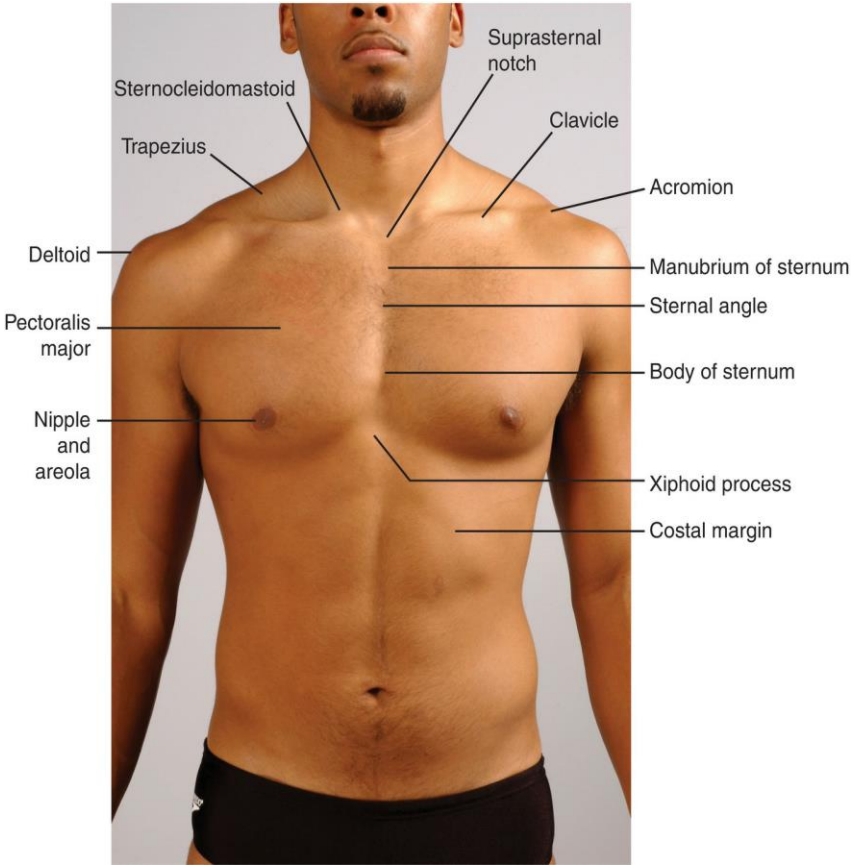
Surface Anatomy of The Thorax

Anterior Chest Wall. The most important anatomical land marks on the anterior chest wall are:

1.The suprasternal notch is the superior margin of the manubrium sterni and is easily felt between the prominent **medial ends of the clavicles** in the midline. It lies opposite the lower border of the body of the **second thoracic vertebra.**

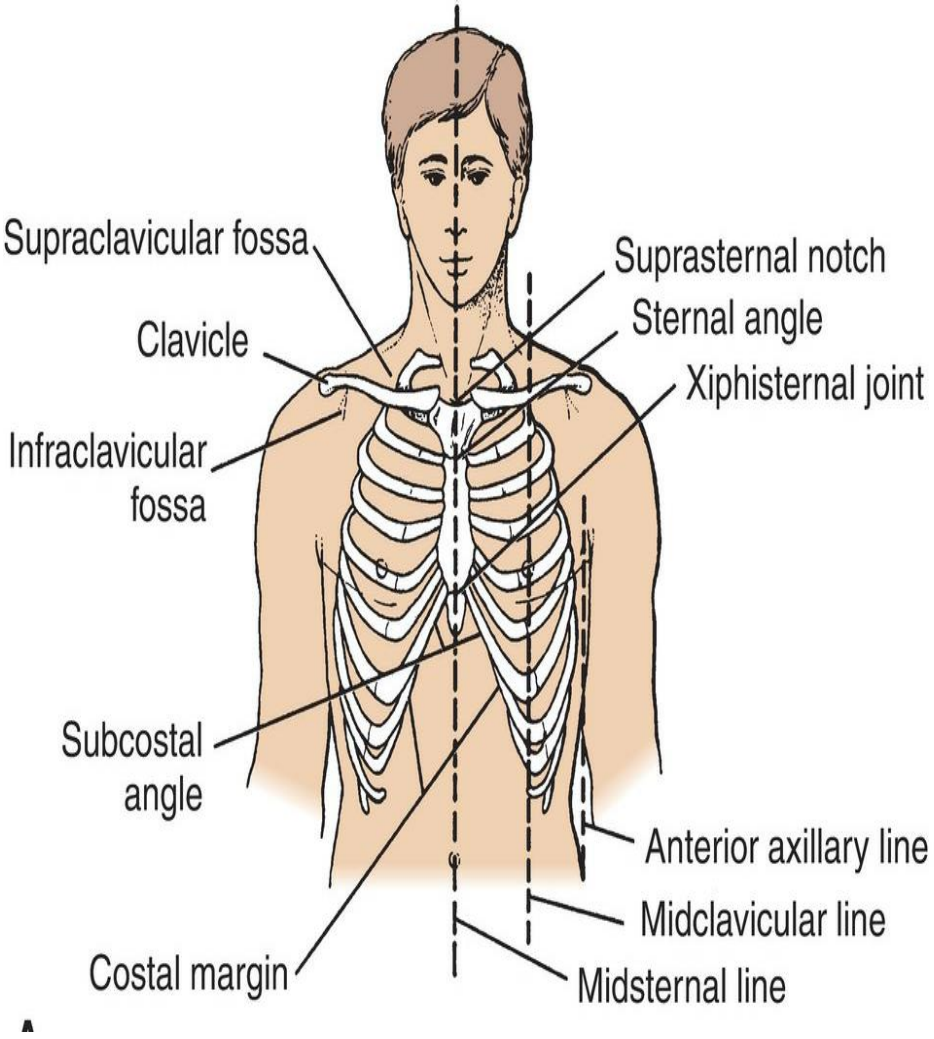
2.The sternal angle (angle of Louis) is the angle made between the manubrium and the body of the sternum**. It lies opposite the intervertebral disc between the fourth and fifth thoracic vertebrae**. The position of the sternal angle can easily be felt and is often seen as a transverse ridge.



The finger moved from this angle to the right or to the left will pass directly onto the second costal cartilage and then the second rib. **All ribs may be counted from this point.**

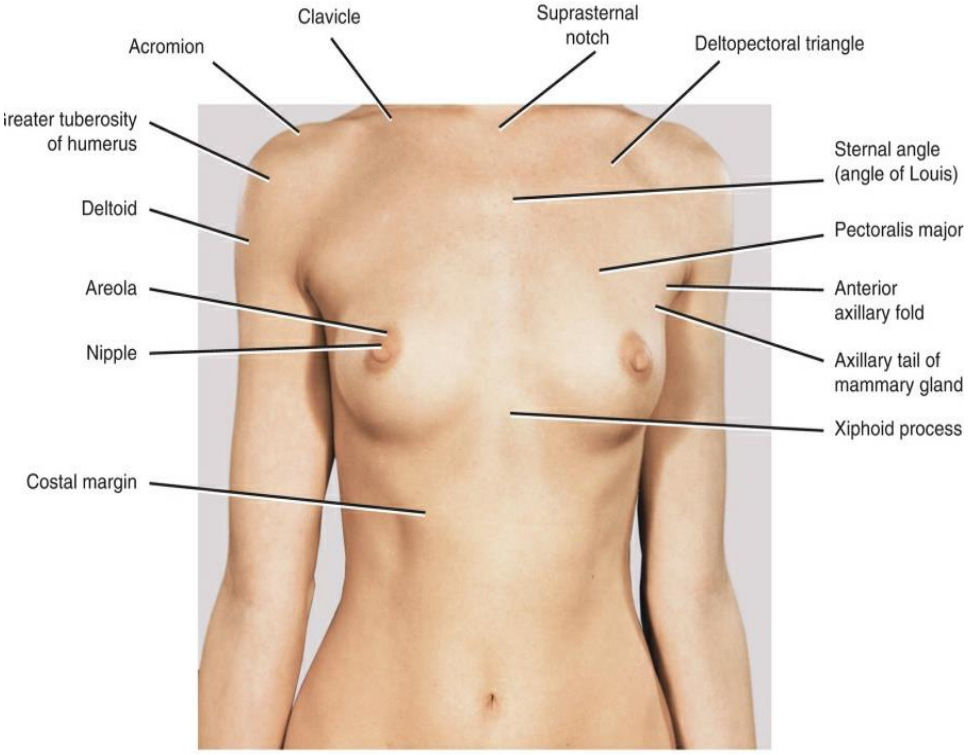
3.The xiphisternal joint is the joint between the xiphoid process of the sternum and the body of the sternum . It **lies opposite the body of the ninth thoracic vertebra.**

4.The subcostal angle is situated at the inferior end of the sternum, between **the sternal attachments of the seventh costal cartilages .**



