Practical Guide to Pulmonary Examination (Lung Exam)

See online here

The clinical examination of the lungs is important for every patient anamnesis done in internal medicine. As a pulmonologist, your main focus will be on studying and examining the lungs. A dependable strategy to be followed during examinations enables routine work, helps to stay on top of things, and prevents a physician from forgetting anything during daily clinical practice. E.g., what is auscultated in case of pneumothorax or pleural effusion? What are the different shapes of the thorax? How can tuberculosis be recognized from examining the patient's skin? Below you will find a checklist to be used during your practical work and oral exams!

General Observation of the Patient

1. Does the patient look systematically unwell? Does he or she have a fever?
2. What is the patient’s level of consciousness?
3. Does the patient have difficulty in breathing at rest? Look for the following:
    - Abnormal breathing patterns
    - Use of accessory muscles
    - Pursed lip breathing
    - Intercostal recession
4. Are there any visible chest wall/general abnormalities?

Some abnormal types of breathing patterns

Prolonged expiratory phase: indicates airways obstruction

Cheyne-Stokes breathing: alternating slow/fast respiratory rate occurs in pulmonary edema and brain stem lesions

Kussmaul's breathing: rapid sighing respiration caused by metabolic acidosis

Irregular breathing pattern: indicative of imminent cardiorespiratory arrest

Audible stridor: an inspiratory wheeze suggesting significant obstruction of the major airways

Excess abdominal movements on inspiration: occurs in chronic obstructive pulmonary disease (COPD)

Paradoxic abdominal movements: indrawing of the abdomen on inspiration, indicates diaphragmatic weakness

Some visible general/chest wall abnormalities

Cachexia: occurs in cancer, severe COPD, and chronic infection

Obesity: increased risk of asthma, obstructive sleep apnea, obesity, and hypoventilation

Shrunken lung: visibly smaller hemithorax and flattening of the upper anterior chest

Surgical scars: thoracotomy, pleural drains, mediastinoscopy, and sternotomy

Hyperexpanded chest — severe airway obstruction: increased anterior/posterior diameter and horizontal ribs

Kyphoscoliosis: anterior and lateral curvature of the spine, affects the mechanics of ventilation

Chest wall masses: lipomas are common; tumors can occasionally erode

Inspection

The following can be studied simply by looking at a patient:

- Tachypnea (> 20/min), stridor, coughing, hoarseness, and dyspnea
- Breathing pattern: Kussmaul's breathing, Cheyne-Stokes breathing, and Biot's breathing
- Accessory respiratory muscles and withdrawal
- Symmetry of the thorax
- Shape of the thorax: barrel chest, kyphoscoliosis, gibbus, pectus excavatum, and pectus carinatum

