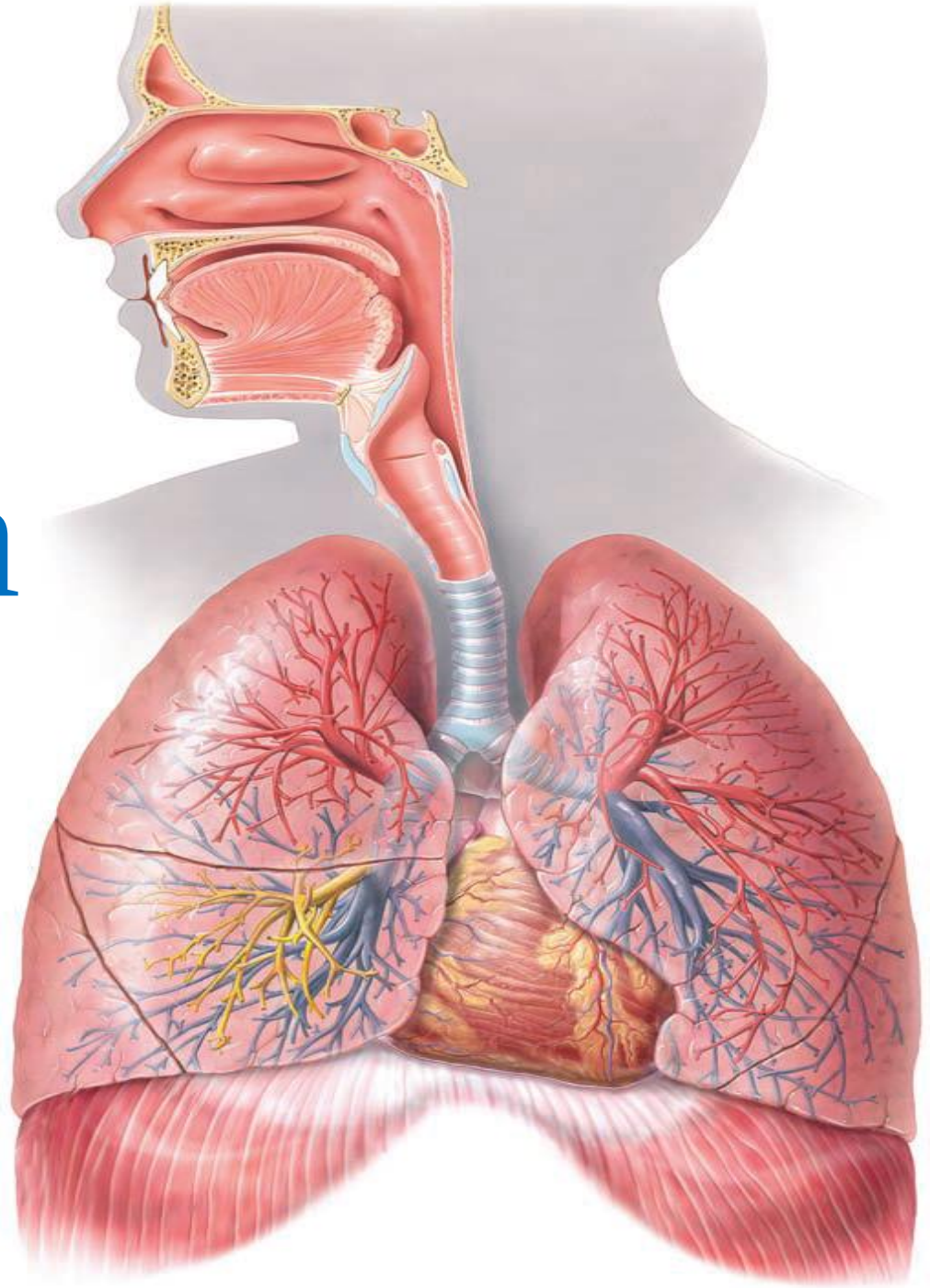
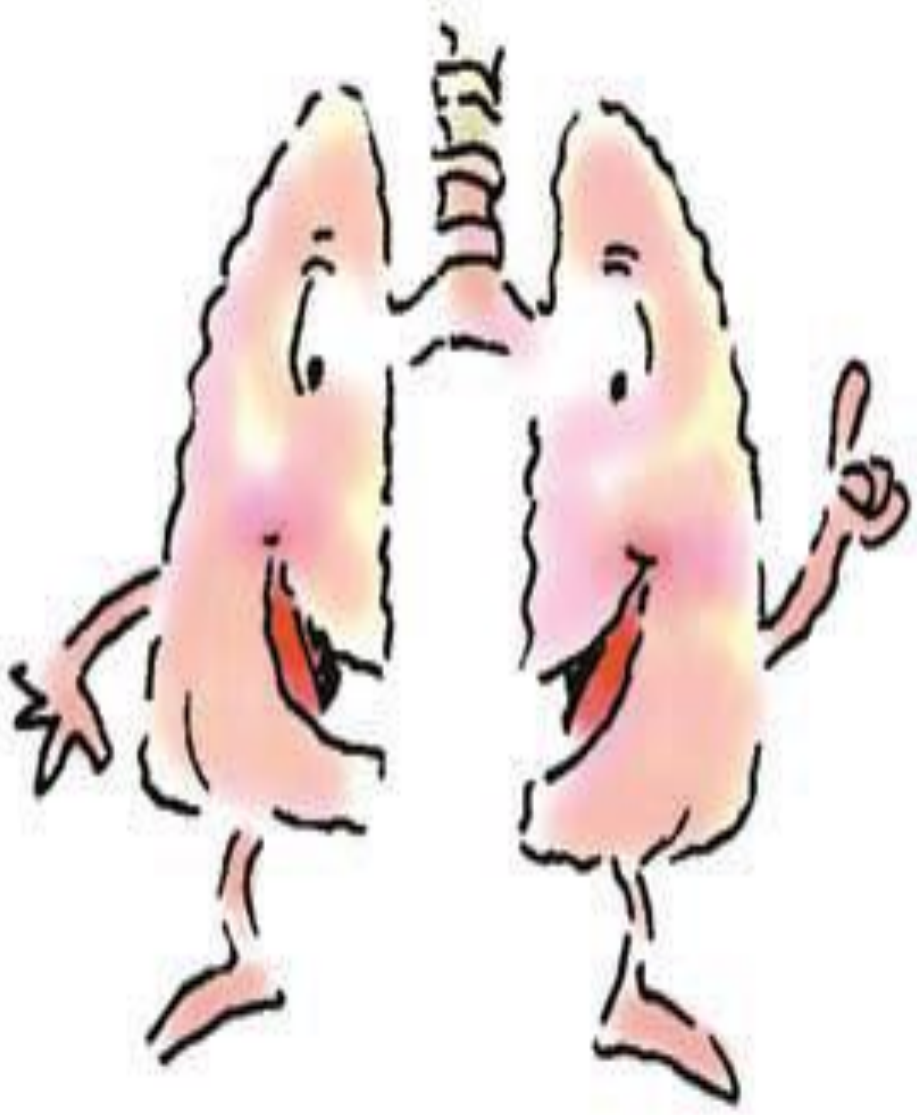
Assessment of the Respiratory System

