Respiratory Emergencies CME
*** CME Version ***

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Scenario

- At 11PM, you are called to a 95YO Female where the home attendant says that “she can’t breath and she’s cold and sweaty”.
- V/S:
  - Pulse: 100 and very irregular
  - BP 120/70
  - Respirations: 45 and very shallow
  - Pulse Oximetry: 84% on room air
- **PE:** Skin cold and **dripping wet. Lung sounds are clear bilaterally**
- Medical History: Dementia, impaired swallowing, Myasthenia Gravis (no longer an issue), Repeated recent admissions for pneumonia. Most recent admission for profound dehydration and pneumonia. Released from hospital today at 5PM.

Scenario - Questions

- Is this person having respiratory distress? How would you know?
- **Is this person in “Respiratory Failure”? How would you know?**
- **How will you treat this patient?**

Respiratory Terminology

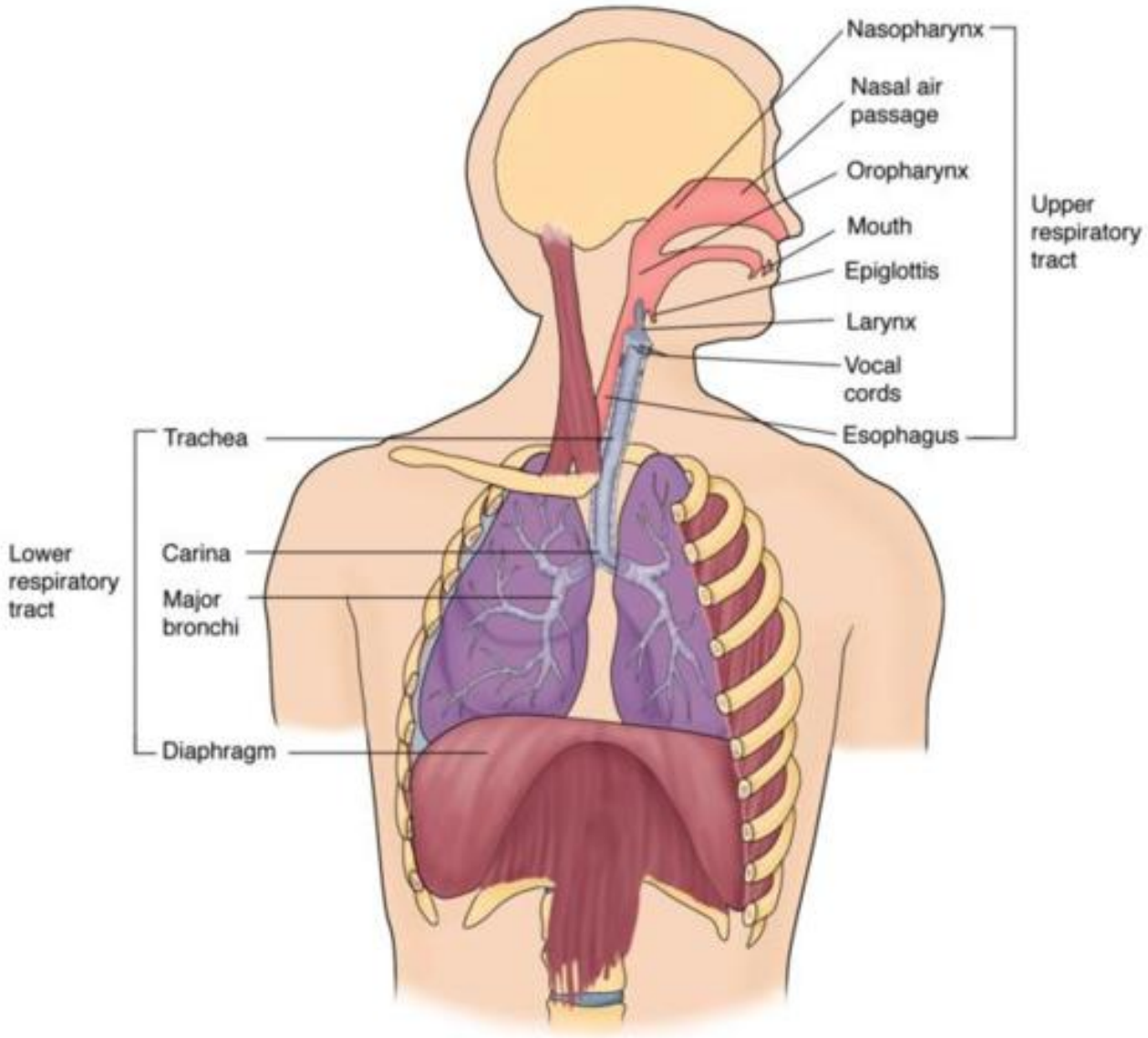
- Respiratory Distress
- **Respiratory Failure**
- Respiratory Arrest
  - **Quickly leads to cardiac arrest**
- **Key Points:**
  1. Must identify respiratory distress **PROMPTLY** and treat it
  2. ***Must be able to quickly identify when they've "crossed the line" to respiratory failure <u>and treat it aggressively</u>***
  3. ***The transition from "distress" to "failure" can happen very quickly***
     1. ***Need to assess respiratory status – early and often***

