

Examination of the Thorax and Lungs

Thorax and Lungs: Function

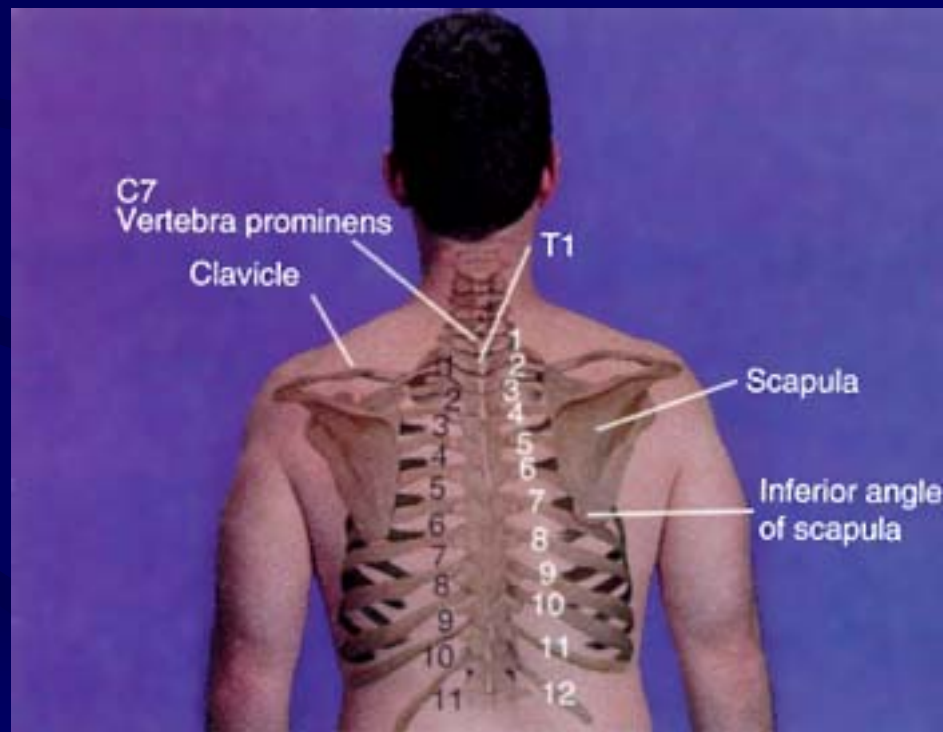
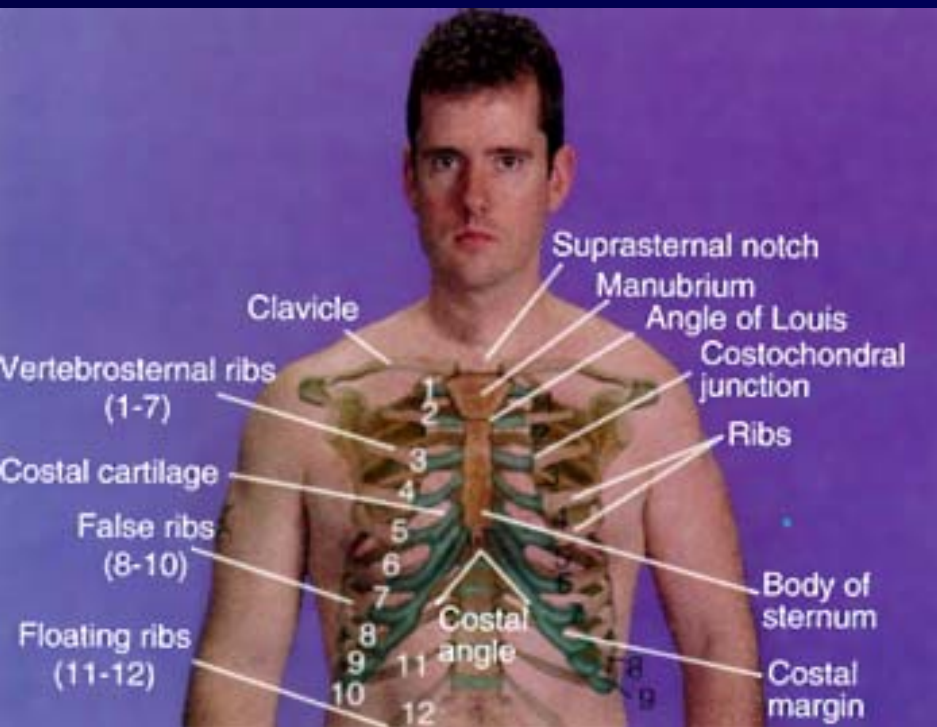
- Thorax
 - bony structures --> protective, expandable cage
 - muscles --> increase intrathoracic space
- Lungs
 - movement of air
 - gas exchange