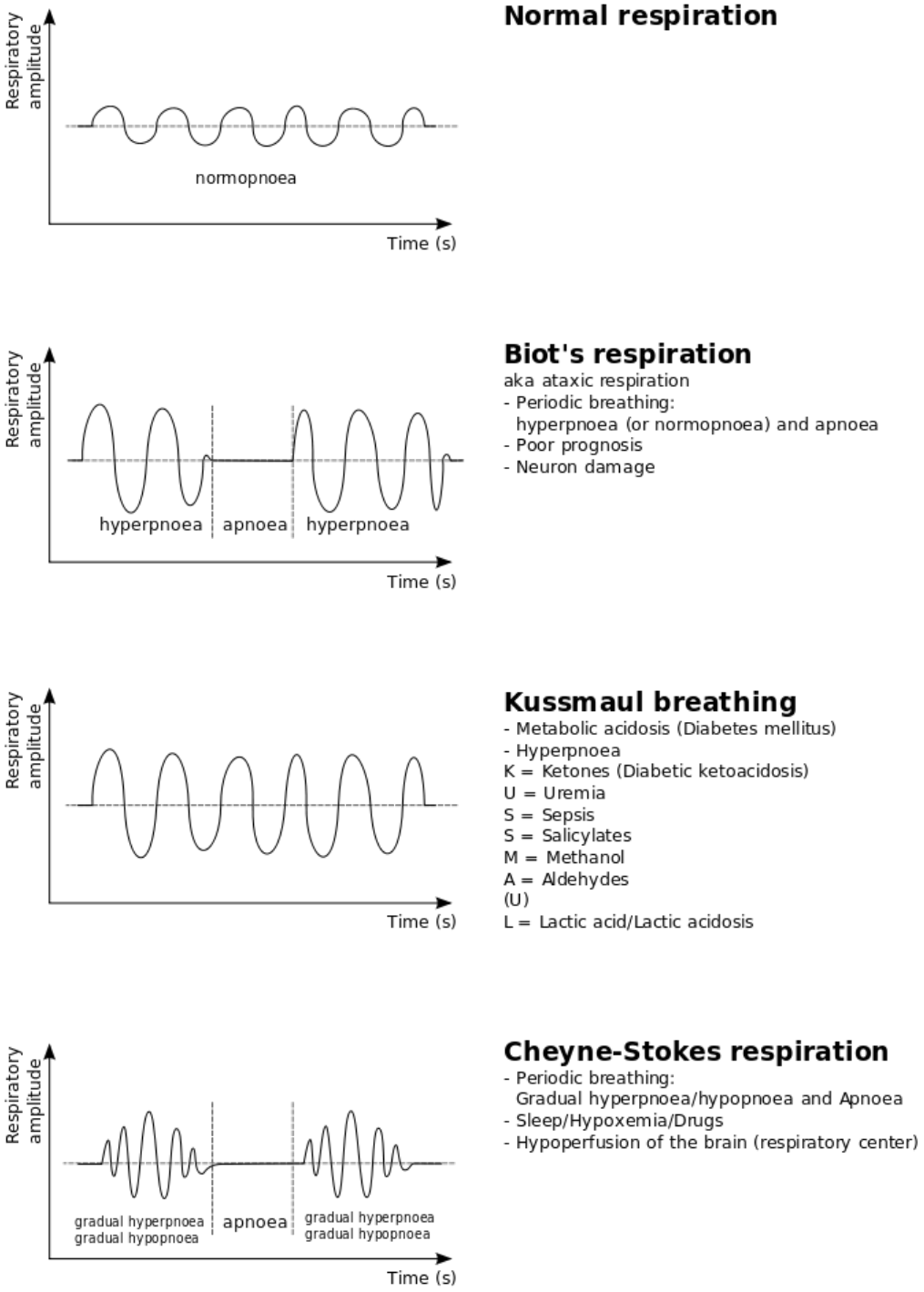


Image: Respiratory abnormalities: abnormal breathing patterns that can help diagnose or discover the underlying cause of pathologic breathing. By Sav vas. License: CC BY-SA 3.0.

Palpation

- Location of the trachea (in the middle)
- Spinal column/ribs: pain upon percussion, fracture, Tietze syndrome, and rachitis
- Skin emphysema
- Symmetric excursion

- Pain upon compression

What was that again...?

Vocal fremitus: Place your hands laterally on the patient's thorax and ask the patient to say the number **"99"** (loud and resounding). Palpable vibrations during the infiltration of the lung (pneumonia, bronchiectasis, and pulmonary congestion) are pathologically intensified. A weakened fremitus can be felt in cases where air or liquids are trapped in the pleural cavity (pneumothorax, pleural effusion).

Percussion

1. Poor technique (e.g., raised finger of the chest wall)
2. Pleural effusion: classically very dull and described as "stony dull"
3. Lobar/total lung collapse
4. Previous pneumonectomy or lobectomy
5. Extensive consolidation due to pneumonia
6. Pleural thickening/mesothelioma
7. Obesity (relative, falsely dull)
8. Raised hemidiaphragm (due to loss of lung volume or phrenic palsy)
9. Normally over the liver and heart

Quality of percussion sound:

Hyper sonor	emphysema, pneumothorax
Sonor	normal, bronchitis, central pneumonia, pulmonary edema
Hypo sonor	pleural effusion, infiltrate, tumor, pleural

