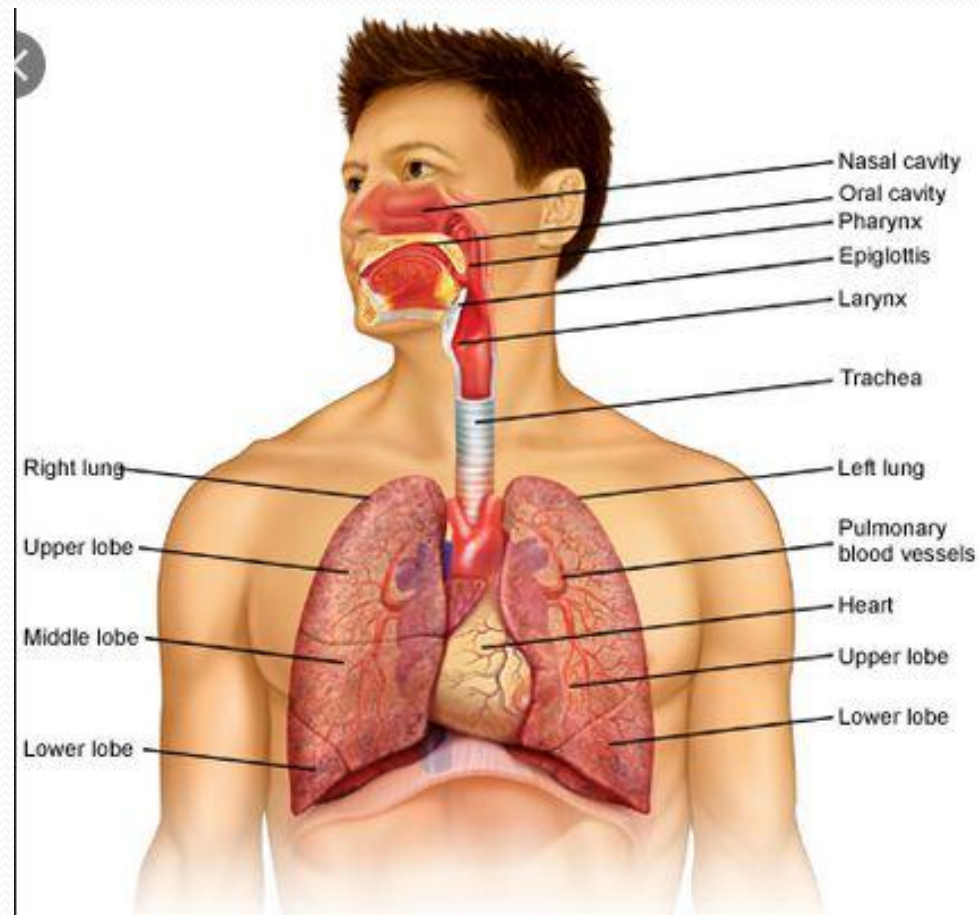
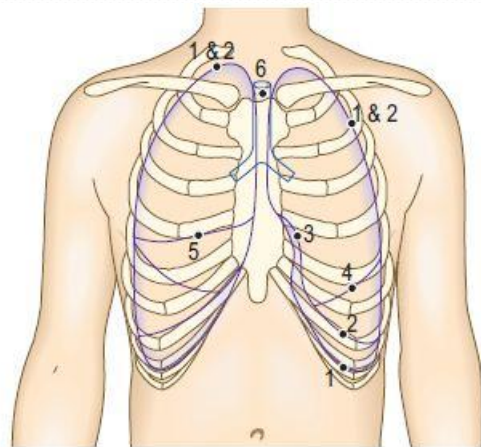


RESPIRATORY SYSTEM EXAM

ROGNIDAN & V.V.DEPT.

ANATOMY

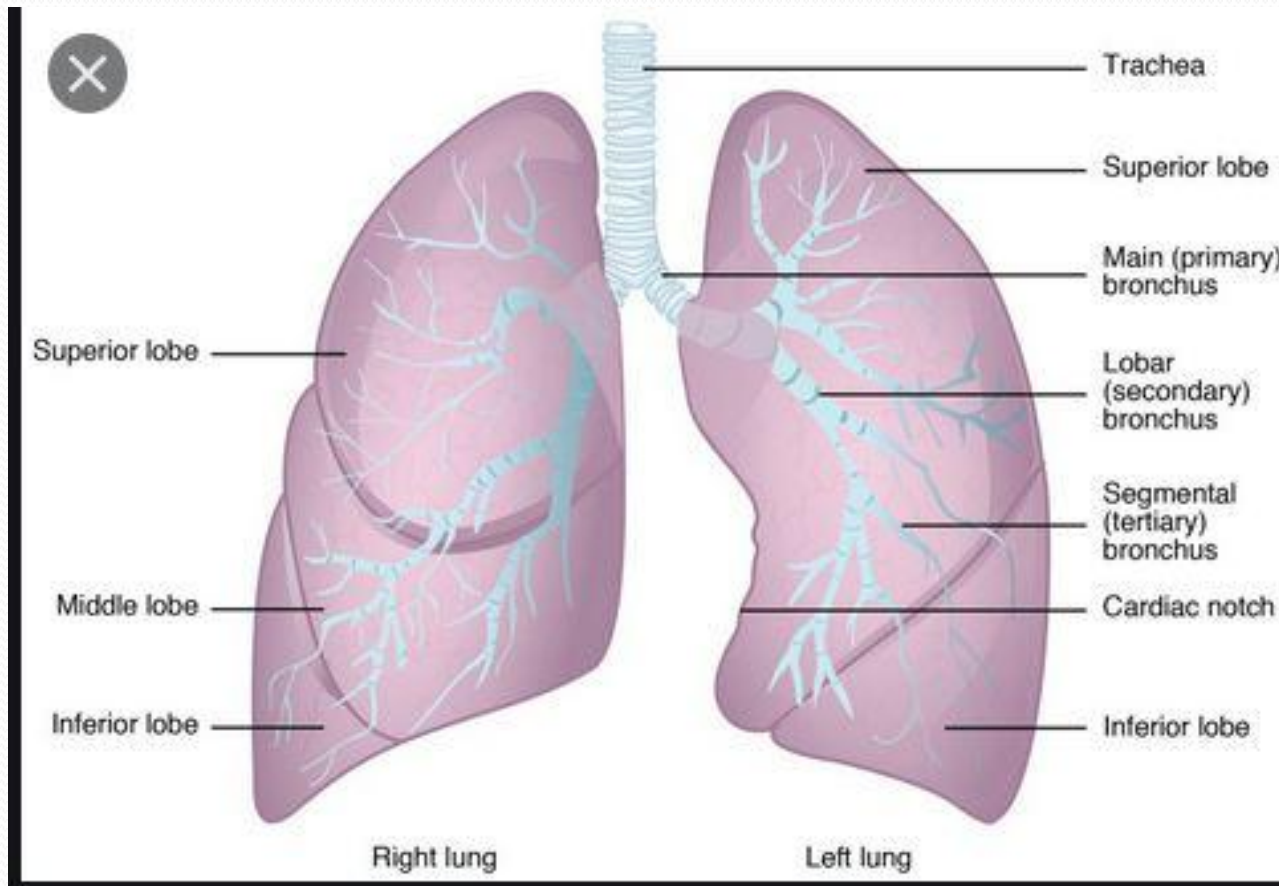




- | | |
|--------------------|----------------------|
| 1 Pleural markings | 4 Oblique fissure |
| 2 Lung markings | 5 Horizontal fissure |
| 3 Cardiac notch | 6 Trachea |

A





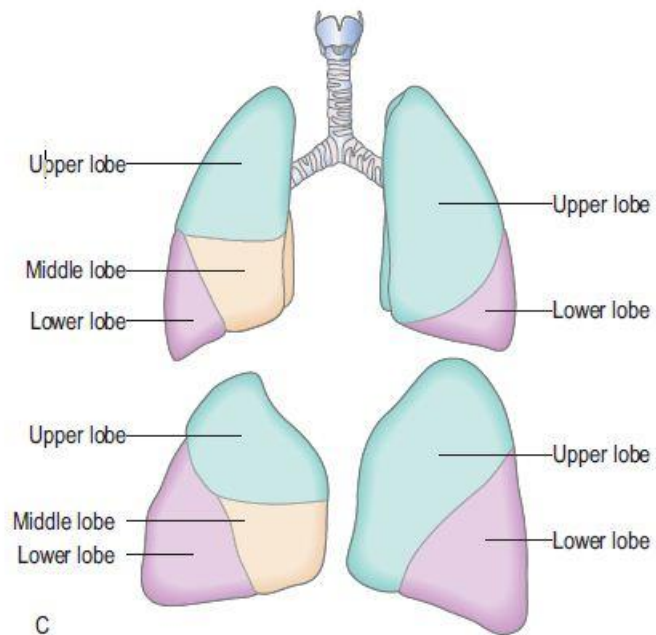


Fig. 7.1 Surface anatomy of the thorax. (A) Surface markings of the lungs and pleura, trachea and bronchi. The trachea is normally central. The bifurcation of the trachea corresponds on the anterior chest wall with the sternal angle, the transverse bony ridge at the junction of the sternum and manubrium sternum. Count the ribs downwards from the second costal cartilage at the level of the sternal angle. (B) Surface markings of the right lung and underlying viscera. (C) Lobes of the lungs: anterior view (upper) and lateral view (lower).