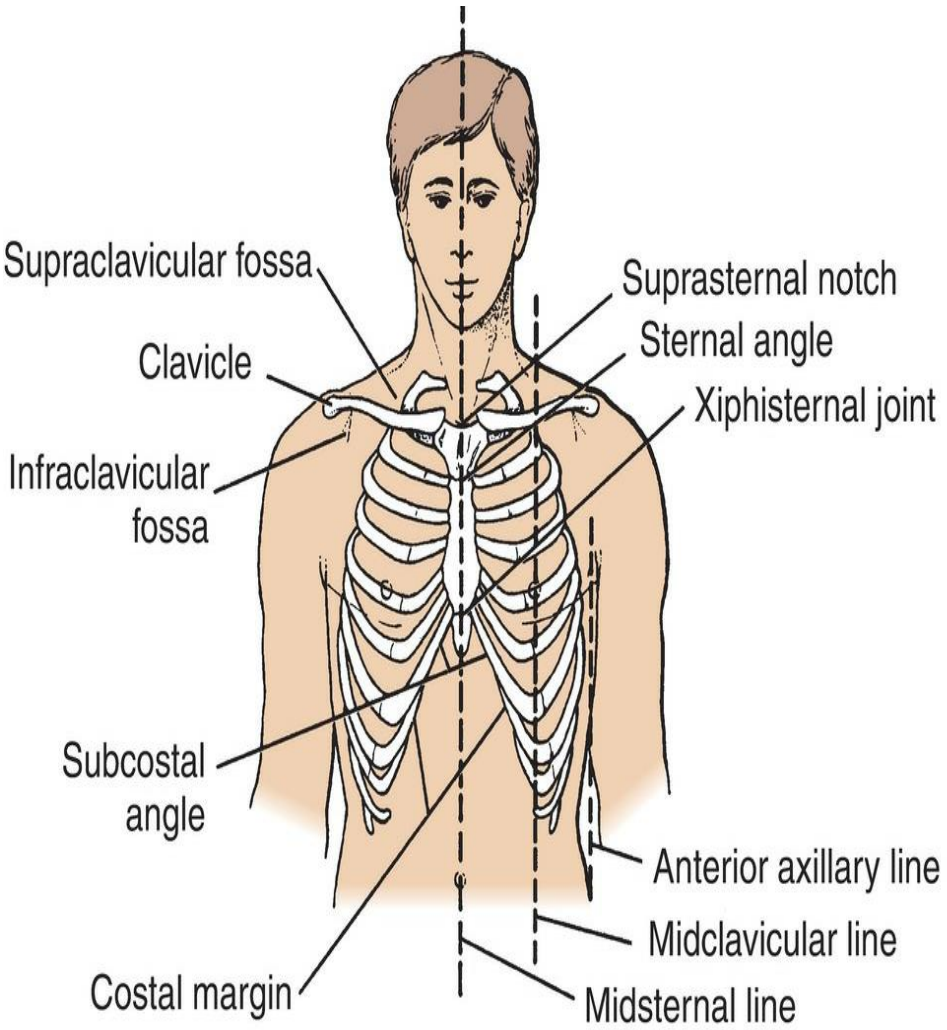
5.The costal margin is the lower boundary of the thorax and is **formed by the cartilages of the 7th, 8th, 9th, and 10th ribs and the ends of the 11th and 12th cartilages.** The lowest part of the costal margin is formed by **the 10th rib** and lies at the level of the **third lumbar vertebra.**

6.The clavicle is subcutaneous throughout its entire length and can be easily palpated. It **articulates at its lateral extremity with the acromion process of the scapula.**



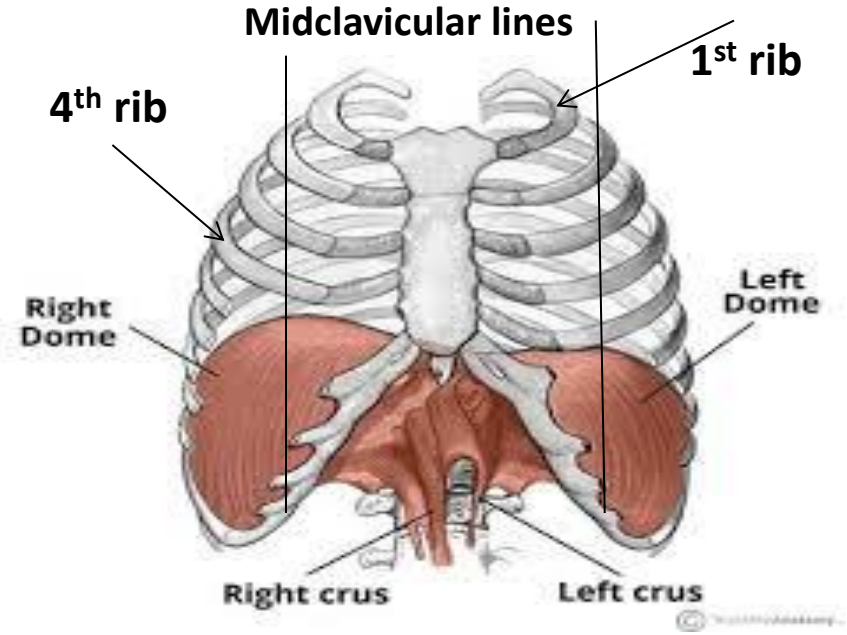
The Ribs are important land marks in the chest wall,

the **first rib lies deep to the clavicle and cannot be palpated**. If you press your fingers upward into the armpit and draw them downward over the lateral surface of the chest wall you can feel the lateral surfaces of the remaining ribs. **The 12th rib can be used to identify a particular rib by counting from below.** However, in some individuals, the 12th rib is very short and difficult to feel. For this reason **palpating the sternal angle and the second costal cartilage is the most convenient method.**



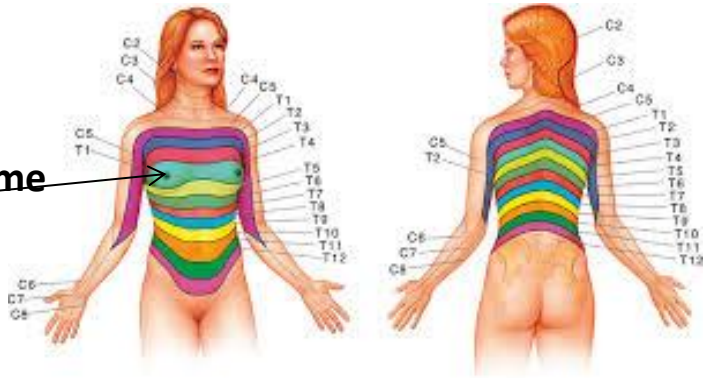
Diaphragm

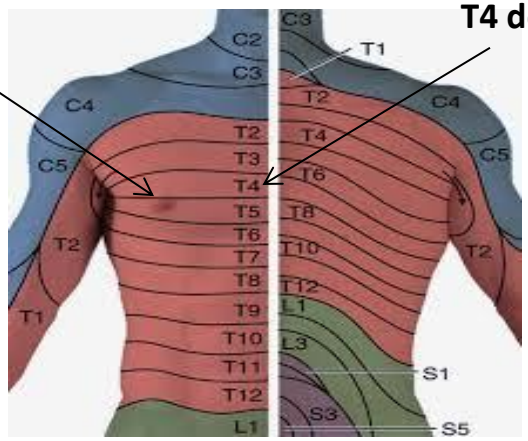
The central tendon of the diaphragm lies directly behind the xiphisternal joint. In the **midrespiratory** position, the summit of the right dome of the diaphragm reaches upward as far as the **upper border of the fifth rib in the midclavicular line,** but the left dome only reaches as far as the **lower border of the fifth rib.**



Nipple

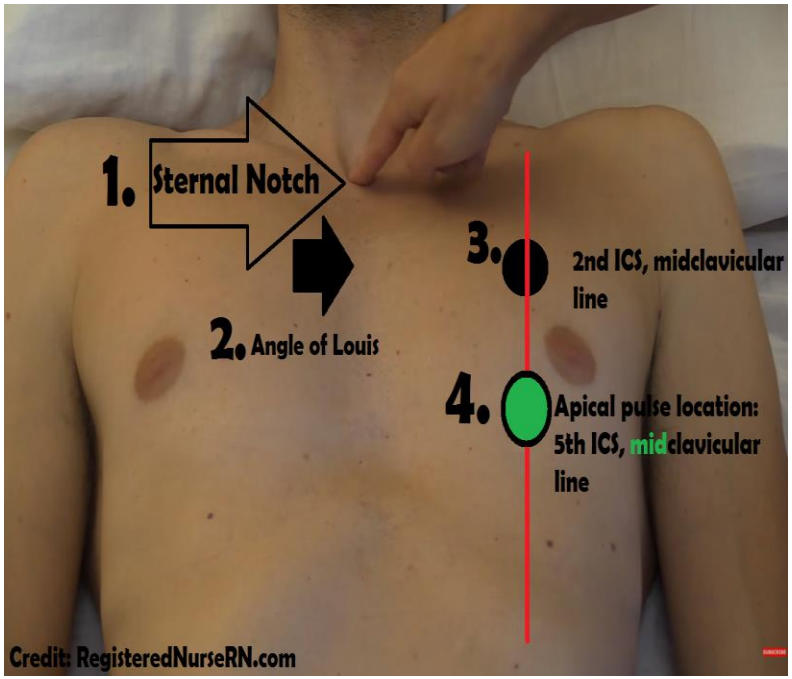
In the male, the nipple usually lies in **the fourth intercostal space** about **4 in. (10 cm) from the midline**. In the female, its position is not constant. However, **the T4 dermatome always crosses the nipple in both sexes** regardless of the form of the breast.