Dr. Hawraa Razzaq Kadhim



Lecture outlines



Anatomy
Assessment
Abnormal findings

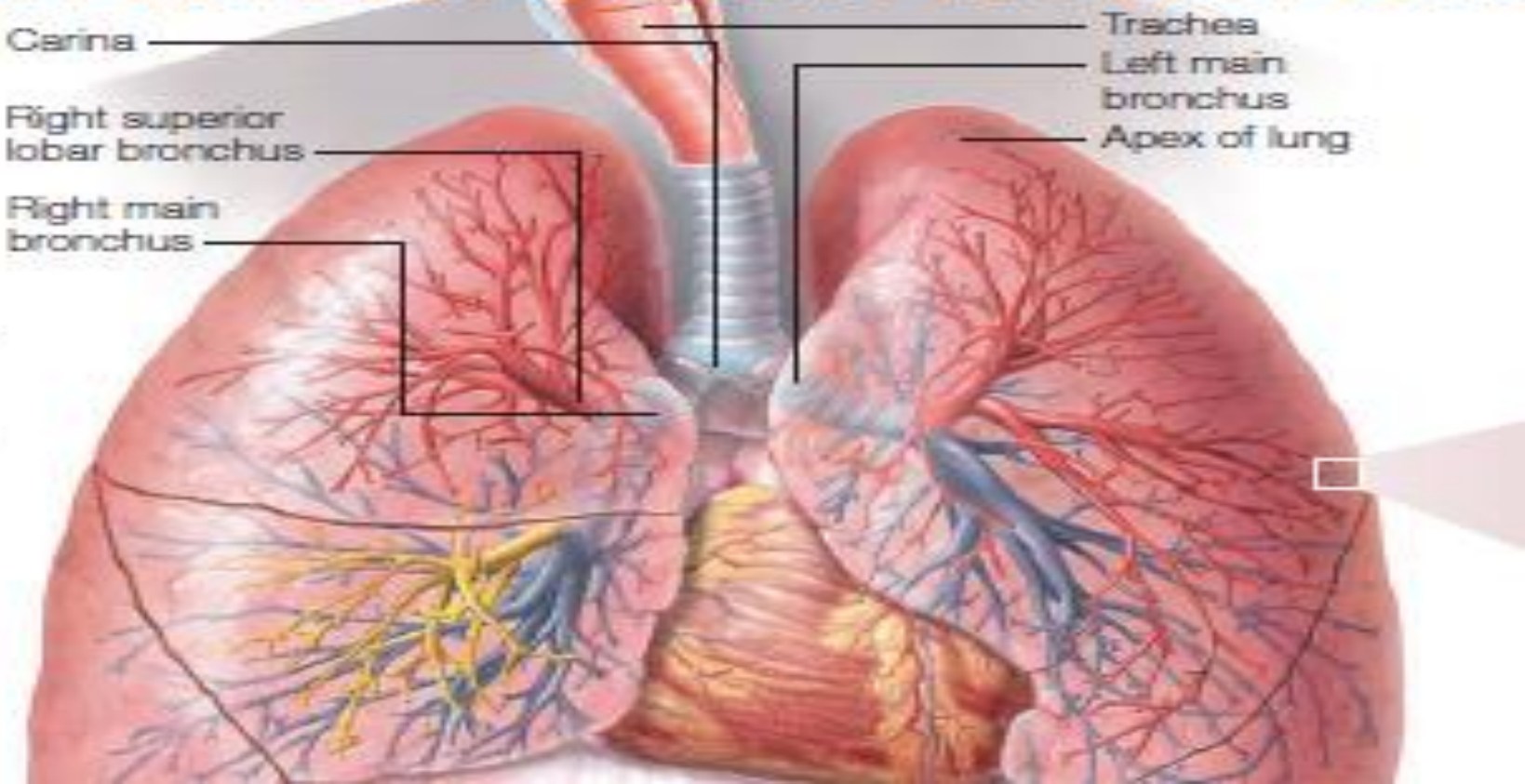
Anatomy

Upper airways

The upper airways include the nasopharynx (nose), oropharynx (mouth), laryngopharynx, and larynx. These structures warm, filter, and humidify inhaled air.

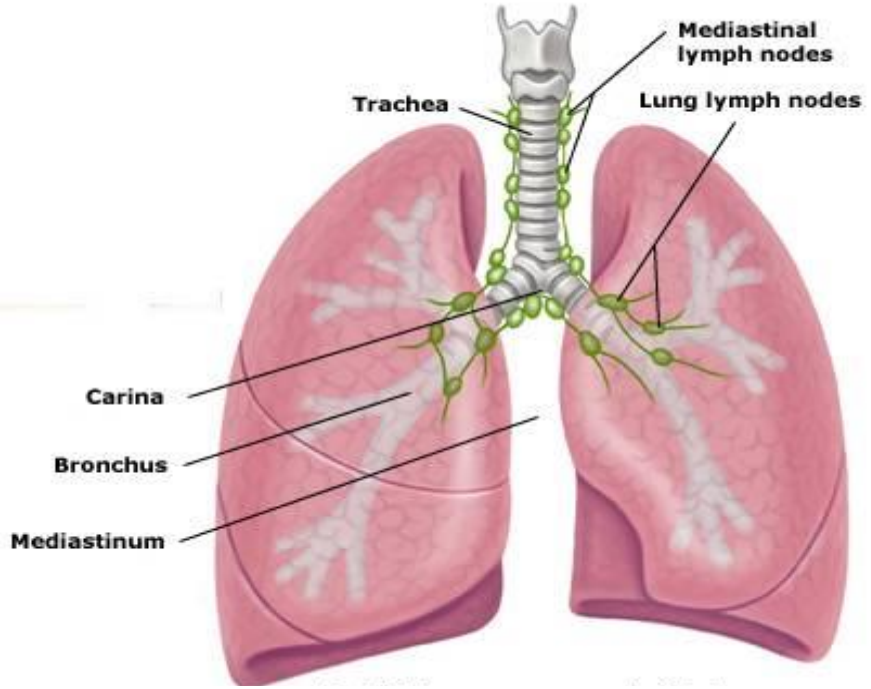
Lower airways

The lower airways begin with the trachea, or windpipe, which extends from the cricoid cartilage to the carina. The trachea then divides into the right and left mainstem bronchi, which continue to divide all the way down to the alveoli, the gas-exchange units of the lungs.



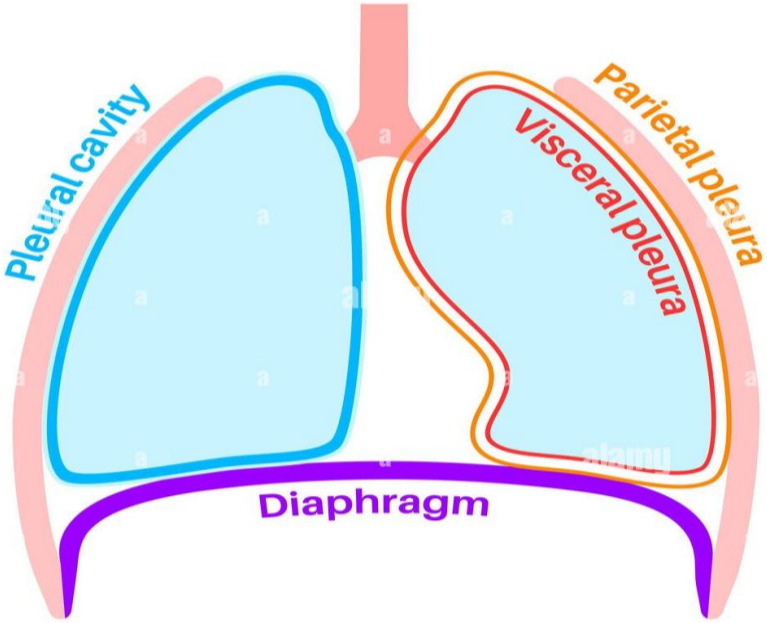
Lungs

The right lung has three lobes: upper, middle, and lower. The left lung is smaller and has only an upper and a lower lobe. The lungs share space in the thoracic cavity with the heart and great vessels, the trachea, the esophagus, and the bronchi. The space between the lungs is called the *mediastinum.*



Pleurae

Each lung is wrapped in a lining called the visceral pleura. All areas of the thoracic cavity that come in contact with the lungs are lined with parietal pleura. A small amount of pleural fluid fills the area between the two layers of the pleura and allows the layers to slide smoothly over each other as the chest expands and contracts.



Respiratory muscles

- **Primary muscles** used in breathing:

1-The diaphragm

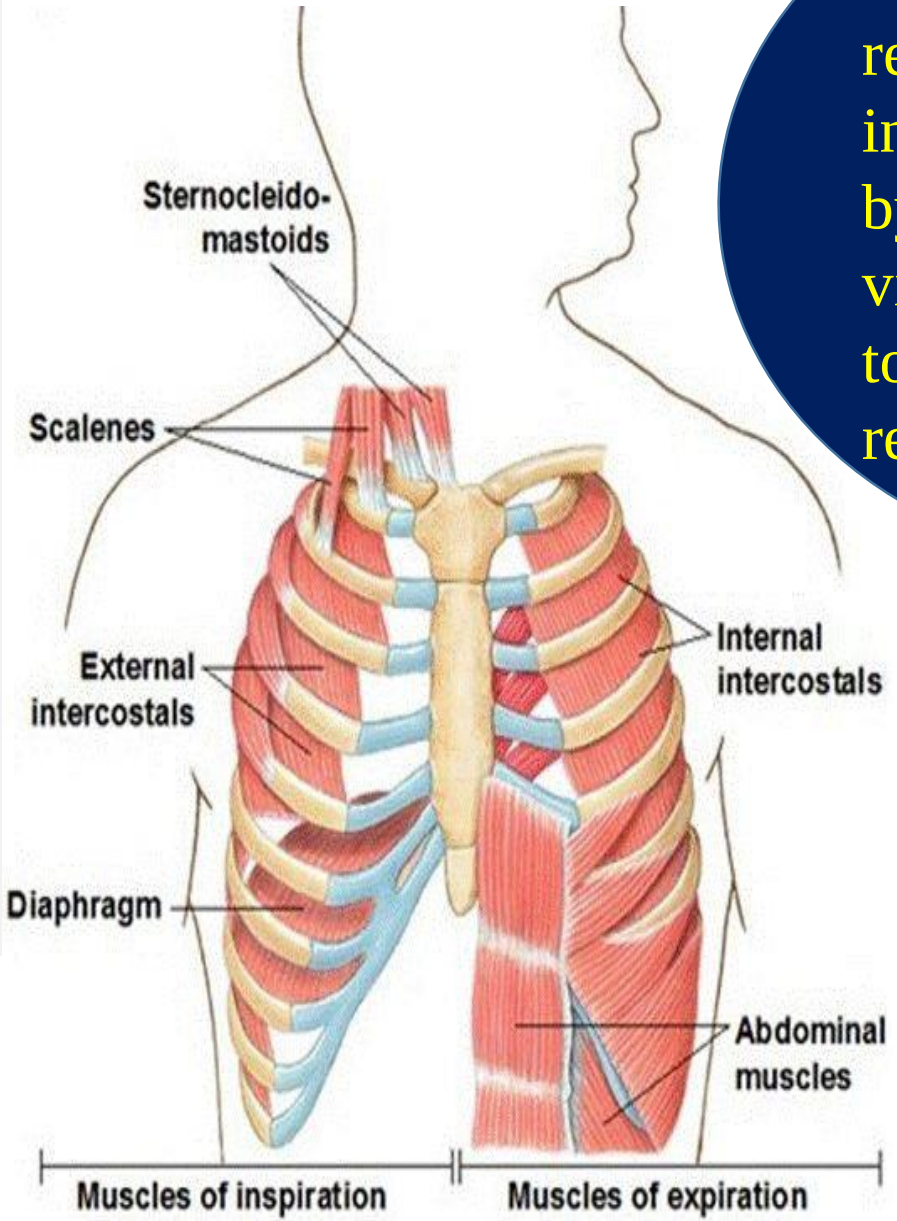
2-the external intercostal muscles.