Fig. 3.4.2: Lobes to be examined on anterior surface of chest



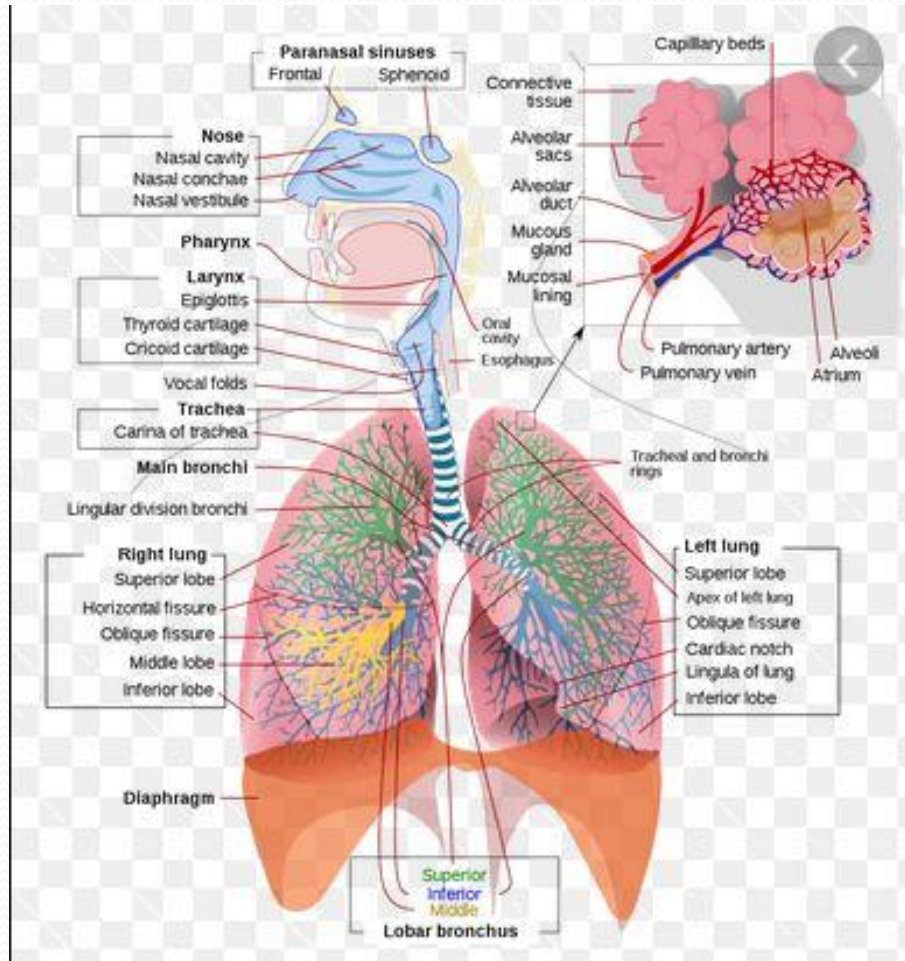
Fig. 3.4.4: Lobes on left lateral surface and axillary area of chest

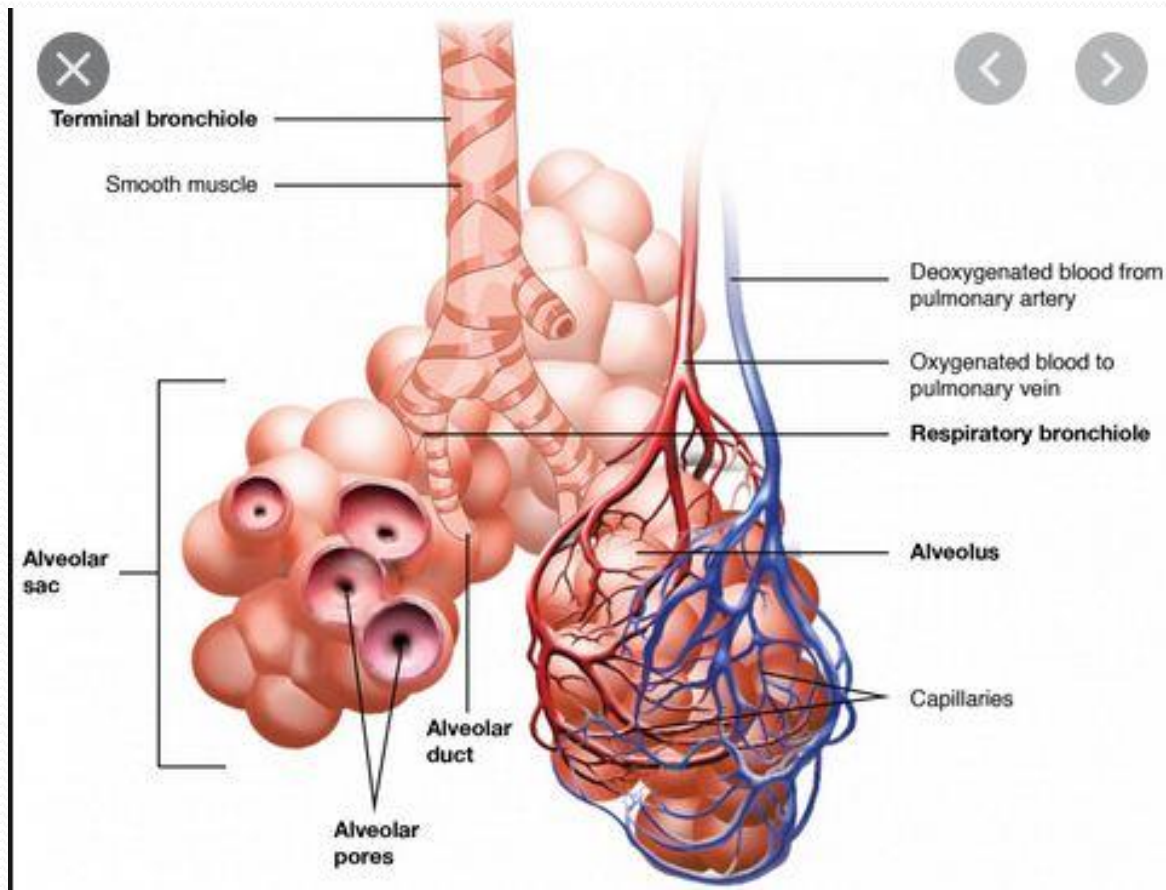


Fig. 3.4.3: Lobes on right lateral surface and axillary area of chest



Fig. 3.4.5: Lobes on posterior chest





Muscles of Respiration

Muscles of inspiration

Accessory

Sternocleidomastoid
(elevates sternum)

Scalenes Group
(elevate upper ribs)

Not shown:
Pectoralis minor

Principal

External intercostals
Interchondral part of
internal intercostals
(also elevates ribs)

Diaphragm
(dome descends, thus
increasing vertical
dimension of thorac
cavity; also elevates
lower ribs)



Muscles of expiration

Quiet breathing

Expiration results from
passive, elastic recoil
of the lungs, rib cage
and diaphragm

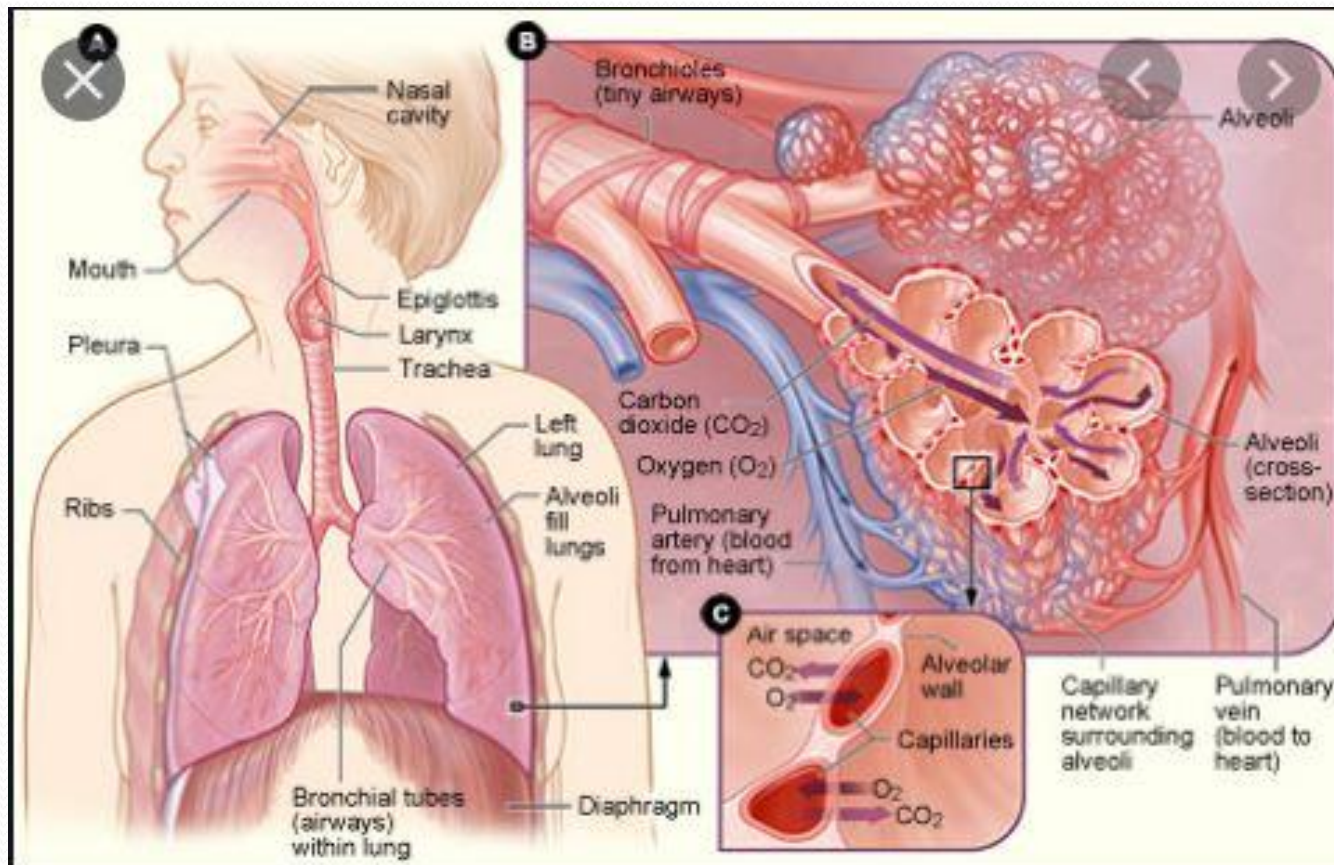
Active breathing

Internal intercostals,
except interchondral
part (pull ribs down)

Abdominals
(pull ribs down,
compress abdominal
contents thus pushing
diaphragm up)

Note shown:
Quadratus lumborum
(pulls ribs down)

Physiology of lungs



Symptoms of RS

- **Cough-** dry- URTI

Wet- LRTI

- Short- URTI

Prolonged- LRTI- bronchitis

- Morning wet and prolonged- chronic bronchitis
- Night- LVF or B.Asthama

Sputum

- Amount

Large- bronchiactasis

- Consistency- thick- B .Asthma , thin- C. Asthma

- Colour

Green, yellow- pus

Red- blood

Haemoptysis

- Expectoration of blood
- Causes- CA, TB, Mitral valve disease

Dyspnoea

- An undue awareness of respiratory effort
- Dyspnoea on exertion- lung disease
- Paroxysmal nocturnal dyspnoea is due to LVF
- Altitude, anaemia, acidosis, fever, thyrotoxicosis
- Lung tissue is insensitive, therefore pain is due to pleuracy.

