

Lung & Thorax Exams

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Lung Exam

- Includes **Vital Signs & Cardiac Exam**
- **4 Elements (cardiac & abdominal too)**
 - **Observation**
 - **Palpation**
 - **Percussion**
 - **Auscultation**

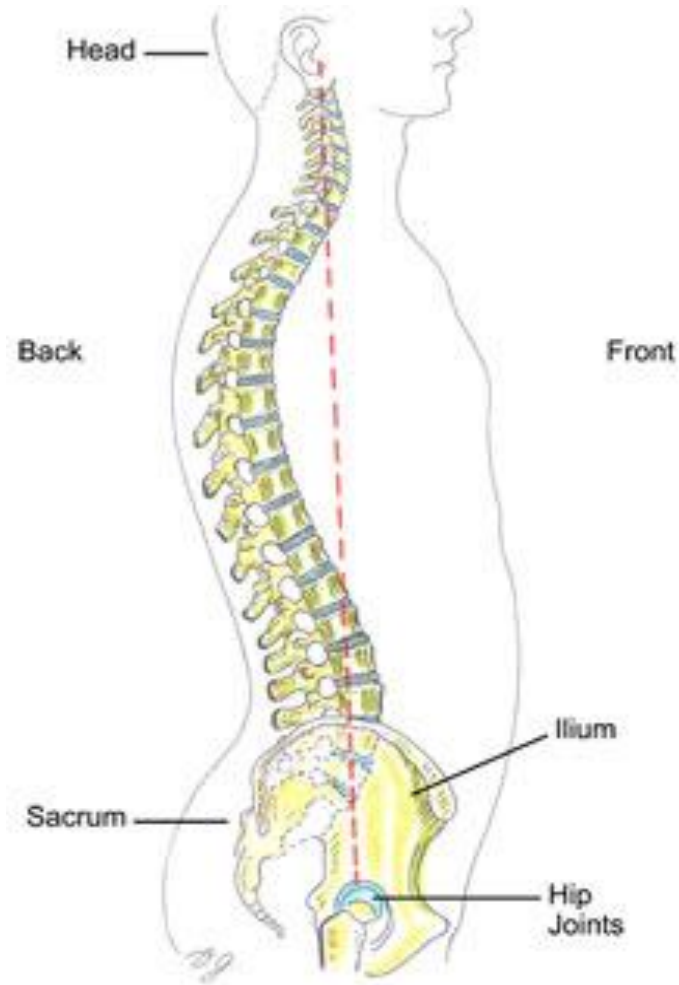
Pulmonary Review of Systems

- All organ **systems** have an ROS
- Questions to uncover problems in area
- Need to know right questions & what the responses might mean!
- An example: <http://meded.ucsd.edu/clinicalmed/ros.htm>

Exposure Is Key – You Cant Examine What You Can't See!



Anatomy Of The Spine



Cervical: 7 Vertebrae

Thoracic: 12 Vertebrae

Lumbar: 5 Vertebrae

Sacrum: 5 Fused Vertebrae

Note gentle curve ea segment

Anatomic Images courtesy
Orthospine.com

http://www.orthospine.com/tutorial/frame_tutorial_anatomy.html

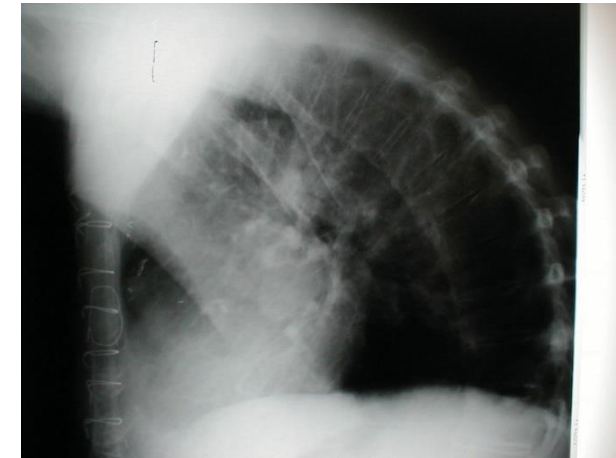
Spine Exam As Relates to the Thorax

- W/patient **standing, observe:**
 - **shape of spine.**
 - Stand behind patient, **bend @ waist**
 - **w/Scoliosis (curvature) one shoulder appears “higher”**

Pathologic Changes In Shape Of Spine – Can Affect Lung Function



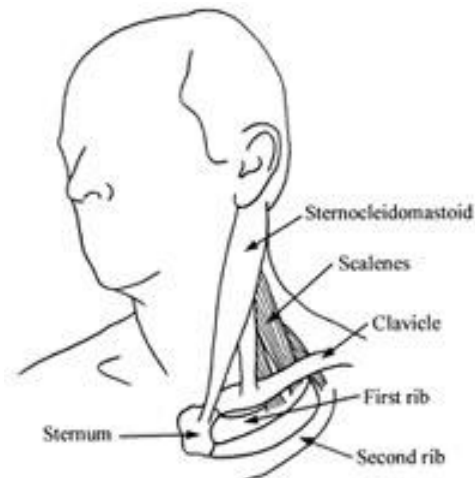
Scoliosis (curved to one side)



Thoracic Kyphosis (bent forward)