- **Accessory inspiratory muscles** include:

1-Trapezius

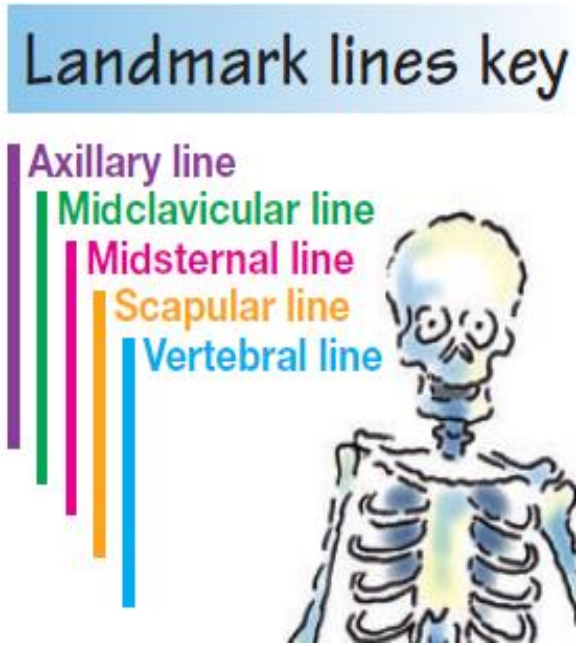
2-Sternocleidomastoid

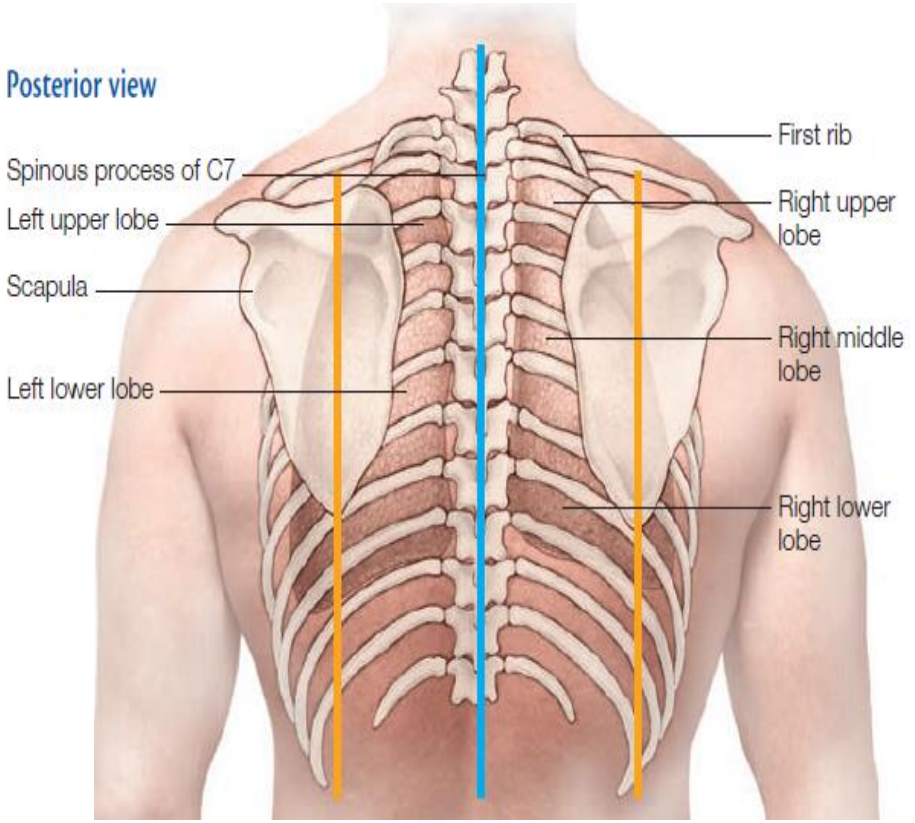
3-Scalenes.

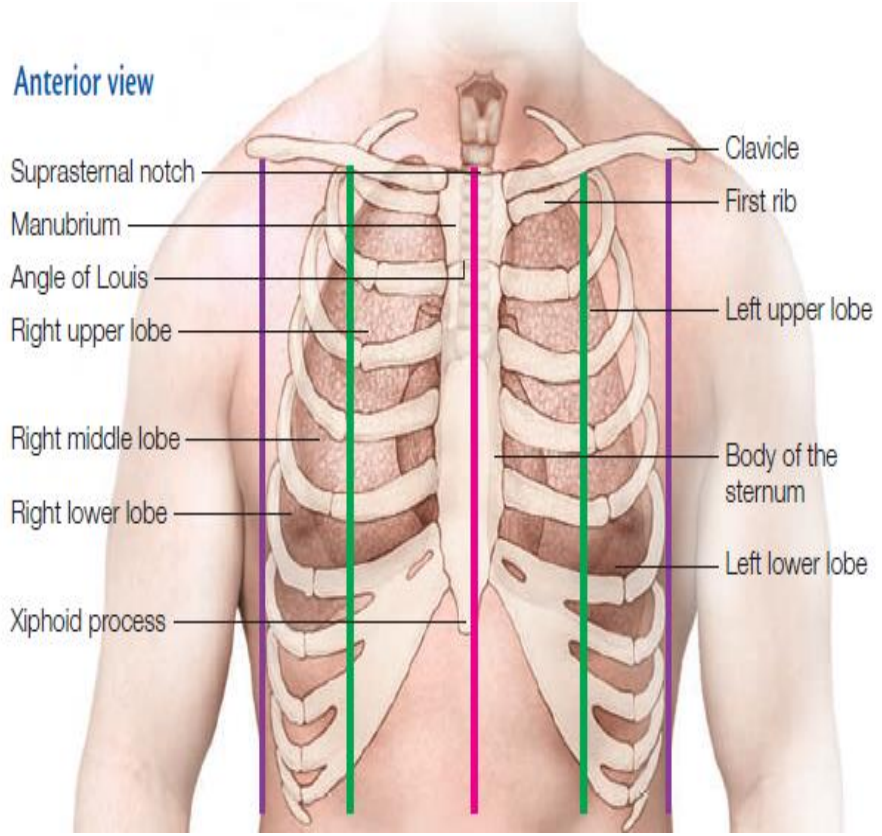


The medulla's respiratory center initiates each breath by sending messages via the phrenic nerve to the primary respiratory muscles.

Respiratory assessment landmarks:







You can use these landmarks to help describe the locations of your assessment findings.

Inspecting the chest

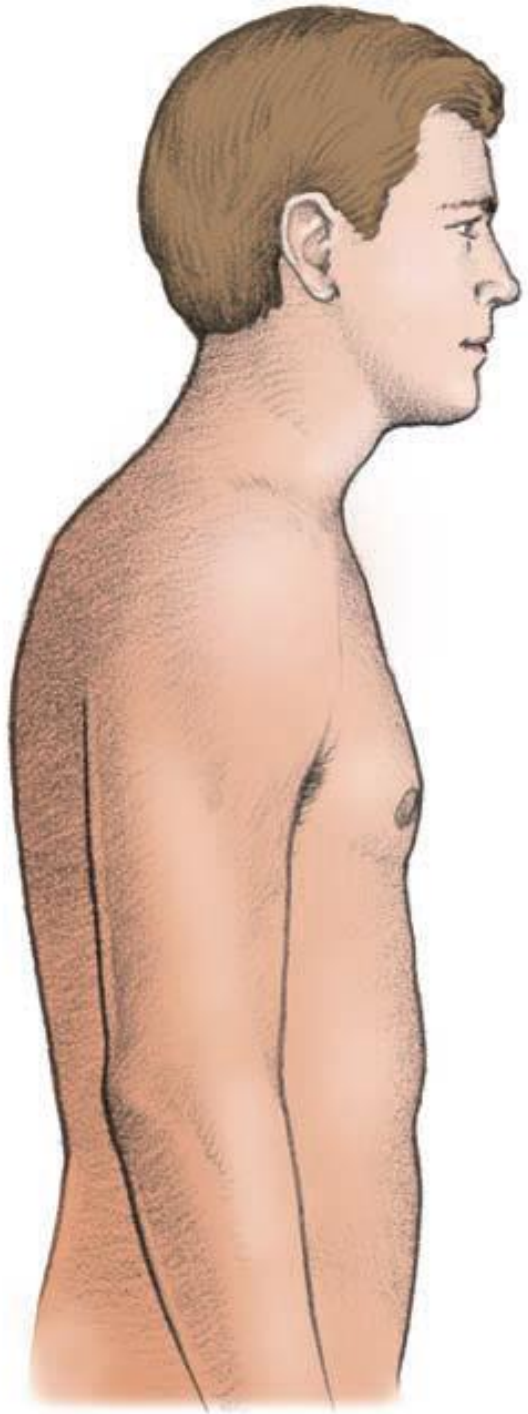
Inspect for chest-wall symmetry. Note masses or scars that indicate trauma or surgery.