The Thorax: Anatomy

Bones and Cartilage

- Anterior
 - sternum
 - manubrium
 - xiphoid process
 - costal cartilages
- Lateral
 - 12 pairs of ribs
 - all connected to thoracic vertebrae
 - upper 7 connected to sternum by costal cartilages anteriorly
- Posterior
 - 12 thoracic vertebrae

The Thorax



The Thorax: Anatomy

Musculature

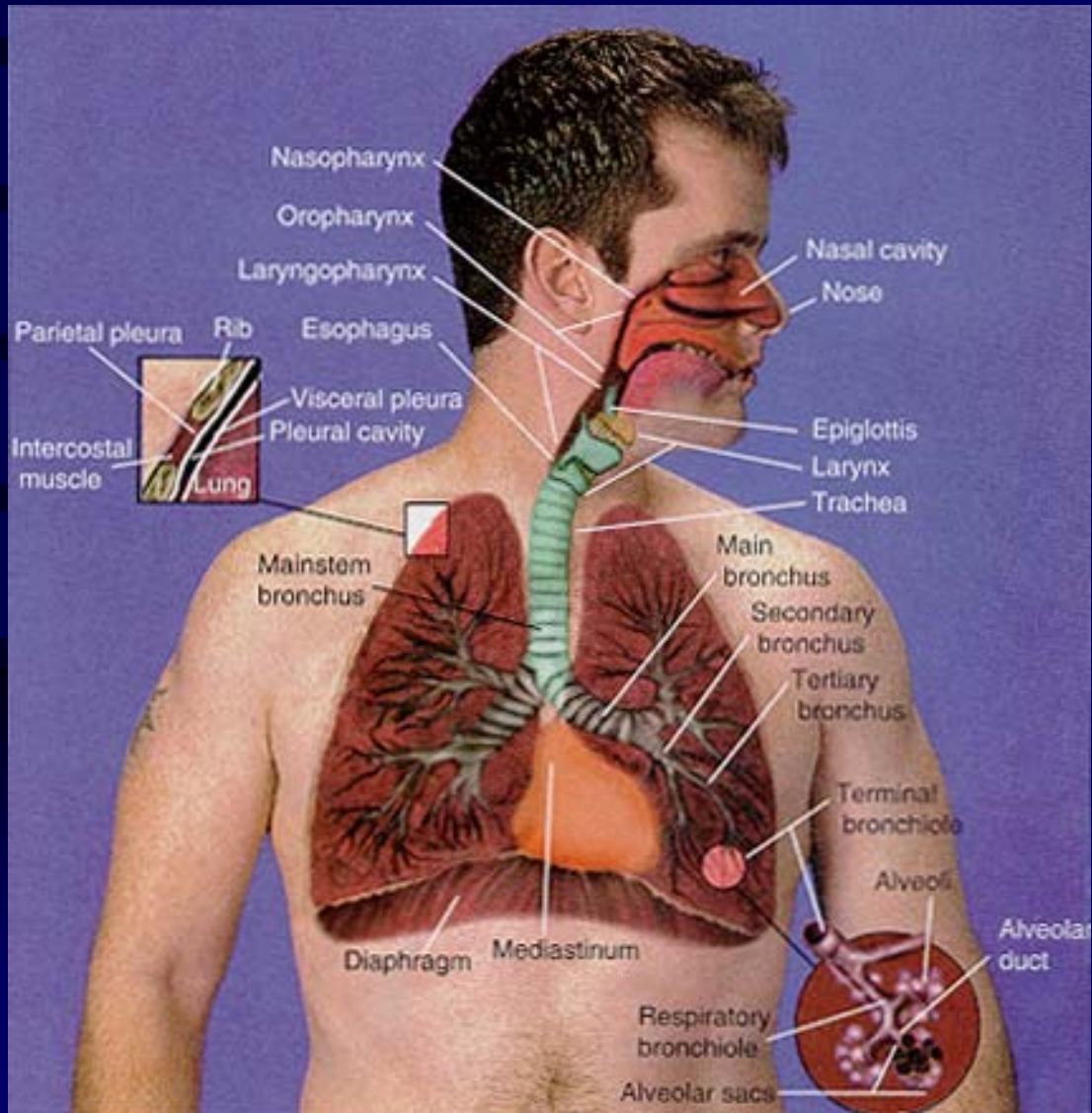
- Diaphragm
 - contracts and moves downward during inspiration
 - increases intrathoracic space
- Intercostals
 - External
 - increase anteroposterior diameter during inspiration
 - Internal
 - decrease the transverse diameter during expiration
- Accessory muscles
 - sternocleidomastoid
 - trapezius

