PHYSICAL DIAGNOSIS  
Chest and Lungs

GOALS:  
1) Review clinically important chest anatomy.  
2) Develop a routine for chest/lung exam- **Inspection, Palpation, Percussion, Auscultation**  
3) Learn about use of stethoscope  
4) Be able to describe physical findings for common lung diseases

**Anatomy**

Lung boundaries: best reviewed by pictures rather than words!

Superior:  
Anteriorly: Apex extends 4 cm above first rib  
Posteriorly: Apex at level of first thoracic vertebra (T1)

Inferior:  
T12 with deep inspiration, T9 with forced expiration

Lobes:  
Most of posterior lung surface is made up of lower lobes (RLL, LLL)  
Right middle lobe (RML) found anteriorly below fourth rib

Other landmarks:  
Angle of Louis (manubriosternal junction) a marker for…  
Where second rib meets sternum (can begin counting ribs here)  
Arch of aorta  
Carina of trachea  
Right mainstem bronchus is wider, shorter, more vertical- thus more prone to foreign body aspiration than the left  
Midclavicular line (MCL) a marker for…  
Heart’s normal point of maximum impulse (PMI)  
Where liver height is measured  
Where inferior lung borders cross 6th rib
**Anatomy of Chest, continued**

Also can use Anterior, Mid, and Posterior Axillary Lines (AAL, MAL, PAL) to locate surface findings or place EKG leads
Scapular line- through the inferior angle of the scapula

“Accessory muscles of respiration”
Sternocleidomastoid (SCM), scalenes, serratus
Help out the diaphragm and intercostals during heavy exertion or respiratory distress

**Examination of Chest and Lungs: Inspection**

Remember to *expose what you need to inspect*- patient may need drape or gown

Variations in shape of chest wall-
“Barrel chest”- from some chronic lung diseases
Normal adults: transverse > anterior-posterior (AP) diameter
Barrel chest: relative increase in AP diameter
Pectus carinatum ("pigeon chest")- sternal protrusion
Pectus excavatum ("funnel chest")- sternal indentation

Other observations:
Symptoms (described by patient):
Dyspnea (DISP-nee-ah)- difficult breathing
Orthopnea (ohr-THOPP-nee-ah)- shortness of breath (SOB), worse when supine. “How many pillows do you use to sleep?”
Paroxysmal Nocturnal Dyspnea (PND) – sudden SOB after a period of sleep, relieved by sitting up

Signs (observed by you)
Cyanosis- bluish discoloration of lips or nails
Clubbing- nail base angle of 180° or more
Nasal flaring, use of accessory muscles, retractions- air hunger
… all of these suggest pulmonary or cardiac problem
Patterns of Respiration:

- Abnormal respiratory rate- normal for adults is 12-20
  
<table>
<thead>
<tr>
<th>Definition</th>
<th>Common Causes</th>
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<tbody>
<tr>
<td>Tachypnea</td>
<td>anxiety, infection, pain</td>
</tr>
<tr>
<td>Hyperpnea</td>
<td>exercise, anxiety, metabolic</td>
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  Other patterns:
  
  - Sighing
  - Cheyne (“chain”)-Stokes
    crescendo-decrescendo-apnea
  - Kussmaul (KOOS-mall)
    Rapid, deep, labored
  - Stridor (STRIDE-or)
    Harsh, high-pitched inspiration

  Dangerous sign of laryngeal obstruction!

Palpation

Tracheal position- assess with fingers or thumbs in suprasternal notch
Causes for deviation include thyroid mass, tension pneumothorax

Crepitus- a crackling sensation, can be both felt and heard
Caused by air in the subcutaneous space

Pleural friction rub- coarse vibration, can be both felt and heard
Caused by pleural inflammation

Thoracic expansion- thumbs at 10th ribs posteriorly will diverge symmetrically with inspiration. Loss of symmetry is abnormal.