- **Respiratory rate and pattern:**

Count the number of breaths for a full minute. Adults normally breathe at a rate of 12 to 20 breaths/minute. An infant's breathing rate may reach 40 breaths/minute. The respiratory pattern should be even, coordinated, and regular, with occasional sighs (long, deep breaths).

- **Accessory muscle use**

Frequent use of accessory muscles may indicate a respiratory problem, particularly when the patient purses his lips and flares his nostrils when breathing.



While inspecting the chest, look for these Characteristics that may put a **CRAMP** in your patient's Respiratory system.

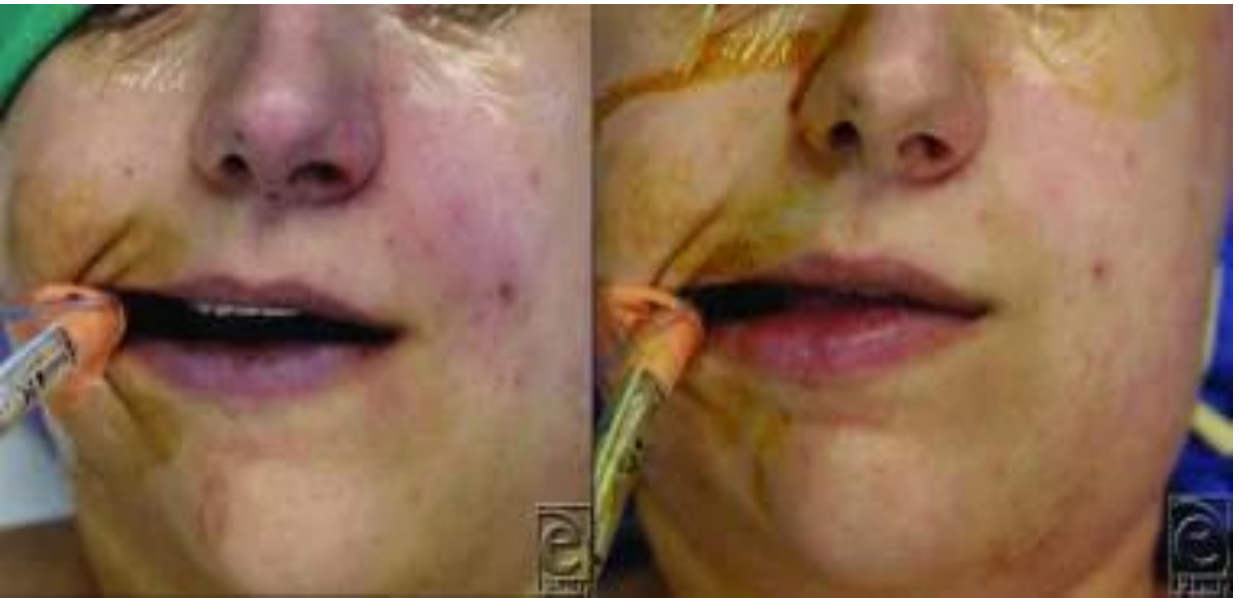
CRAMP

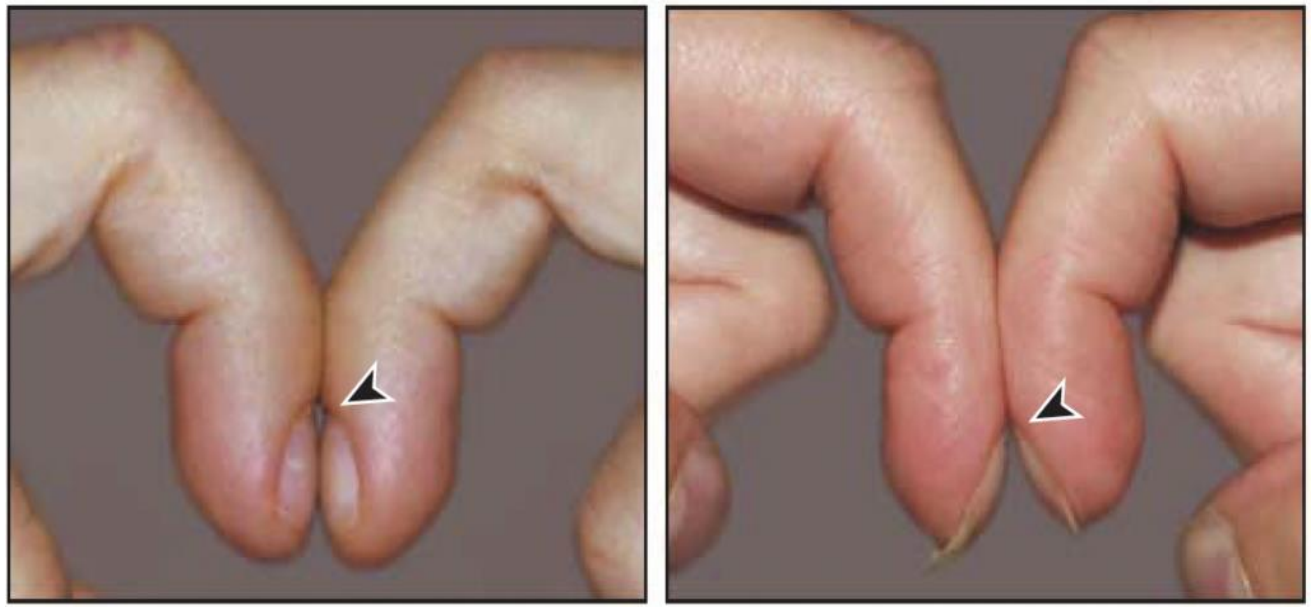
- **C**hest-wall asymmetry
- **R**espiratory rate and pattern (abnormal)
- **A**ccessory muscle use
- **M**asses or scars
- **P**aradoxical movement

Inspecting related structures

Inspect the skin, tongue, mouth, fingers, and nail beds.

- Patients with a bluish tint to their skin and mucous membranes are considered cyanotic.
- Clubbing of the fingers may signal long-term **hypoxia**.

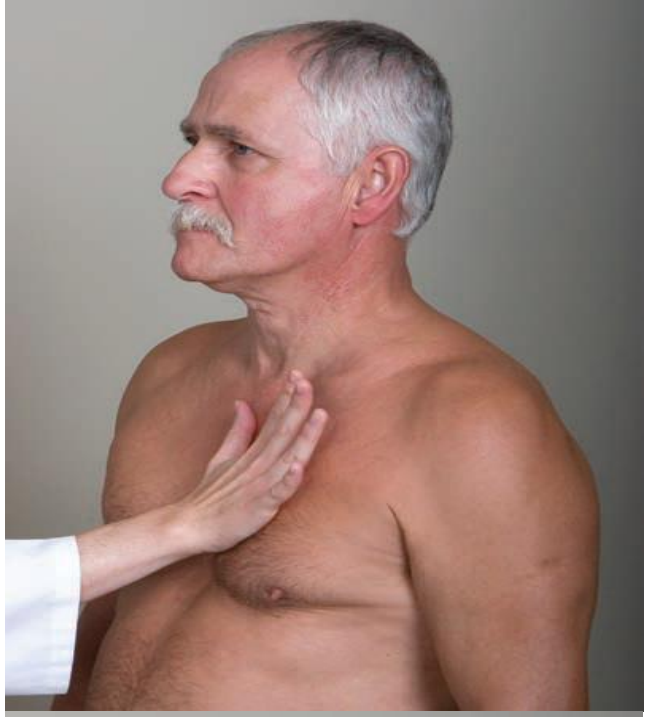


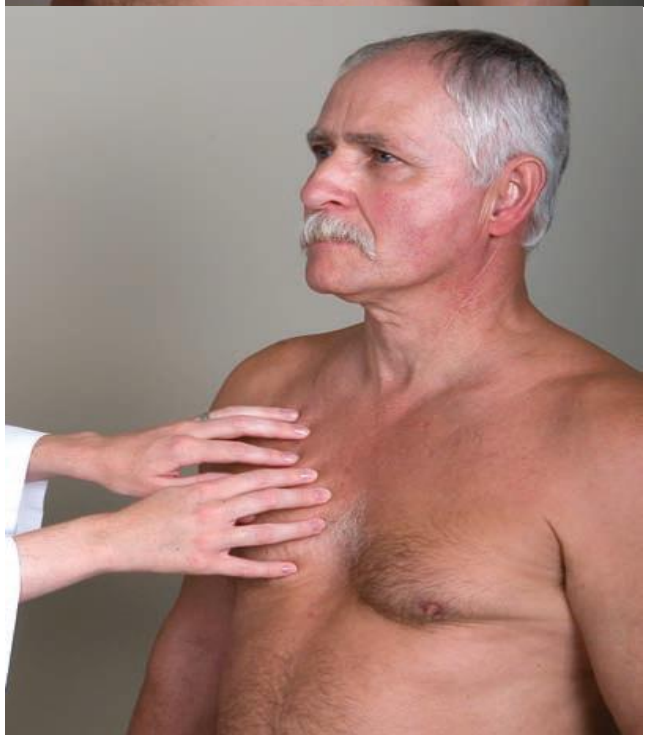


Palpating the chest

Place your **palm** lightly over the thorax. Palpate for tenderness, alignment, bulging, and retractions of the chest and intercostal spaces. Assess the patient for crepitus, especially around drainage sites. Repeat this procedure on the patient's back.