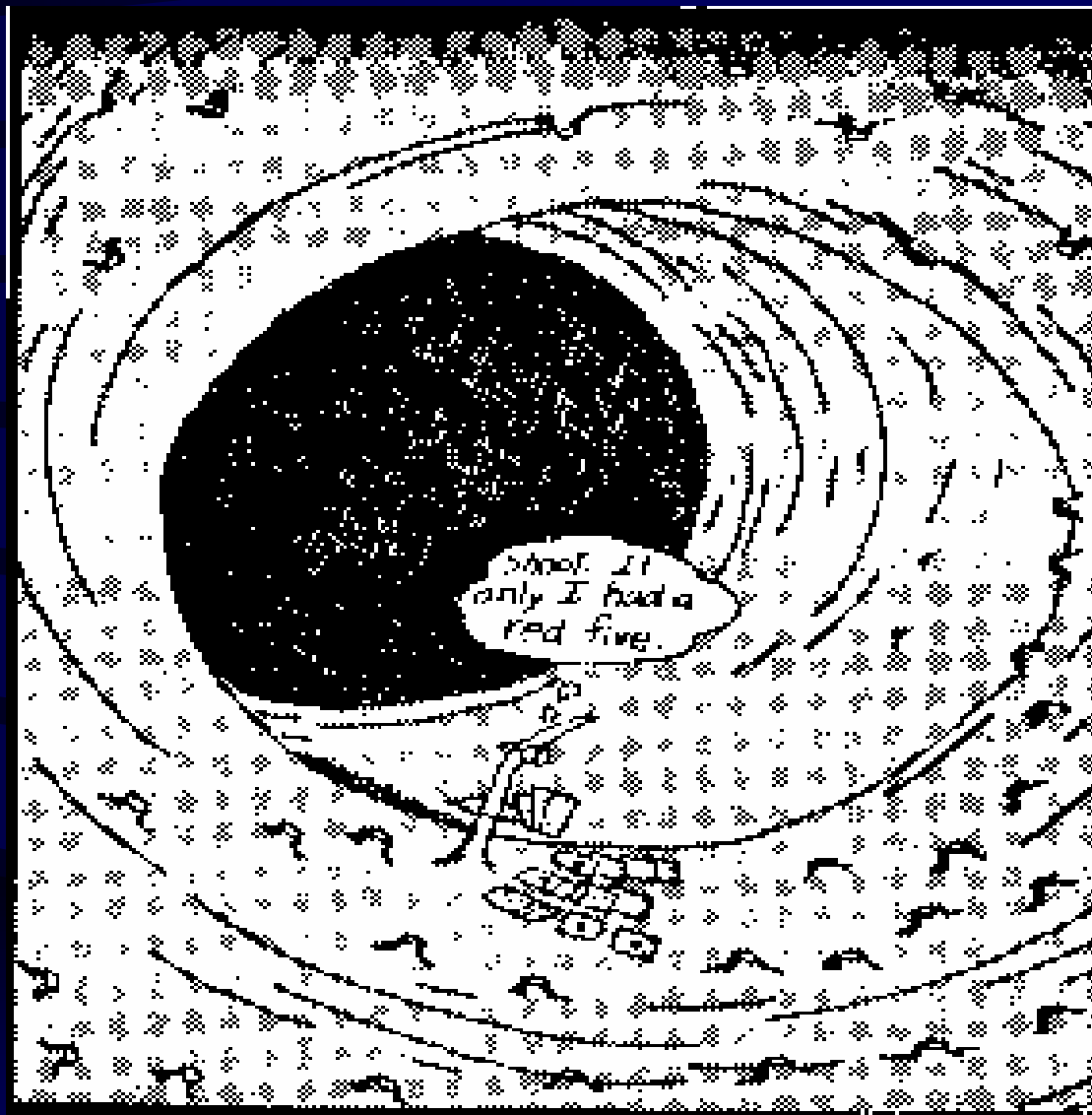
The Thorax: Anatomy

Interior

- Right Pleural Cavity
 - lined with parietal and visceral plurae
 - contains right lung which has 3 lobes
- Left Pleural Cavity
 - lined with parietal and visceral plurae
 - contains left lung with has 2 lobes
- Mediastinum
 - situated between the lungs
 - contains all of the thoracic viscera except the lungs

