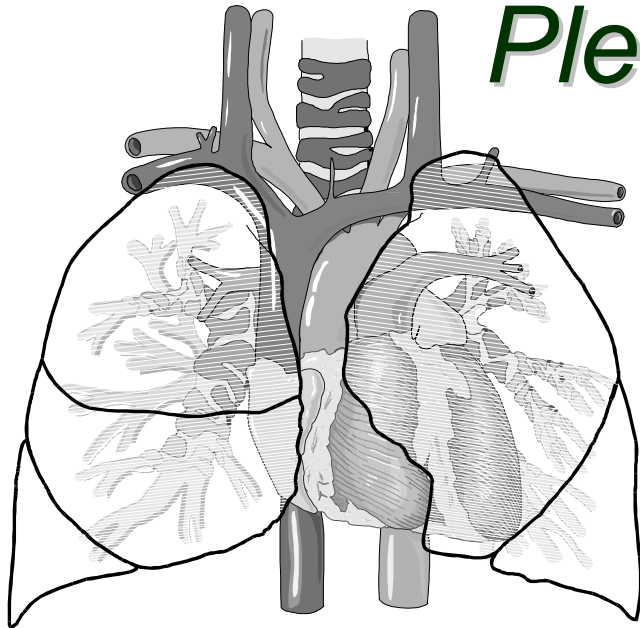


# *Clinical Anatomy of the Pleural Cavity & Mediastinum*



Handout download:

<http://www.oucom.ohiou.edu/dbms-witmer/gs-rpac.htm>

23 Nov 2004



**Lawrence M. Witmer, PhD**

Department of Biomedical Sciences

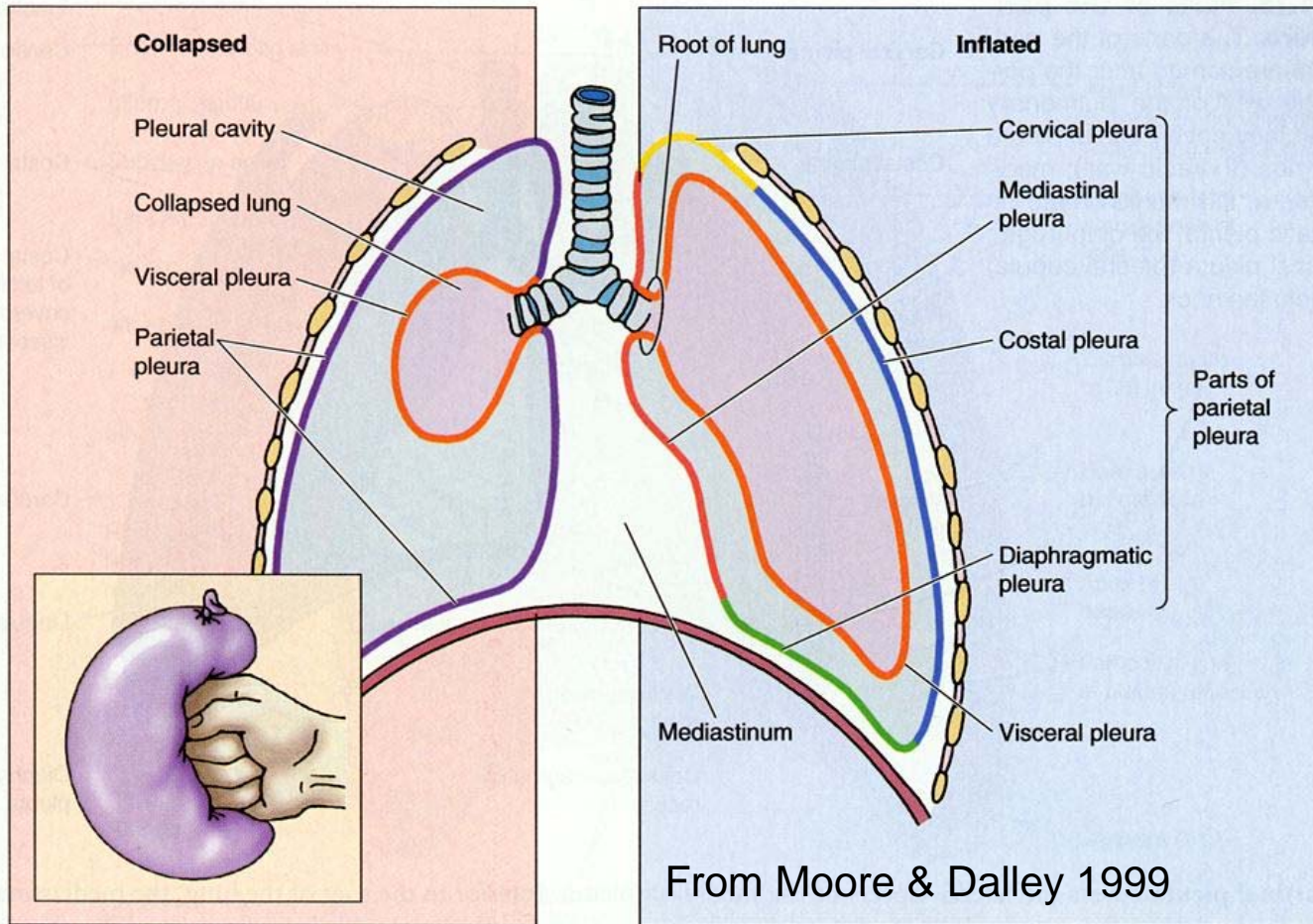
College of Osteopathic Medicine

Ohio University

Athens, Ohio 45701

[witmer@exchange.oucom.ohiou.edu](mailto:witmer@exchange.oucom.ohiou.edu)