Examination

- Inspection –(दर्शन)
- Palpitation-(स्पर्शन)
- Percussion- (स्पर्शन)
- Auscultation-(स्पर्शन)

Inspection

Before Examination :

Wash hands

Introduce yourself

Confirm patient details – *name / DOB*

Explain the examination

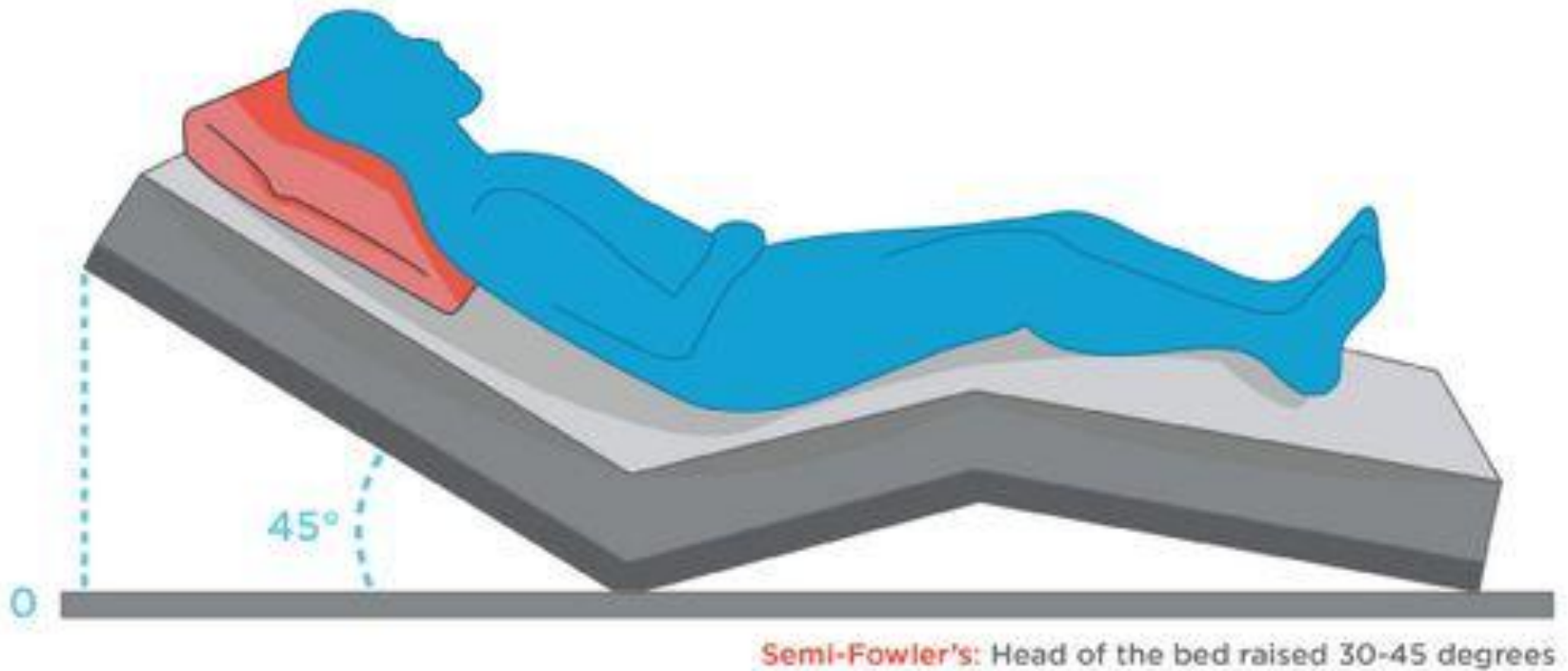
Gain consent

Expose the patient's chest

Position patient at 45°

Ask patient if they have pain anywhere before you begin!

45 degree position of patient



General Inspection

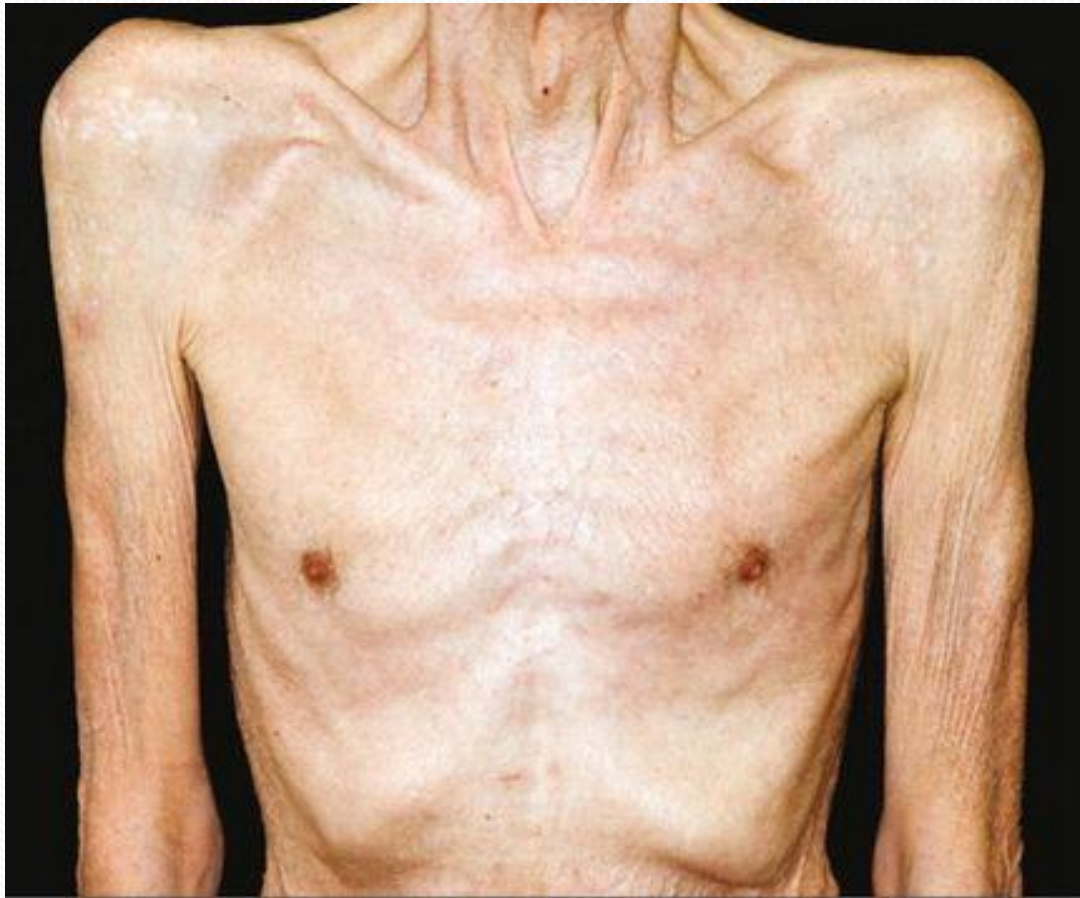
1 Bedside clues

- Oxygen cylinder
- Sputum pot
- Inhaler

2 Hydration and Nutrition

3 Dyspnoea- breathlessness

Cachexia (Wasting of muscles)



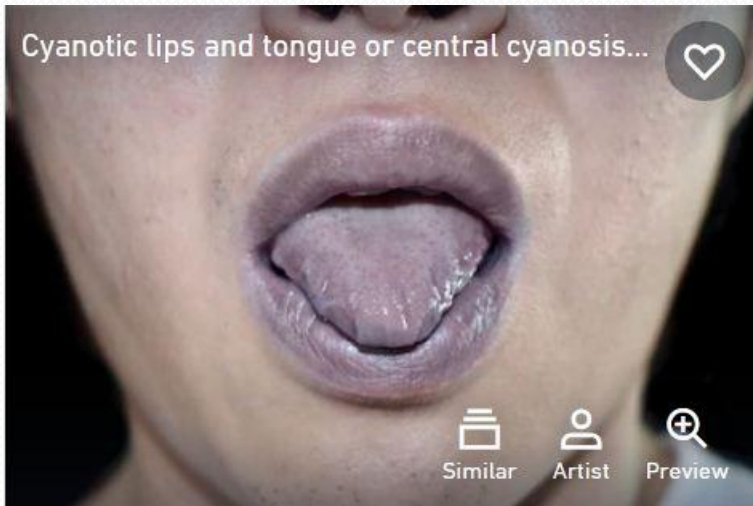
Use of Accessory muscles

- use of accessory muscles

cynosis

- *Cyanosis* is defined as a bluish discoloration, especially of the skin and mucous membranes, due to excessive concentration of deoxyhemoglobin in the blood caused by deoxygenation. *Cyanosis* is divided into two main types: central (around the core, lips, and tongue) and peripheral (only the extremities or fingers).
- Peripheral – 1) reduced cardiac output-shock
2) Local vasoconstriction- cold
- Central- 1) lung diseases- pneumonia
2) Septal defect in the heart
3) Polycythemia

