

The Thorax

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- *Forms protective cage around vital organs of the thoracic cavity (heart, lungs, and great blood vessels).*
- *Supports the shoulder girdles and upper limbs.*
- *Provides attachment points for the muscles of the back, chest, and shoulders.*
- *Intercostal spaces between the ribs are occupied by intercostal muscles.*

The Sternum

- Flat bone approximately 15cm.long (6 in.)
- Fusion of three bones: *manubrium, body, and xiphoid process.*
- Landmarks: *jugular notch, sternal angle and xiphisternal joint.*

The Ribs

- Ribs originate on/between thoracic vertebrae; attach to sternum
12 pairs
7 true (*vertebrosternal*)
3 false (*vertebrochondral*)
2 floating(*vertebromuscular ribs*)
- Rib morphology: *head, neck, tubercle,angle, shaft, costal groove.*

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The Mammary Glands

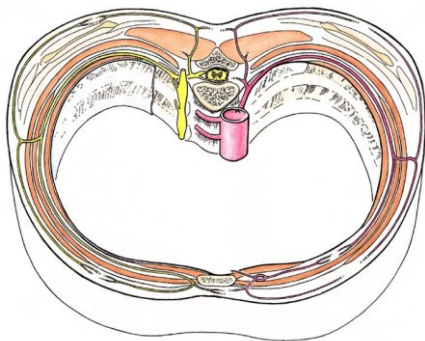
- Pectoral fat pad
- Nipple, areola
- Lactiferous duct
- Lactiferous sinus
- Suspensory ligament
- Angiology-branches of int.thoracic artery

Respiratory Muscles

- **Diaphragm**
- **External, internal intercostal**
- **Accessory muscles:** Sternocleidomastoid, serratus anterior, pectoralis minor, scalenes (inspiration)

Respiratory movements

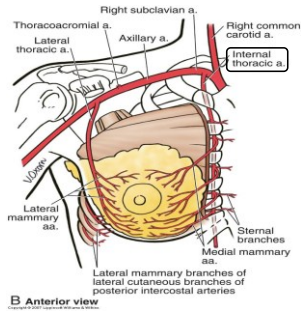
- **Eupnea** diaphragmatic breathing/costal breathing
- **Hyperpnea**



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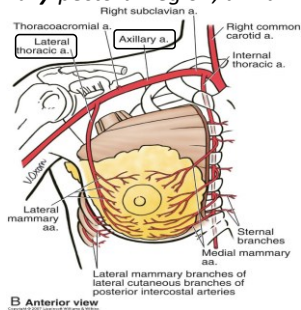
Subclavian Arteries and Branches

- **Internal thoracic**-anterior thoracic wall



Subclavian Arteries and Branches

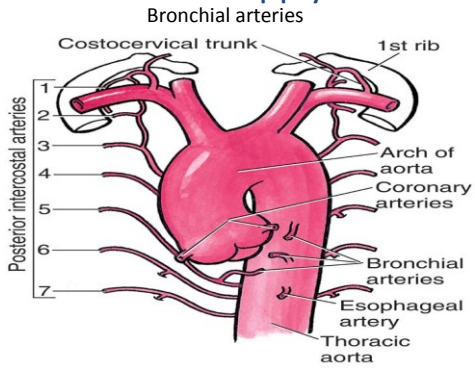
- **Axillary-pectoral region, axilla**



The Descending Aorta **Thoracic Aorta & Branches**

- **Visceral branches**-Bronchial, pericardial, mediastinal, esophageal arteries.
- **Parietal branches**-Intercostal, superior phrenic.

Blood Supply



Systemic Veins

SVC formation

- **Subclavians**
- **Brachiocephalics**(vertebrals,ext/int jugulars)
- **Azygos(hemiazygos)**-chief blood collectors of thorax

The Trachea

- Descends from larynx into mediastinum
- 10-12 cm (4 inches) long,2.5cm diameter(1 inch)
- **Tracheal walls**-mucosa, submucosa, adventitia
- **Trachealis muscle**
- **Carina**

The Bronchi and Subdivisions:
The Bronchial Tree
The Conducting Zone

- Right/left primary bronchi(extrapulmonary)
- Secondary(lobar),tertiary(segmental), terminal bronchioles
- Structural changes occur as bronchi diameter diminish:(1)cartilage rings replaced by irregular cartilaginous plates; (2)pseudostratified>columnar>cuboidal; and (3)smooth muscle increases.