# Pleura and Pleural Cavity



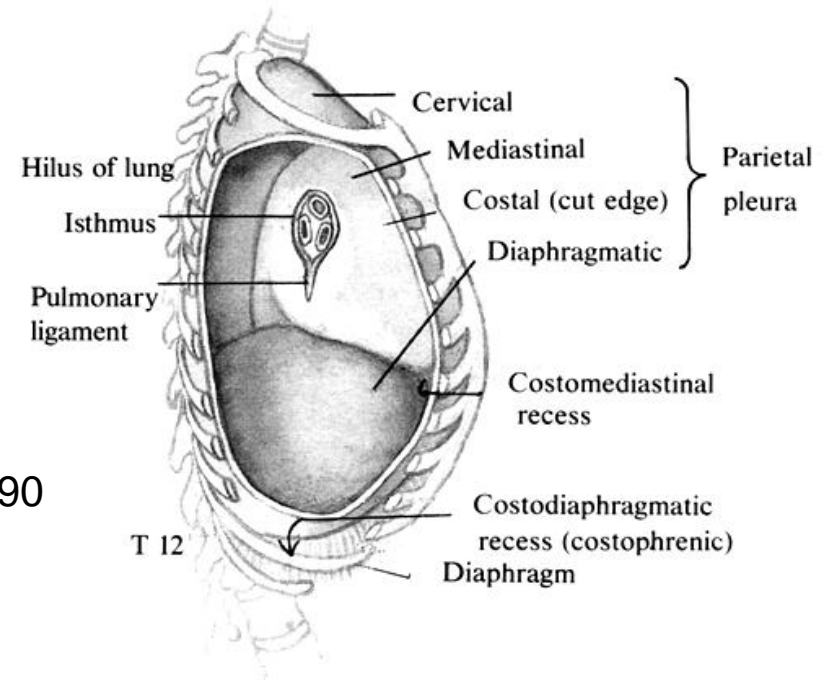
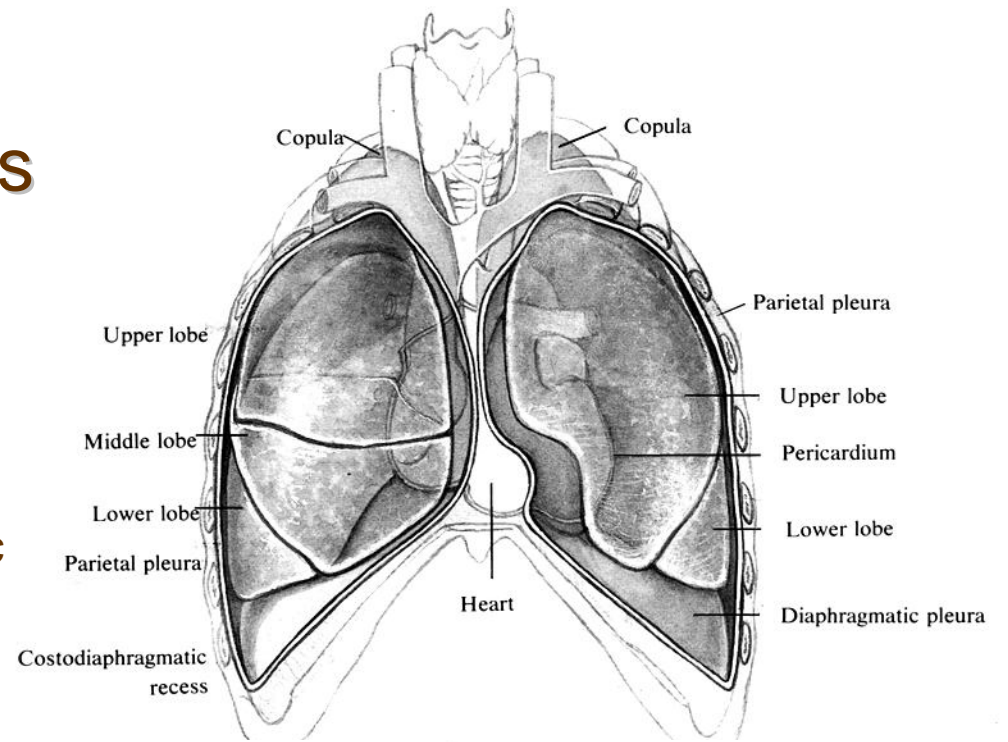
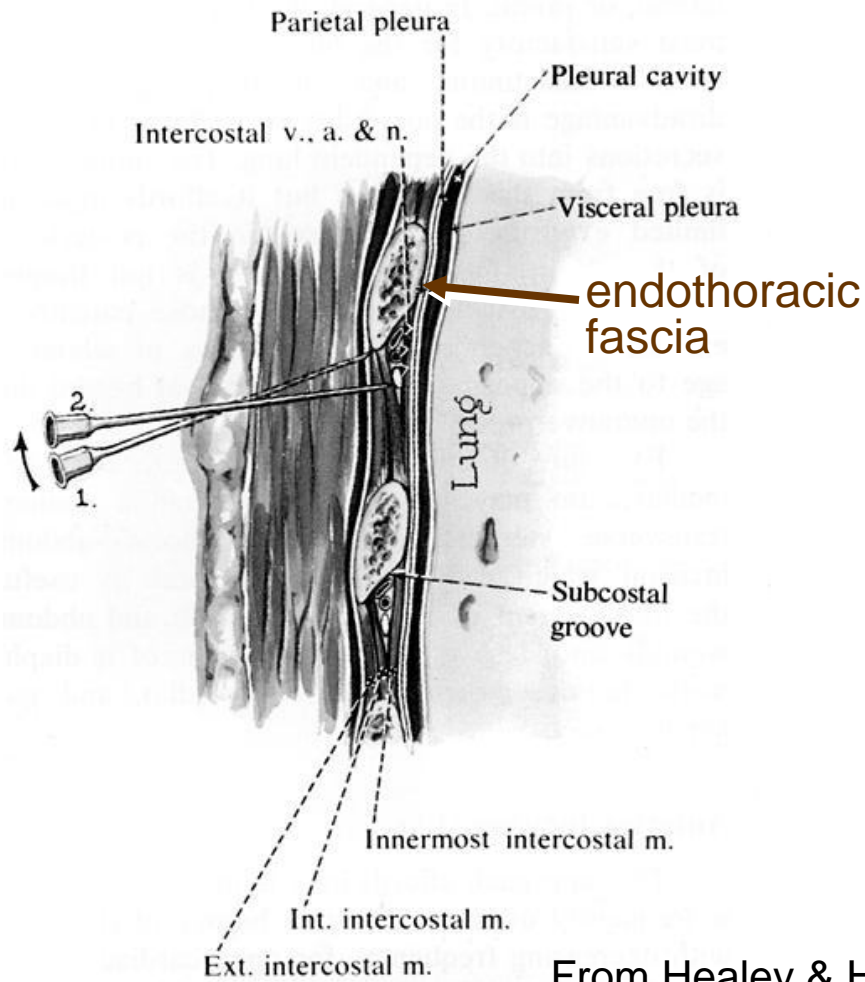
## Pleura

- Mesothelial lining of each hemithorax
- Derived from embryonic coelomic lining
- Visceral pleura: lung
- Parietal pleura: wall
  - Costal
  - Diaphragmatic
  - Mediastinal
  - Cervical

## Pleural Cavity

- Potential space between visceral & parietal pleura
- Capillary layer of serous fluid produced by mesothelium
  - Reduces friction
  - Surface tension provides cohesion between lung and thoracic wall