Types of Cyanosis

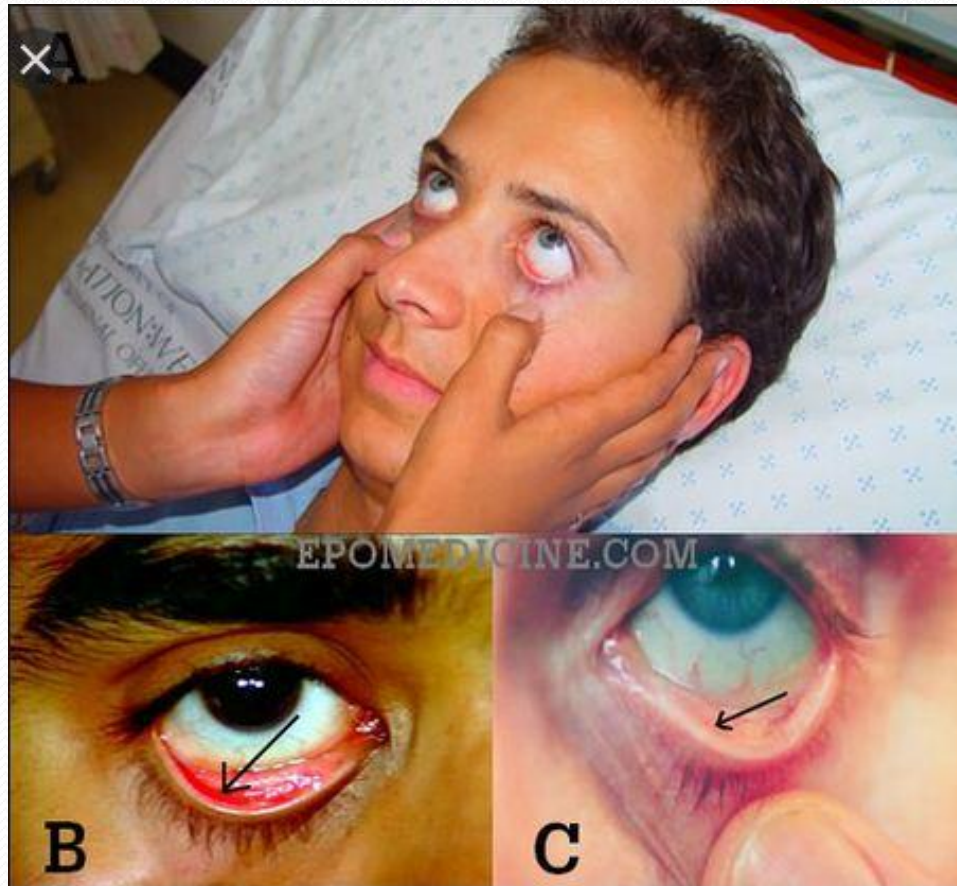


Central Cyanosis

Peripheral Cyanosis



Pallor (pale appearance)



Tar staining due to smoking



Tremors

- A **tremor** is an involuntary, somewhat rhythmic, muscle contraction and relaxation involving oscillations or twitching movements of one or more body parts. It is the most common of all involuntary movements and can affect the hands, arms, eyes, face, head, vocal folds, trunk, and legs.



Tremors

3- Tremors

Flapping tremor – CO₂ retention – often seen in patients with type 2 respiratory failure – e.g. COPD

Fine tremor – can be a side effect of beta 2 agonist use (e.g. salbutamol)

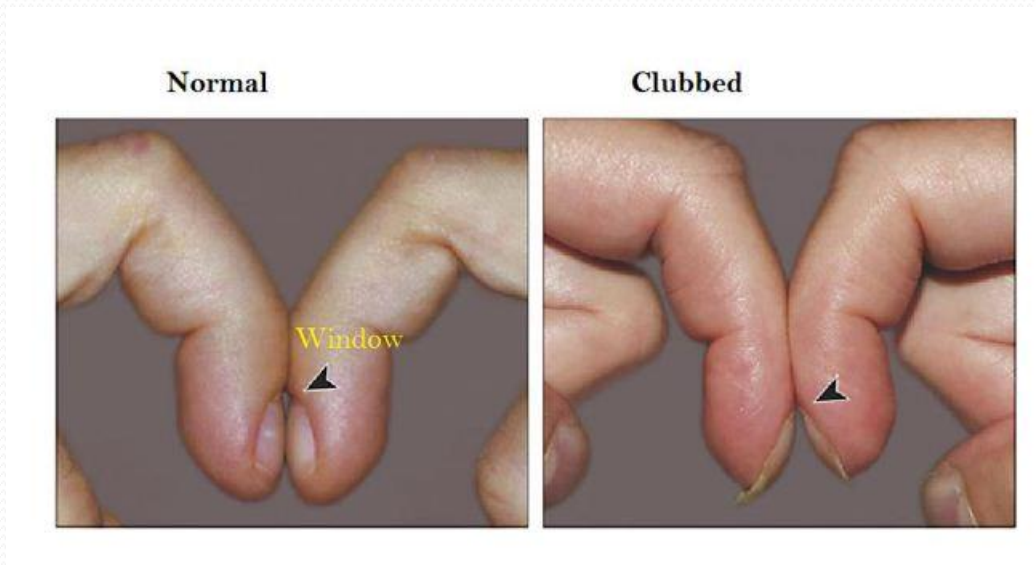


Clubbing of fingures

- The tips of the **fingers** enlarge and the nails become extremely curved from front to back. **Clubbed fingers** is a symptom of disease, often of the heart or lungs which cause chronically low blood levels of oxygen.

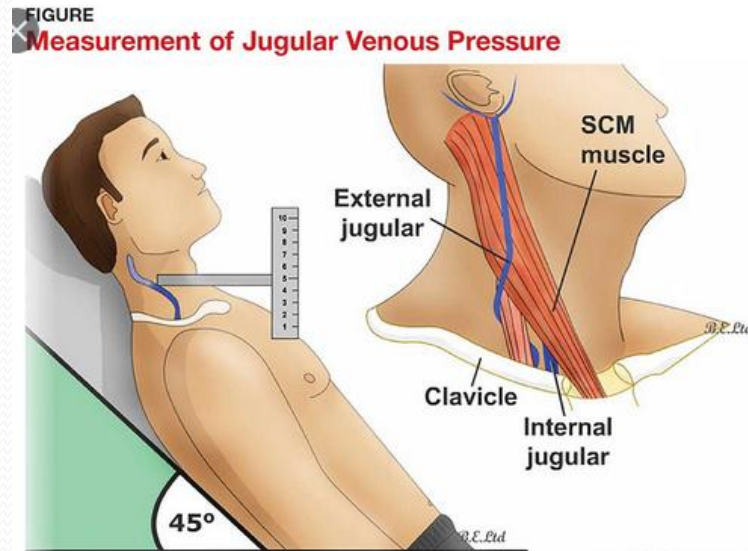


Clubbing of nails

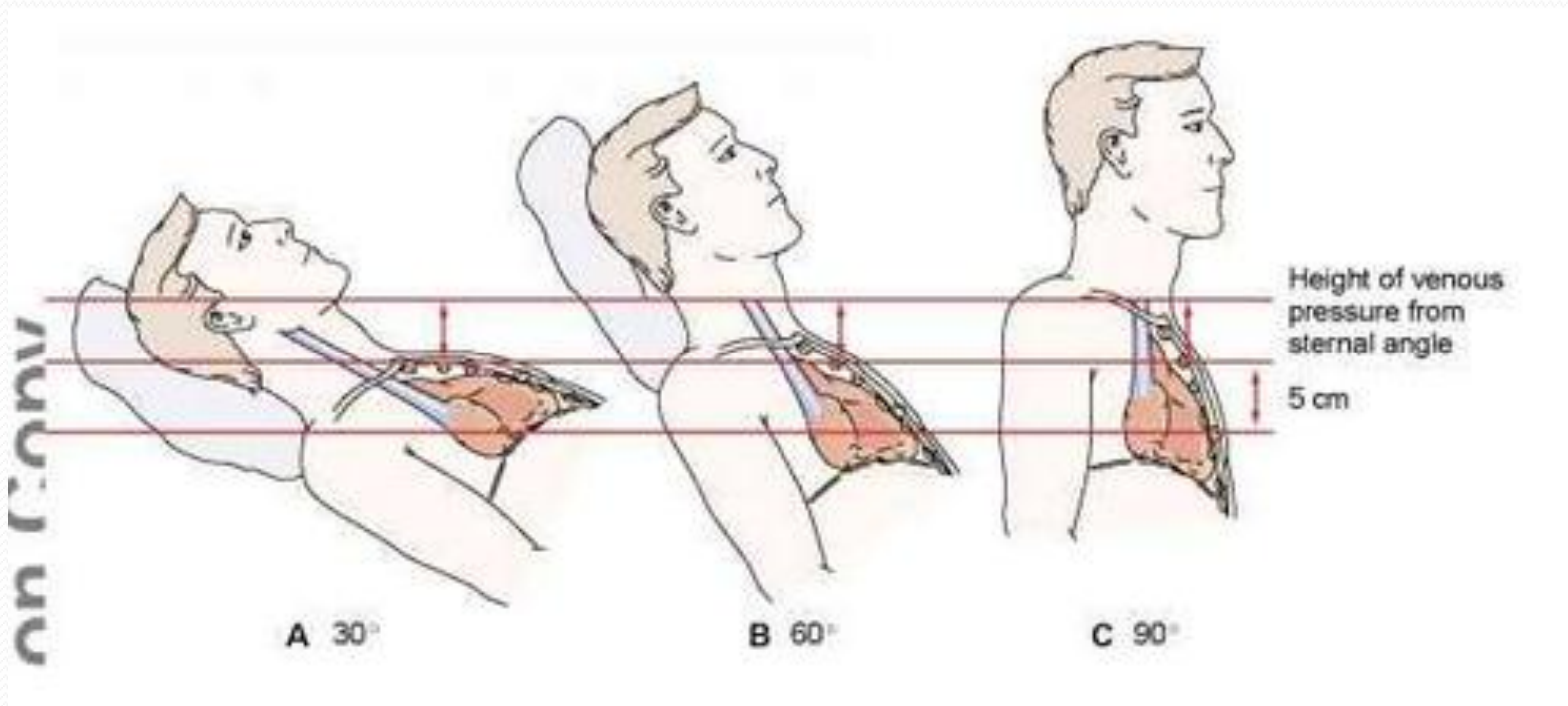


JVP

- The **jugular venous pressure** (JVP, **jugular venous pulse**) is the indirectly observed **pressure** over the **venous** system via visualization of the internal **jugular** vein. It can be useful in the differentiation of different forms of heart and lung disease.
- CCF and CA Bronchus



