

**PRE-CLINICAL CLERKSHIP, YEAR 1**  
**Physical Examination**

**Session Three**  
**Lung Sounds**  
**Cheryl A. Walters, M.D.**

**1. Learning Objectives**

- To outline on the chest, the lobes of the lung.
- To outline on the chest, maps for auscultation and percussion.
- To practice the techniques of auscultation and percussion.
- To describe and appreciate the defining features of vesicular, bronchovesicular, and bronchial breath sounds.
- To develop a flow for the head to toe exam.

**2. Student Prep**

**Read** pp. 361-366, 373-385, Chapter 13 The Chest

**View** the companion portion of the CD

**View** the VH Dissector Pro 4.5 exercise on the computers in the Clinical Exam Suites

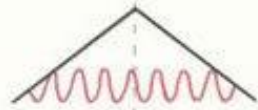
**Practice Exercises:** Identify on the anterior chest of yourself or partner, the sternal angle or angle of Louis (the level of the carina), midclavicular line (MCL), anterior axillary line (AAL), and 4-6<sup>th</sup> right intercostal spaces (the 4<sup>th</sup> ICS is at the level of the nipple).

On the posterior chest, begin by bending the neck forward to find C7 (vertebra prominens). Outline the upper lobes from T1-T4, and the lower lobes from T4-T10. On the right lateral chest, outline the right middle lobe (RML) between the right 4-6<sup>th</sup> intercostal spaces.

Listen to the recording of lung sounds on the CD. Practice differentiating normal (vesicular), bronchovesicular, and bronchial breath sounds. In a healthy person, we can listen to normal lung sounds centrally which mimic abnormal lung sounds in the peripheral lung in illness causing fluid accumulation or consolidation. Pay attention to differences in the loudness or volume, pitch, quality, and I:E ratio. The I:E ratio is the ratio of the duration of inspiration to duration of expiration of each breath,

Placing the diaphragm (or larger part of the listening head) of your stethoscope on the chest, listen to your own or partner's breath sounds. Listen over the trachea (bronchial BS). Listen over the angle of Louis (bronchovesicular BS). Listen over peripheral lung (a good spot is over the lower lobes on the posterior chest). Refer to the description and visual representations of breath sounds in the following diagram and table, and try to begin appreciating the defining features of the various types of breath sounds:

I E



*John Doe*

<u>Type of BS</u>	<u>Loudness (Height)</u>	<u>Pitch (Wave form)</u>	<u>Quality (Wave form)</u>	<u>I:E</u>
Bronchial	Very loud	High	Coarse	1:3
Bronchovesicular	Mod loud	Med	Mod coarse	I=E
Vesicular	Soft	Low	Fine	3:1

### 3. Clinical Anatomical Landmarks

Bony chest -- sternum, 12 ribs, 12 thoracic vertebrae

Anterior chest:

Suprasternal notch

Sternal angle (angle of Louis)—level of the carina and second rib; 2<sup>nd</sup> intercostal space is below it

Mid Clavicular Line (MCL)

Right 4<sup>th</sup> rib (level of nipple and horizontal fissure separating RUL and RML Left

6<sup>th</sup> rib (level of oblique fissure separating LUL and LLL)

Anterior maps for auscultation and percussion

Posterior chest:

C7 vertebra prominens, and T1

T4 (level of oblique fissure separating ULs and LLs)

Posterior maps for auscultation and percussion

Lateral chest:

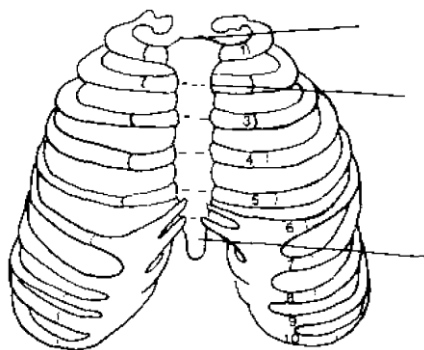
Anterior Axillary Line (AAL)