Apex Beat of Heart

The lower portion of the left ventricle forms the apex of the heart. The apex of the heart when thrust forward against the thoracic wall during systole causes **the apex beat**. The apex beat can usually be felt by placing the palm of the hand on the chest wall over the heart. After the area of cardiac pulsation has been determined, the apex beat is accurately localized by placing two fingers over the intercostal spaces and **moving them until the point of maximum pulsation is found. The apex beat is normally found in the fifth left intercostal space, 3.5 in. (9 cm) from the midline.** If you have difficulty in finding the apex beat, ask the patient to lean forward in the sitting position.

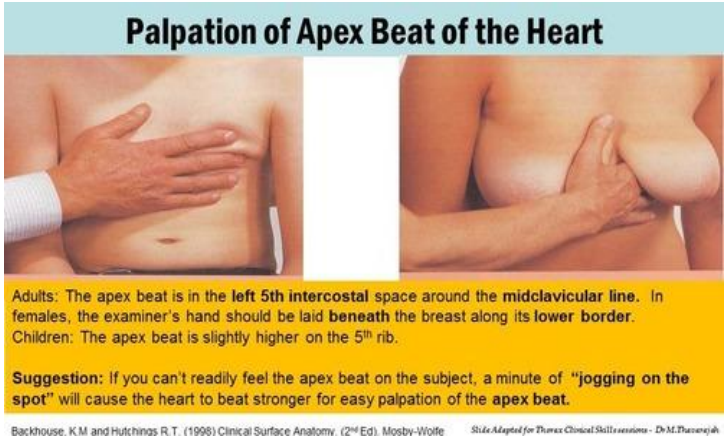


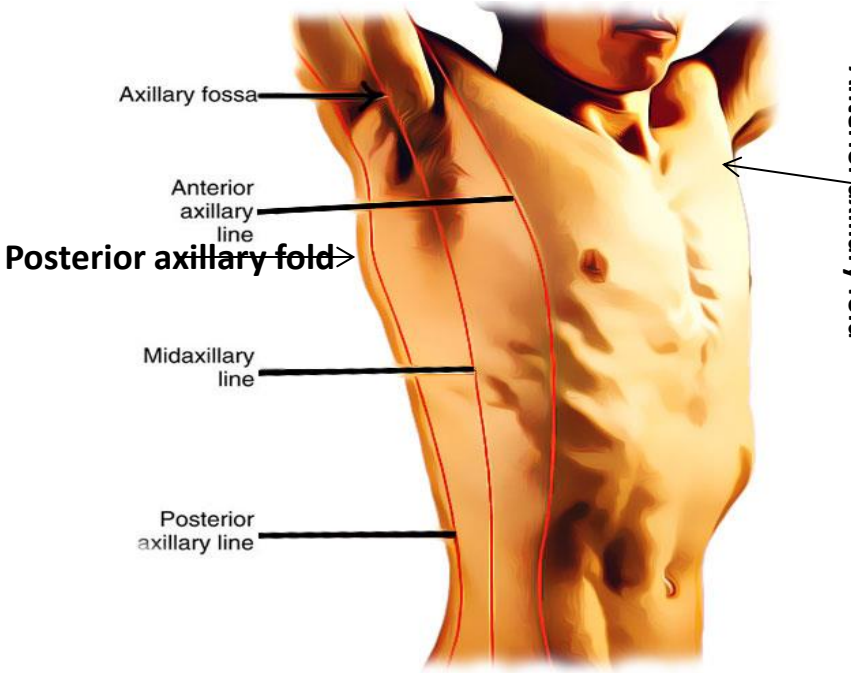
In a female with pendulous breasts, the examining fingers should gently raise the left breast from below as the intercostal spaces are palpated.

Axillary Folds

Anterior axillary fold. The lower border of **the pectoralis major** muscle forms the **anterior axillary fold.** This can be made to stand out by asking the patient to press a hand hard against the hip.

The posterior axillary fold. The tendon of **the latissimus dorsi** muscle forms the posterior axillary fold.