Observation

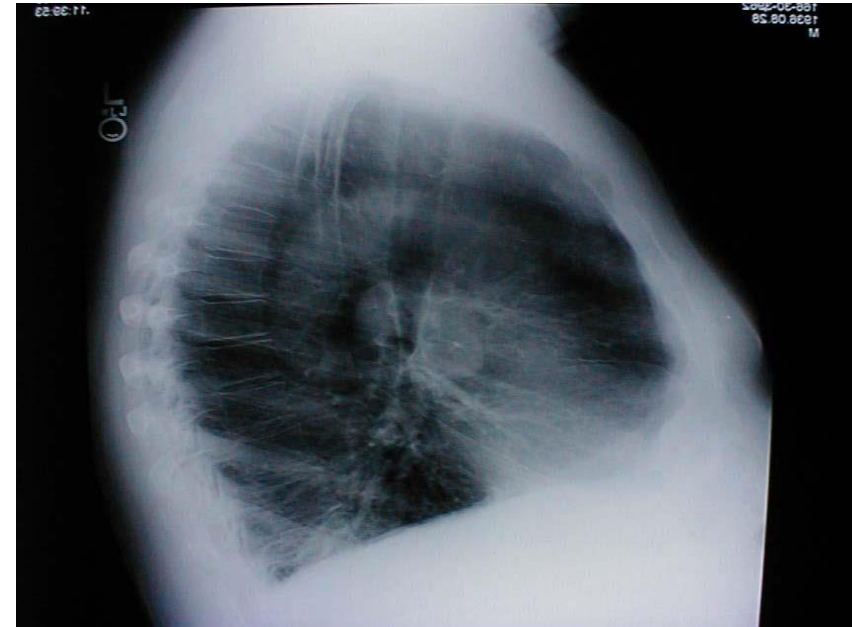
- ? **Ambulates w/out breathing** difficulty?
- **Readily audible noises** (e.g. wheezing)?
- **Appearance** → ? **sitting up, leaning forward**, inability to **speak**, **pursed lips** → significant **compromise**
- ? Use of **accessory muscles** of neck
(sternocleidomastoids, scalenes), inter-costals → significant **compromise**



Accessory Muscles

American Massage
Therapy Association
<http://www.amtamassage.org/>

Make Note of Chest Shape: Changes Can Give Insight into Underlying Pathology



Barrel Chested (hyperinflation secondary to emphysema)

Examine Nails/Fingers: Sometimes Provides Clues to Pulmonary Disorders



Cyanosis



Nicotine Staining



Clubbing

Assorted Other Hand and Arm Abnormalities: Shape, Color, Deformity



Palpation

- Patient in **gown** → chest **accessible & exposed**
- **Explore** painful &/or abnormally appearing areas
- **Chest expansion** – position hands as below, have patient inhale deeply → hands lift out laterally



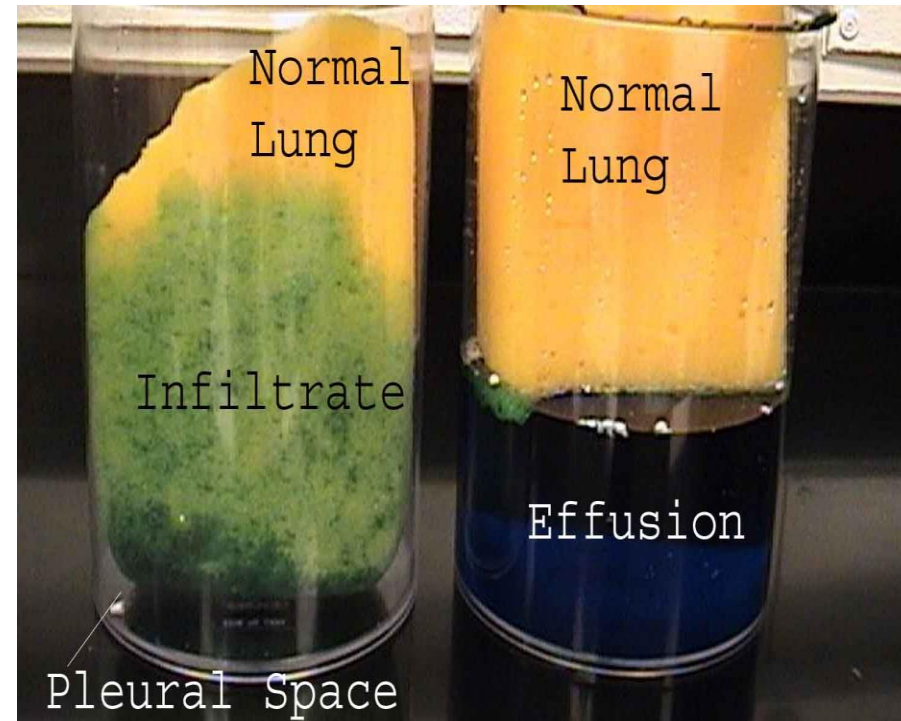
Palpation – Assessing Fremitus

- **Fremitus** =s **normal vibratory** sensation w/**palpating** hand when patient speaks
- Place **ulnar** aspect (pinky side) of **hand** firmly against **chest** wall
- Ask patient to say “**Boy**”
- You’ll **feel** transmitted **vibratory sensation** → **fremitus!**
- Assess **posteriorly** & **anteriorly** (i.e. lower & upper lobes)
- * **Not Performed in the absence of abnormal findings** *