# Pleural sac and recesses

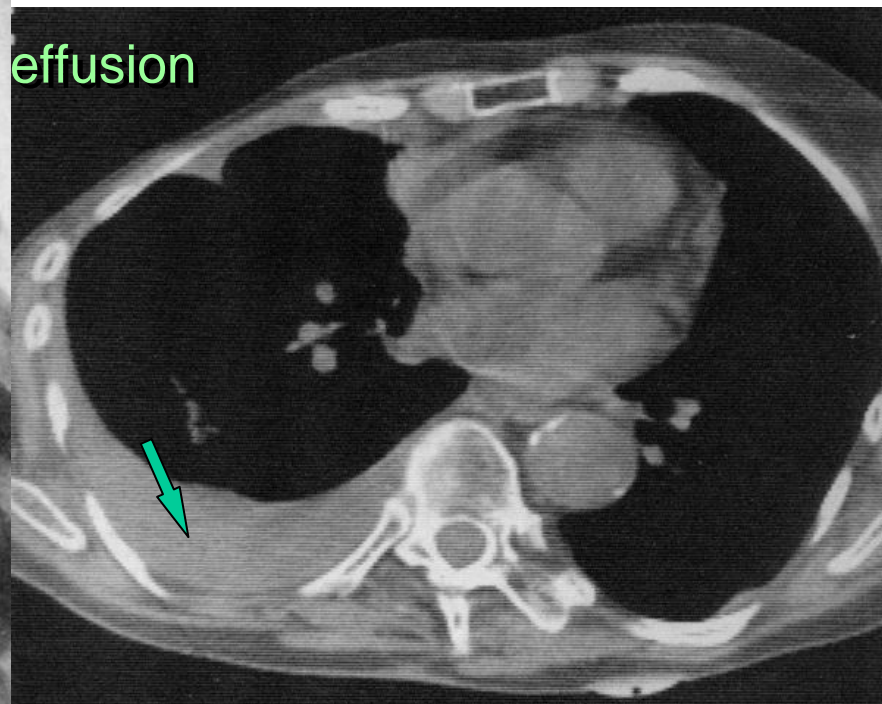
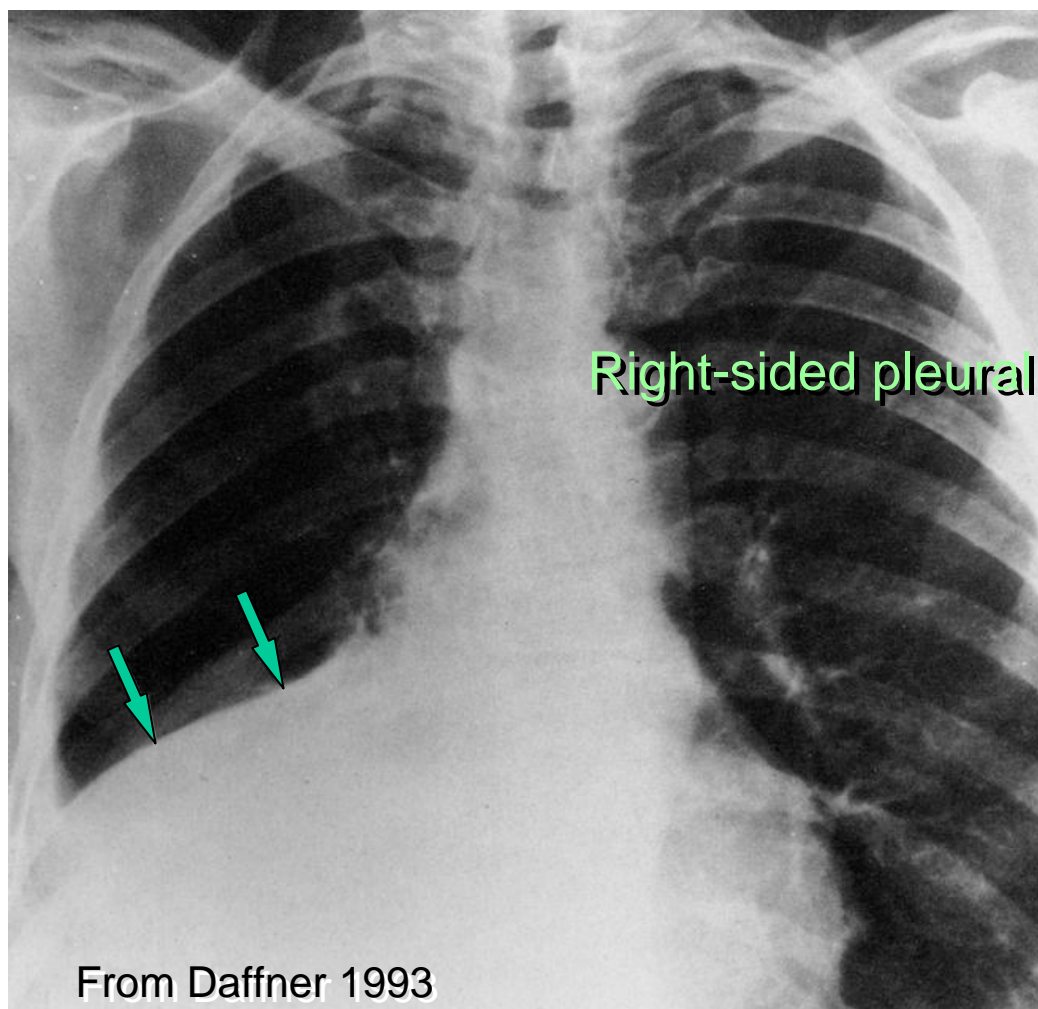


From Healey & Hodge 1990



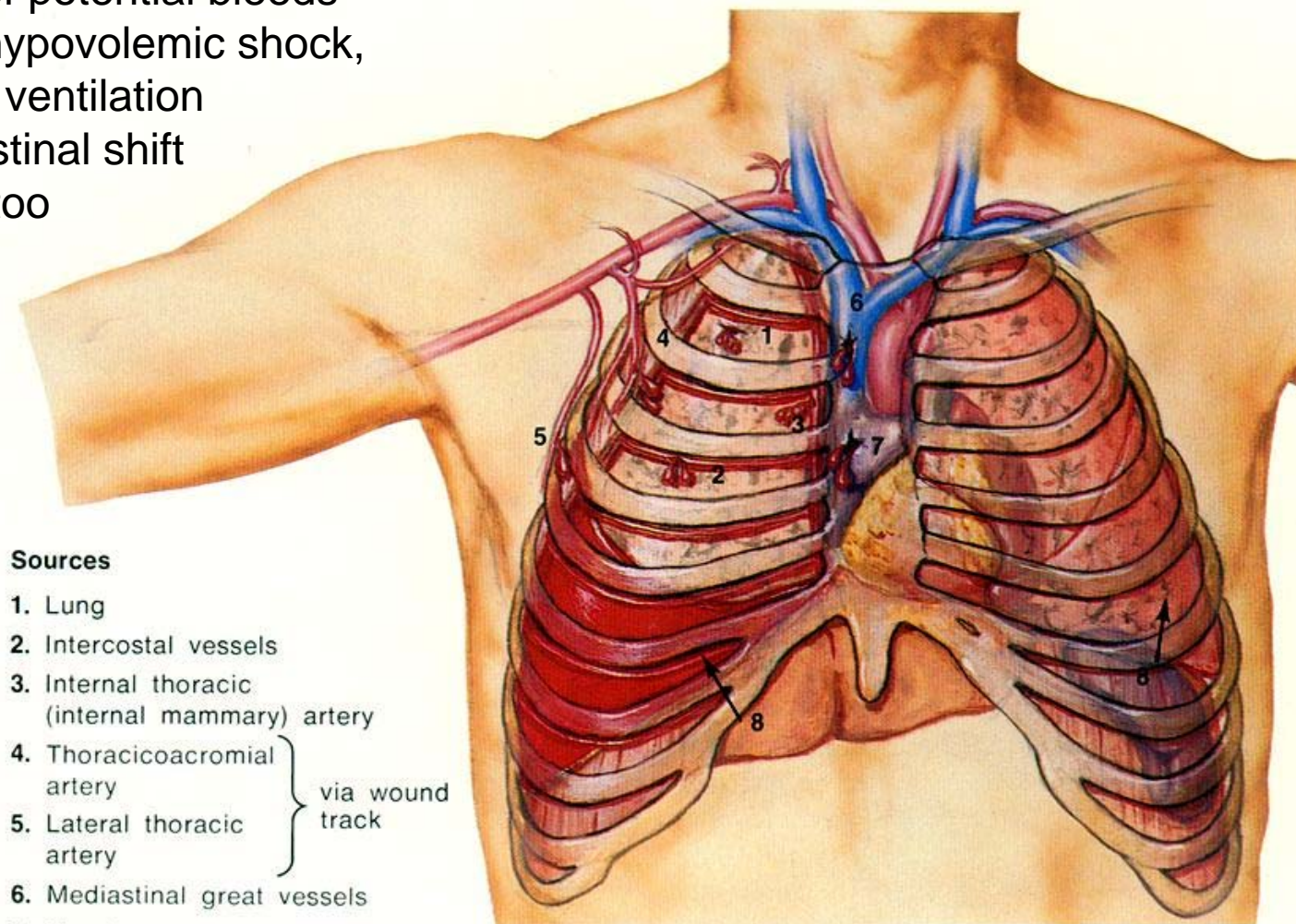
# Pleural Diseases & Signs 1: Pleural Effusion

- Accumulation of fluid in the pleural space
- Transudative vs. exudative effusion
- Empyema as potential sequelae to exudative effusion