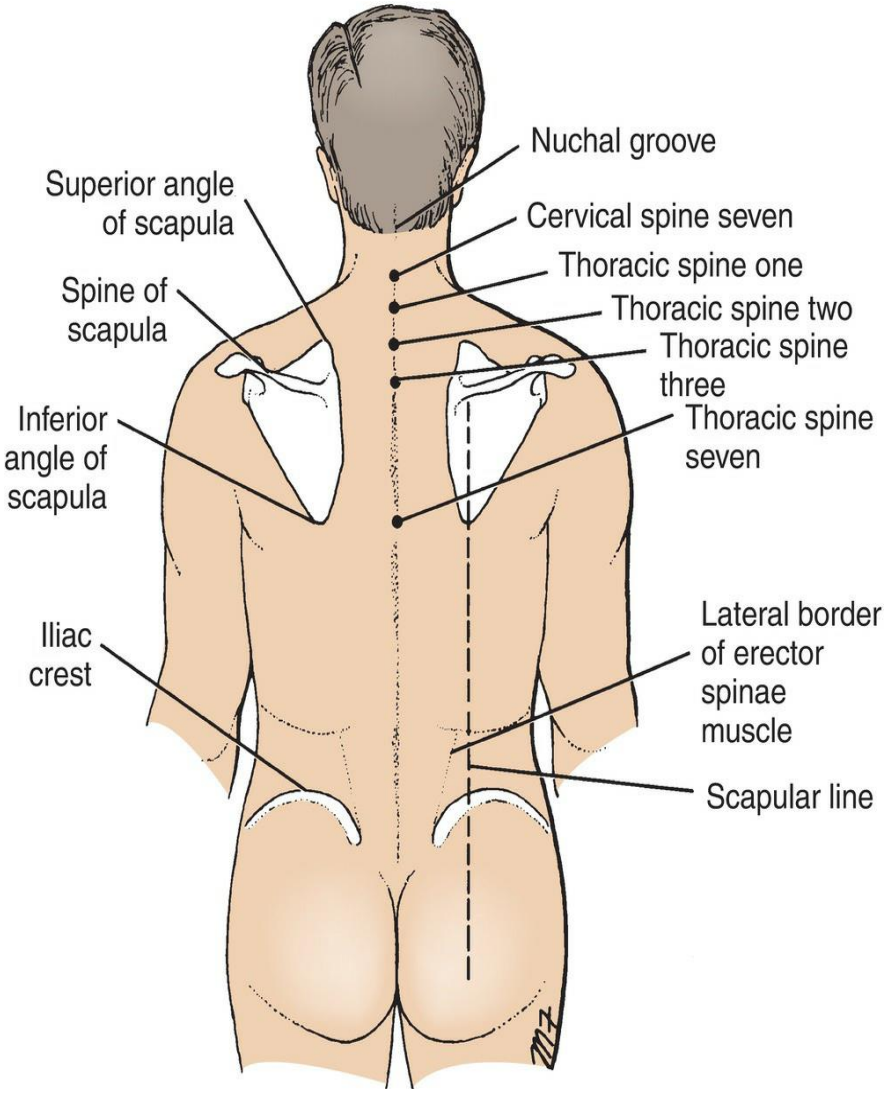


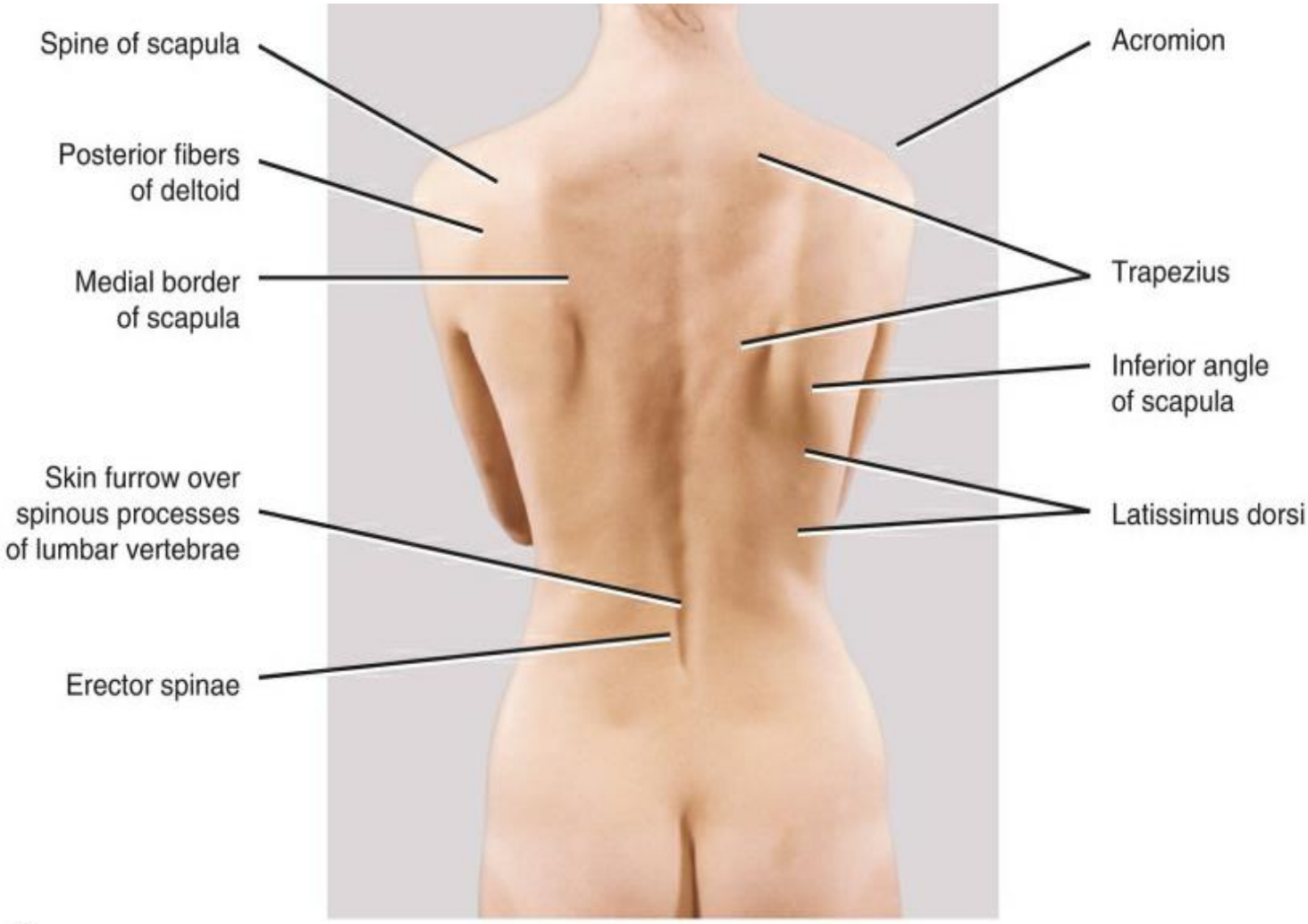


Posterior Chest Wall

The most important anatomical land marks on the posterior chest wall are:

1.The spinous processes of the thoracic vertebrae, can be palpated in the posterior midline. The index finger should be placed on the skin in the midline on the posterior surface of the neck and drawn downward in the nuchal groove. The first spinous process to be felt is that of the **seventh cervical vertebrae** (**vertebra prominens**). The overlapping spines of the thoracic vertebrae are below this level. A large ligament, the **ligamentum nuchae**, covers the spines of the C1 to 6 vertebrae.



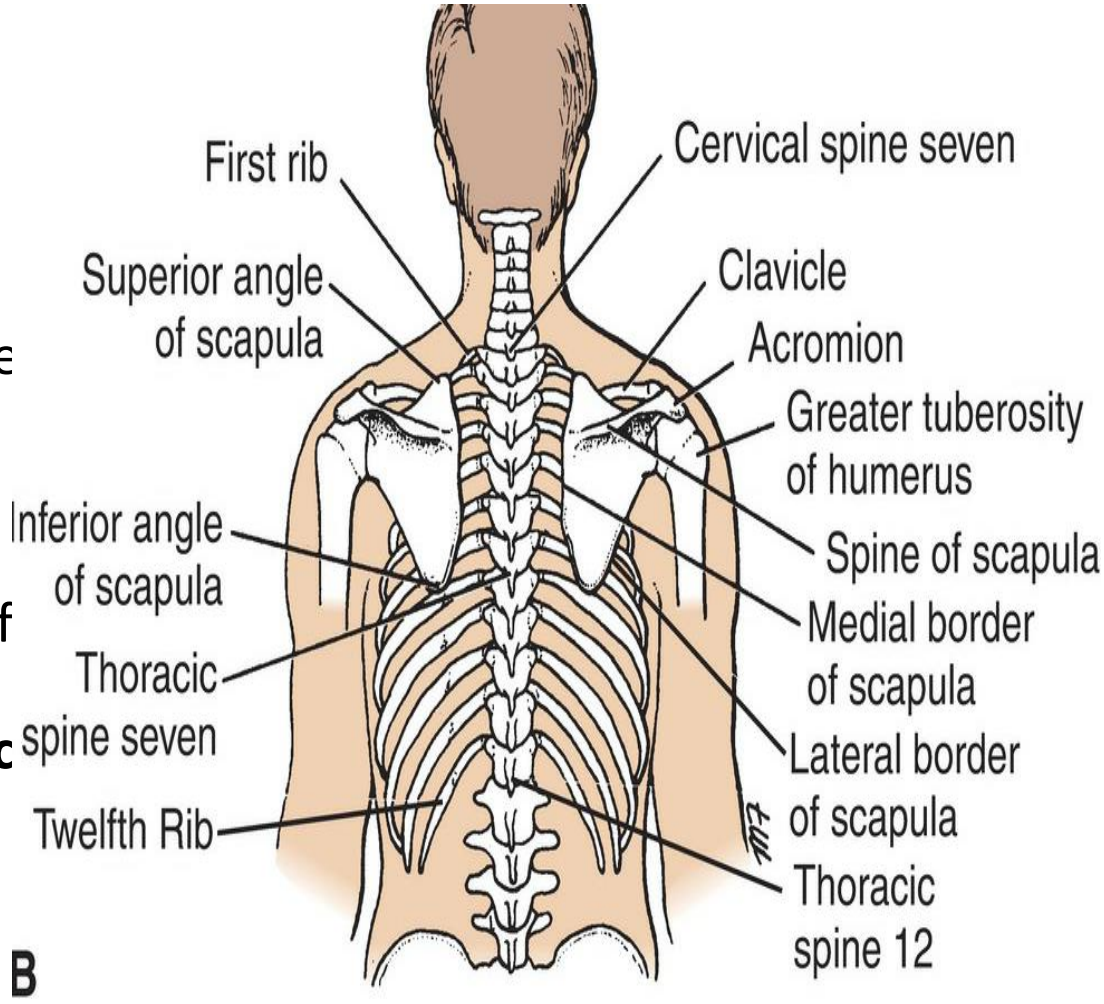

Spine of scapula
Posterior fibers of deltoid
Medial border of scapula
Skin furrow over spinous processes of lumbar vertebrae
Erector spinae
Acromion
Trapezius
Inferior angle of scapula
Latissimus dorsi

2.The scapula (shoulder blade) is flat and triangular in shape and is located on the upper part of the posterior surface of the thorax.

3.The superior angle of the scapula lies opposite the spine of the second thoracic vertebra.

4.The spine of the scapula is subcutaneous, and the root of the spine lies on a level with the **spine of the third thoracic vertebra.**

5.The inferior angle lies on a level with the spine of the **seventh thoracic vertebra**.



Clinical Examination of Chest (*important*)

As medical doctor, you will be examining the chest to detect evidence of disease. Your examination consists **of inspection, palpation, percussion, and auscultation**.

1.Inspection, examination by eyes, to show the configuration of the chest, the range of respiratory movement. The type and rate of respiration are also noted. **2.Palpation, examination by hands,** enables the clinician to confirm the impressions gained by inspection, especially of the respiratory movements of the chest wall. Abnormal protuberances or recession of part of the chest wall is noted. Abnormal pulsations are felt and tender areas detected.**3. Percussion** is a sharp tapping of the chest wall with the fingers. This produces vibrations that extend through the tissues of the thorax. Air-containing organs such as the lungs produce a resonant note; conversely, a more solid viscus such as the heart produces a dull note. **4. Auscultation, examination by using stethoscope.** enables the clinician to listen to the breath sounds as air enters and leaves the respiratory passages. If the alveoli or bronchi are diseased and filled with fluid, the nature of the breath sounds will be altered. The rate and rhythm of the heart can be confirmed by auscultation, and the various sounds produced by the heart and its valves during the different phases of the cardiac cycle can be heard. Detecting friction sounds produced by the rubbing together of diseased layers of pleura or pericardium may be possible.

To make these examinations, the clinician must be familiar with the normal structure of the thorax and must have a mental image of the normal position of the lungs and heart in relation to identifiable surface landmarks. Furthermore, the clinician must be able to relate any abnormal findings to easily identifiable bony landmarks so that he or she can accurately record and communicate them to colleagues.

Orientation Lines.

Several imaginary lines are sometimes used to describe surface locations on the anterior and posterior chest walls, these are:

1.The midsternal line lies in the median plane over the sternum.