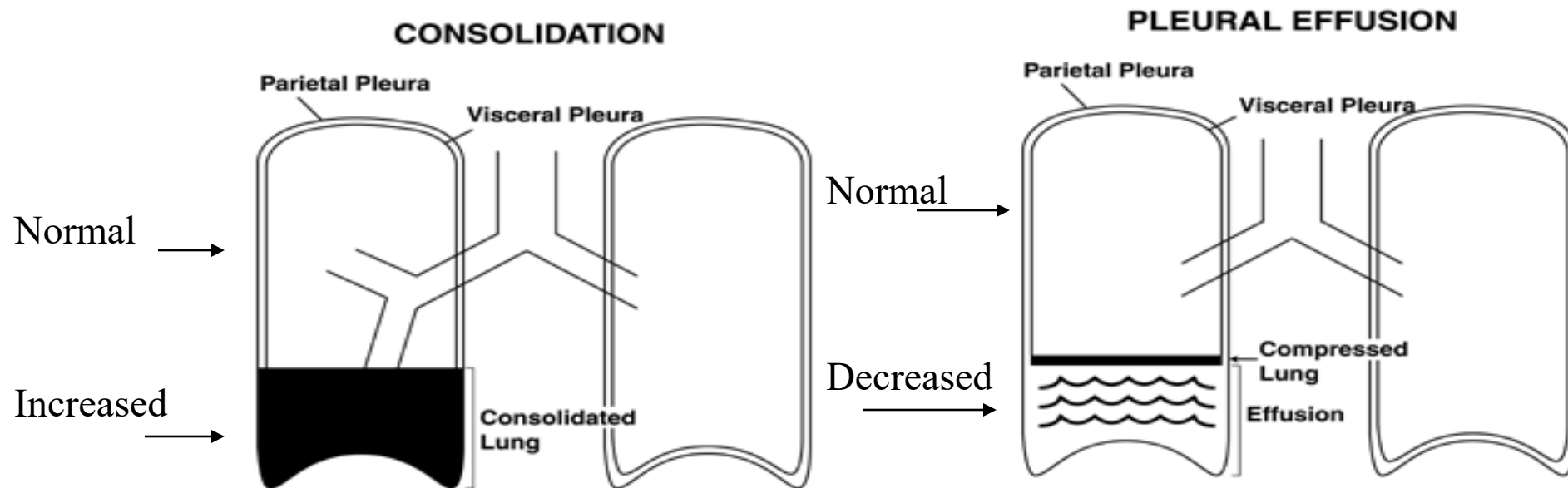
Lung Pathology - Simplified

- **Lung** =s sponge, pleural cavity =s plastic **container**
- **Infiltrate** (e.g. pneumonia) =s **fluid within lung tissue**
- **Effusion** =s **fluid in pleural space** (outside of lung)



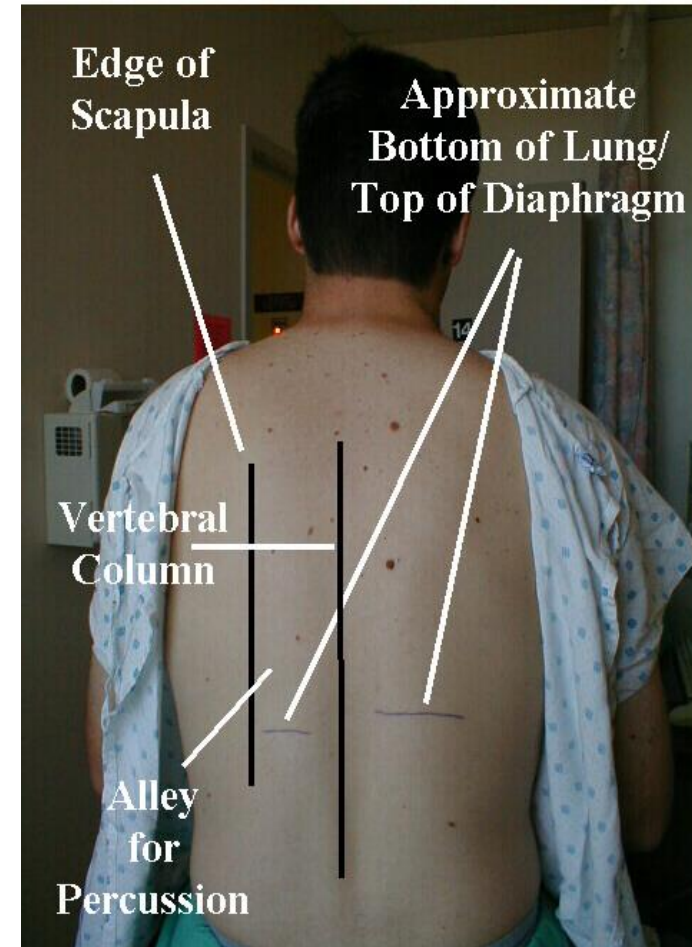
Fremitus - Pathophysiology

- **Fremitus:**
 - **Increased** w/**consolidation** (e.g. pneumonia)
 - **Decreased** in **absence** of **air filled** lung tissue (e.g. effusion).



Percussion

- **Normal** lung filled w/air
- **Tapping** generates **drum-like** sound → resonance
- When **no** longer over **lung**, percussion → **dull** (decreased resonance)
- Work in “**alley**” between vertebral column & scapula.



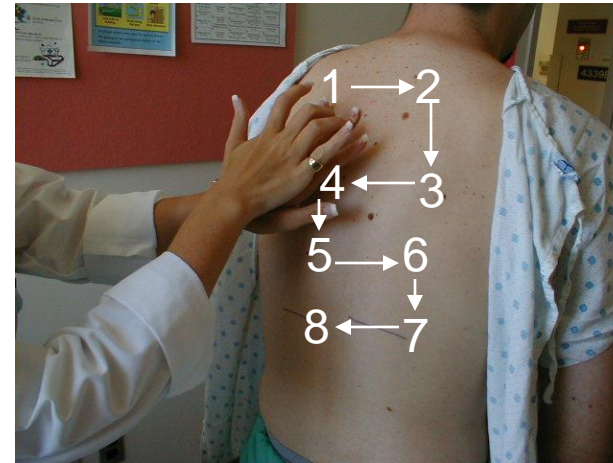
Percussion - Technique

- Patient **crosses arms** in front, grasping opposite shoulder (pulls scapula out of way)
- Place **middle finger of flat** against **back**, other fingers off
- **Strike distal** phalanx w/middle finger of other hand - strike 2-3 times @ each spot



Percussion (cont)

- Use **loose, floppy wrist** action – percussing finger =s hammer
- Start @ top of one side → then move across to same level, other side → R to L (as shown)
- @ **Bottom of lungs**, detect **diaphragmatic excursion** → difference between diaphragmatic level @ full inspiration v expiration (~5-6cm)
****Done when patients have suggestive symptoms or other findings****
- **Percuss laterally**
- **Percuss upper lobes (anterior)**
- **Cut nails** to limit bloodletting!