Mid Axillary Line (MAL)

4<sup>th</sup> rib (level of nipple and horizontal fissure separating RUL and RML)

6<sup>th</sup> rib (level of oblique fissure separating RML and RLL)

Lateral maps for auscultation and percussion

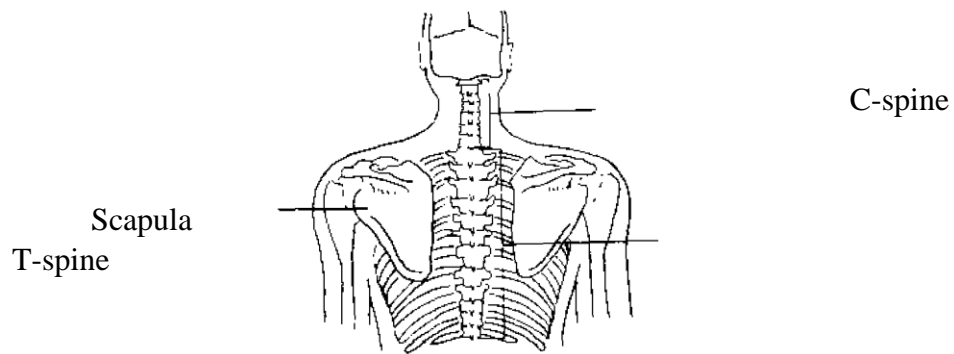


Suprasternal notch

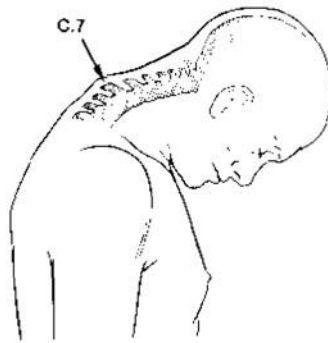
Sternal angle (Angle of Louis)

Xyphoid process

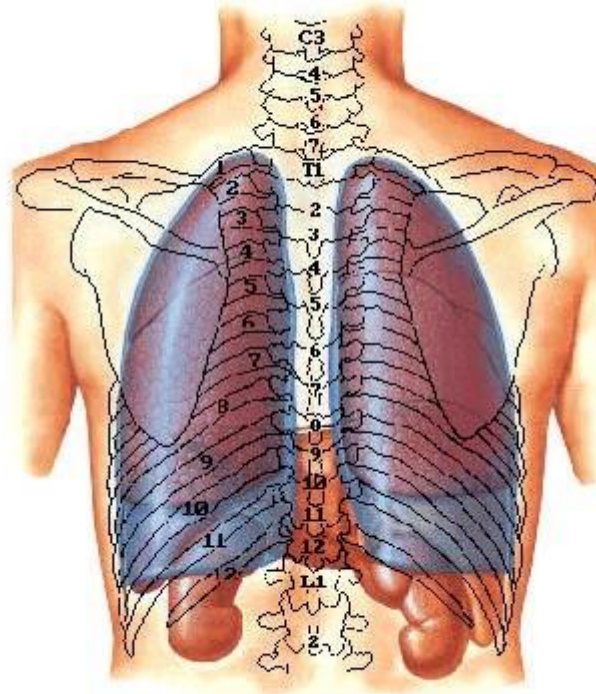
Posteriorly 12 thoracic vertebrae; areas accessible for evaluations of lung sounds – maps for auscultation and percussion -- will be in the areas between the T-spine and scapulae and below the scapulae