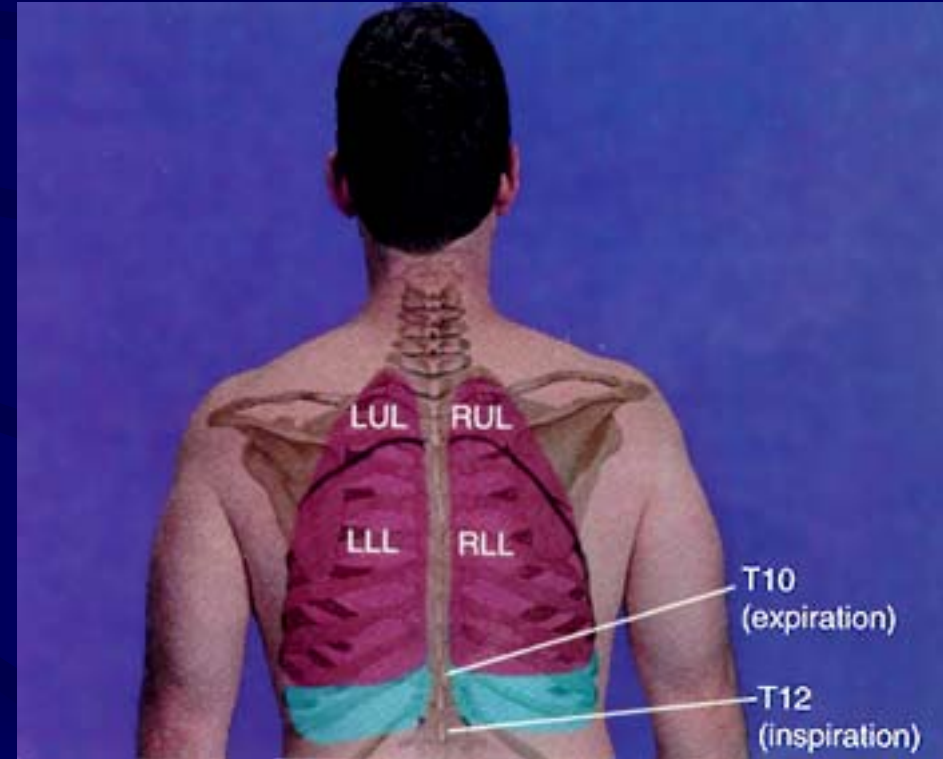
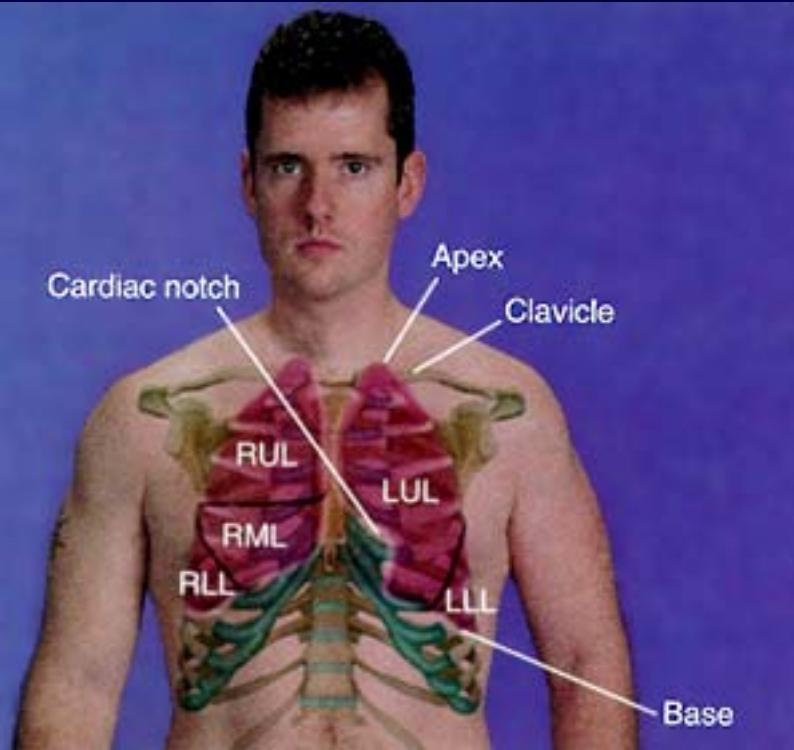
The Respiratory Tract