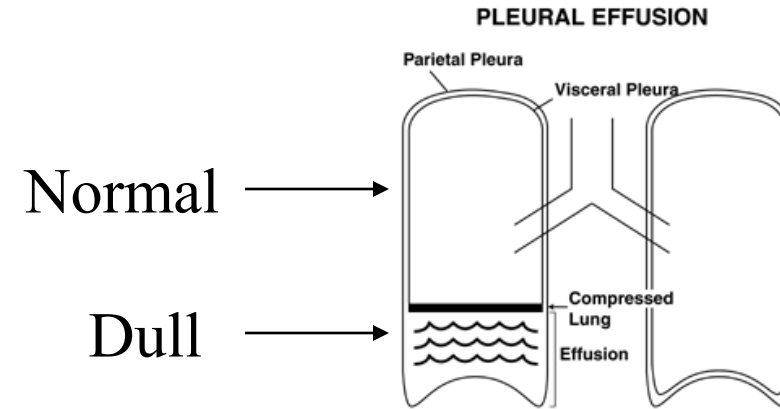


Percussion (Cont)

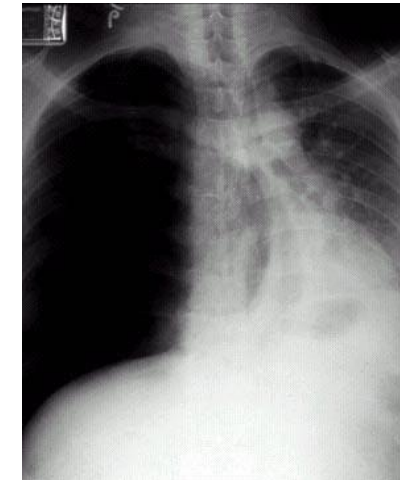
- **Difficult** to master technique & detect tone changes - expect to be frustrated!
- **Practice** – on friends, yourself (find your stomach, tap on your cheeks, etc.)
 - Detect **fluid** level in **container**
 - Find **studs** in **wall**

Percussion: Normal, Dull/Decreased or Hyper/Increased Resonance

- Causes of **Dullness**:
 - Fluid outside of lung (**effusion**)
 - Fluid or soft tissue filling parenchyma (e.g. pneumonia, tumor)
- Causes of **hyper-resonance**:
 - COPD → **air trapping**
 - Pneumothorax (air filling pleural space)



Hyper-Resonant
all fields → COPD

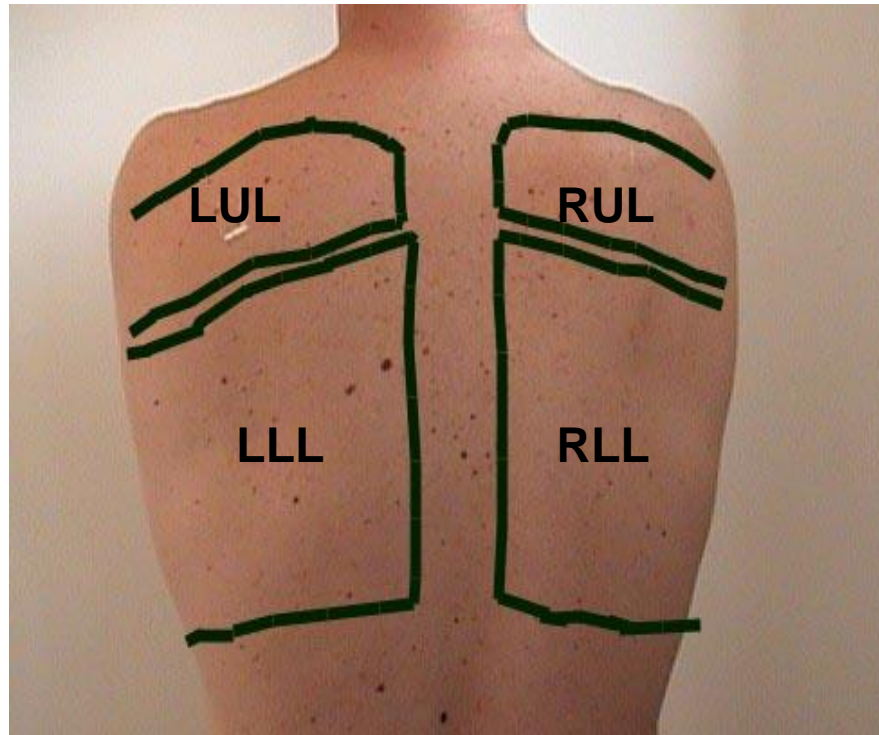


Hyper-Resonant R
lung → Pneumothorax

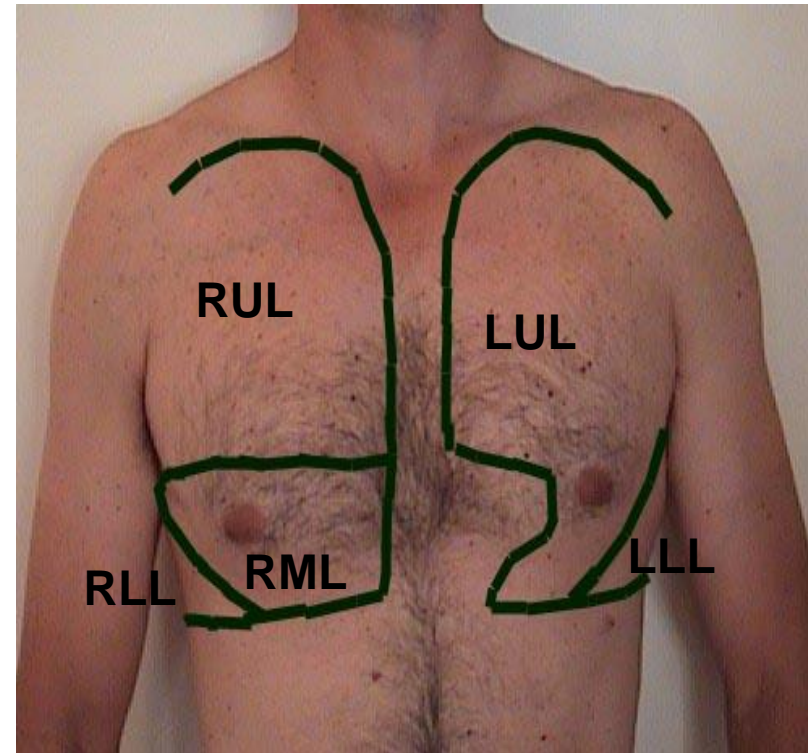
Auscultation

- **Normal** breathing creates sound → appreciated via stethoscope over chest → “**vesicular breath sounds**”
- Note sounds w/both expiration & inspiration – inspiration typically more apparent
- Pay attention to:
 - **quality**
 - **inspiration v expiration**
 - **location**
 - **intensity**