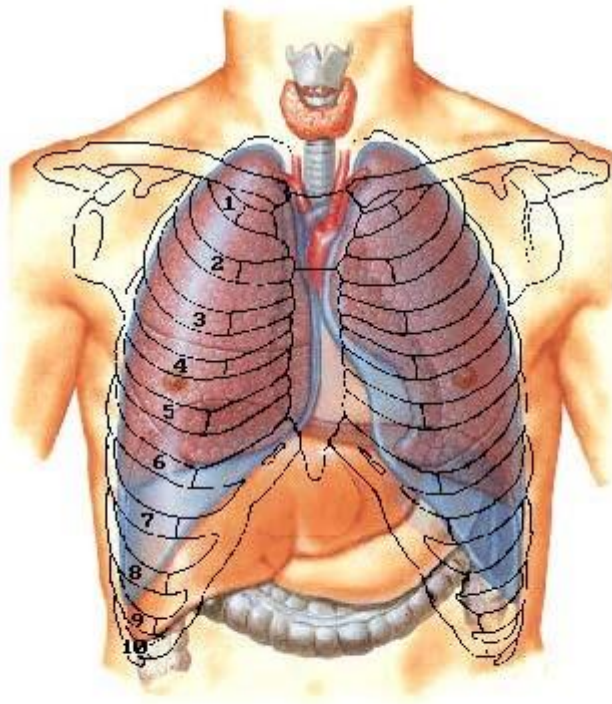
To eyeball where T1 is, have your partner flex his neck and the most prominent vertebral body is C7; T1 is just below it.



Posterior approach to lobes-the ULs and LLs are separated by the oblique fissures at T4. The posterior approach captures the ULs from T1 to T4 and the LLs from T4 to T10 (T12 on deep inspiration).



Anterior approach to lobes—the LUL apex extends above clavicle and lobe is separated from the LLL by the oblique fissure at the level of the sixth rib. RUL apex extends above clavicle and is separated from the RML by the horizontal fissure at the 4<sup>th</sup> rib (nipple). A reasonable approach is to listen and percuss the ULs in the MCL and to the level of nipples in male patients and just above the breasts in female patients.



RML—separated from the RUL by the horizontal fissure at the 4th rib (level of nipple), and RML is separated from the RLL by the oblique at the 6th rib. Listening and percussing are best between the 4<sup>th</sup> and 6<sup>th</sup> ribs between the anterior and mid axillary lines.

#### **4. List of Maneuvers to be Demo/Practiced**

##### ***Inspection with patient sitting:***

Identify the following landmarks on your partner:

##### ***Anterior chest:***

Suprasternal notch

Sternal angle (angle of Louis)—level of the carina and second rib; 2<sup>nd</sup> intercostal space is below it

Mid Clavicular Line (MCL)

Right 4<sup>th</sup> rib (level of nipple and horizontal fissure separating RUL and RML)

Left 6<sup>th</sup> rib (level of oblique fissure separating LUL and LLL)

Anterior maps for auscultation and percussion

***Posterior chest:***

With neck flexed, C7 vertebra prominens, and T1  
T4 (level of oblique fissure separating ULs and LLs) Posterior  
maps for auscultation and percussion

***Lateral chest:***

Anterior Axillary Line (AAL)  
Mid Axillary Line (MAL)  
4<sup>th</sup> rib (level of nipple and horizontal fissure separating RUL and RML)  
6<sup>th</sup> rib (level of oblique fissure separating RML and RLL)  
Lateral maps for auscultation and percussion

***Inspection with patient sitting:***

General appearance—comfort level, presence or absence of cyanosis, posture  
(bolt upright –distress)

Chest wall—symmetry, shape, AP diameter: transverse diameter (nl 1:2)  
Respiratory Rate (normal 14-20/min) and ease of respirations (use of  
accessory muscles - SCM or intercostals muscles)

Grossly audible sounds (expiratory wheeze, inspiratory wheeze or stridor—  
upper airway obstruction, stertor –snoring)

***Palpation with patient sitting:***

Anterior chest --Position of trachea—normal midline in suprasternal notch  
Posterior chest-- +/- chest wall expansion—place hands across back at about  
T10 with thumbs almost touching medially; and ask patient to inhale deeply-  
asymmetry may be due to pain with splinting, pleural effusion, scarring of  
pleura

Palpate any areas of tenderness reported or lesions observed

***Percussion of posterior chest with patient sitting:***

Percuss in mirror L-pattern between and below scapulae; proceed from apex  
to base, from side to side to compare notes.