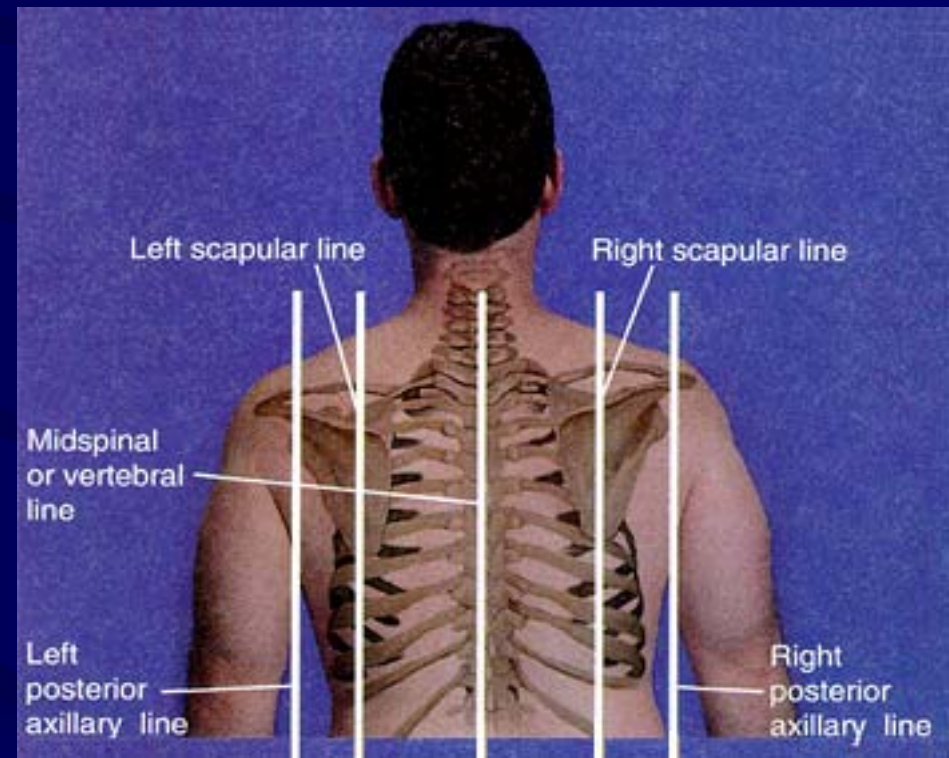
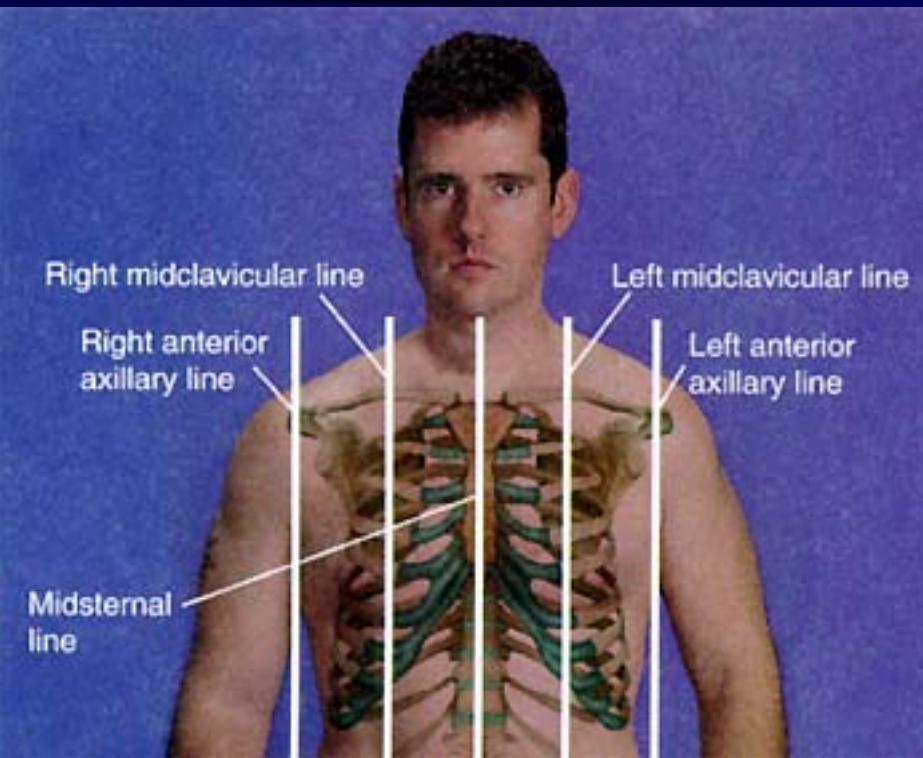