## Pleural Diseases & Signs 2: Hemothorax

- Intrathoracic bleeding (e.g., trauma)
- Numerous sources of potential bleeds
- Large hemothorax: hypovolemic shock, restricted ipsilateral ventilation, contralateral mediastinal shift
- Clotting may not be too problematic (except for catheters)



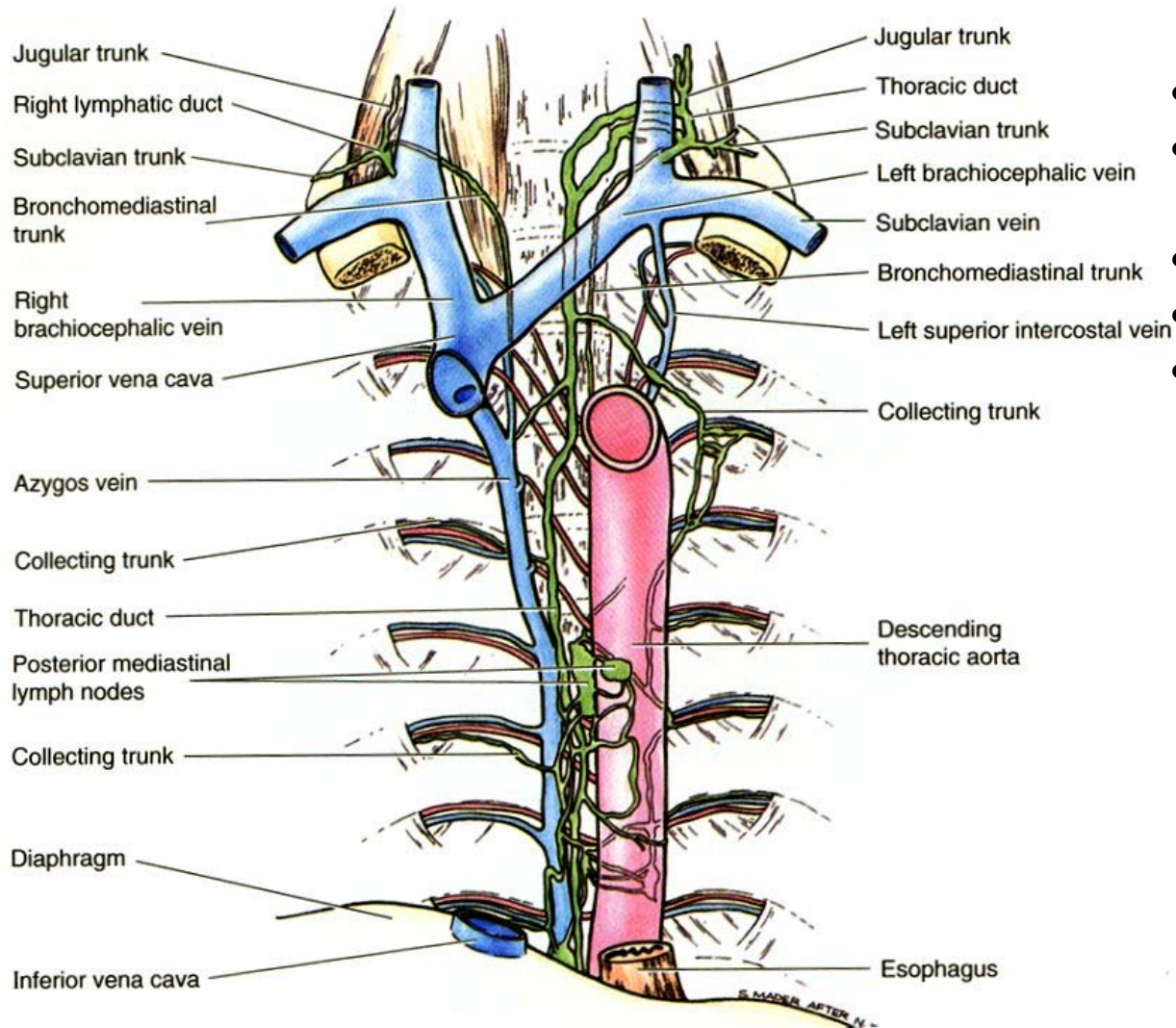
### Sources

1. Lung
  2. Intercostal vessels
  3. Internal thoracic (internal mammary) artery
  4. Thoracicoacromial artery
  5. Lateral thoracic artery
  6. Mediastinal great vessels
  7. Heart
  8. Abdominal structures (liver, spleen) via diaphragm
- } via wound track

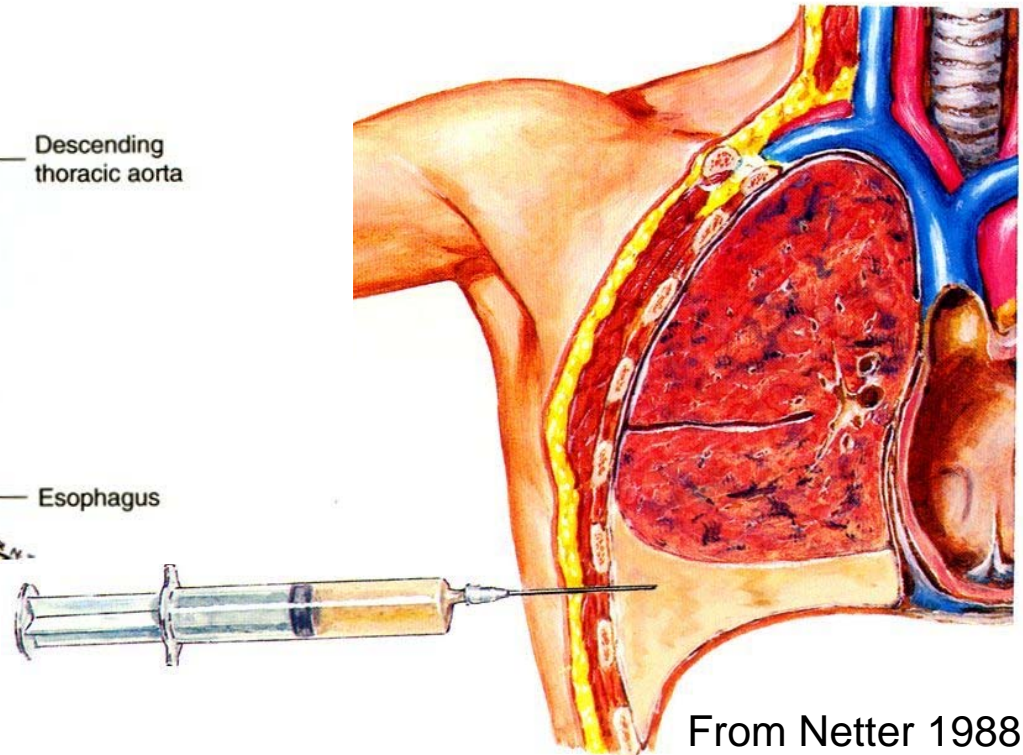
From Netter 1988



# Pleural Diseases & Signs 3: Chylothorax



- Leakage of lymph
- Usually a result of surgical trauma during mediast. proc.
- Traumatic vs nontraumatic
- Traumatic: 2/3, unilateral
- Nontraumatic: 1/3, bilateral, assoc. with SVC thrombosis