Use the **pads** of your fingers to palpate the front and back of the thorax. Pass your fingers over the ribs and any scars, lumps, lesions, or ulcerations. Note the skin temperature, turgor, and moisture. Also note tenderness or subcutaneous crepitus. The muscles should feel firm and smooth.





Checking for tactile fremitus

Ask the patient to fold his arms across his chest. This movement shifts the scapulae out of the way. Lightly place your open palms on both sides of the patient's back, as shown, without touching his back with your fingers. Ask the patient to repeat the phrase **"ninety-nine"** loud enough to produce palpable vibrations. Then palpate the front of the chest using the same hand positions.

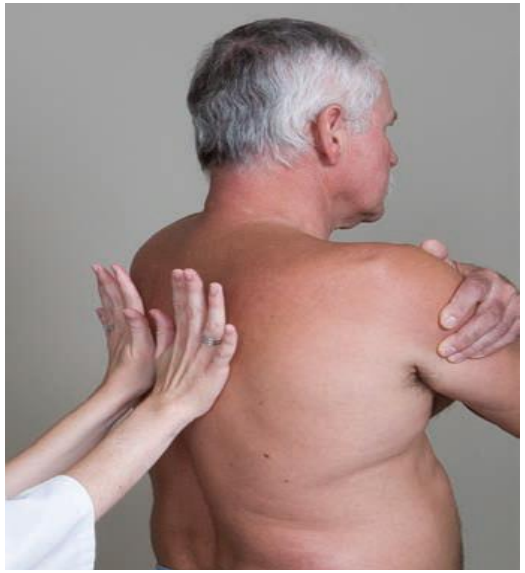
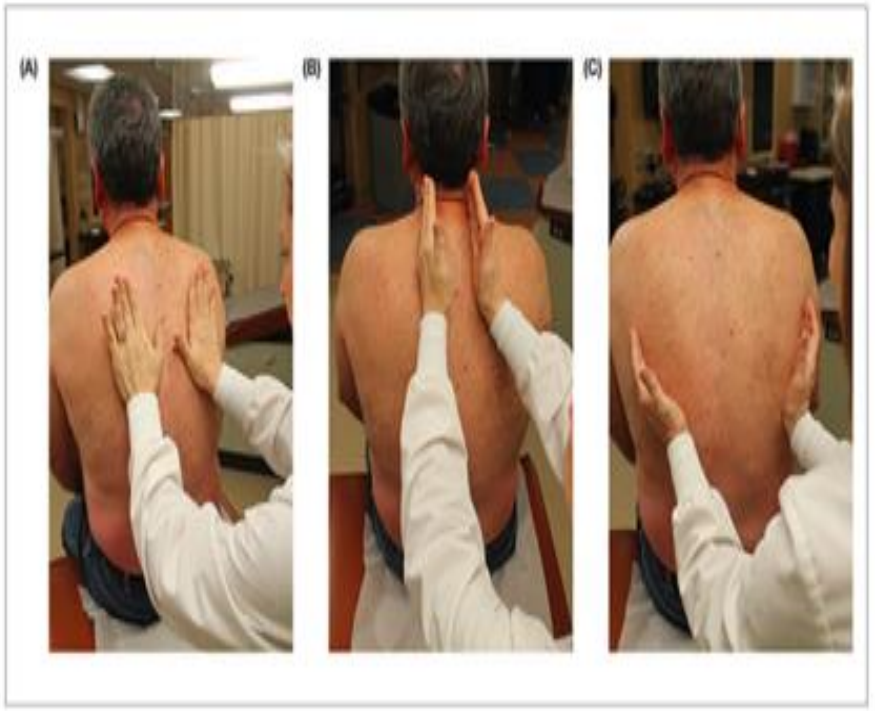


FIGURE 7.17
Palpation for tactile fremitus. (A) Technique using both hands. (B, C) Technique with ulnar aspect of both hands.



What the results mean

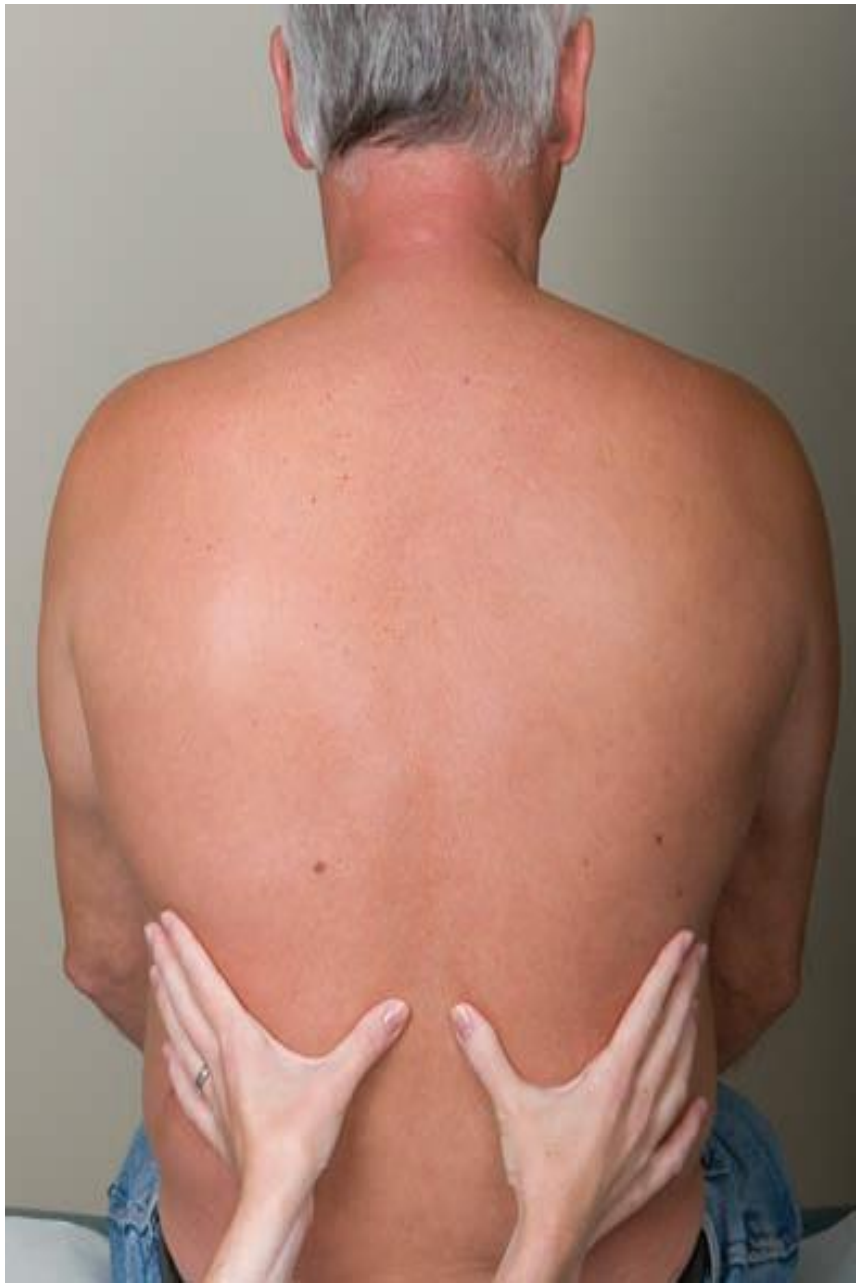
- **Vibrations** that feel more intense on one side than the other indicate tissue consolidation on that side.
- Less intense vibrations may indicate emphysema, pneumo thorax, or pleural effusion.
- Faint or no vibrations in the upper posterior thorax may indicate bronchial obstruction or a fluid-filled pleural space.

Video for tactile fremitus

Evaluating chest-wall symmetry and expansion

Place your hands on the front of the chest wall with your thumbs touching each other at the second intercostal space. As the patient inhales deeply, watch your thumbs. They should separate simultaneously and equally to a distance several centimeters away from the sternum. Repeat the measurement at the fifth intercostal space.