Lobes Of Lung



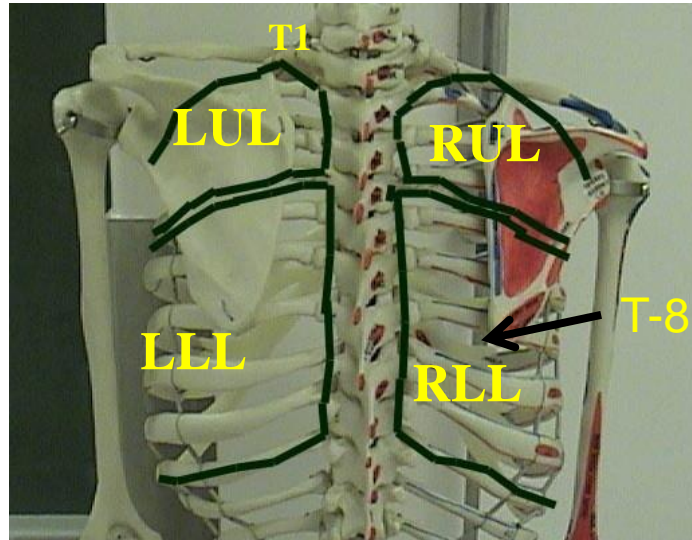
Posterior View



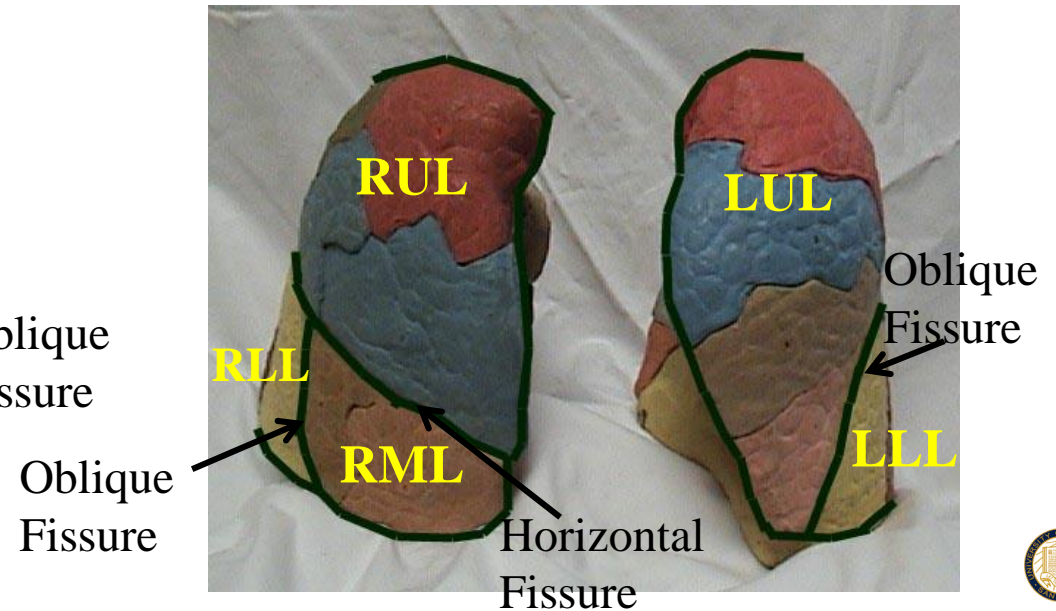
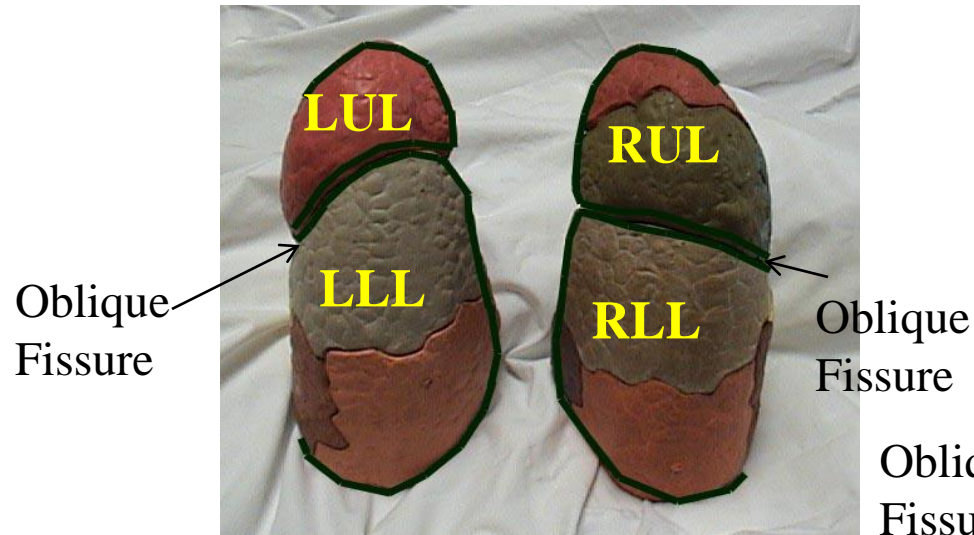
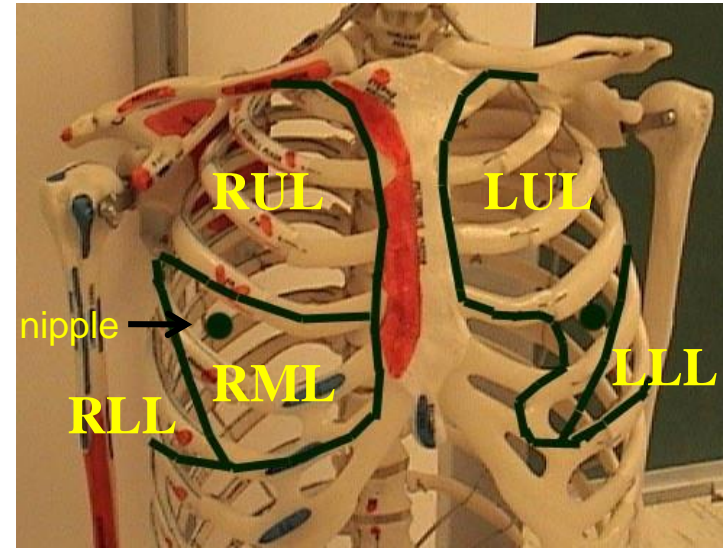
Anterior View

Where you listen dictates what you'll hear!