<https://> JVP EXAMINATION

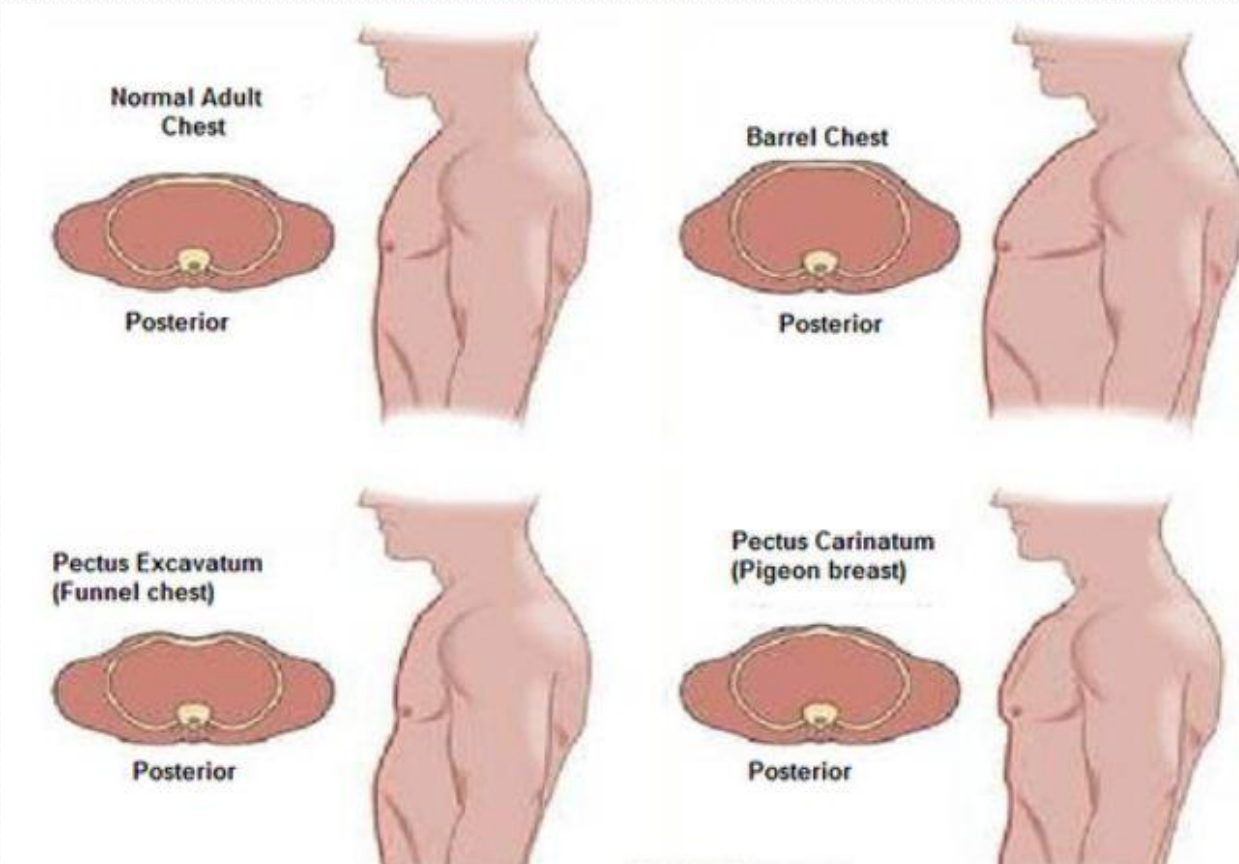


Enlarged lymph nodes

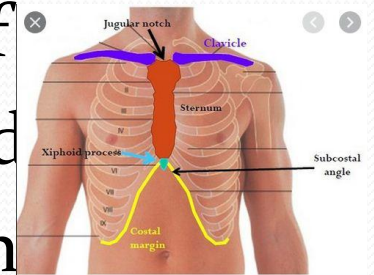
- Brochial CA
- Tuberculosis



Shape of chest



Normally the chest is bilaterally symmetrical, with smooth contours, and slight recession below the clavicles. On cross-section, it is ellipsoidal in shape, its anteroposterior diameter is lesser than its transverse diameter with a ratio of 1:2. The subcostal angle is acute, about 70° and the interspaces are broader anteriorly than posteriorly.



Rickets (pigeon breast or keeled chest or pectus carinatum): There is depression on either side of the sternum often associated with bead like enlargement at the costochondral junction (*rickety rosary*) and a transverse groove passing outwards from the xiphisternum to the mid-axillary line (*Harrison's sulcus*).

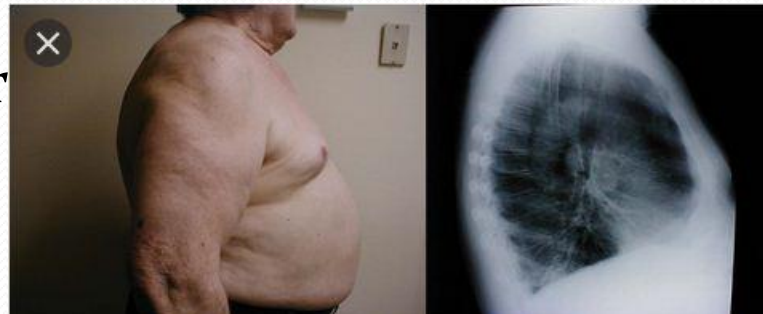


Funnel chest (Cobbler's chest or pectus excavatum): There is a depression in the lower part of the sternum which may be congenital, following rickets in childhood or an occupational deformity in cobblers.



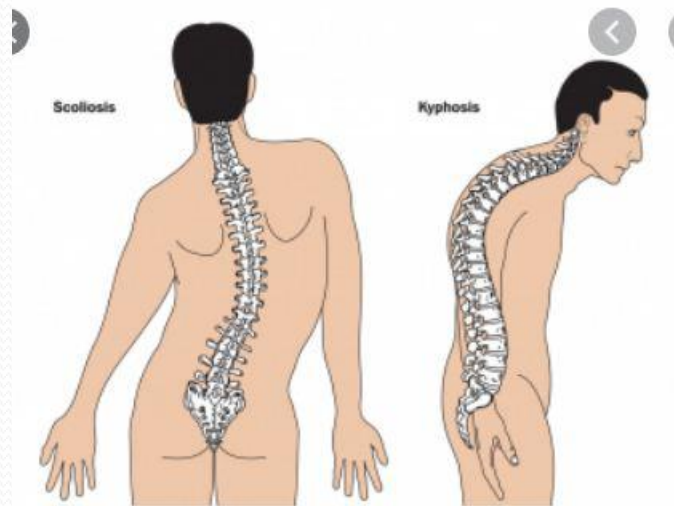
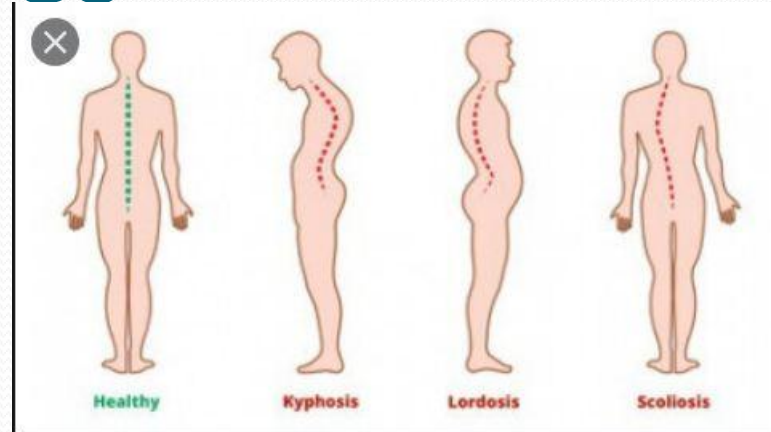
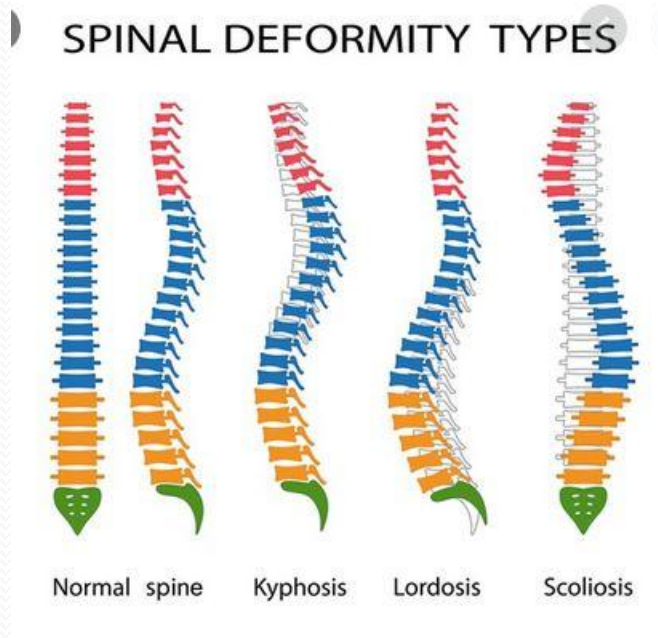
Barrel shaped chest: The anteroposterior diameter is increased, the sub-costal angle is wide, the angle of Louis unduly prominent, the sternum is more arched, the spine is unduly concave forwards and the ribs are less oblique. This is seen in **emphysema, old age** and infancy. The Ratio of AP diameter

to transverse diameter is normally 1:1 in a normal chest it is 1:1 or more.