From Moore & Dalley 1999

From Netter 1988

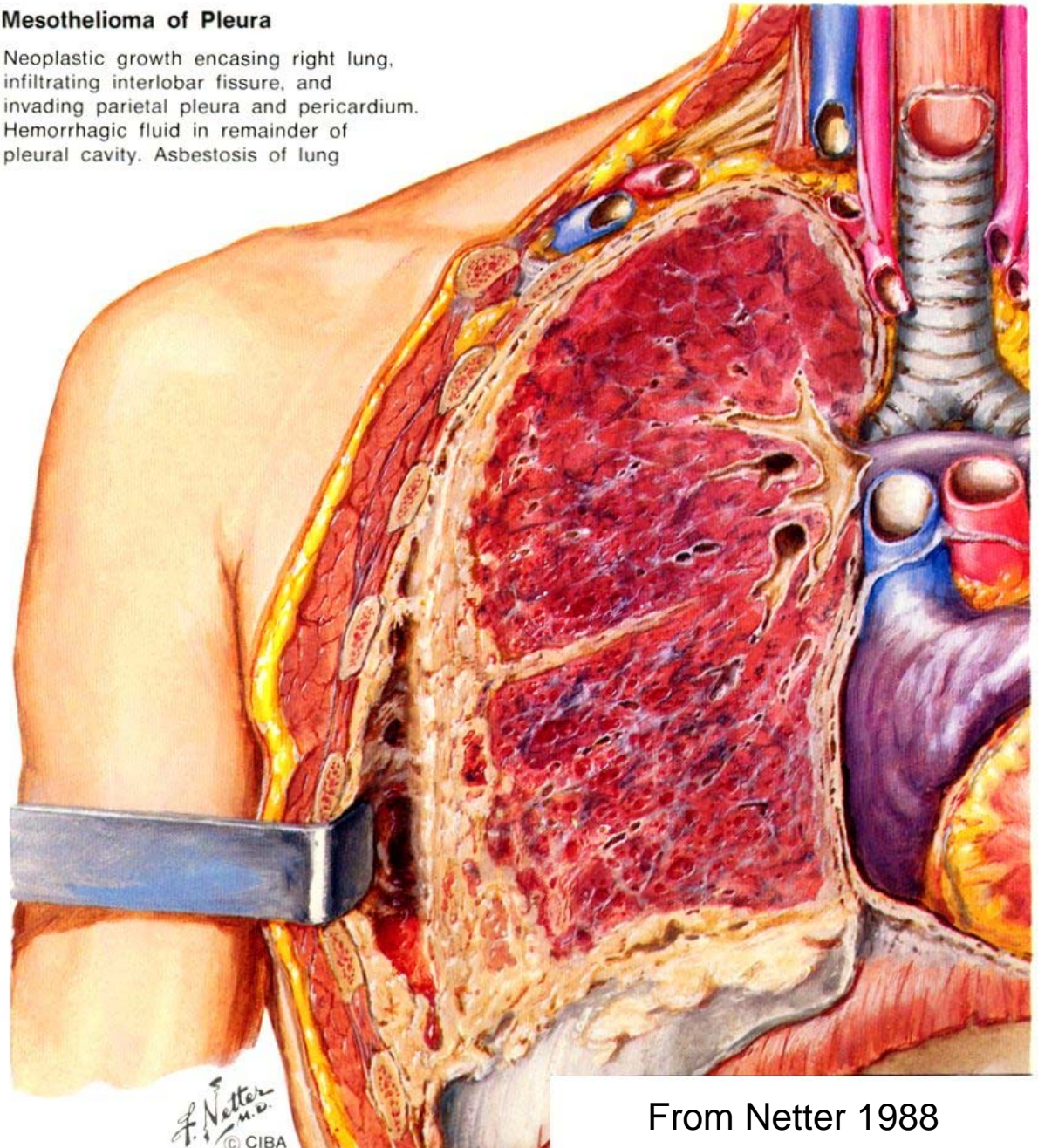


# Pleural Diseases & Signs 4: Malignant Mesothelioma

## Mesothelioma of Pleura

Neoplastic growth encasing right lung, infiltrating interlobar fissure, and invading parietal pleura and pericardium. Hemorrhagic fluid in remainder of pleural cavity. Asbestosis of lung

- Neoplasm of pleural serosa
- Linked to asbestos exposure
- Coalescence of pleural plaques
- May be restricted to parietal pleura but can involve visceral pleura
- Can lead to contracture of all structures in affected hemithorax

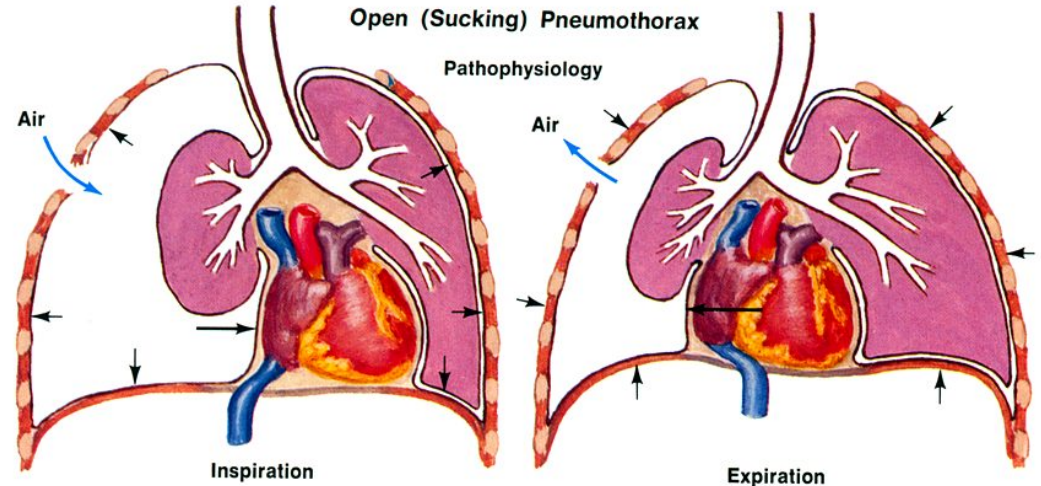


From Netter 1988



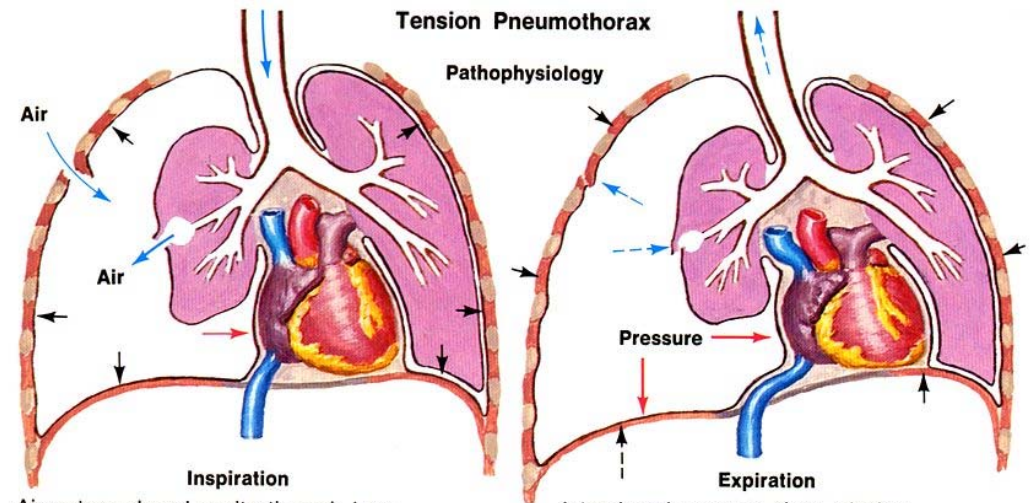
# Pleural Diseases & Signs 5: Pneumothorax

- Presence of free air or gas in the pleural cavity
- Types of pneumothorax
  - Open pneumothorax
  - Spontaneous pneumothorax
  - Tension pneumothorax
- Collapse of ipsilateral lung due to pressure change & disruption of surface tension
- Potential for mediastinal shifts