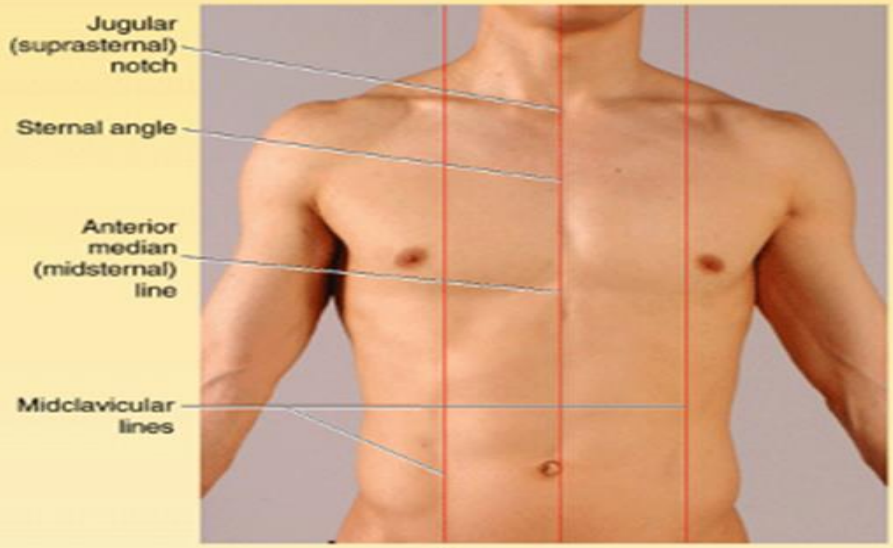
2.The midclavicular line runs vertically downward from the midpoint of the clavicle.

3.The anterior axillary line runs vertically downward from the anterior axillary fold.

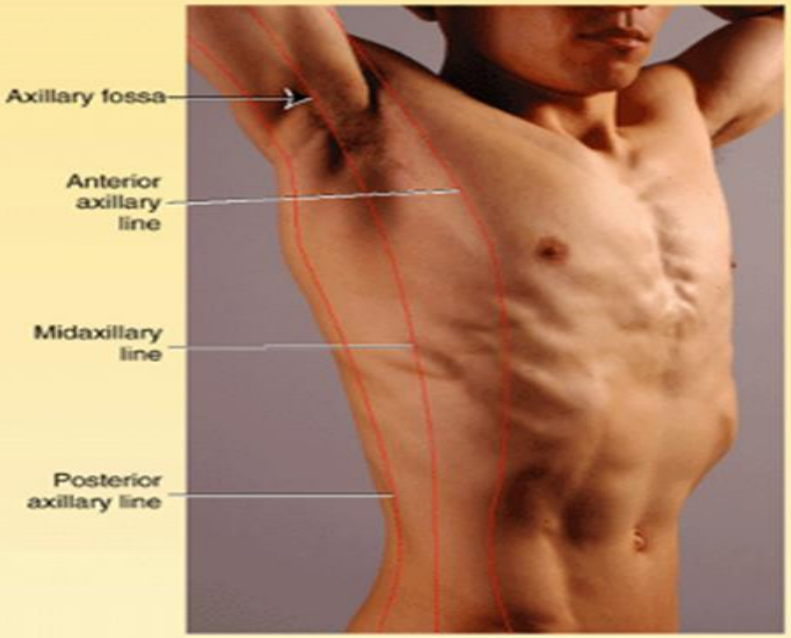
4.The posterior axillary line runs vertically downward from the posterior axillary fold.

5.The midaxillary line runs vertically downward from a point situated midway between the anterior and posterior axillary folds.

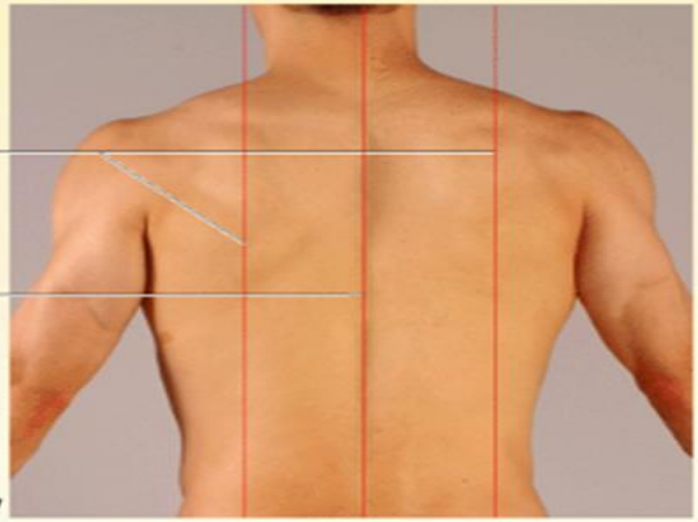
6.The scapular line runs vertically downward on the posterior wall of the thorax, passing through the **inferior angle of the scapula** (arms at the sides)



A Anterior view



B Anterolateral view

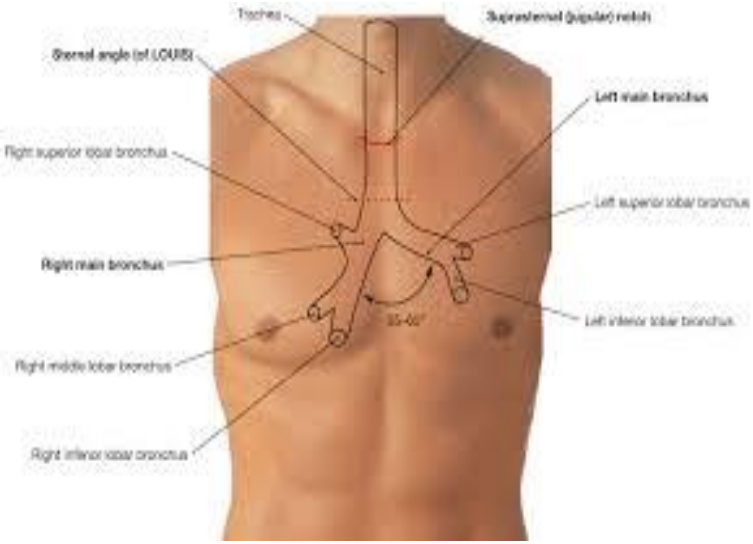


C Posterior view

Trachea

The trachea is one of the important landmarks on the anterior aspect of the neck. The trachea extends from the **lower border of the cricoid cartilage** (opposite the body of the **sixth cervical vertebra**) in the neck to the **level of the sternal angle** in the thorax.

It commences in the midline and ends just to the right of the midline by dividing into the right and the left principal bronchi. At the root of the neck, it may be palpated in the midline in the **suprasternal notch.**



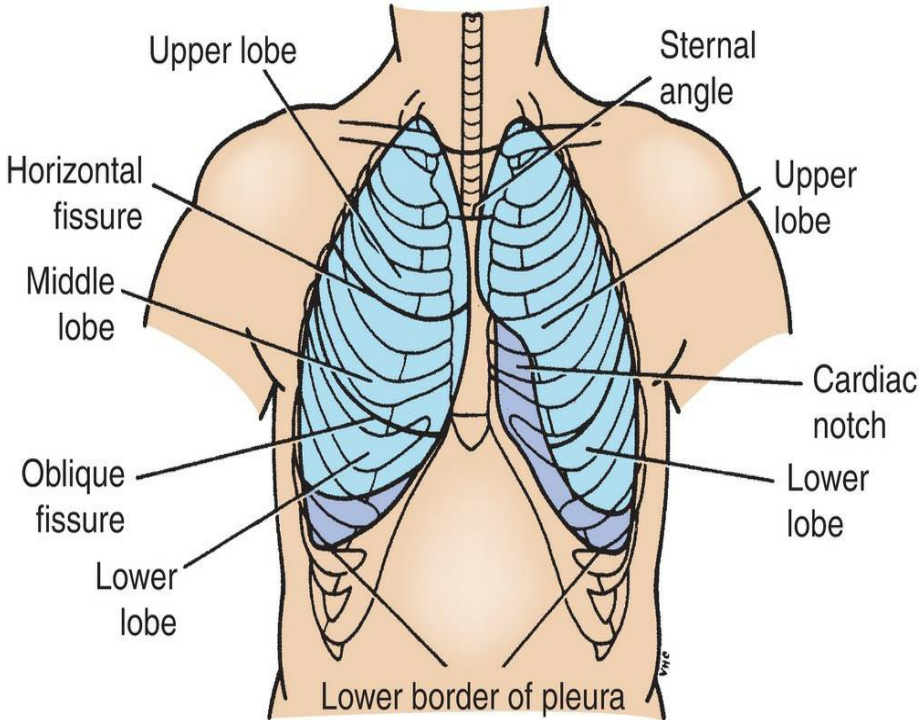
Surface anatomy of the lungs

The apex of the lung projects into the neck. It can be mapped out on the anterior surface of the body by drawing a curved line, convex upward, from the sternoclavicular joint to a point 1 in. (2.5 cm) above the junction of the

medial and intermediate thirds of the clavicle.

The anterior border of the right lung begins behind the sternoclavicular joint and runs downward, almost reaching the midline behind the sternal angle. It then continues downward until it reaches the xiphisternal joint.

The anterior border of the left lung has a similar course, but at the level of the fourth costal cartilage, it deviates laterally and extends for a variable distance beyond the lateral margin of the sternum to form the **cardiac notch**. The heart displacing the lung to the left produces this notch. The anterior border then turns sharply downward to the level of the xiphisternal joint.



The lower border of the lung

in midinspiration follows a curving line,

which crosses the sixth rib in the midclavicular line and the eighth rib in the midaxillary line, and reaches the 10th rib adjacent to the vertebral column posteriorly.