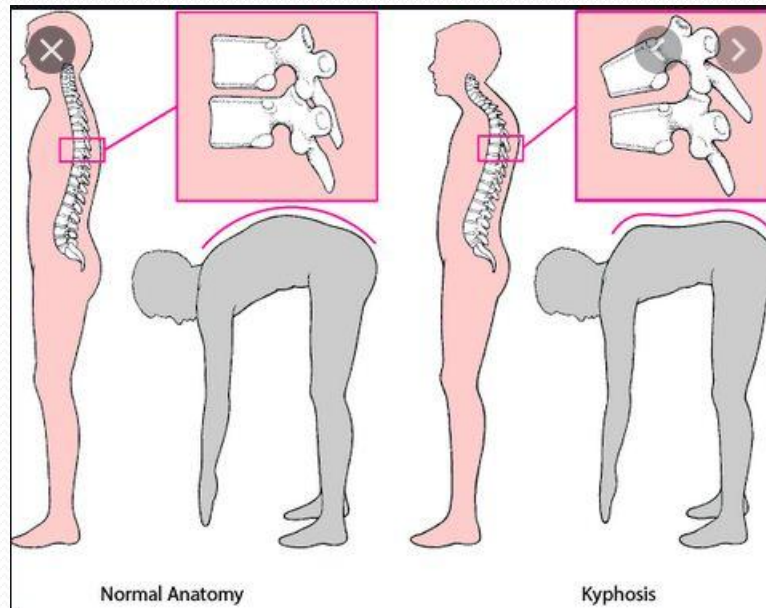
ed

Spinal deformities



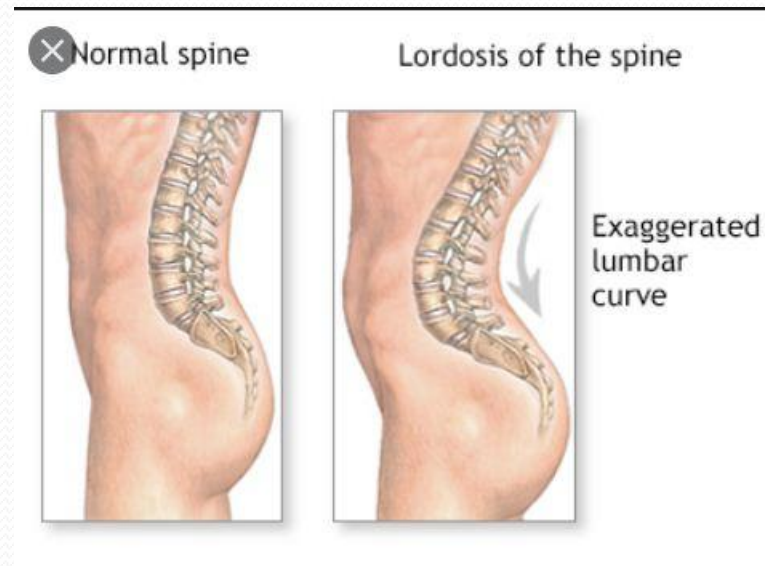
kyphosis

- **Kyphosis** is a spinal disorder in which an excessive outward curve of the spine results in an abnormal rounding of the upper back



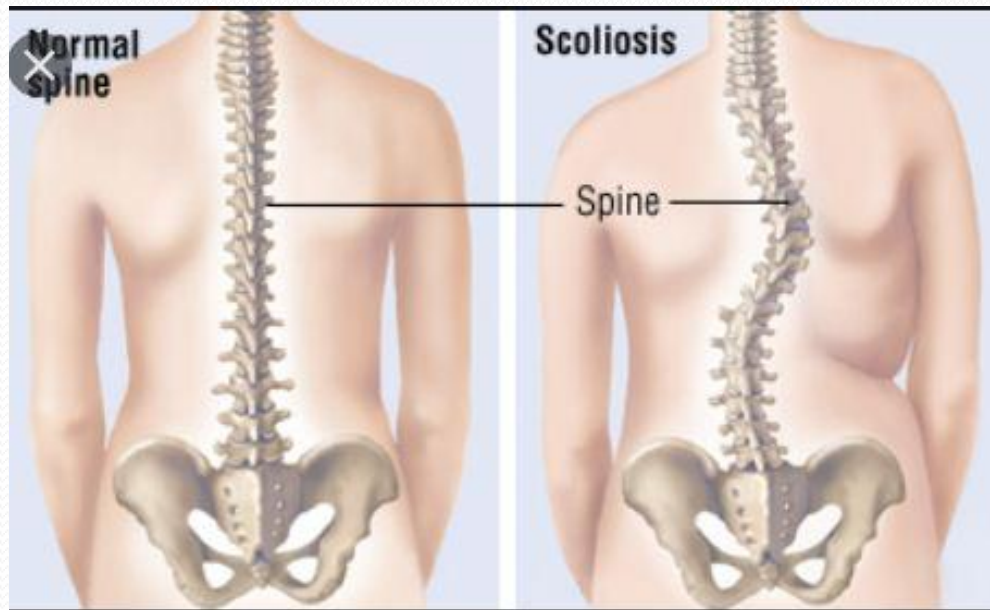
Lordosis

- **Lordosis** is defined as an excessive inward curve of the spine.




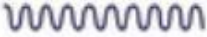







Scoliosis

- **Scoliosis** is a sideways curvature of the spine.







Rate & depth of Respiration

*Normal 12 to 20 per min *RR is faster in children and slower in old age. *RR: pulse =1:4

Table 2-2		BREATHING PATTERNS	
	Condition	Description	Causes
	Eupnea	Normal breathing rate and pattern	
	Tachypnea	Increased respiratory rate	Fever, anxiety, exercise, shock
	Bradypnea	Decreased respiratory rate	Sleep, drugs, metabolic disorder, head injury, stroke
	Apnea	Absence of breathing	Deceased patient, head injury, stroke
	Hyperpnea	Normal rate, but deep respirations	Emotional stress, diabetic ketoacidosis
	Cheyne-Stokes	Gradual increases and decreases in respirations with periods of apnea	Increasing intracranial pressure, brain stem injury
	Biot's	Rapid, deep respirations (gasps) with short pauses between sets	Spinal meningitis, many CNS causes, head injury
	Kussmaul's	Tachypnea and hyperpnea	Renal failure, metabolic acidosis, diabetic ketoacidosis
	Apneustic	Prolonged inspiratory phase with shortened expiratory phase	Lesion in brain stem

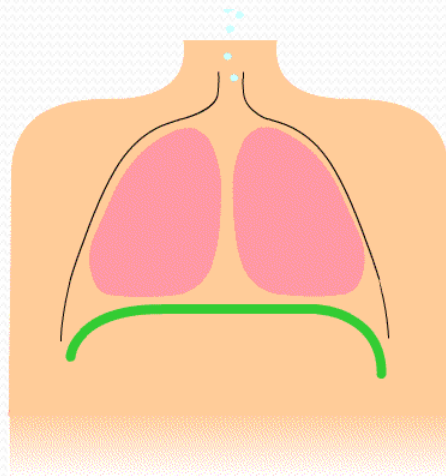
Characteristics of breath sounds

Characteristics of Breath Sounds				
	Duration of Sounds	Intensity of Expiratory Sound	Pitch of Expiratory Sound	Locations Where Heard Normally
Vesicular* 	Inspiratory sounds last longer than expiratory sounds.	Soft	Relatively low	Over most of both lungs
Broncho-vesicular 	Inspiratory and expiratory sounds are about equal.	Intermediate	Intermediate	Often in the 1st and 2nd interspaces anteriorly and between the scapulae
Bronchial 	Expiratory sounds last longer than inspiratory ones.	Loud	Relatively high	Over the manubrium, (larger proximal airways)
Tracheal 	Inspiratory and expiratory sounds are about equal.	Very loud	Relatively high	Over the trachea in the neck

*The thickness of the bars indicates intensity; the steeper their incline, the higher the pitch.

Type of Respiration

- Abdominothoracic- Male
- Thoracoabdominal- Female
- Abdominal- thoracic lesion(pleuracy)
- Thoracic-Abdominal lesion(acute peritonitis)



Expansion of the chest

- Use measuring tape
- If one side moves less, it is affected.
- If generalized restriction- Emphysema, ankyloising spondylitis

Palpation

- <https://www.youtube.com/watch?v=gRWSyqatWQQ&t=156s>
- Palpate apex beat of heart .
- Trachea position .
- Compare expansion of the two sides of the chest.

Different Lines

Clip slide

Jugular
(suprasternal)
notch

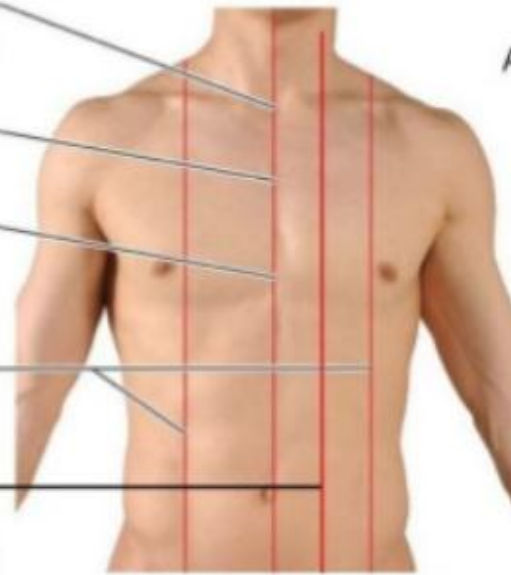
Sternal angle

Anterior
median
line

Midclavicular
lines

Parasternal
Line

(A)



Axillary fossa

Anterior
axillary
line *pectorales major*

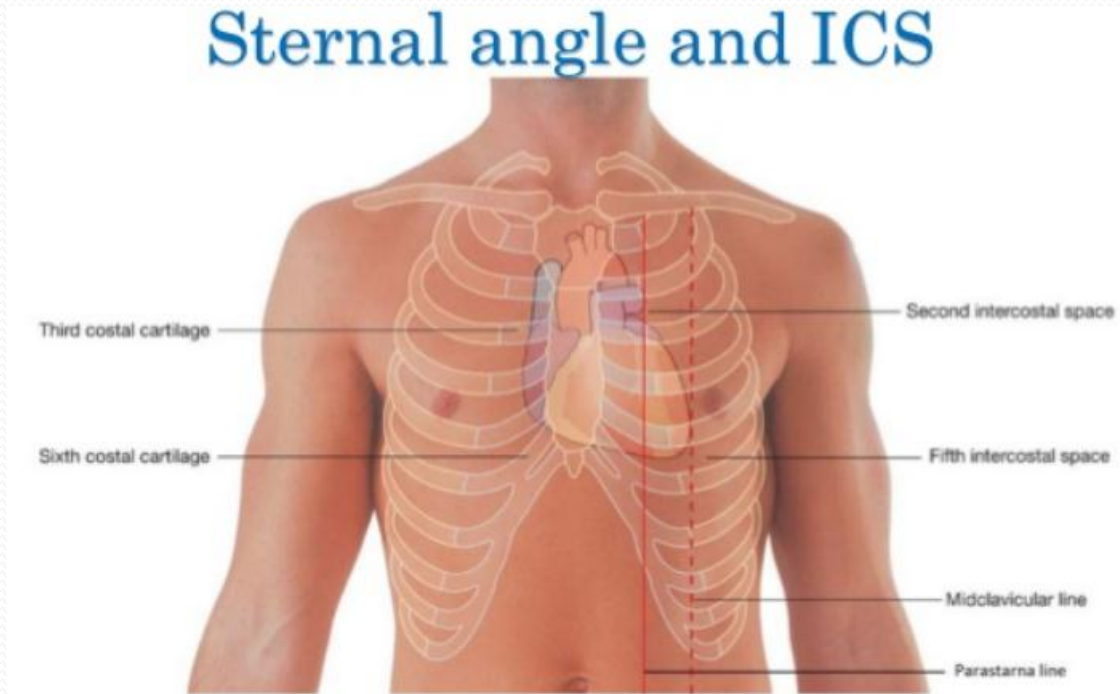
Midaxillary
line *middle of arm pit*

Posterior
axillary line
Posterior border..lats

(B)