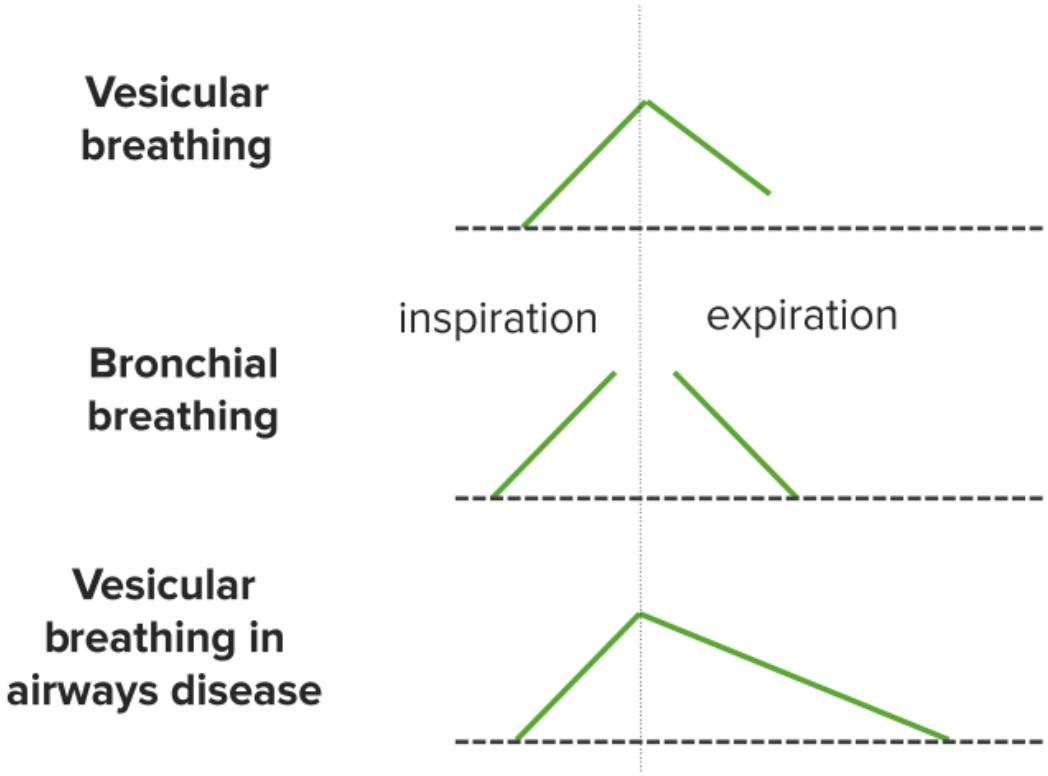
Auscultation

- Respiratory sounds: tracheal, bronchial, bronchovesicular, and vesicular (normal findings are known from many clinical reports: vesicular respiratory sounds)
- Weakened/missing respiratory sounds: emphysema, status asthmaticus, pneumothorax, effusion, pleural fibrosis, and tumor
- Bronchial breath sounds: consolidation (in cases of pneumonia, hemorrhages, and edema)
- Pleural rub (pleuritis)
- **Adventitious breath sounds:**
    - Continuous wheezing and humming
    - Discontinuous: **Fine bubbling rales** are usually of high frequency and occur due to an opening of the small airways, indicative of pulmonary fibrosis or beginning lung edema. **Coarse bubble rales** are usually of low frequency and occur due to trapped liquid in the small airways, indicative of bronchitis or lung edema.
- **Bronchophony:** Examination of the forwarding of higher tones. Ask the patient to say the number **"66"** in a high (slightly hissing) voice. The number can be heard better via infiltrated areas (pneumonia) due to better forwarding. In cases of pneumothorax or pleural effusion, little or nothing may be heard.

Inspiratory/expiratory breath sounds

- Calculate the ratio of inspiration to expiration on breathing.

- Normally, inspiration is slightly longer than the expiration.



Breath sounds: added sounds and their common causes

Speed of onset	Possible causes
Crepitations	Consolidation due to pneumonia (asymmetric, coarse) Pulmonary fibrosis and other interstitial lung diseases (fine) Pulmonary edema (fine) Bronchiectasis (coarse)
Wheeze	Asthma exacerbation COPD Bronchiectasis Partial obstruction of a major bronchus (monophonic) Pulmonary edema (‘cardiac asthma’) Upper airway obstruction (inspiratory—stridor)
Pleural rub	Pleural infection Over-consolidated lung in pneumonia Pulmonary embolism Other inflammatory effusions (e.g., Dressler’s syndrome) Recently drained pleural effusions

Systemic Examination

The lung is not the only organ that can give indications of pulmonary diseases.

Hands: The typical signs of chronic hypoxia are Hippocratic fingers and Hippocratic nails. Pay attention to venous filling and the heart rate!

Image: Example of clubbing secondary to pulmonary hypertension in a patient with Eisenmenger's syndrome. By Ann McGrath. License: Public Domain.

Head: Color reveals a lot: Is there anemia, jaundice, or cyanosis of the lips? How do the veins on the base of the tongue and the buccal mucosa appear?

Extremities: Sarcoidosis or hypertrophic osteoarthropathy are examples of diseases that can present symptoms of frequent pulmonary manifestation in other parts of the body. Are there signs of thrombosis on the lower leg? A lung embolism might be present. Edema would be a sign of right ventricular insufficiency with a backlog of blood and other problems with the lungs.

Skin:

- Erythema multiforme: *Mycoplasma pneumoniae*
- Erythema nodosum: tuberculosis, sarcoidosis, and histoplasmosis
- Purpura: vasculitis
- Lupus pernio: sarcoidosis
- Lupus vulgaris: tuberculosis

For the Pocket in Your Doctor's Coat: Everything Important at One Glance

Disease	Inspection	Palpation	Percussion	Auscultation
Status asthmaticus	Hyperinflation, auxiliary respiratory muscles	Fremitus	Hyper-resonant, depression of the diaphragm	Expiration, wheezes
Pneumothorax	Excursion	Fremitus, shift of the trachea to the healthy side	Hyper-resonant	Faint/no respiratory sound
Pleural effusion	Excursion	Fremitus, shift of the trachea to the healthy side	Damped	Faint respiratory sound
Atelectasis	Excursion	Fremitus, shift of the trachea to the diseased side	Damped	Faint respiratory sound
Consolidation	Excursion	Fremitus	Damped	Bronchial breath sounds, bronchophony

Fixed airway obstruction: COPD

Observation

- Increased respiratory rate
- Using accessory muscles: sternocleidomastoids, trapezius, etc.
- Excessive abdominal movement on inspiration
- Pursed lip breathing

Auscultation throughout both lungs

- Quiet breath sounds
- Prolonged expiratory phase
- +/- expiratory wheeze

Hyperexpanded lungs (hyperexpansion)

- Horizontal angle to the ribs
- ‘Barrel chest’: increased anterior–posterior diameter
- Tracheal lung
- Bilateral reduced chest expansion
- Trachea central

Percussion note: resonant over liver and heart, and below T10

Severe disease: central cyanosis, evidence of *cor pulmonale*

References

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Notes