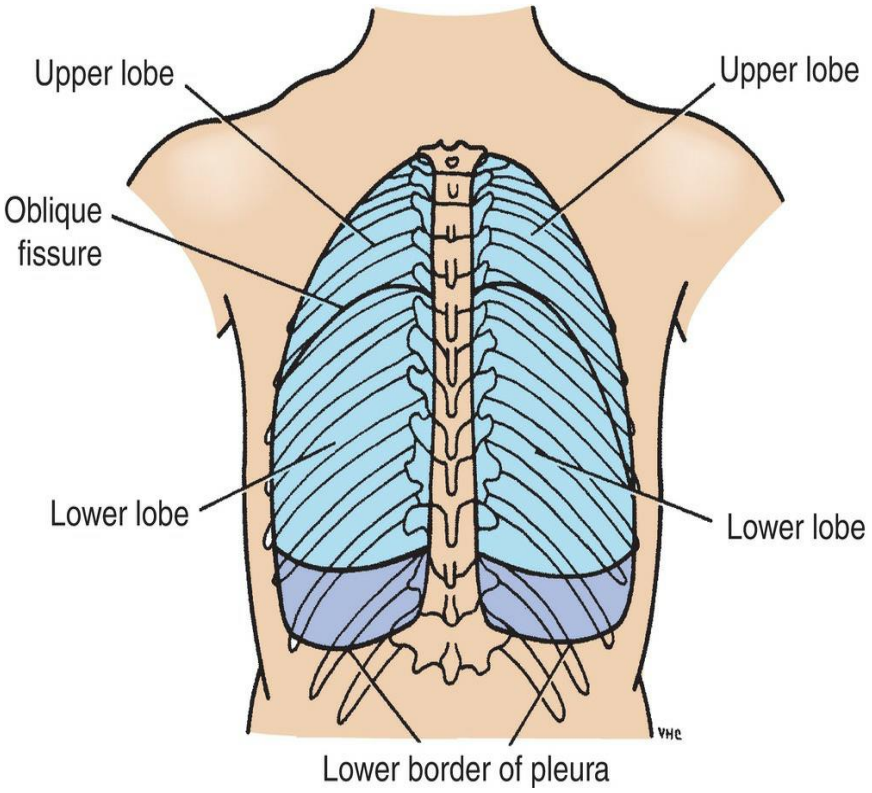
The posterior border of the lung extends downward from the spinous process of the seventh cervical vertebra to the level of the 10th thoracic vertebra and lies about 1.5 in. (4 cm) from the midline.

The oblique fissure of the lung can be indicated on the surface by a line

drawn from the root of the spine of the scapula obliquely downward, laterally

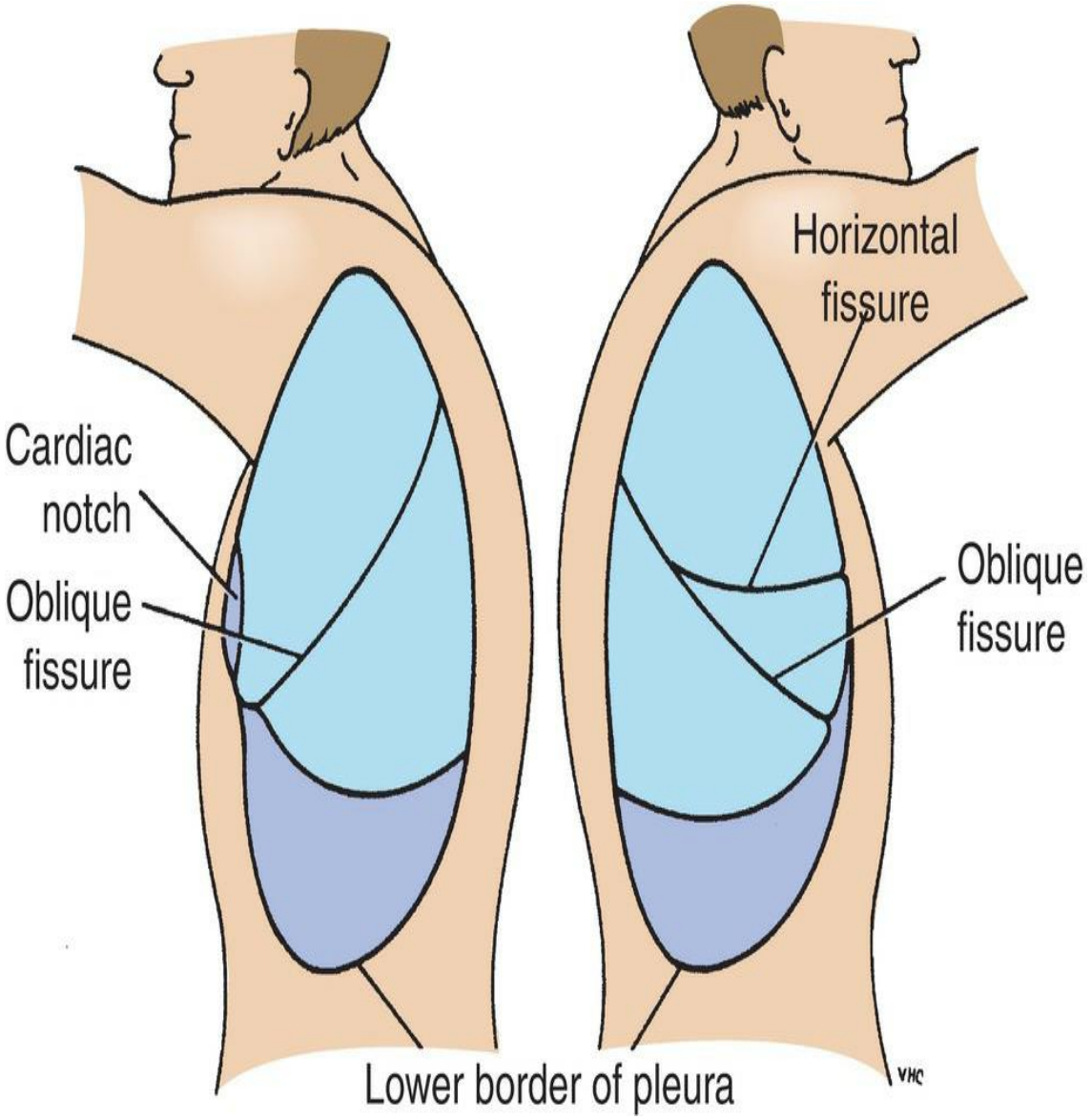
and anteriorly, following the course of the sixth rib to the sixth costochondral

junction. In the left lung, the upper lobe lies above and anterior to this line, whereas the lower lobe lies below and posterior to it



Surface markings of the lungs and parietal pleura on the posterior thoracic wall.

The horizontal fissure is an additional fissure in the right lung only. This fissure may be represented by a line drawn horizontally along the fourth costal cartilage to meet the oblique fissure in the midaxillary line). The upper lobe lies above the horizontal fissure, and the middle lobe lies below it. The lower lobe lies below and posterior to the oblique fissure.

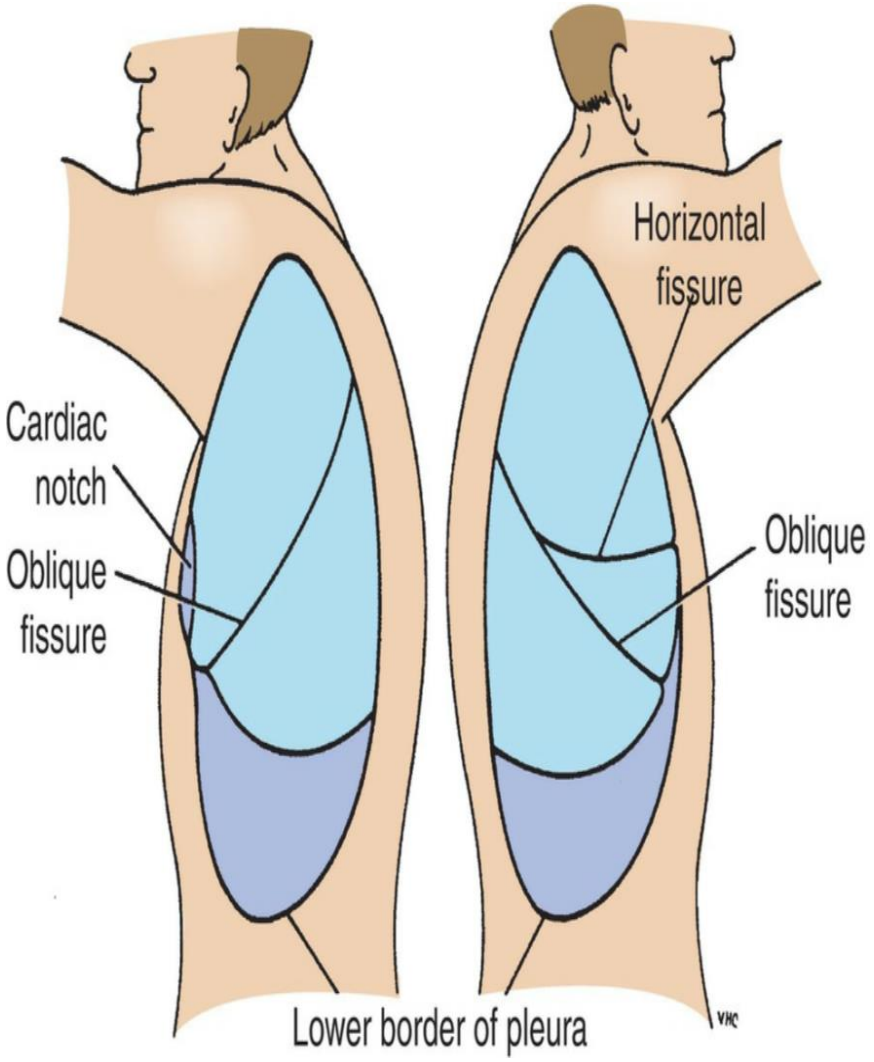


Surface markings of the lungs and parietal pleura on the lateral thoracic walls.