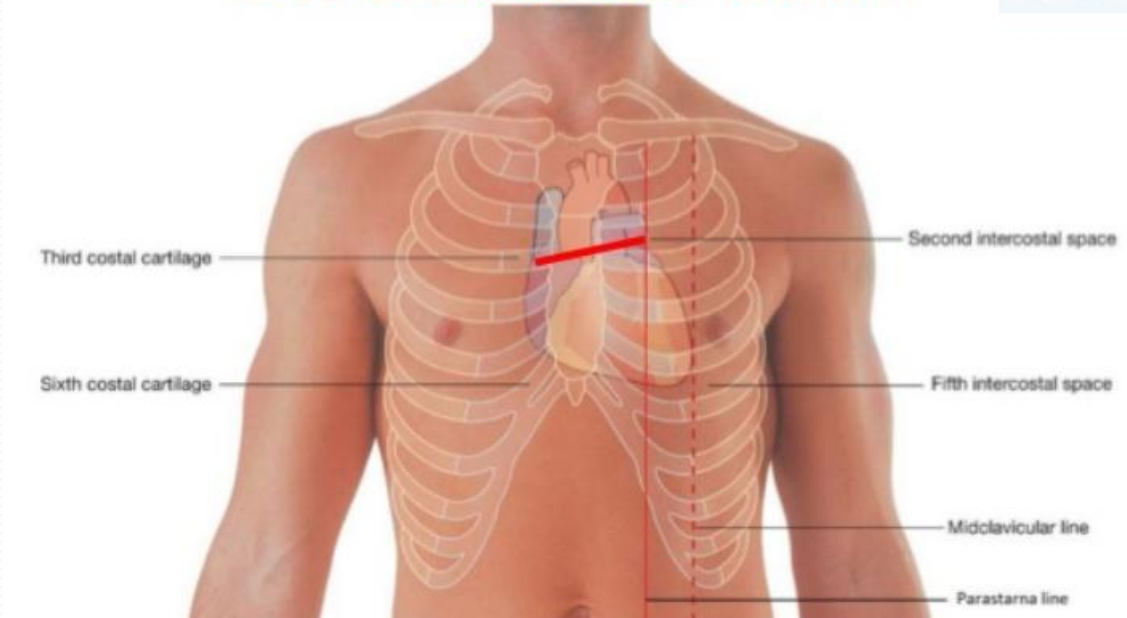


Sternal angle and ICS



Borders of the Heart

Clipart



Type of apex beat	Clinical examples
Normal	Normal
Normal but shifted	Normal character, but abnormal position due to mediastinal shift
Impalpable	Hyperinflated lungs, high BMI, pericardial effusion
Pressure-loaded	Left ventricular hypertrophy (e.g. hypertension, aortic stenosis)
Volume-loaded	Severe mitral or aortic regurgitation
Tapping	Mitral stenosis
Double-impulse	Hypertrophic cardiomyopathy
Dyskinetic	Left ventricular apical aneurysm

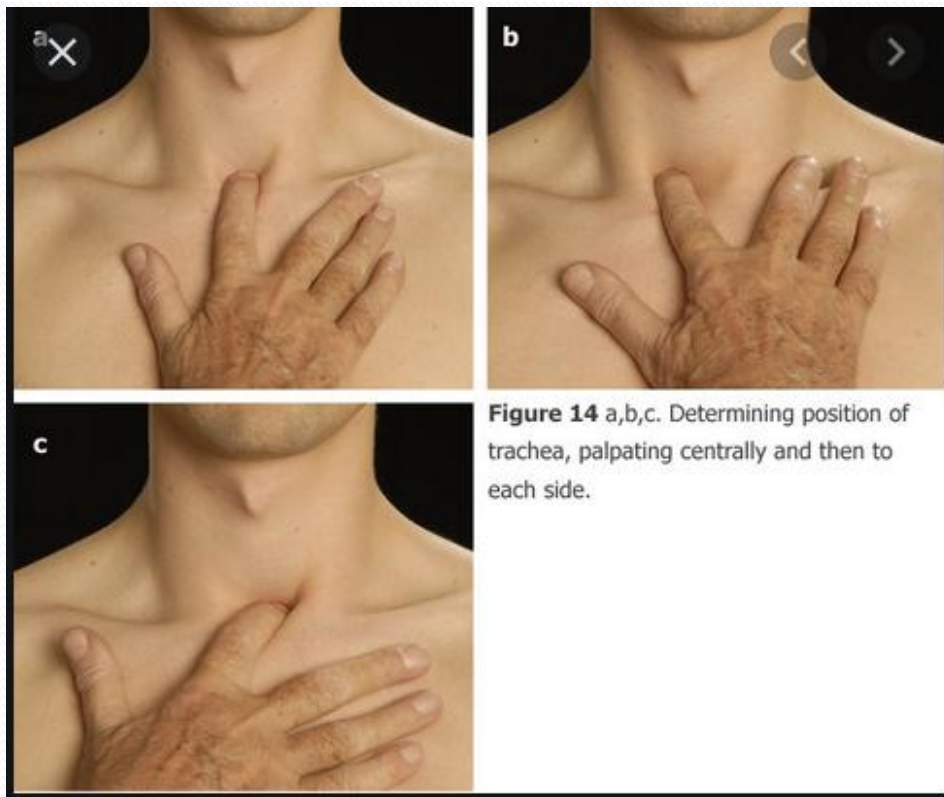


Figure 14 a,b,c. Determining position of trachea, palpating centrally and then to each side.

chest expansion can be more accurately evaluated by observing chest movement than by palpating the chest wall (Ford et al, 2005).

Palpation of Respiratory Movements

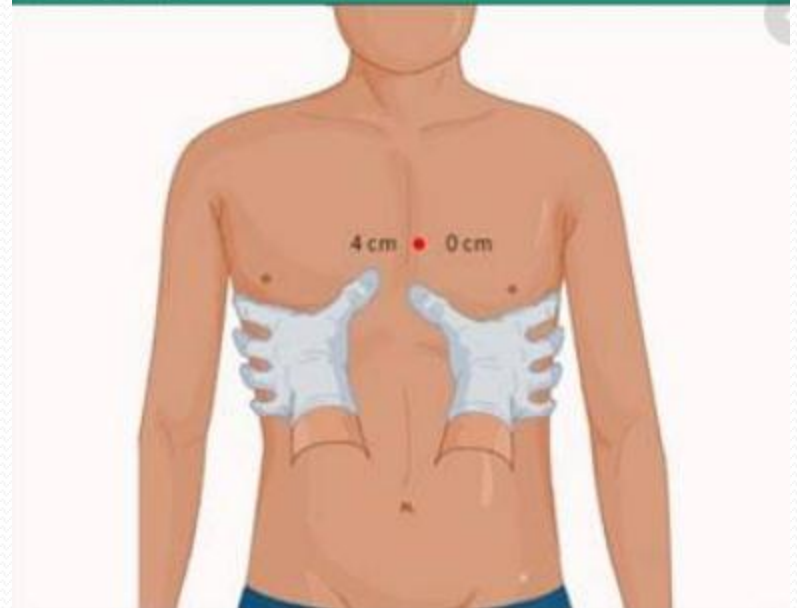
1. Respiratory movements in the infraclavicular regions
2. Respiratory movements at the costal margins
3. Respiratory movements of the lower ribs posteriorly



Significance of reduced respiratory movements

- > Unilateral reduction of chest wall movements:
 - > Pleural effusion/empyema
 - > Pneumothorax
 - > Pulmonary collapse
 - > Pleural or parenchymatous pulmonary fibrosis
- > Bilateral reduction of chest wall movements:
 - > Bronchial asthma
 - > Emphysema
 - > Diffuse pulmonary fibrosis

Chest Expansion



CHEST – PALPATION

TACTILE VOCAL FREMITUS

1. Palpate with ulnar border of your hand
2. Ask patient to repeat “*Ninety-Nine*”
3. Assess all zones in zig-zag manner
4. Note if
 - Increased
 - Decreased
 - Absent




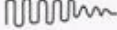



Tactile fremitus (TF)

- Locate the area where TF increased, decreased or absent.
- Increased TF in
 - Lung consolidation
 - Lung fibrosis
- Decreased to absent TF when transmission of vibrations from the larynx to the surface of the chest is impeded by:
 - Obstructed bronchus
 - Chronic obstructive pulmonary disease (COPD)
 - Separation of the lung from chest wall by:
 - Pleural air e.g. Pneumothorax
 - Pleural fluid e.g. pleural effusion, hemothorax
 - Pleura thickening

Percussion

- <https://www.youtube.com/watch?v=RhsvCfuuQKw>

E 9-1: Characteristics of Percussion Notes					
	AMPLITUDE	PITCH	QUALITY	DURATION	SAMPLE LOCATION
Resonant 	Medium-loud	Low	Clear, hollow	Moderate	Over normal lung tissue
Hyperresonant 	Louder	Lower	Booming	Longer	Normal over child's lung Abnormal in the adult, over lungs with increased amount of air, as in emphysema
Tympany 	Loud	High	Musical and drumlike (like the kettle drum)	Sustained longest	Over air-filled viscus, e.g., the stomach, the intestine
Dull 	Soft	High	Muffled thud	Short	Relatively dense organ, as liver or spleen
Flat 	Very soft	High	A dead stop of sound, absolute dullness	Very short	When no air is present, over thigh muscles, bone, or over tumor



Definition:

Percussion is a method of examination which depends on the interpretation of sounds heard and the sense of resistance encountered on subjecting the chest to a series of strokes or taps with the fingers .