The last cilium on a smoker's lung

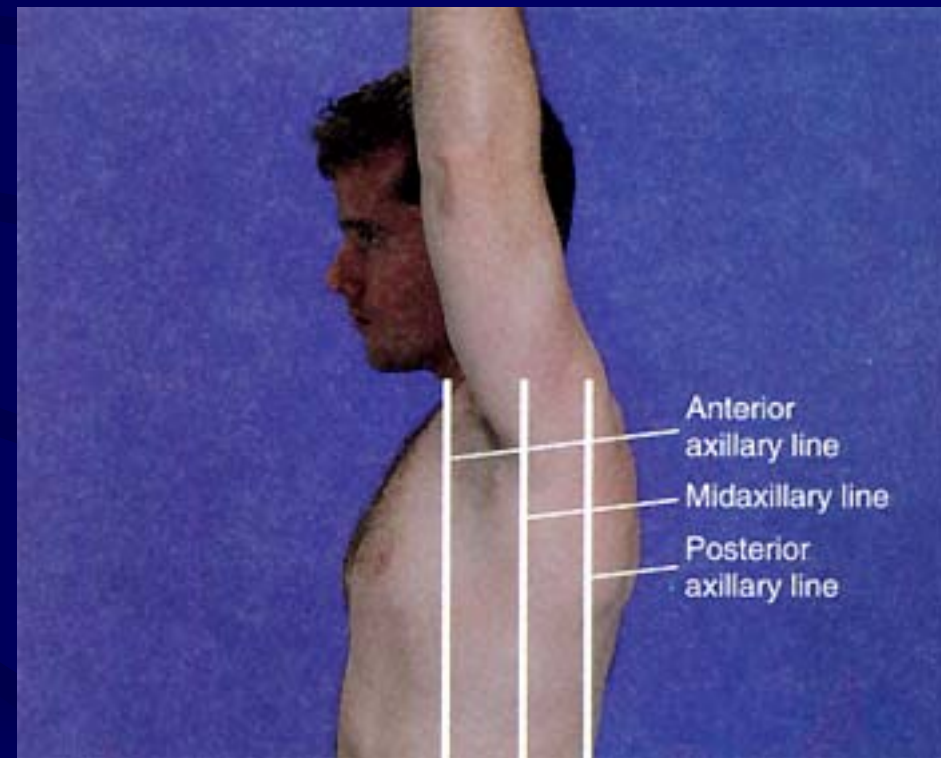
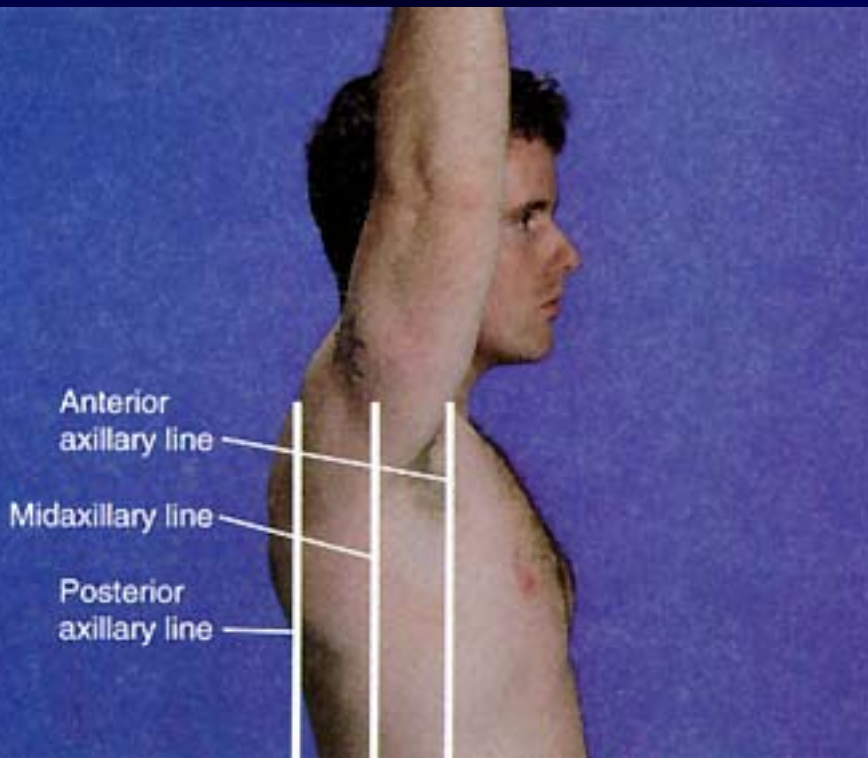
Visualizing the Lungs from the Surface



Thoracic Landmarks



Thoracic Landmarks (cont.)



Thorax and Lung Anatomy: Variations

- Infants and Children
 - chest of newborn generally round . . . assumes adult proportions by 2 years
 - chest wall is thin, more yielding, & prominent
- Pregnant Women
 - chest expansion increases, lung length decreases, and diaphragm rises
 - deeper breathing & slightly increased rate of respiration
- Older Adults
 - barrel chest look
 - chest wall may stiffen and expansion is decreased
 - underventilation of alveoli and decreased exercise tolerance
 - mucous membranes become drier . . . bacterial growth may occur from retained mucous