Air enters pleural cavity through open, sucking chest wound. Negative pleural pressure is lost, permitting collapse of ipsilateral lung and reducing venous return to heart. Mediastinum shifts, compressing opposite lung

As chest wall contracts and diaphragm rises, air is expelled from pleural cavity via wound. Mediastinum shifts to affected side and mediastinal flutter further impairs venous return by distortion of venae cavae



Air enters pleural cavity through lung wound or ruptured bleb (or occasionally via penetrating chest wound) with valvelike opening. Ipsilateral lung collapses and mediastinum shifts to opposite side, compressing contralateral lung and impairing its ventilating capacity

Intrapleural pressure rises, closing valvelike opening, thus preventing escape of pleural air. Pressure is thus progressively increased with each breath. Mediastinal and tracheal shifts are augmented, diaphragm is depressed, and venous return is impaired by increased pressure and vena caval distortion

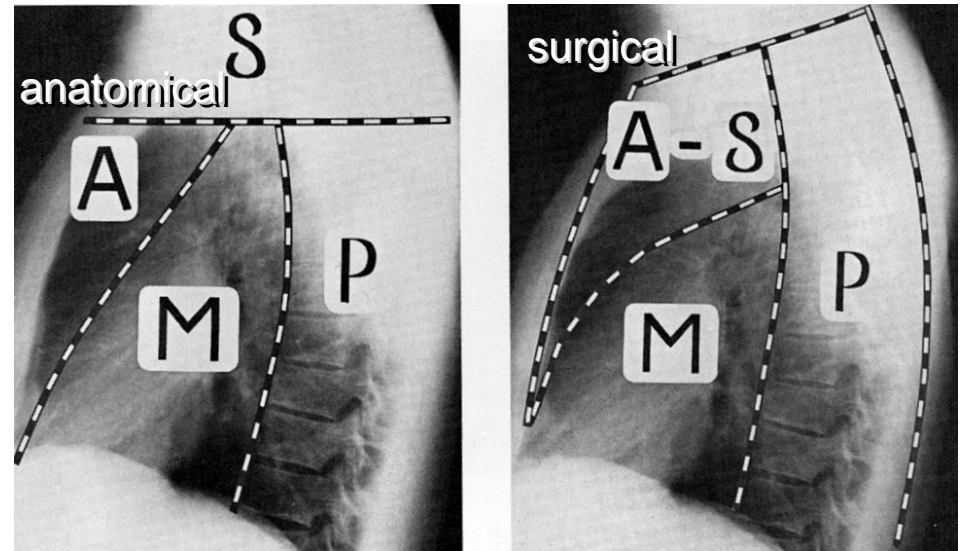
From Netter 1988



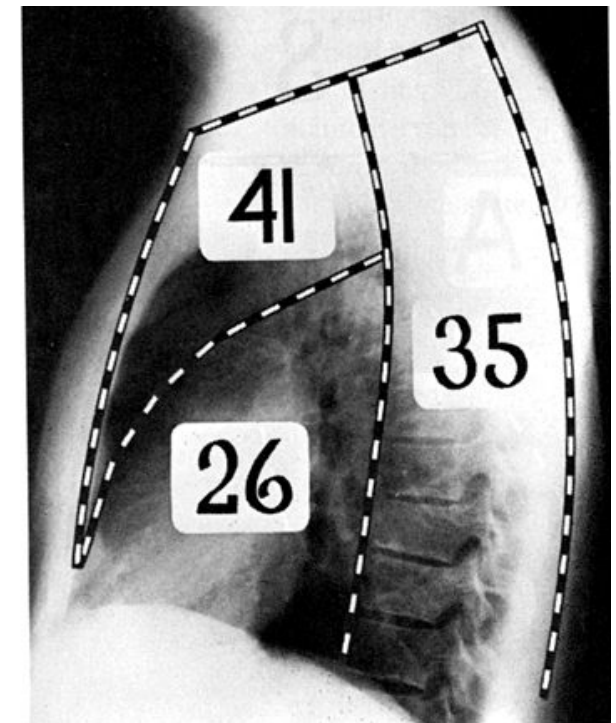
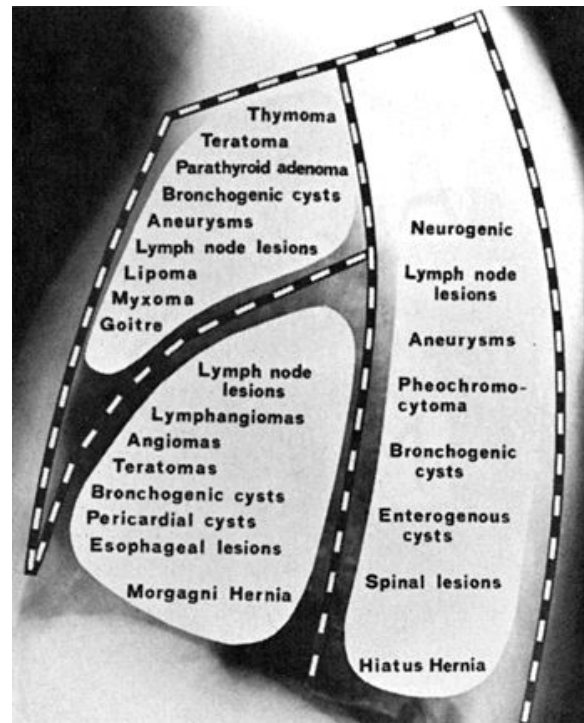
# Mediastinum

- Anterior mediastinum
  - thymus, fat, lymphatics
- Posterior mediastinum
  - descending aorta, esophagus, azygos veins, autonomic, thoracic duct
- Middle mediastinum
  - heart, pericardium, aorta, trachea, main bronchi, lymph nodes