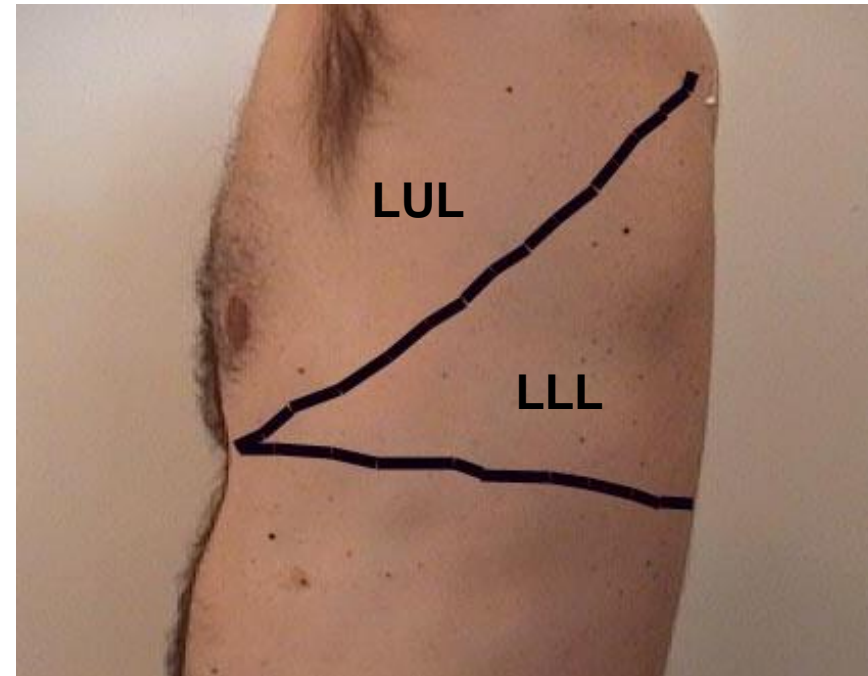
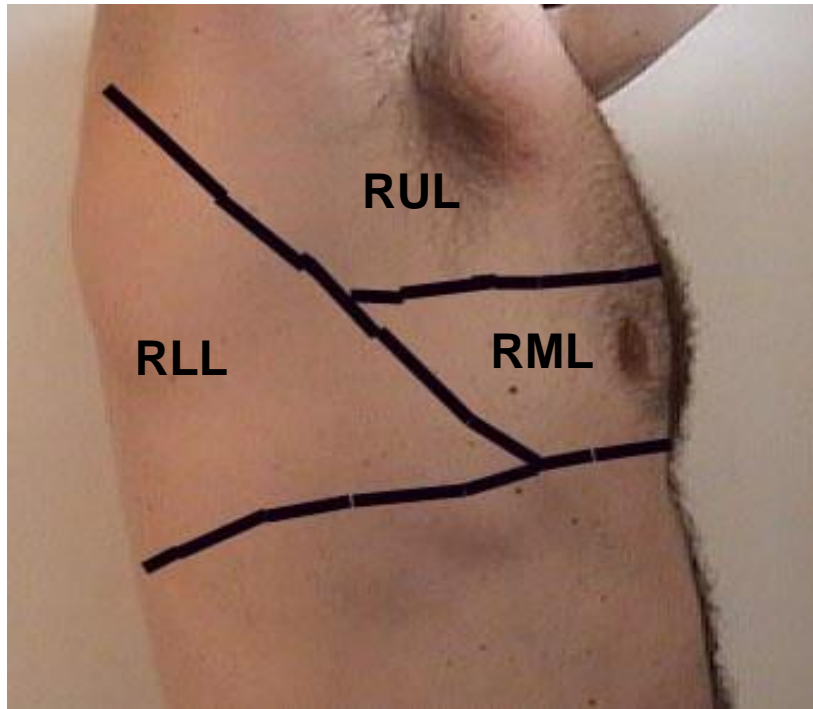
Posterior View



Anterior View

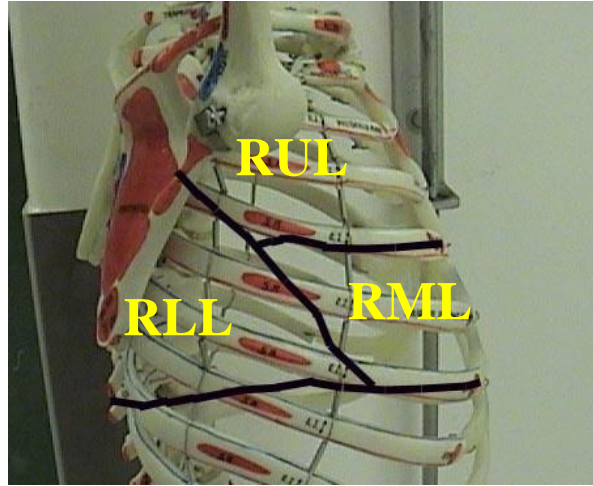


Lobes Of The Lung (cont)