Thorax and Lung Assessment: History Review

- Present Problem
 - coughing
 - shortness of breath
 - chest pain
- Past Medical History
 - thoracic trauma or surgery
 - use of oxygen
 - chronic pulmonary diseases
 - other systemic disorders
 - testing
- Family History
 - tuberculosis, cystic fibrosis, emphysema
 - allergy, asthma, atopic dermatitis
 - malignancy
- Personal & Social History
 - work related exposures
 - use of protective devices
 - home environment, hobbies
 - exercise tolerance
 - travel history

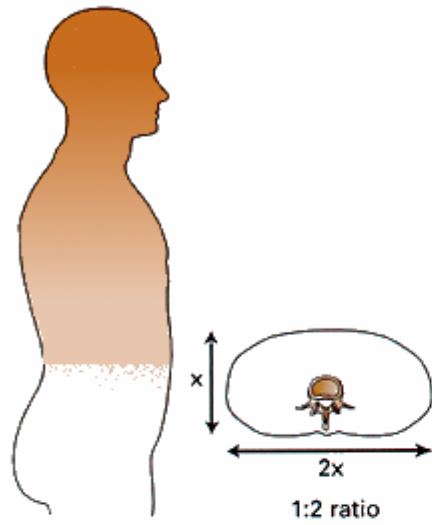
History Variations

- Infants and Children
 - low birth weight or assisted ventilation
 - coughing or possible aspiration
 - difficult feeding
 - apneic episodes
 - sibling crib death
 - recurrent spitting up, recurrent pneumonia
- Older Adults
 - exposure and frequency of respiratory infections
 - effects of weather and activity on respiratory status
 - difficulty swallowing
 - immobilization or marked sedentary habits
 - influenza and pneumonia vaccines

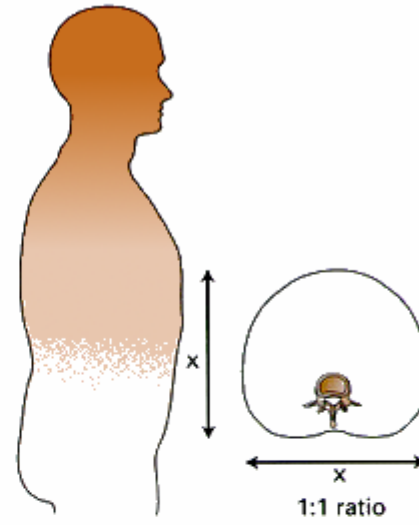
Examination of the Thorax & Lungs: Inspection

- Size and shape
 - anteroposterior : transverse
- Symmetry
 - deformities
- Color
 - skin, nails, lips
- Superficial venous patterns
- Prominence of ribs
- Breath odor

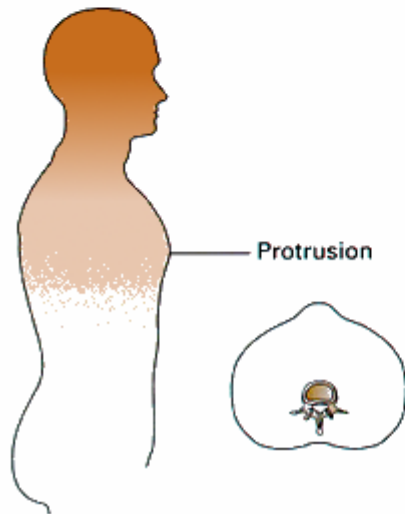
A. Normal Adult



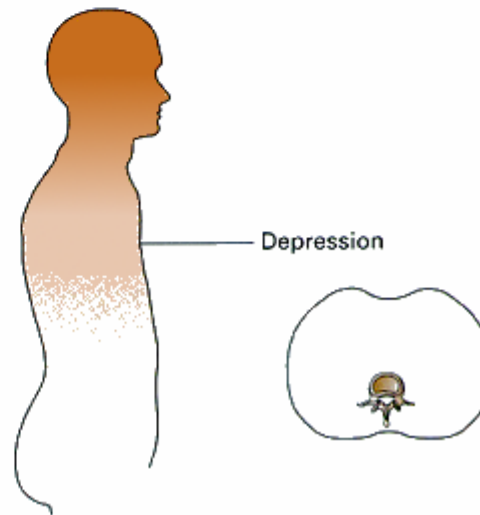
B. Barrel Chest



C. Pectus Carinatum



D. Pectus Excavatum



Examination of the Thorax & Lungs: Inspection

- Evaluate respirations for:
 - Rate
 - Rhythm or pattern
- Inspect chest movement with breathing for:
 - Symmetry
 - Bulging/Retractions
 - Use of accessory muscles
- Note any audible sounds with respiration
 - wheezes
 - stridor