## Divisions of the Mediastinum



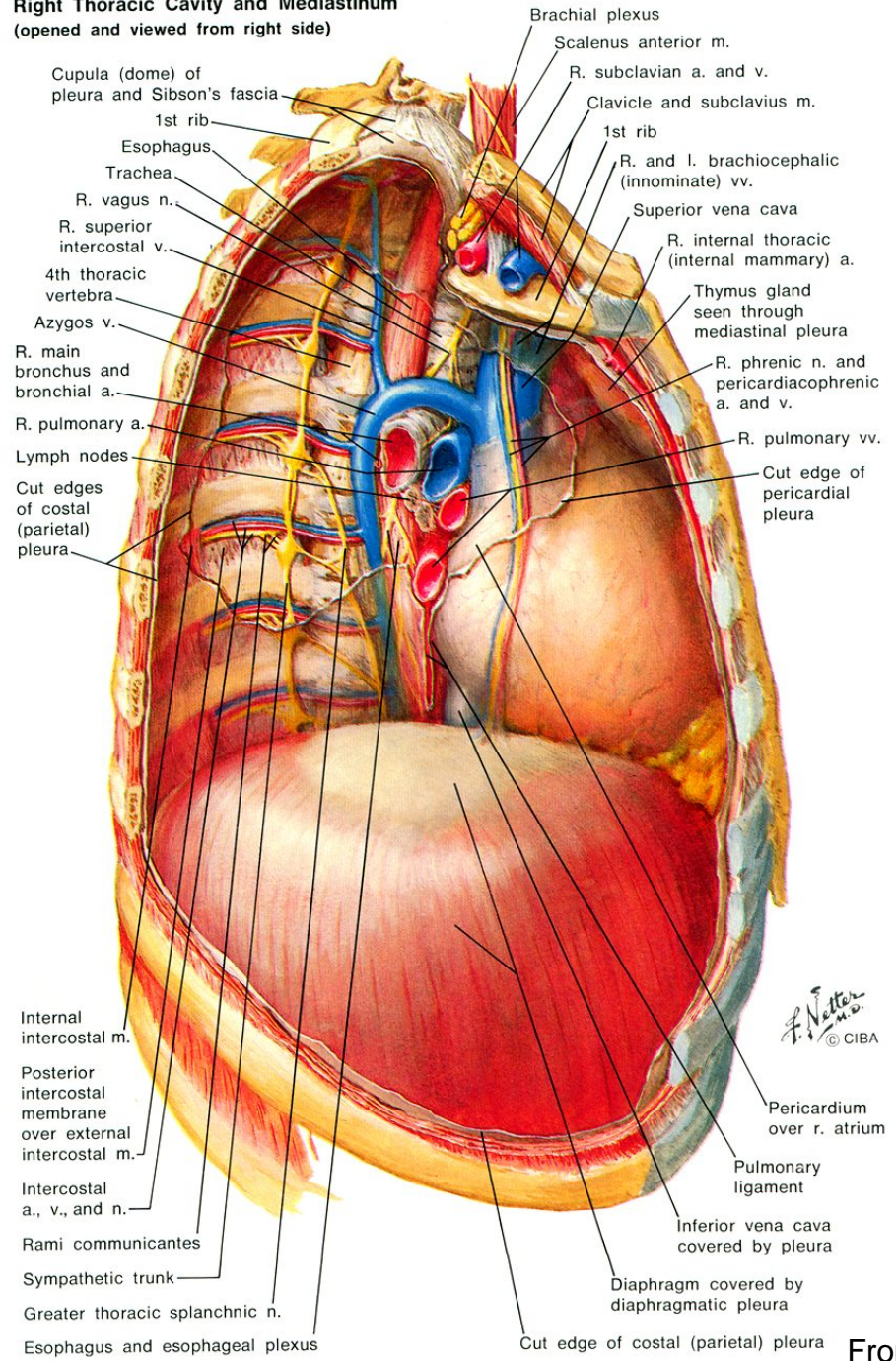
Mediastinal lesions and their distribution in 102 patients