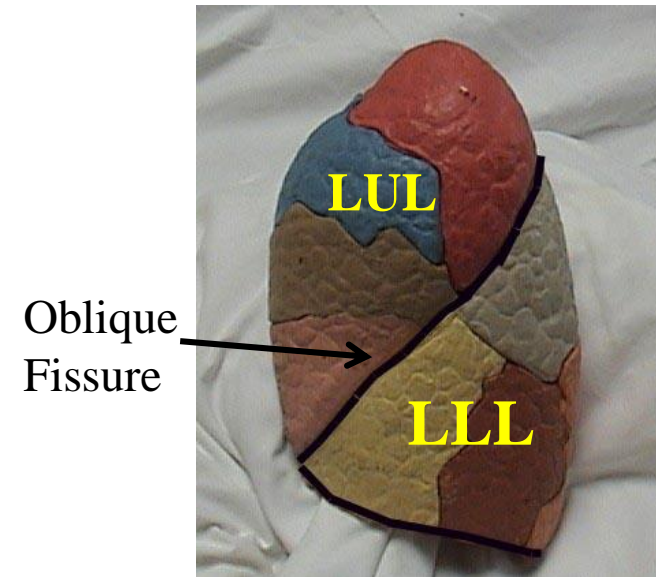
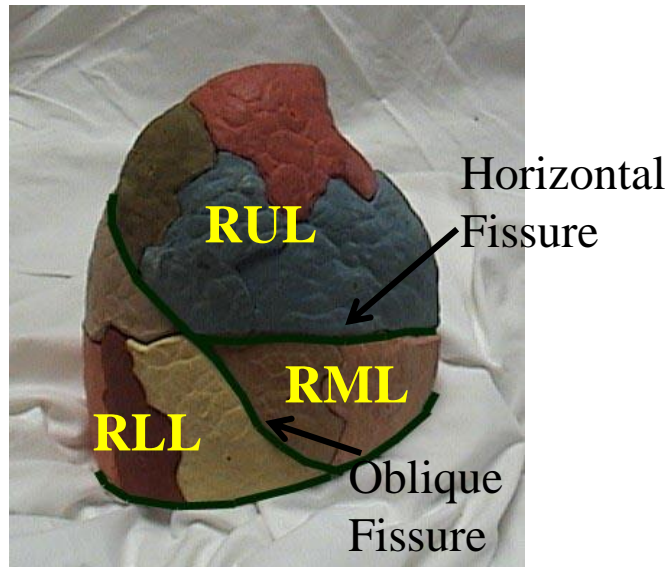
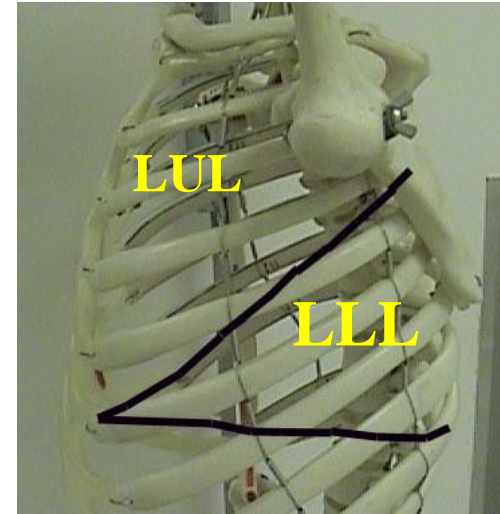


Lateral Views

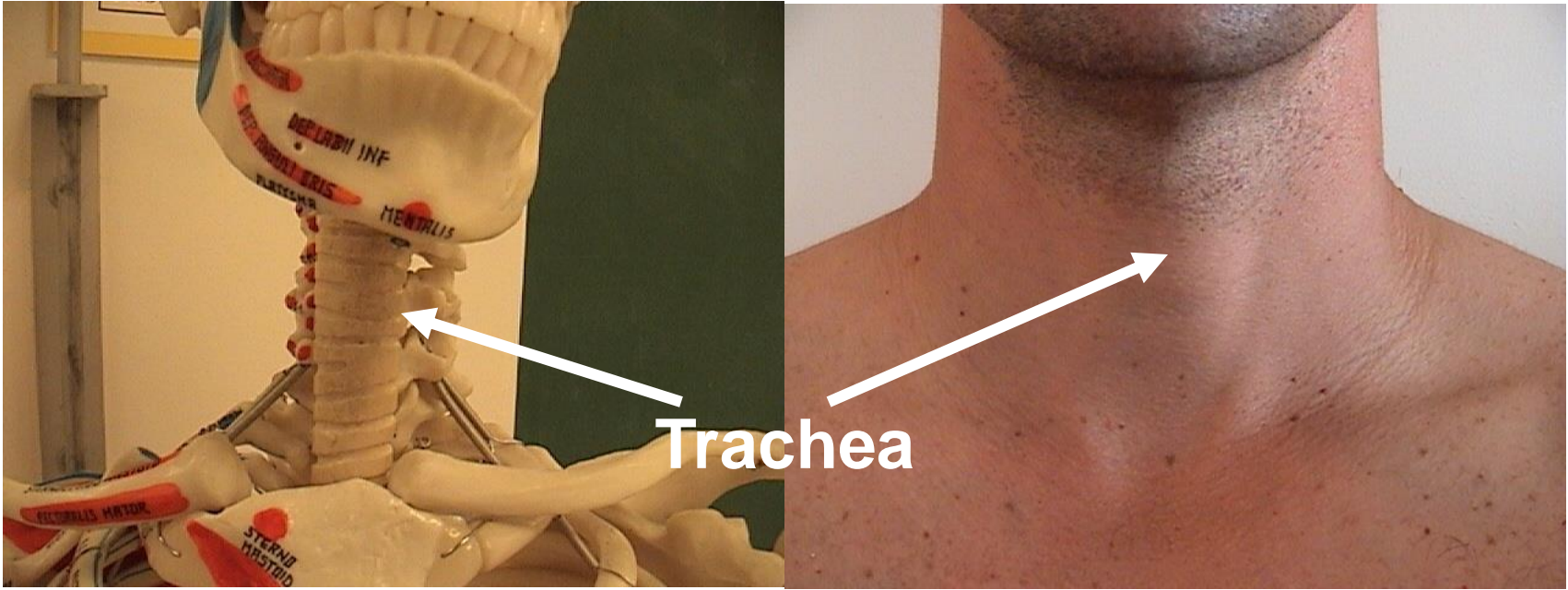
Right Lateral View



Left Lateral View



Trachea



Auscultation - Technique

- **Stethoscope** - ear pieces directed away from you, **diaphragm** engaged
- Patient **crosses arms**, grasping opposite shoulders