Patterns of Respiration

1. Eupnea (normal)



2. Tachypnea



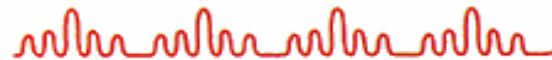
3. Bradypnea



4. Apnea



5. Cheyne-Stokes



6. Biot's



7. Apneustic



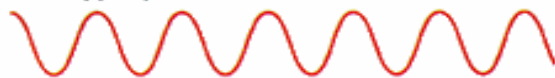
8. Agonal



9. Shallow



10. Hyperpnea



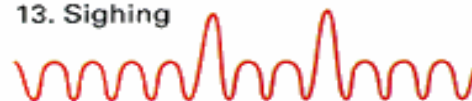
11. Air trapping



12. Kussmaul's



13. Sighing



Examination of the Thorax & Lungs: Palpation

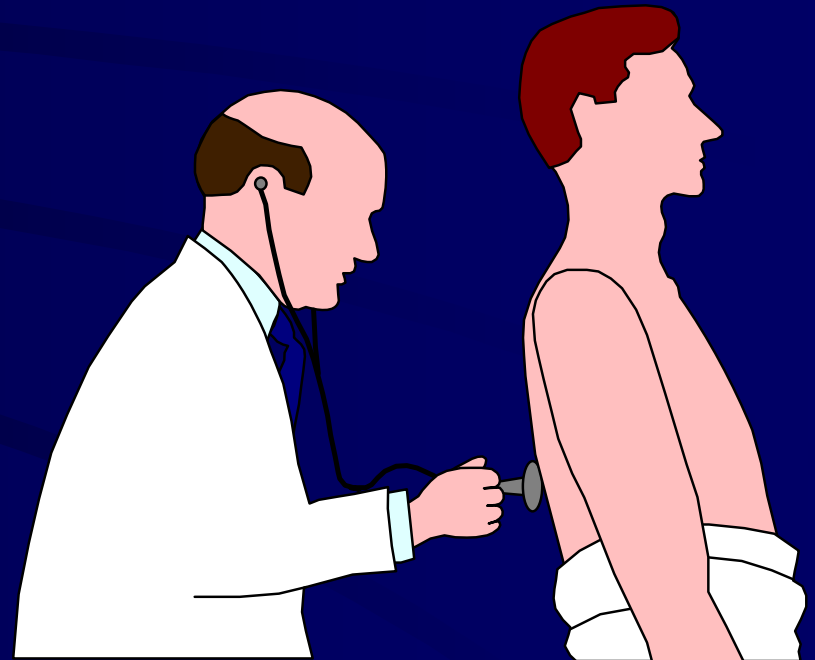
- Palpate the chest for the following:
 - Symmetry
 - Tenderness
 - Pulsations
 - Sensations such as crepitus, grating vibrations
 - Thoracic expansion
 - Tactile fremitus
 - Position of the trachea

Examination of the Thorax & Lungs: Percussion

- Percuss for:
 - Tone, comparing all areas bilaterally
 - resonance - loud, low pitch -> normal lung
 - hyperresonance - very loud, very low pitch -> COPD, pneumothorax
 - dullness - medium intensity and pitch -> pneumonia, pleural effusions
 - Diaphragmatic excursion




Examination of the Thorax & Lungs: Auscultation

- Breath sounds
- Adventitious
(unexpected) sounds
- Vocal resonance



Breath Sounds

Table 14-2 Characteristics of Normal Breath Sounds

BREATH SOUND	PITCH	INTENSITY	QUALITY	RELATIVE DURATION OF INSPIRATORY AND EXPIRATORY PHASES	LOCATION	
Bronchial	High	Loud	Blowing/hollow	$I < E$		Trachea
Bronchovesicular	Moderate	Moderate	Combination of bronchial and vesicular	$I = E$		Between scapula, first and second ICS lateral to the sternum
Vesicular	Low	Soft	Gentle rustling/breezy	$I > E$		Peripheral lung

Auscultation Technique

- Patient sitting, breathing slowly and deeply through mouth
- Avoid hyperventilation!
- Use diaphragm of stethoscope
- Diaphragm placed firmly on the skin
- Listen to anterior, posterior and lateral



Adventitious Sounds

- **Discontinuous**
 - Fine crackles
 - Coarse crackles
- **Continuous**
 - Rhonchi (sonorous wheeze)
 - Wheeze (sibilant wheeze)
 - Pleural friction rub
 - Stridor

Vocal Resonance

- Bronchophony
- Whispered pectoriloquy
- Egophony

Examination of the Thorax & Lungs: Web Resources

- To hear breath sounds:
 - The R.A.L.E. Repository
 - <http://www.RALE.ca/>
 - RC-WEB
 - <http://www.hsc.missouri.edu/~shrp/rtwww/rcweb/docs/sounds.html>
- History and Physical Study Guides:
 - <http://www.medinfo.ufl.edu/year1/bcs/clist/index.html>