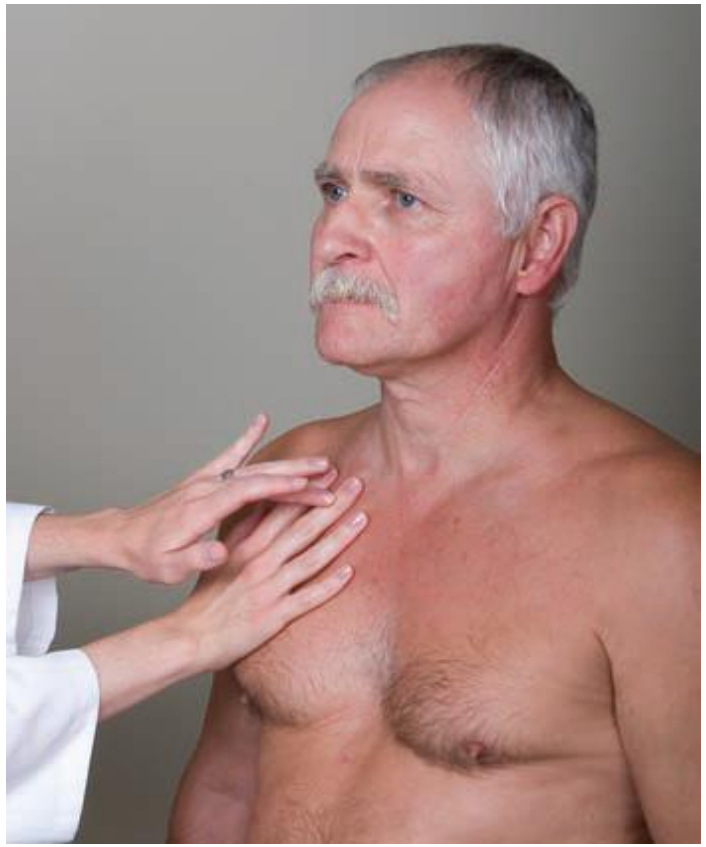
The same measurement may be made on the back of the chest near the tenth rib. The patient's chest may expand asymmetrically if he has pleural effusion, atelectasis, pneumonia, or pneumothorax.



Video for chest expansion

Percussing the chest

Chest percussion reveals the boundaries of the lungs and helps to determine whether the lungs are filled with air or fluid or solid material.



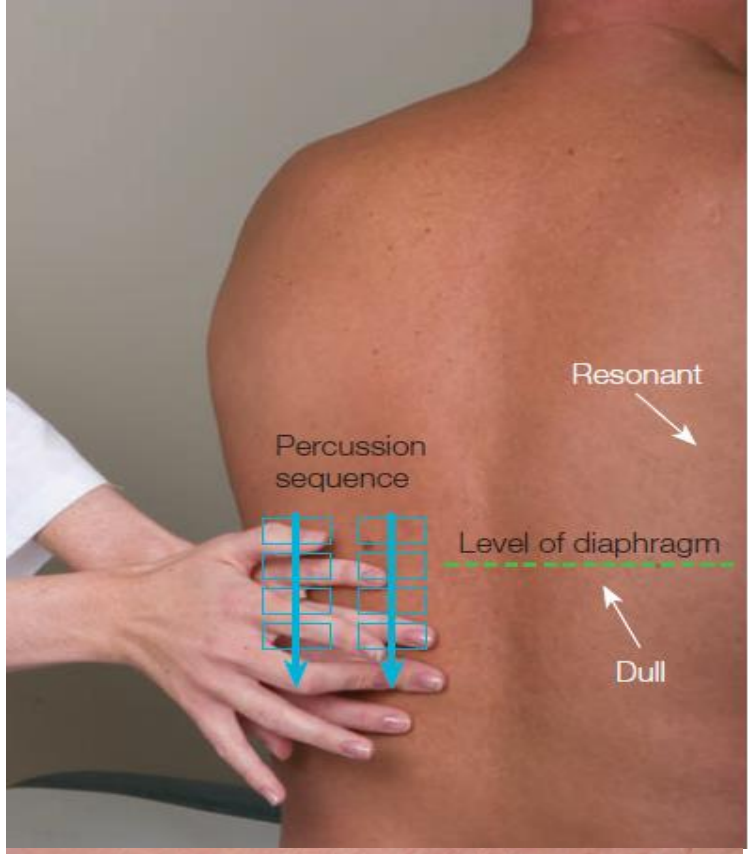
Percussion sounds

Sound	Description	Clinical significance
Flat	Short, soft, high-pitched, extremely dull, as found over the thigh	Consolidation, as in atelectasis and extensive pleural effusion
Dull	Medium in intensity and pitch, moderate length, thudlike, as found over the liver	Solid area, as in lobar pneumonia
Resonant	Long, loud, low-pitched, hollow	Normal lung tissue; bronchitis
Hyperresonant	Very loud, lower-pitched, as found over the stomach	Hyperinflated lung, as in emphysema or pneumothorax
Tympanic	Loud, high-pitched, moderate length, musical, drumlike, as found over a puffed-out cheek	Air collection, as in a large pneumothorax

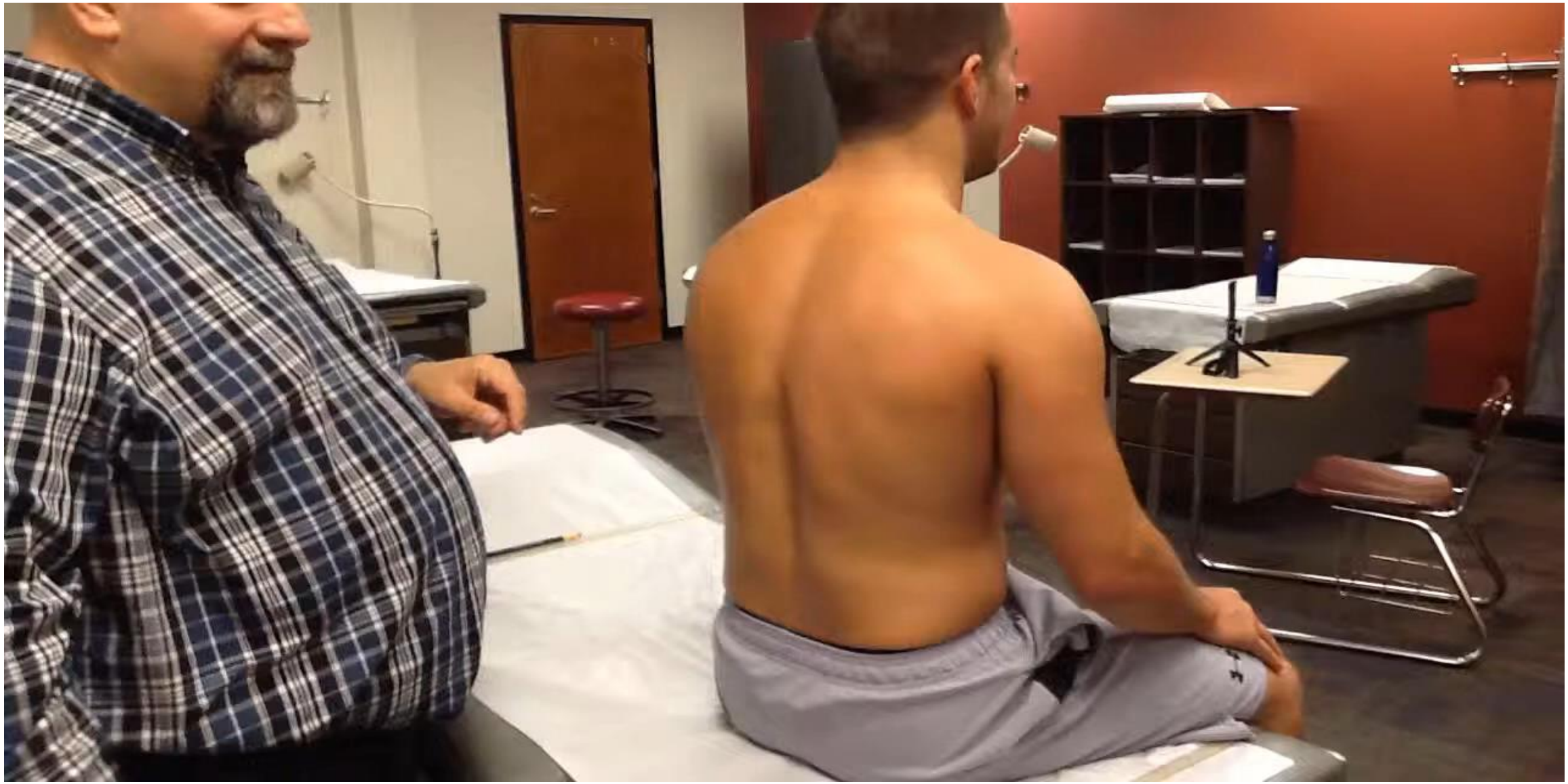
Video for Percussion

Diaphragmatic excursion

- Ask the patient to exhale.
- Percuss the back on one side to locate the upper edge of the diaphragm, the point at which normal lung resonance changes to dullness.
- Use a pen to mark the spot indicating the position of the diaphragm at full expiration on that side of the back.
- Ask the patient to inhale as deeply as possible.
- Percuss the back when the patient has breathed in fully until you locate the diaphragm. Use the pen to mark this spot as well.
- Repeat on the opposite side of the back.
- Use a ruler or tape measure to determine the distance between the pen marks. The distance, normally (3 to 5 cm), should be equal on both the right and left sides.