Areas To Auscultate

- **Posteriorly** (lower lobes) ~ **6-8 places** - Alternate R → L as move down (comparison) - ask patient to take **deep breaths** thru mouth
- **Right middle lobe** – listen in ~ 2 spots – lateral/anterior
- **Anteriorly** - Upper lobes – listen ~ **3 spots** each side
- Over **trachea**



Pathologic Lung Sounds

- **Crackles (Rales)**: “Scratchy” sounds associated w/**fluid** in **alveoli & airways** (e.g. pulmonary edema, pneumonia); finer crackles w/fibrosis
- **Ronchi**: “Gurgling” type noise, caused by **fluid** in **large & medium** sized **airways** (e.g. bronchitis, pneumonia)
- **Wheezing**: **Whistling** type noise, loudest on expiration, caused by **air forced** thru **narrowed airways** (e.g. asthma) – expiratory phase prolonged (E>>>I)
- **Stridor**: **Inspiratory whistling** type sound due to tracheal narrowing → heard best over **trachea**

Pathologic Lung Sounds (cont)

- Bronchial Breath Sounds: Heard **normally** when listening over the **trachea**. If **consolidation** (e.g. severe pneumonia) upper airway sounds transmitted to periphery & apparent upon auscultation over affected area.
- Absence of Sound: In chronic severe emphysema, often small tidal volumes & thus **little air movement**.
 - Also w/very severe asthma attack, effusions, pneumothorax

Pathologic Lung Sounds (cont)

- **Egophony**: in setting of suspected **consolidation**, ask patient to say “**eee**” while auscultating. **Normally**, sounds like “**eee**”..
- Listening over **consolidated** area generates a nasally “**aaay**” sound.
 - Not a common finding (but interesting)

Normal Lung Sounds



Bronchial Breath Sounds: Normal sounds when listening over large airways, like the trachea. Can be present as well in the setting of dense consolidation (i.e. air completely replaced by fluid – as occurs with a severe pneumonia)

Lung Sound Simulation Site (for practice):

Bohadan A, et al. Fundamentals of Auscultation. NEJM 2014; 370: 744-51.

<http://www.nejm.org/doi/full/10.1056/NEJMra1302901> (click on “interactive graphic”)

Normal Lung Sounds



Vesicular Breath Sounds: Sounds heard over any lobe of the lung with inspiration and expiration

Common Abnormal Lung Sounds



Crackles (Rales):

- Sounds associated with fluid filled alveoli & airways
- Commonly associated with congestive heart failure or pneumonia
- Finer crackles associated w/fibrosis

Common Abnormal Lung Sounds



Wheezing:

- Sound of air being forced through narrowed airways, loudest upon expiration.
- Most commonly associated with exacerbation of asthma or chronic obstructive pulmonary disease.

A Not So Common (but interesting) Abnormal Sound

Egophony: Nasal sounding 'ayyyyy' heard over an area of consolidation (air completely replaced by fluid – as occurs with a severe pneumonia) when the patient says 'eeeeee'



Normal 'e'

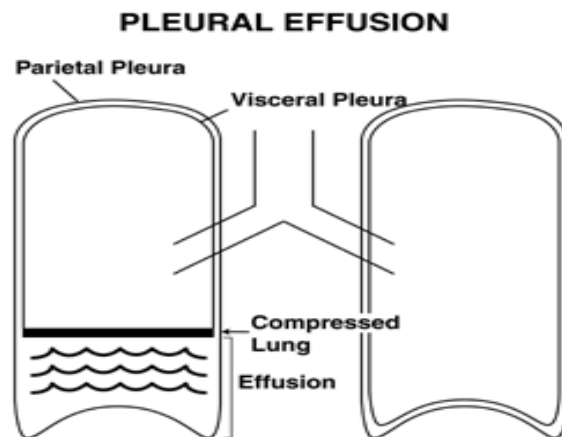


+ Egophony

Putting It All Together: Few findings are Pathognomonic → Put 'em Together to Paint Best Picture.

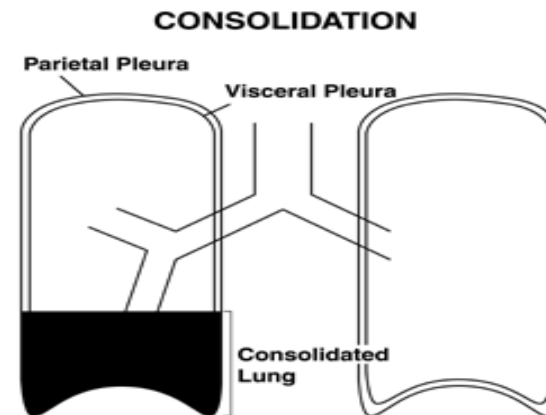
• Effusion

- Auscultation → decreased/absent breath sounds Vs
- Percussion → dull
- Fremitus → decreased
- Egophony → absent



• Consolidation

- Auscultation → bronchial breath sounds
- Percussion → dull
- Fremitus → increased
- Egophony → present



Summary of Skills



- Wash hands, Gown & drape

Observe & Inspect Hands

- Nails, fingers, hands, arms
- Respiratory rate

Lungs and Thorax

General observation & Inspection

- Patient position, distress, accessory muscle use
- Spine and Chest shape

Palpation

- Chest excursion
- Fremitus

Percussion

- Alternating R & L lung fields posteriorly top → bottom
- R antero-lateral (RML), & Bilateral anteriorly (BUL)
- *Determines diaphragmatic excursion

Auscultation

- R & L lung fields posteriorly, top → bottom, comparing side to side
- R middle lobe
- Anterior fields bilaterally
- Trachea

- Wash hands

* Done in selected circumstances



Time Target: < 10 minutes

Web Sites and Apps For Sound Simulations

- [Easy Auscultation](#) Heart and Lung Sounds
- [NEJM: Fundamentals of Lung Auscultation](#)
- [Heart Sounds and Murmurs, University of Washington School of Medicine](#)
- [Heart Sounds Tutorial, Blaufuss Medical](#)
- [Auscultation Assistant, University of California, Los Angeles](#)