Main purposes of respiratory percussion :

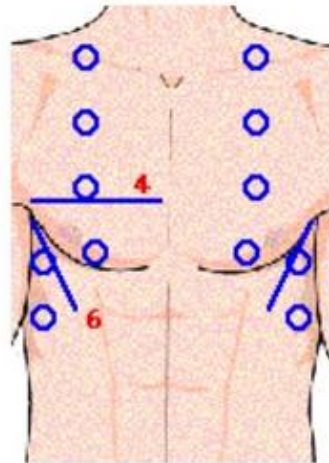
- Diagnostic Percussion.
- Topographical Percussion.

Percussion

✕ Percussion: Anterior Chest



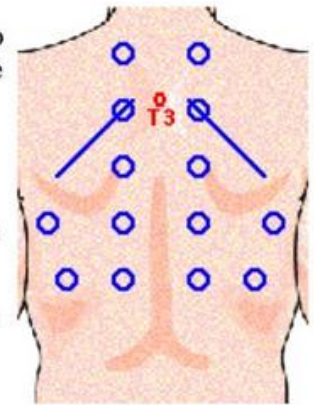
1. Percuss from side to side and top to bottom using the pattern shown in the illustration.
2. Compare one side to the other looking for asymmetry.
3. Note the location and quality of the percussion sounds you hear.



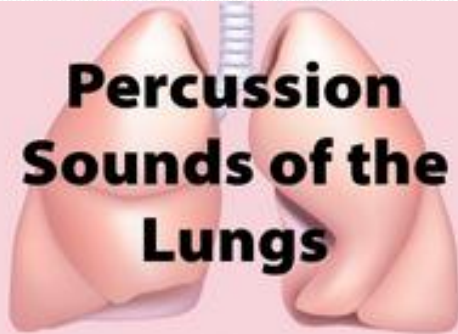
✕ Percussion: Posterior Chest



1. Percuss from side to side and top to bottom using this pattern. Omit the areas covered by the scapulae.
2. Compare one side to the other looking for asymmetry.
3. Note the location and quality of the percussion sounds you hear.
4. Find the level of the diaphragmatic dullness on both sides.



Percussion Sounds of the Lungs



Flat percussion sounds are a high-pitched sound with a soft quality. This sound is heard over dense tissue where there is no air.

Dullness usually has a medium pitch. You will hear the dullness when there is a combination of a solid and a fluid-filled area.

Resonance sounds are heard over normal lungs. These sounds usually have a low pitch.








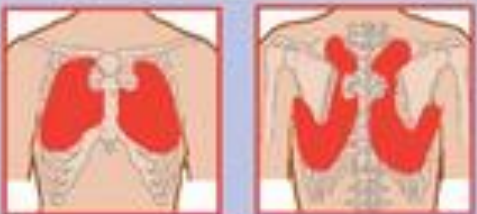
Hyperresonance sounds are also low-pitched. However, these sounds are lower than resonance sounds. You will hear hyperresonance sounds over hyper-inflated lungs.

Tympany sounds are drum-like sounds. A gas-filled area can cause tympanic breath sounds. Also, a pneumothorax can cause tympanic breath sounds.

Percussion sounds

Sound	Intensity	Pitch	Length	Quality	Example of origin
Resonance (heard over part air and part solid)	Loud	Low	Long	Hollow	Normal lung
Hyper-resonance (heard over mostly air)	Very loud	Low	Long	Booming	Lung with emphysema
Tympany (heard over air)	Loud	High	Moderate	Drum like	Puffed-out cheek, gastric bubble
Dullness (heard over more solid tissue)	Medium	Medium	Moderate	Thud like	Diaphragm, pleural effusion
Flatness (heard over very dense tissue)	Soft	High	short	Flat	Muscle, Bone, Thigh

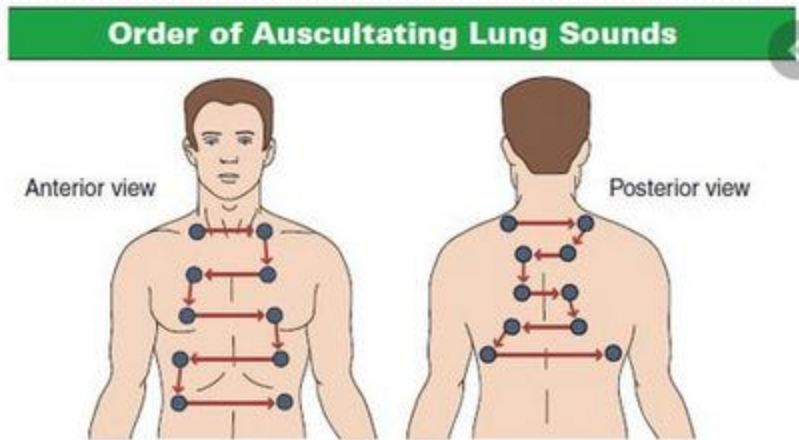
Table 1. Quality of normal breath sounds

Breath sound	Intensity and pitch	Inspiratory: expiratory ratio	Positions to hear sounds
Tracheal 	Very loud, high pitch	Inspiratory and expiratory sounds equal	Over the trachea (above the subclavicular notch) 
Bronchial 	Loud, relatively high pitch	Inspiratory sound shorter than expiratory	Over the manubrium (just above the clavicles) 
Bronchovesicular 	Medium loudness, intermediate pitch	Inspiratory and expiratory sounds equal	First and second intercostal spaces next to the sternum and between the scapula 
Vesicular 	Soft, relatively low pitch	Inspiratory sound longer than expiratory	Most of the lung field 

stethoscope and its parts



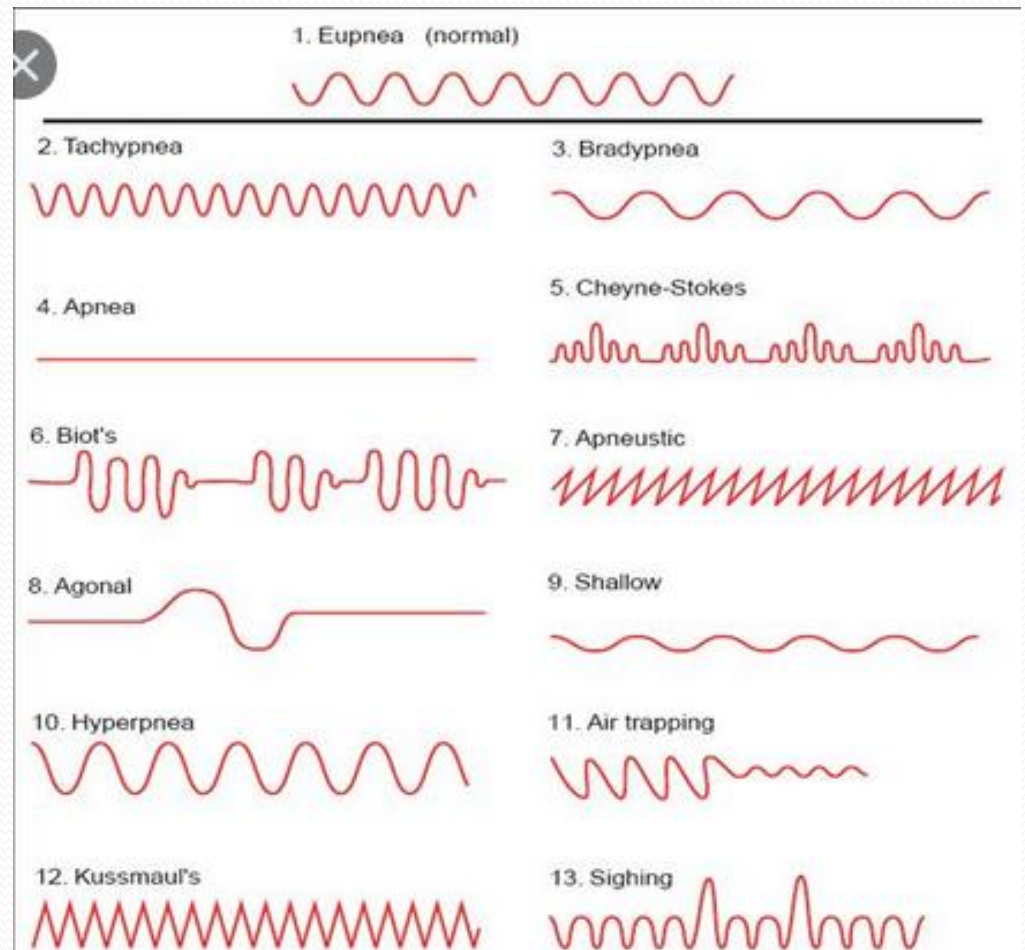
- <https://www.youtube.com/watch?v=2NvBk61ngDY>







Respiratory Patterns	
Normal (eupnea)	Regular and comfortable at 12–20 breaths/minute.
Tachypnea	>20 breaths/minute.
Bradypnea	<12 breaths/minute.
Hyperventilation	Rapid, deep respiration >20 breaths/minute.
Apneustic	Neurological—sustained inspiratory effort.
Cheyenne-Stokes	Neurological—alternating patterns of depth separated by brief periods of apnea.
Kussmaul's	Rapid, deep, and labored—common in DKA.
Air trapping	Difficulty during expiration— emphysema.

Auscultation

Types of breathing



Breath sounds

	Duration of Sounds	Intensity of Expiratory Sound	Pitch of Expiratory Sound	Locations Where Heard Normally
Vesicular* 	Inspiratory sounds last longer than expiratory sounds.	Soft	Relatively low	Over most of both lungs
Broncho-vesicular 	Inspiratory and expiratory sounds are about equal.	Intermediate	Intermediate	Often in the 1st and 2nd interspaces anteriorly and between the scapulae
Bronchial 	Expiratory sounds last longer than inspiratory ones.	Loud	Relatively high	Over the manubrium, (larger proximal airways)
Tracheal 	Inspiratory and expiratory sounds are about equal.	Very loud	Relatively high	Over the trachea in the neck

*The thickness of the bars indicates intensity; the steeper their incline, the higher the pitch.

Phonchi

- A low pitched wheeze
- Continuous, often sounding like snoring or gurgling
- Often clear after coughing



Breath sounds

- <https://www.youtube.com/watch?v=TlgP8MzIMaw>

Wheeze and crackles

- <https://www.youtube.com/watch?v=7oTfvJff7go>
- crackles
- <https://www.youtube.com/watch?v=LHqqvrm2j6g>
- <https://www.youtube.com/watch?v=aSor2XBc9K8>