The Bronchial Tree
The Respiratory Zone

- Terminal bronchioles feed into into respiratory bronchioles.
- Alveolar ducts
- Alveolar sacs

Respiratory membrane

- **Type I cells** (epitheliocytes)-alveolar walls; angiotensin converting enzyme(ACE)
- **Type II cells**-secrete surfactant (interferes w/H2O molecule cohesiveness)
- **Alveolar macrophages**
- **Respiratory membrane**-fused basal laminas of alveolar epithelium & capillary endothelium

Pathologies

Chronic Obstructive Pulmonary Disease

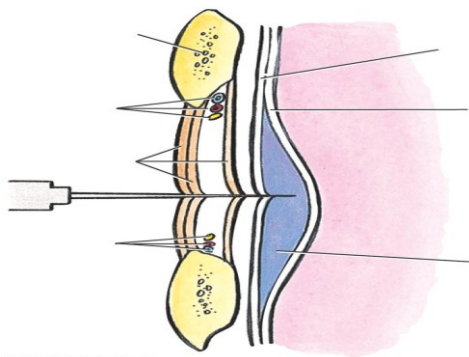
- Obstructive emphysema-alveolar enlargement, alveolar wall deterioration
- Chronic bronchitis-inhaled irritants
- Asthma
- Tuberculosis
- Lung Cancer

The Pleurae

- *Parietal*
- *Visceral*
- *Pleural cavity*

Respiratory Muscles

- *Diaphragm*
- *External,internal intercostal*
- *Accessory muscles:*
Sternocleidomastoid,serratus anterior, pectoralis minor, scalenes (inspiration)



Gross Anatomy of the Lungs

- **Apex, base, root**
- **Lobes:** Superior, middle, inferior
- **Fissures:** Horizontal, oblique
- **Surfaces:** Costal, mediastinal, cardiac notch
- **Connective tissue, trabeculae, elastic fibers, smooth muscles, and lymphatics.**

Blood Supply and Innervation of the Lungs

- Pulmonary arteries, arterioles, pulmonary capillary network, venules, veins
- Bronchial arteries
- Pulmonary plexus-parasympathetic motor, visceral sensory fibers

The Heart

Size, Location, and Orientation

- **Weighs between 250-350 grams**
- **Located in mediastinum (extends obliquely from 2nd rib to 5th intercostal space)**
- **Base, apex**

Coverings of the Heart

- **Fibrous pericardium**-(1) protection;(2) anchors to surroundings (diaphragm,great vessels); (3) prevents blood overfill.
- **Serous pericardium**-(1) parietal layer lines inner fibrous pericardium;(2)visceral layer (epicardium);(3) Pericardial cavity-in between

Layers of the Heart Wall

- **Epicardium**-often infiltrated with adipose
- **Myocardium**-layered cardiac muscle tissue(contractile), CT, blood vessels, & nerves
- **Endocardium**-glistening white endothelial layer resting on CT;continuous with endothelium

Fibrous Heart Skeleton

- *Collagen & elastic fibers*
- *Encircle bases of pulmonary trunk/aorta and heart valves*
- **Functions**:(1) stabilizes cardiocyte/valve positionings; (2) reinforcement of blood vessels & nerves;(3) elasticity

Anatomical Orientation and Superficial Heart Anatomy

- **Borders:** Superior, Right, Inferior, Left
- **Sterncostal surface**-rt.atrium & ventricle
- **Diaphragmatic surface**-post./inf.wall of left ventricle
- **Auricles**
- **Coronary sulci**
- **Interventricular sulci**(ant.,post.)

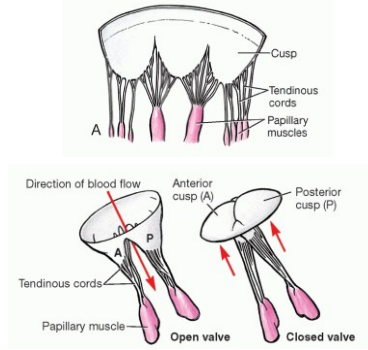
Internal Anatomy/Organization of the Heart

- **Right atrium**-superior/inferior vena cavae,coronary sinus;pectinate muscles, interatrial septum, fossa ovalis
- **Tricuspid valve**
- **Right ventricle**-chordae tendineae, papillary muscles,trabeculae carneae, pulmonary semilunar valve, pulmonary trunk

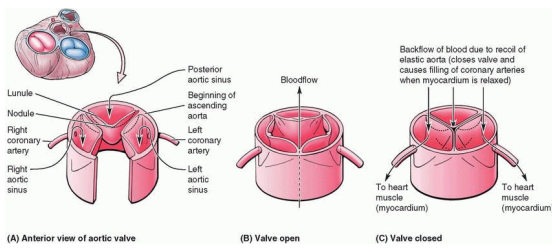
Internal Anatomy/Organization of the Heart(cont'd)

- **Left Atrium**-Lt./Rt. Pulmonary veins
- **Bicuspid valve**
- **Left ventricle**-Aortic semilunar valve,aortic sinuses, ascending aorta
- **Vestigial structures**:Ligamentum arteriosum(pulm.trunk, aortic arch),fossa ovalis