Video for Diaphragmatic excursion

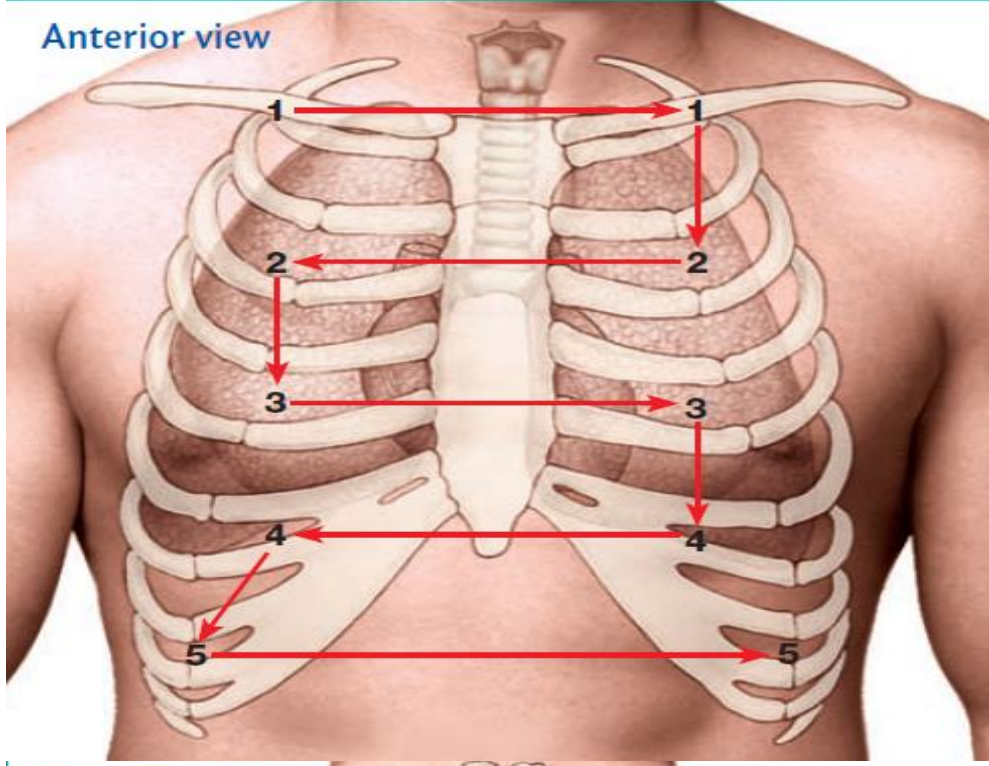


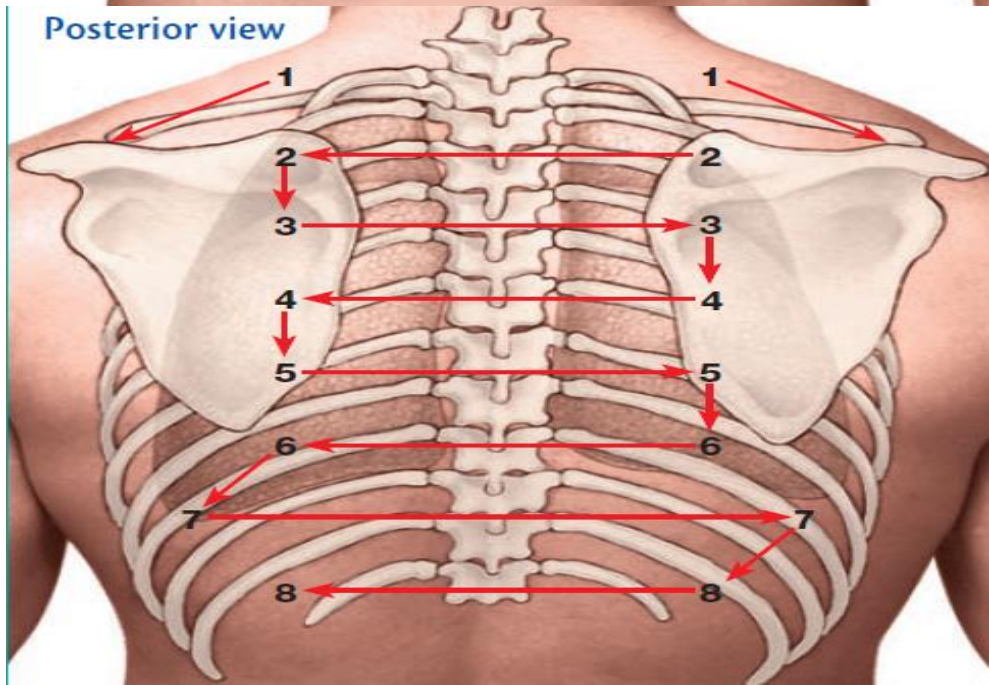
Auscultating the chest

To distinguish between normal and adventitious breath sounds in the patient's lungs, press the diaphragm of the stethoscope firmly against the skin. Listen to a full inspiration and a full expiration at each site in the sequence shown.

The sequence used in **percussion** is also used for **auscultation**.

■ Have the patient breathe through his mouth; nose breathing alters the pitch of breath sounds.
■ If the patient has abundant chest hair, mat it down with a damp washcloth so the hair doesn't make sounds like crackles.





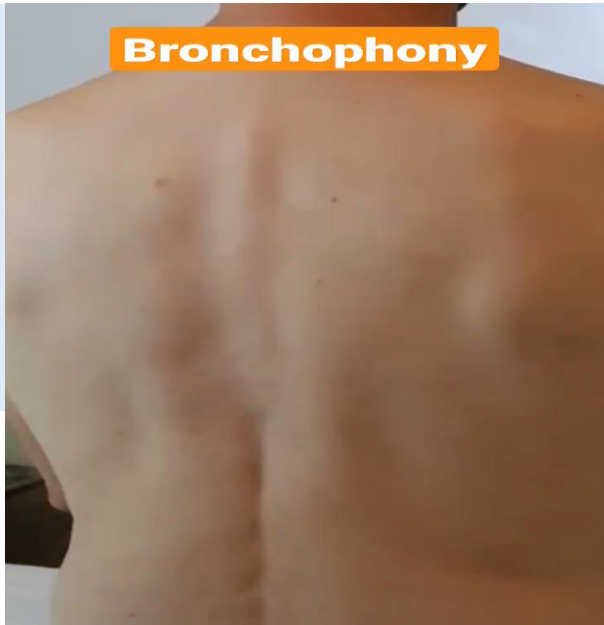
Assessing voice sounds

Check the patient for vocal fremitus —voice sounds resulting from chest vibrations that occur as the patient speaks. Abnormal transmission of voice sounds may occur over consolidated areas.

The most common abnormal voice sounds are:

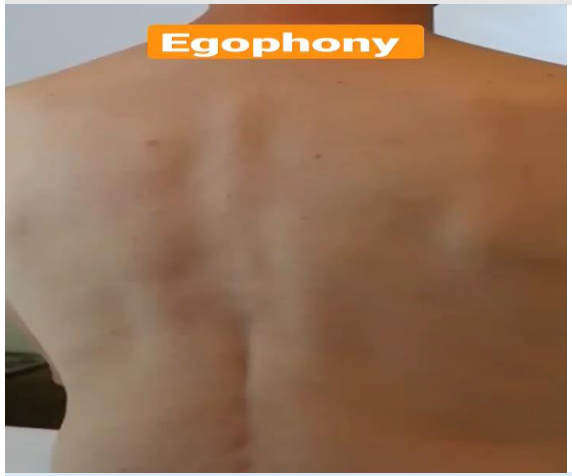
1- Bronchophony

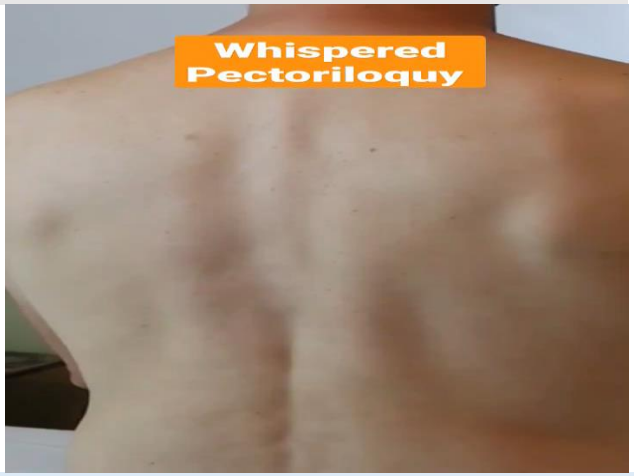
- Ask the patient to say, “ninety-nine.”
- Over normal lung tissue, the words sound muffled.
- Over consolidated areas, the words sound unusually loud.



2- Egophony

- Ask the patient to say, “E.”
- Over normal lung tissue, the sound is muffled.
- Over consolidated lung tissue, it will sound like the letter a.