***Auscultation of posterior chest with patient sitting; using diaphragm of  
stethoscope:***

Listen posteriorly in same pattern as for percussion. Note the quality of BS and the ratio of the respiratory phases (I:E).

***Percussion of anterior chest with patient sitting:***

Percuss over the ULs in midclavicular line--proceeding from apices above clavicle to 4<sup>th</sup> rib at level of nipple, and from side to side to compare notes.

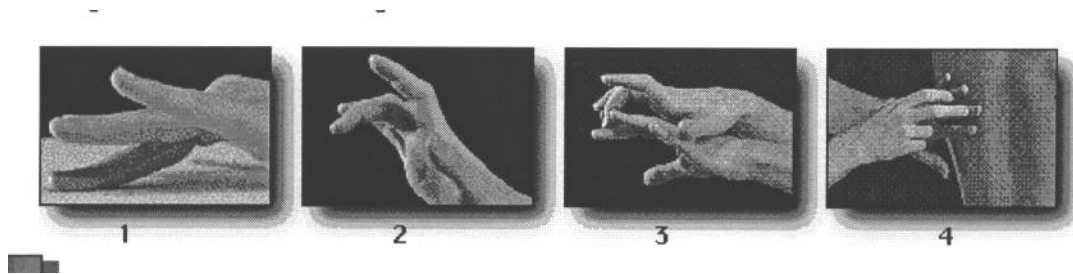
***Percussion of lateral chest with patient sitting:***

Percuss over the RML on the patient's side in between the anterior and mid axillary lines and between the 4<sup>th</sup> rib (nipple) and 6<sup>th</sup> rib.

***Auscultation of the anterior and lateral chest with patient sitting; using diaphragm of stethoscope:*** Listen to ULs and RML in same pattern as for percussion.

**5. Procedural Tips**

Percussion Technique—1. Place the distal part of the middle finger of the nondominant hand (the pleximeter) on the chest wall (up to the DIP joint), 2-4. Tap just proximal to the DIP joint with the tip of the middle finger of the dominant hand, using brisk wrist movement to enhance volume of sound.)



**6. Perceptual Tips**

Breath Sounds: Take an opportunity to demonstrate the areas one may listen to compare the three different types of BS in the healthy patient. Ask students to begin describing what they are hearing.

- Bronchial BS are heard over the trachea; they are loud in volume, coarse, high pitched with I:E = 1:3. Sound like Darth Vader (hearing these sounds over peripheral lung suggest fluid or consolidation).



- Bronchovesicular BS are heard over the angle of Louis; they are of medium volume, less coarse, less high pitched with I=E. (hearing these sounds over peripheral lung suggests fluid or consolidation).
- Vesicular or normal BS are heard over the peripheral lung fields; they are soft in volume, fine, and relatively lower pitched with I:E ratio about 3:1.

Percussion Notes: Demonstrate the continuum of various percussion notes (flat through tympanic) obtained by tapping over the areas in a normal person outlined below. Emphasize the defining features—duration and pitch. Ask students to begin describing what they are hearing.

<u>Duration</u>	<u>Pitch</u>	
Short	High	Flat—thigh muscle
↓	↓	Dull—over fluid, consolidation, dense organ like liver
↓	↓	Resonant—lung
↓	↓	Hyperresonant—airtrapping—deep breath and hold or obstructive lung disease
↓	↓	
Long	Low	Tympanic—over inflated cheek or abdomen

Dullness to percussion over the lung fields suggests fluid or consolidation. Additional focused maneuvers may then be performed which students will learn in the future when they see ill patients with their tutors.

## 7. Description of Key Features

Chest: Position of trachea in the suprasternal notch; appearance—symmetry, shape, AP diameter: transverse diameter (normal= 1:2), movement, focal tenderness of chest wall. Lungs: Rate (breaths/min) and ease of respirations, percussion note, diaphragm movements (optional), character of breath sounds including I:E, presence of rales, rhonchi, wheezes, or rubs