The posterior border of the lung extends downward from the spinous process of the seventh cervical vertebra to the level of the 10th thoracic vertebra and lies about 1.5 in. (4 cm) from the midline.

The oblique fissure of the lung can be indicated on the surface by a line drawn from the root of the spine of the scapula obliquely downward, laterally and anteriorly, following the course of the sixth rib to the sixth costochondral junction. In the left lung, the upper lobe lies above and anterior to this line, whereas the lower lobe lies below and posterior to it.

The horizontal fissure is an additional fissure in the right lung only. This fissure may be represented by a line drawn horizontally along the fourth costal cartilage to meet the oblique fissure in the midaxillary line). The upper lobe lies above the horizontal fissure, and the middle lobe lies below it. The lower lobe lies below and posterior to the oblique fissure.



Surface anatomy of the Pleura (Pls; see figures above)

The boundaries of the pleural sac can be marked out as lines on the surface of the body. The lines, which indicate the limits of the parietal pleura where it lies close to the body surface, are referred to as the **lines of pleural reflection**.

The cervical pleura bulges upward into the neck and has a surface marking identical to that of the apex of the lung. The **anterior border of the right pleura** runs down behind the sternoclavicular joint, almost reaching the midline behind the sternal angle. It then continues downward until it reaches the xiphisternal joint. The **anterior border of the left pleura** has a similar course, but at the level of the fourth costal cartilage, it deviates laterally and extends to the lateral margin of the sternum to form the cardiac notch. (Note that the pleural cardiac notch is not as large as the cardiac notch of the lung.) It then turns sharply downward to the xiphisternal joint . The **lower border of the pleura** on both sides follows a curved line, which crosses the eighth rib in the midclavicular line and the 10th rib in the midaxillary line, and reaches the 12th rib adjacent to the vertebral column—that is, at the lateral border of the erector spinae muscle. Note that the lower margins of the lungs cross the 6th, 8th, and 10^{th} ribs at the midclavicular lines, the midaxillary lines, and the sides of the vertebral column, respectively; the lower margins of the pleura cross, at the same points, the 8th, 10th, and 12th ribs, respectively. The distance between the two borders corresponds to the **costodiaphragmatic recess**.

Clinical Notes

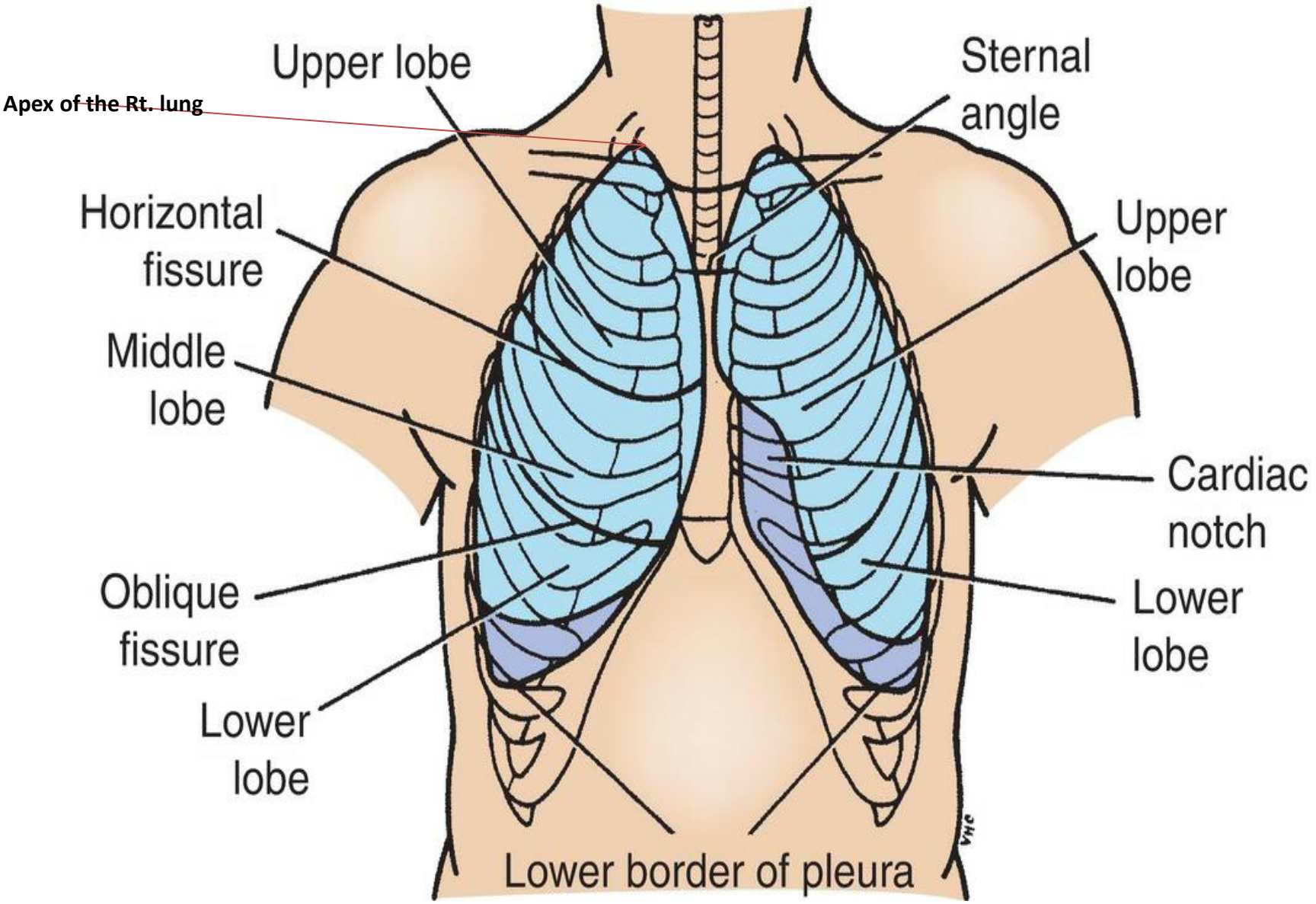
Pleural Reflections (figure below)

Recognizing the surface markings of the pleural reflections and the lobes of the lungs is important. The clinician should have a mental image of the structures that lie beneath the stethoscope when listening to the breath sounds of the respiratory tract.

The cervical dome of the pleura and the **apex of the lungs** extend up into the neck to a point about 2.5 cm above the clavicle. Consequently, they are vulnerable to stab wounds in the root of the neck or to damage by an anesthetist's needle during nerve block of the lower trunk of the brachial plexus.

The **lower limit of the pleural reflection**, as seen from the back, may be damaged during a nephrectomy. The pleura crosses may be damaged during removal of the kidney through an incision in the loin.