Tactile fremitus (FREM-it-us)- chest wall vibrations from speech
Palpate chest with ulnar surfaces of hands while patient says “99”
Varies with chest wall thickness & type of voice, but should be symmetric

Decreased Fremitus: harder for sound to reach chest wall
Examples:
  
  Tumor in bronchus-
  Pleural effusion (fluid in pleural space)
  Pneumothorax (air in pleural space)
  Pleural thickening or obesity

  “blockage”
  “filters”

Increased Fremitus: sound transmission through solid or fluid
Examples:

  Consolidation of lung tissue from pneumonia (air passages become fluid passages)
  Tumor at periphery or compressed lung tissue (air passages become more like a solid)
**Percussion**

**Technique:** index and long finger together; move from your wrist

**Patient position:** arms folded, to move scapulae out of the way

**Sequence:** Consistently use a pattern that is comfortable for you
- Percuss every 4-5 cm over intercostal spaces
- Compare right and left sides

**Findings:** Ignore the confusing last sentence on page 373 of text.
- Hyperresonance: (more air than normal)
  - Pneumothorax
  - Hyperinflation from Chronic Obstructive Pulmonary Disease (COPD)
- Dullness: (less air, more liquid or solid than normal)
  - Pleural effusion
  - Consolidation from pneumonia

**Diaphragmatic Excursion:** detects position and motion of diaphragm
- Locate diaphragm at transition from dullness (kidneys, liver) to resonance (lung tissue) at scapular line
- Compare deep inspiration with forced expiration
- Normal excursion: 3-5 cm

**Auscultation**

**Technique:** Demonstrate deep breathing for patient
- Caution patient against hyperventilation
- Use diaphragm of stethoscope (most sounds high pitched)
- Use same patient position and sequence as for percussion
  - (consider starting at bases for elderly or ill- you’ll have more chance of findings before the patient fatigues)
- Watch out for extra sounds from skin, hair, or clothing

**Findings:**
- Normal breath sounds (listen for these on yourself or your lab partner)
  - Vesicular- heard over most of lung
    - low pitch, soft, breathy
  - Bronchovesicular- heard over main bronchus
    - medium pitch
  - Bronchial- heard over trachea
    - higher pitch, hollow

  - All sounds decrease if it’s harder for sound to reach chest wall
  - Tumor in bronchus- “blockage”
  - Pleural effusion (fluid in pleural space)
  - Pneumothorax (air in pleural space)/COPD “filters”
  - Pleural thickening or obesity

- All sounds increase with consolidation- just like with fremitus
Auscultation findings, continued

Adventitious breath sounds: (unexpected or extra sounds)

**Crackles:** (the finding formerly known as rales)
- May signal pneumonia, congestive heart failure (CHF), fibrosis (scarring)

**Fine:** high-pitched, discrete, inspiratory
- (sounds like hair rubbing together or distant fireworks)

**Coarse:** similar, but with lower pitch

**Wheezes:**
- May signal asthma, COPD, or bronchitis/bronchiolitis
- High pitched, continuous musical whistle
- Originate in small airways; usually with expiration
- Focal wheezes suggest local obstruction—tumor, foreign body, mucus plug

**Rhonchi:**
- May signal bronchitis
- Low pitched, continuous, coarse, like a snore
- Originate in larger airways, often clear with cough

**Friction rub:**
- Signals pleural or pericardial inflammation
- Dry, grating, low pitched during inspiration or expiration

Vocal resonance: transmission of spoken voice-

- The auditory equivalent of tactile fremitus, affected by the same factors (for example, increased in pneumonia)
- Bronchophony (brohn-KOFF-uh-nee)- greater clarity and loudness of spoken words
- Whispered pectoriloquy (pek-torr-ILL-o-quee)- when even a whisper is transmitted clearly to your stethoscope—A form of extreme bronchophony
- Egophony (ee-GOFF-uh-nee) or “E to A changes”-
  - Egophony causes “E” sound to become an “A” during transmission; can be normal between scapulae

Cough: common, but may be serious

How to describe a cough:
- Dry or productive
- Onset- acute (infection, foreign body…) or chronic
- Frequency- seldom or often
- Pitch- high or low
- Postural influences- e.g. post-nasal drip when reclining
- Quality- hoarse, whooping…
Summary: Case Presentation

60 year-old patient with cough and fever
You see the X-ray on your way to the emergency room
You might expect to find:

History: Type of cough:
Other symptoms:

Inspection: Respiratory rate:
Other findings:

Palpation: Tactile fremitus:

Percussion:

Auscultation: Type of breath sounds:
Adventitious sounds:
Vocal resonance:

Examination of Infants and Children:
Variations in exam:

Inspection- chest circumference < head circumference in infants
Signs of respiratory distress:
Retractions- intercostal, subcostal, supraclavicular
Nasal flaring
Grunting
Asynchrony of motion
(diaphragmatic hernia, pneumothorax)

Percussion- less reliable in infants
chest is more resonant

Auscultation- thinner chest wall makes
-normal breath sounds more bronchial in character
-adventitious sounds louder, harder to localize

Sobbing can be a good time to examine- can hear heart and lungs