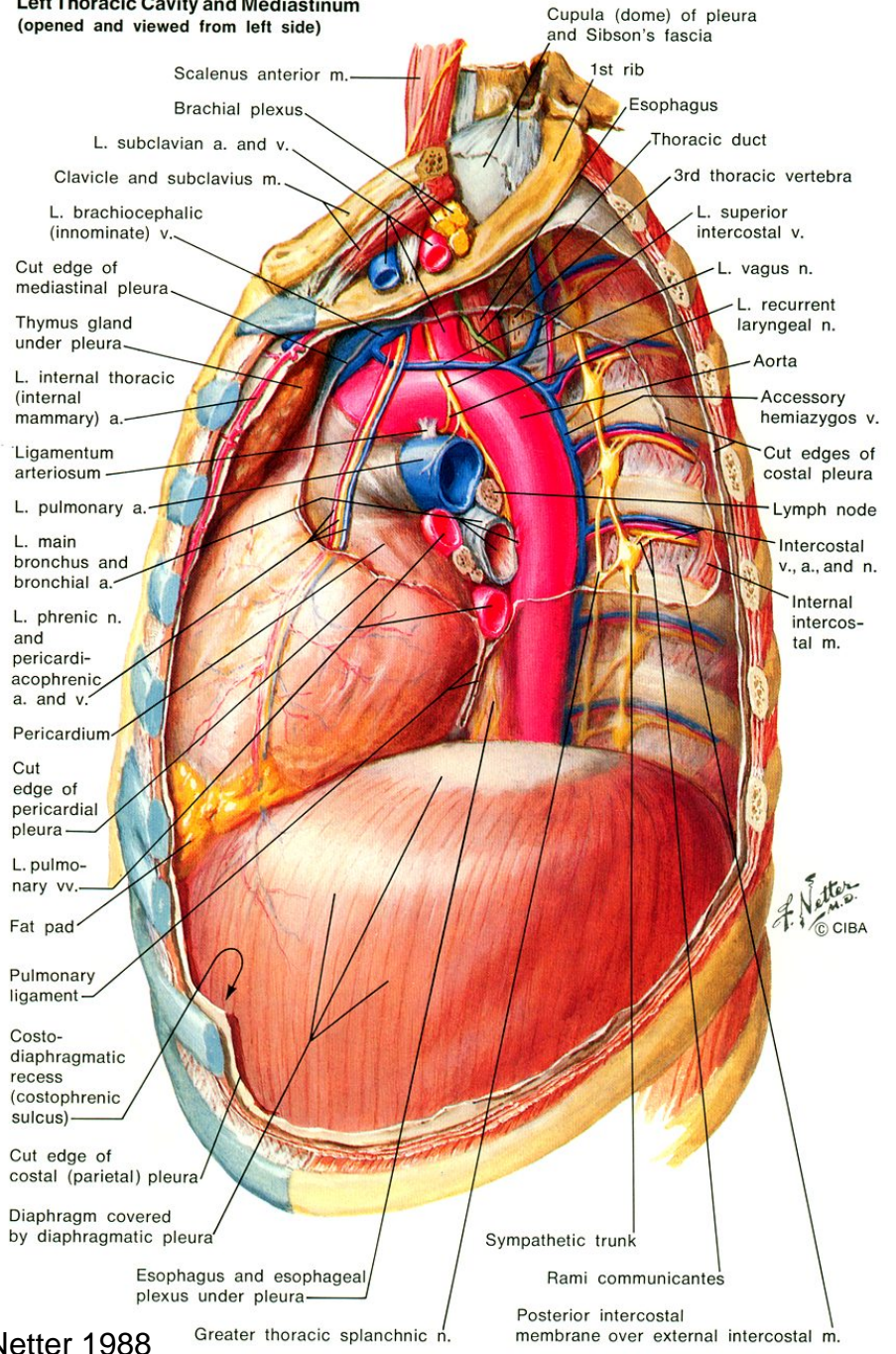
from Schwartz et al., 1999



**Right Thoracic Cavity and Mediastinum**  
(opened and viewed from right side)



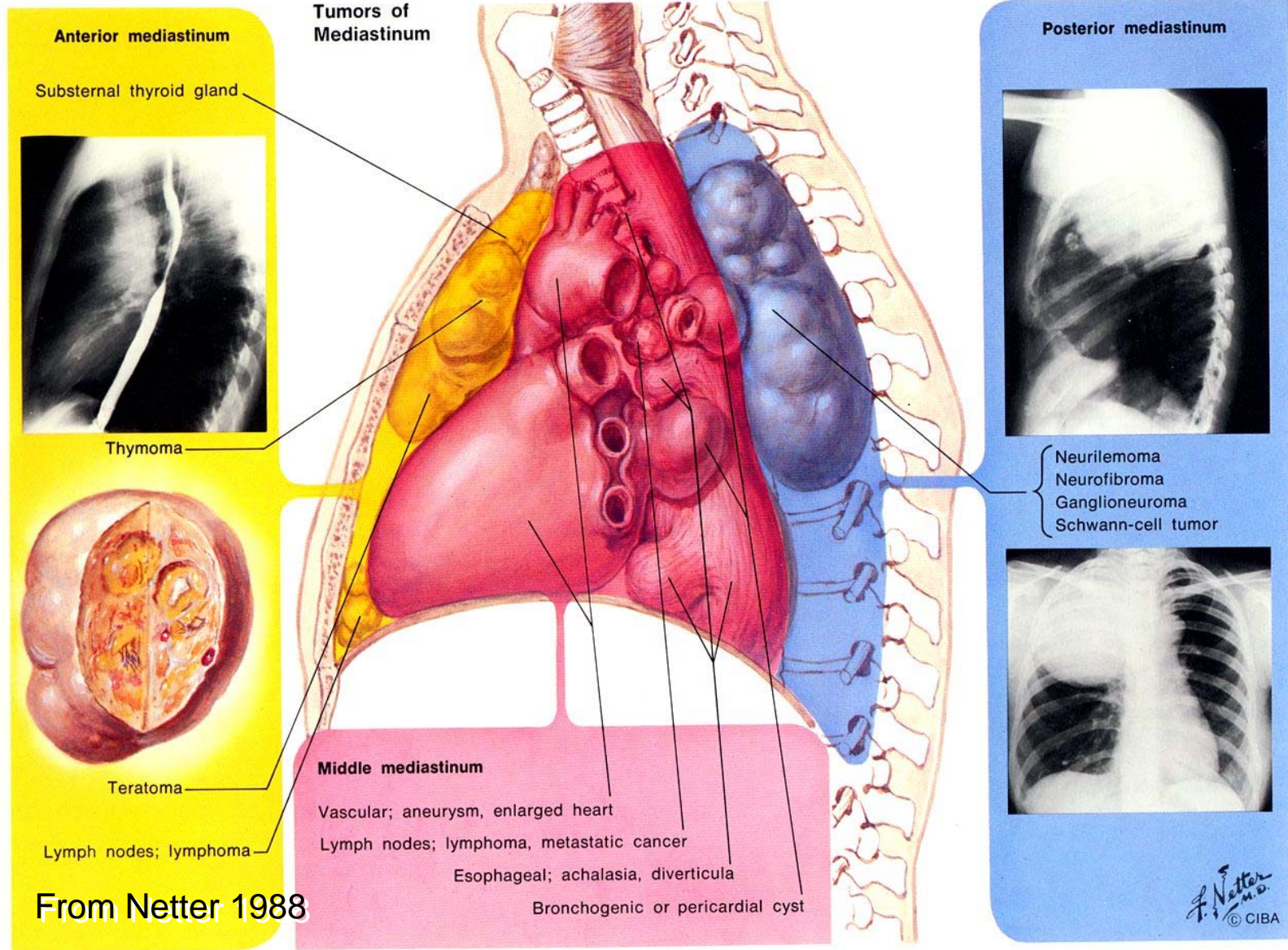
**Left Thoracic Cavity and Mediastinum**  
(opened and viewed from left side)



From Netter 1988



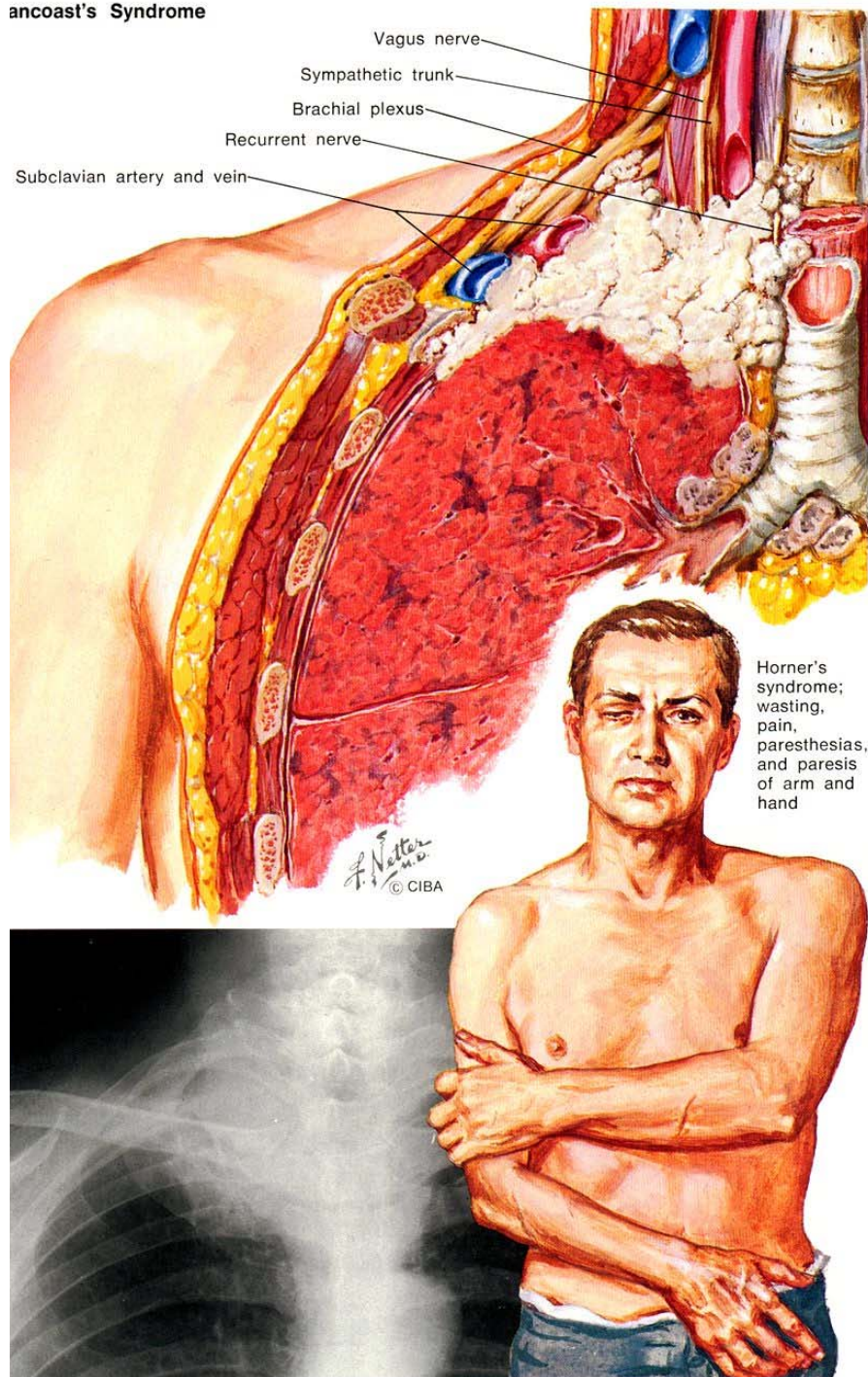
# Mediastinal Masses



Anterior mediastinum: “four Ts”— **T**hymoma, **T**hyroid tumor, **T**errible lymphoma, **T**eratoma



## Pancoast's Syndrome



## Pancoast's Syndrome

- Bronchogenic carcinoma in the apex of the lung
- Horner's Syndrome: miosis, ptosis, enophthalmos, anhidrosis
- Lower brachial plexus injury (C8-T1): Klumpke's palsy
- Paresthesia of the upper extremity due to compression of subclavian a. & v.
- Shoulder pain: due to involvement of upper ribs and intercostal nerves
- Respiratory effects

From Netter 1988



## References

- Daffner, R. H. 1993. *Clinical Radiology, The Essentials*. Williams & Wilkins, Baltimore.
- Healey, J. E. Jr., and J. Hodge. 1990. *Surgical Anatomy, 2nd Ed.* Decker, Philadelphia.
- Moore, K. L. and A. F. Dalley. 1999. *Clinically Oriented Anatomy, 4th Ed.* Lippincott, Williams & Wilkins, Baltimore.
- Netter, F. H. 1988. The CIBA Collection of Medical Illustrations, Volume 7: Respiratory System. CIBA-Geigy, Summit.
- Schwartz et al. (eds.), *Principles of Surgery, 7<sup>th</sup> Ed.*, McGraw Hill, New York.