Pleural reflections; bold black lines

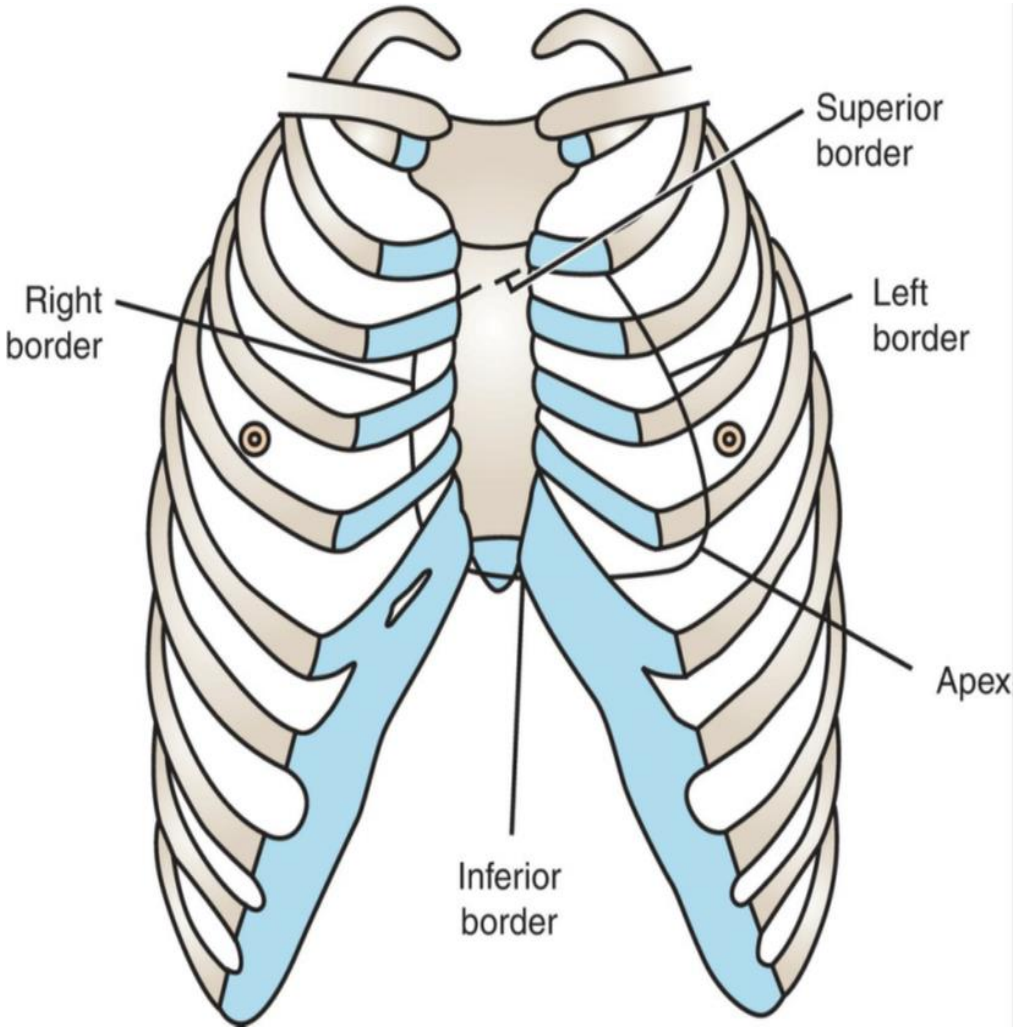


Surface Anatomy of The Heart

For practical purposes, the heart may be considered to have an **apex and four borders.**

The apex, formed by the **left ventricle**, corresponds to the apex beat and is **found in the fifth left intercostal space 9 cm from the midline.**

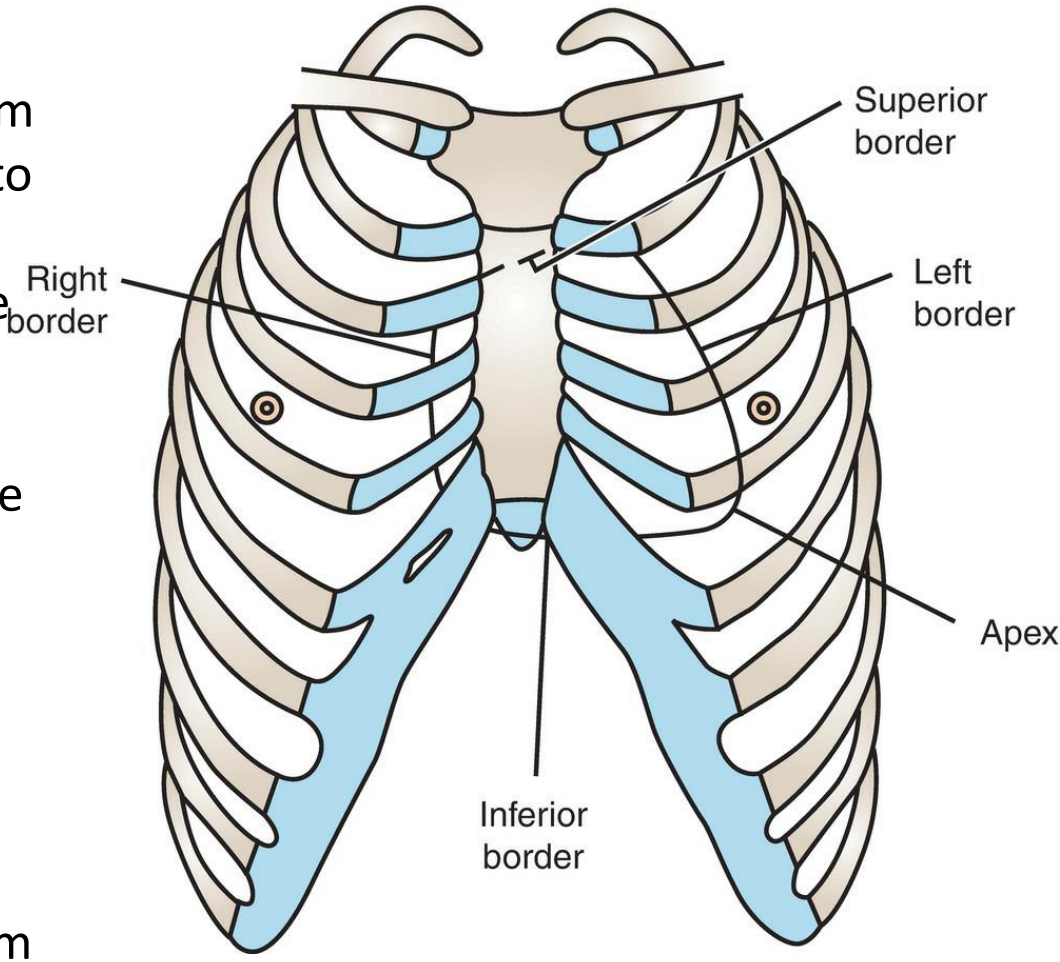
The superior border, formed by the roots of the great blood vessels(aorta, pulmonary artery, superior vana cava, inferior vena cava, and pulmonary veins) and extends from a point on **the second left costal cartilage,** 1.3 cm from the edge of the sternum to a point on the third right costal cartilage 1.3 cm from the edge of the sternum.



The right border, formed by **the right atrium**, extends from a point on the third right costal cartilage 1.3 cm from the edge of the sternum downward to a point on the sixth right costal cartilage 1.3 cm from the edge of the sternum.

The left border, formed by the left ventricle, extends from a point on the second left costal cartilage 1.3 cm from the edge of the sternum to the apex beat of the heart.

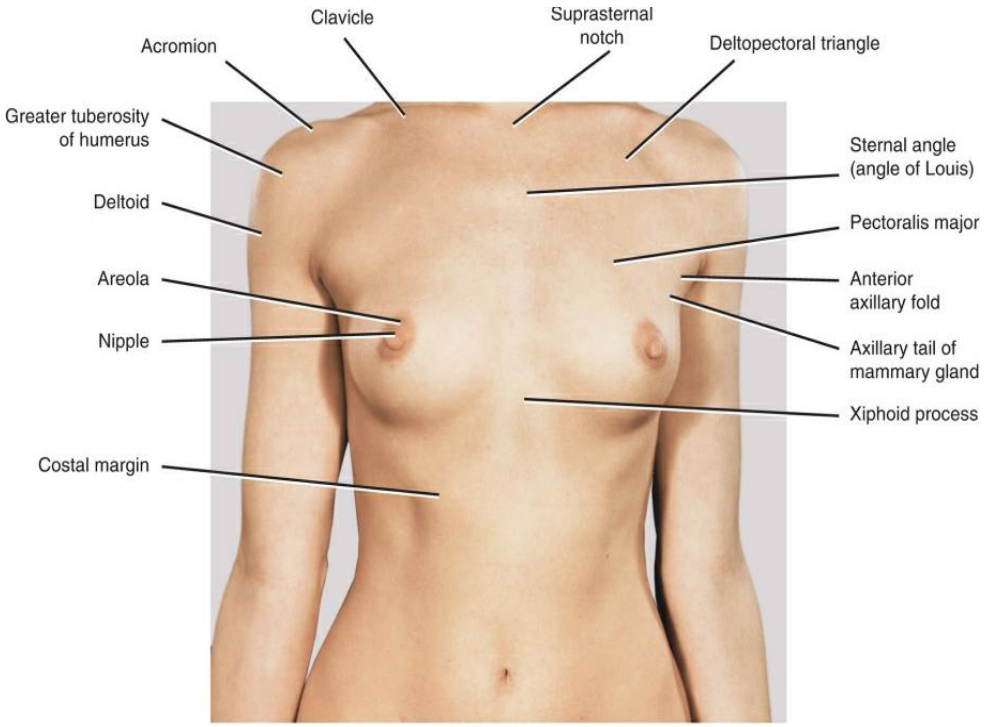
The inferior border, formed by the right ventricle and the apical part of the left ventricle, extends from the sixth right costal cartilage 1.3 cm from the sternum to the apex beat.



Mammary Gland

The mammary gland lies in the superficial fascia covering the anterior chest wall. It is rudimentary in children and in men. It enlarges and assumes its hemispherical shape in females after puberty.

In young adult female, the breast overlies the second to sixth ribs and their costal cartilages and extends from the lateral margin of the sternum to the midaxillary line. Its upper lateral edge extends around the lower border of the pectoralis major and enters the axilla. The breasts may be large and pendulous in middle-aged multiparous women. In older women past menopause, the adipose tissue of the breast may diminish and the hemispherical shape lost; the breasts then become smaller, and the overlying skin is wrinkled.



Thank you