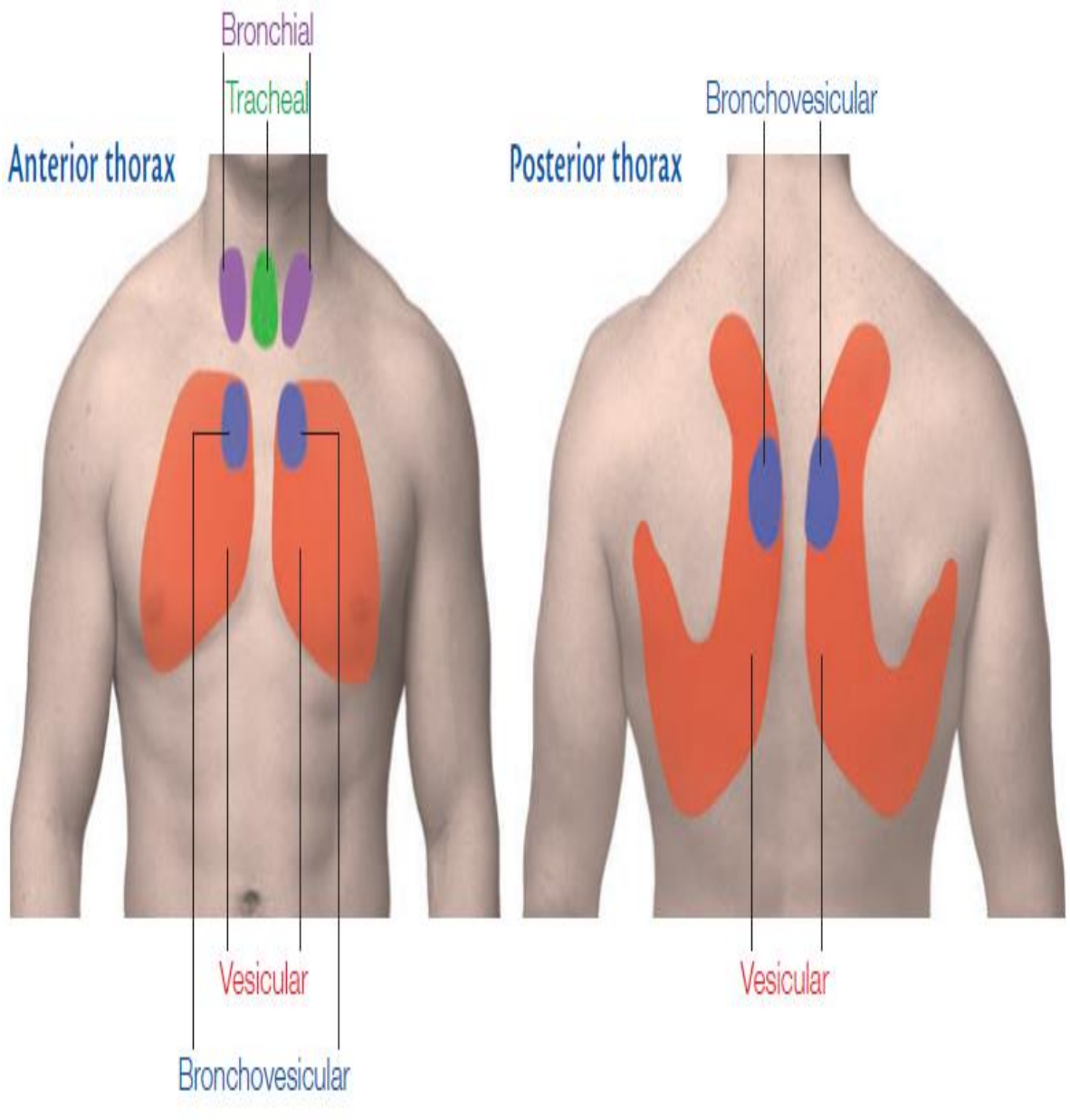


3-Whispered pectoriloquy

- Ask the patient to whisper, “1, 2, 3”
- Over normal lung tissue, the numbers will be almost indistinguishable.
- Over consolidated lung tissue, the numbers will be loud and clear.

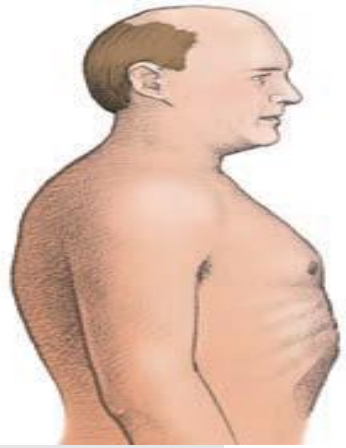
Locations of normal breath sounds

Breath sound	Quality
Tracheal	Harsh, high-pitched
Bronchial	Loud, high-pitched
Bronchovesicular	Medium in loudness and pitch
Vesicular	Soft, low-pitched

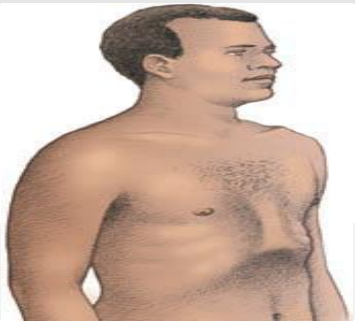


Abnormal findings

Chest-wall abnormalities:

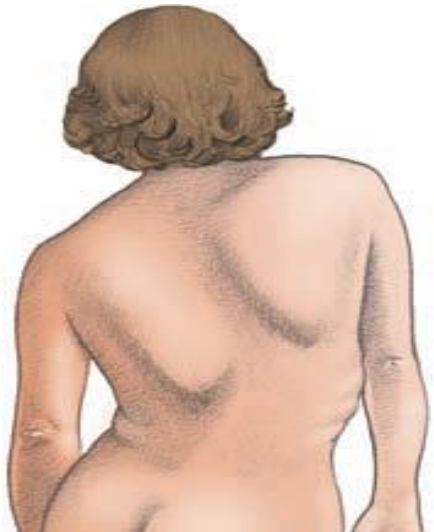


- **Barrel chest:** Increased anteroposterior diameter



- **Funnel chest:** Depressed lower sternum

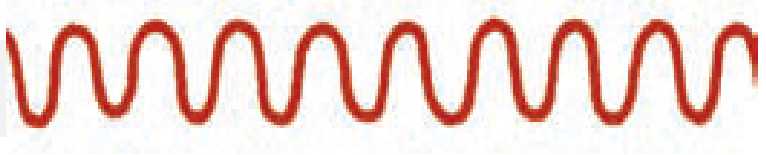
- **Pigeon chest:** Anteriorly displaced sternum



- **Thoracic kyphoscoliosis:** Raised shoulder and scapula, thoracic convexity, and flared interspaces

Abnormal respiratory patterns

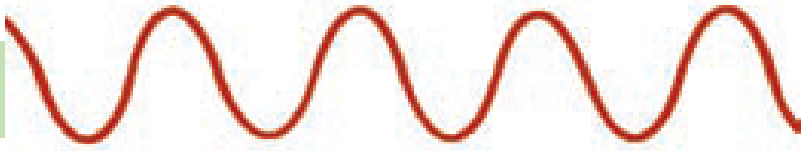
- **Tachypnea:** Shallow breathing with increased respiratory rate



- **Bradypnea:** Decreased rate but regular breathing.

- **Apnea:** Absence of breathing; may be periodic

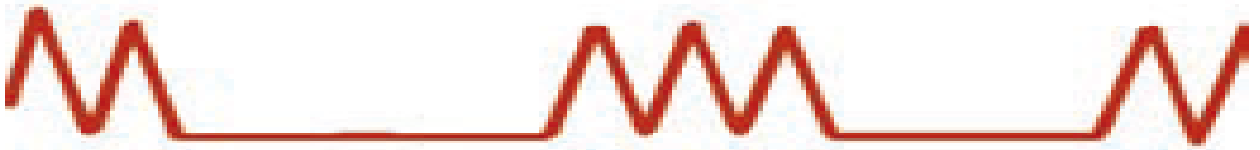
- **Hyperpnea:** Increased depth of breathing



- **Kussmaul's respirations:** Rapid, deep breathing without pauses; in adults, more than 20 breaths/minute; breathing usually sounds labored with deep breaths that resemble sighs

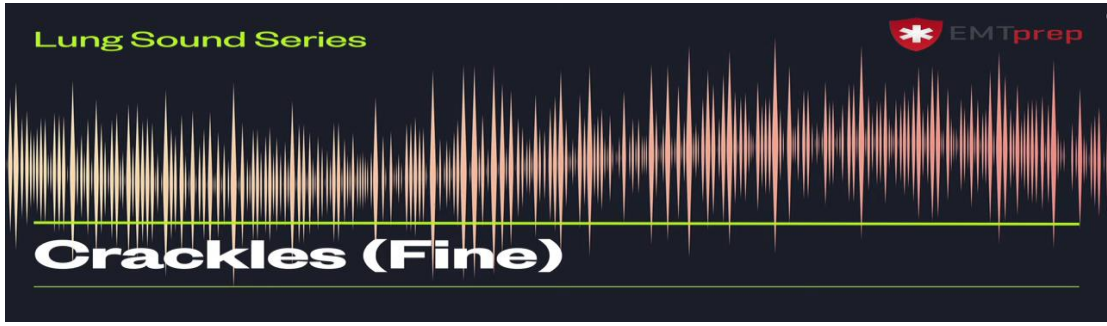
- **Cheyne-Stokes respirations:** Breaths that gradually become faster and deeper than normal, then slower, and alternate with periods of apnea

- **Biot's respirations:** Rapid, deep breathing with abrupt pauses between each breath; equal depth to each breath.



Adventitious sounds

- Fine crackles
- Coarse crackles
- Wheezes
- Rhonchi
- Pleural friction rub




Thank
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