AV valve functional anatomy



Semilunar valve functional anatomy



Coronary Circulation

Arterial Supply

- **Left coronary artery:** anterior interventricular art. (supplies intervent. septum & ant. walls of rt./lt. ventr.) and circumflex art. (lt. atrium & post. walls of lt. vent.)
- **Right coronary artery:** marginal art. (supplies myocardium of lateral part (rt. side) and post. intervent. art. (post. ventr. walls))
- **Anastomoses:** fusing collateral routes

Coronary Circulation

Venous Supply

- **Coronary sinus**-receives blood from great, middle, and small cardiac veins

Cardiac Cycle

- **Systole**-chamber contraction (atrial 0.1s, ventricular 0.3s)
- **Diastole**-chamber relaxation(0.4 s)

Cardiac Cycle

Heart Sounds

- **1st ("lubb") sound**- beginning ventricular systole
- **2nd ("dupp") sound**-beginning ventricular diastole
- **3rd/4th sounds** associated with ventricular blood flow & atrial contractions

Cardiac Cycle

Coordination of Cardiac Contractions

- **Nodal cells**-establish contraction rates(SA, AV nodes)
- **Conducting fibers**-distribute contractile stimuli to myocardium(AV bundle, Purkinje fibers)
- **Bradycardia, Tachycardia**

Mediastinum

- Viscera between pulmonary cavities
- Covered by mediastinal pleura

Mediastinum

Boundaries:

- Superior thoracic aperture
- Diaphragm
- Sternum
- Thoracic vertebral bodies

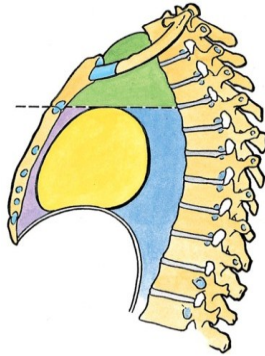
Mediastinum

Surrounded by

- Blood & lymphatic vessels
- Lymph nodes
- Nerves
- Adipose
- Loose CT & lung elasticity accommodates movement

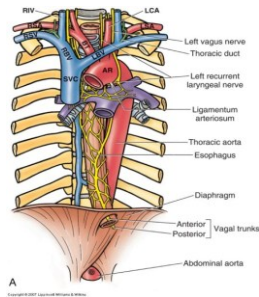
Mediastinal Divisions

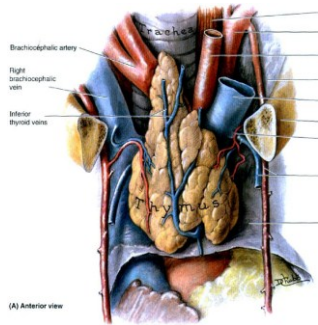
- Superior
- Inferior
 - Anterior
 - Middle
 - Posterior



Superior Mediastinum

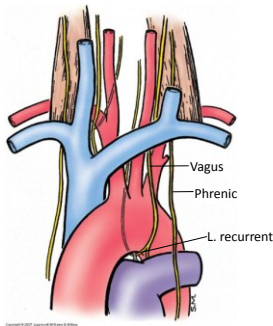
- Superior vena cava
- Brachiocephalic veins
- Aortic arch
- Thoracic duct
- Trachea
- Esophagus
- Thymus





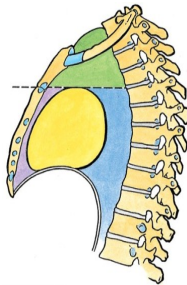
Superior Mediastinum

- Nerves
- Vagus
- L. recurrent laryngeal
- Phrenic



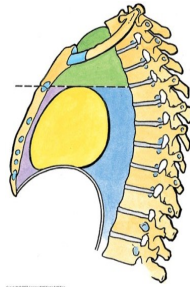
Anterior Mediastinum

- Sternopericardial ligaments
- Adipose
- Lymphatic vessels
- Lymph nodes
- Internal thoracic vessels



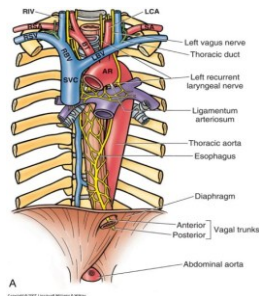
Middle Mediastinum

- Pericardium
- Heart
- Ascending aorta
- Pulmonary trunk
- SVC
- Azygos arch
- Main bronchi



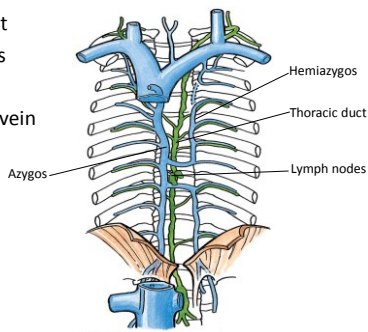
Posterior Mediastinum

- Thoracic aorta



Posterior Mediastinum

- Thoracic duct
- Lymph nodes
- Azygos vein
- Hemiazygos vein



Posterior Mediastinum

- Esophagus
- Esophageal plexus
- Thoracic sympathetic trunks and nerves