Respiratory Failure - defined

- Respiratory failure is a syndrome in which the respiratory system fails in one or both of its gas exchange functions: oxygenation and carbon dioxide elimination.
- **Respiratory failure can arise from an abnormality in any of the components of the respiratory system**, including the airways, alveoli, CNS, peripheral nervous system, respiratory muscles, and chest wall.
- **Patients who have hypoperfusion secondary to cardiogenic, hypovolemic, or septic shock often present with respiratory failure**
- **➔ It is often the patients described in the last bullet that we see in respiratory failure**

Treating Respiratory Problems

- Respiratory Distress: Free flow oxygenation (NRB, nasal)
- Respiratory Failure: **VENTILATION**
  - Forced addition of **O_2**
  - **Forced removal of CO_2**
  - **THIS SAVES LIVES!**

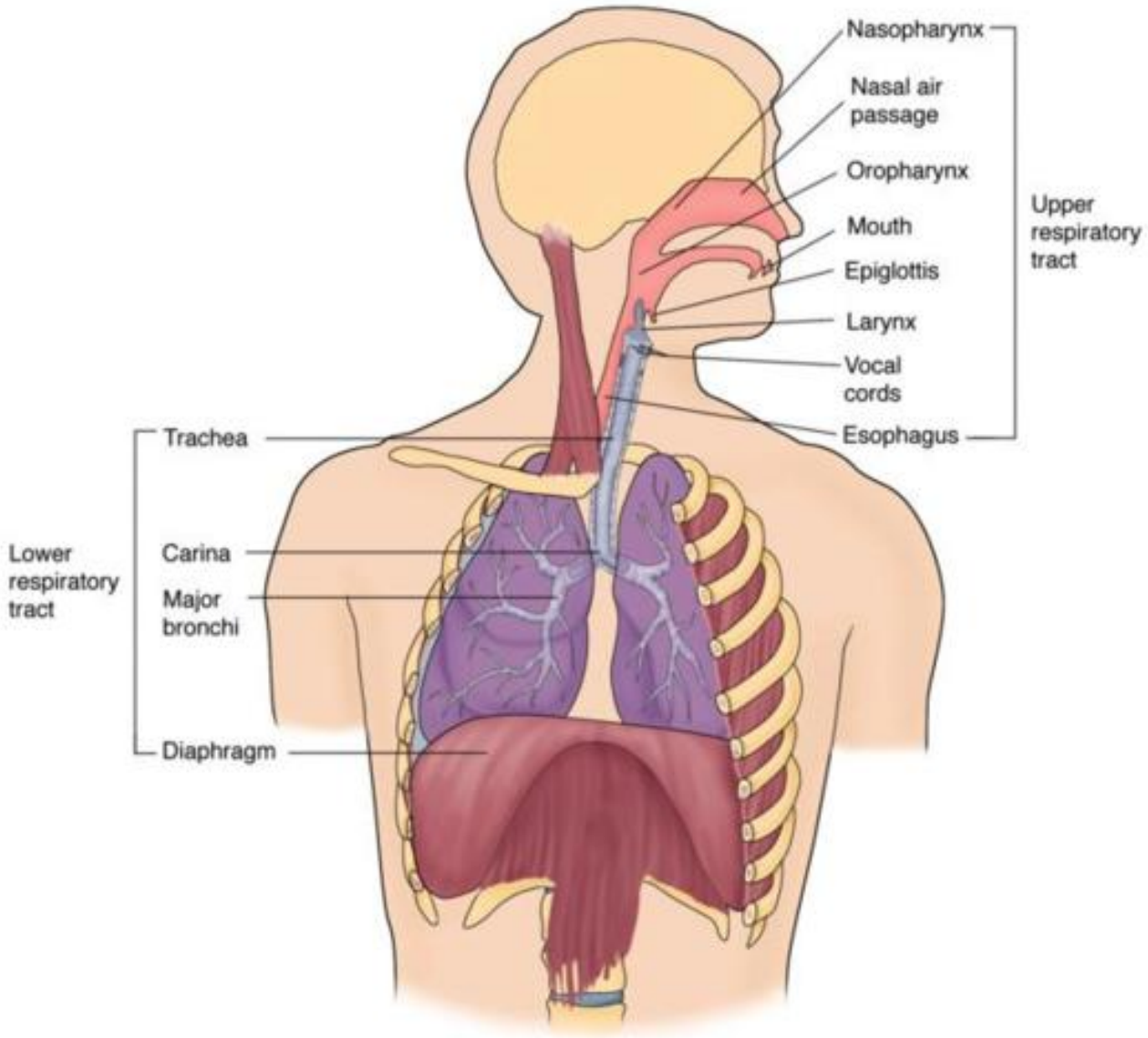

Nasopharynx
Nasal air passage
Oropharynx
Mouth
Epiglottis
Larynx
Vocal cords
Esophagus
Upper respiratory tract
Trachea
Carina
Major bronchi
Diaphragm
Lower respiratory tract

Review of airway anatomy

- Nose/Mouth
- Oropharynx/Nasopharynx
- Epiglottis
- Trachea
- Cricoid cartilage
- Larynx/vocal cords

Review of airway anatomy-2

- Bronchi
- Bronchioles
- Lungs
- Alveoli
- Diaphragm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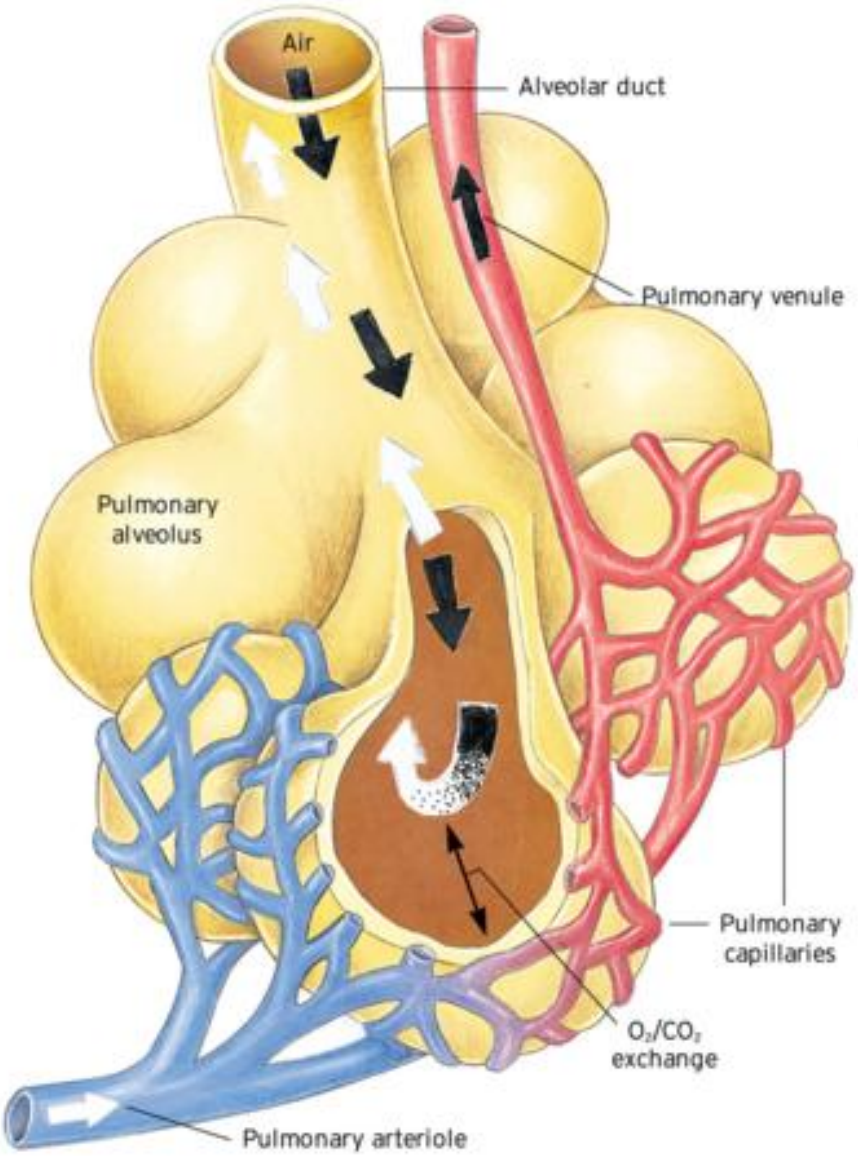
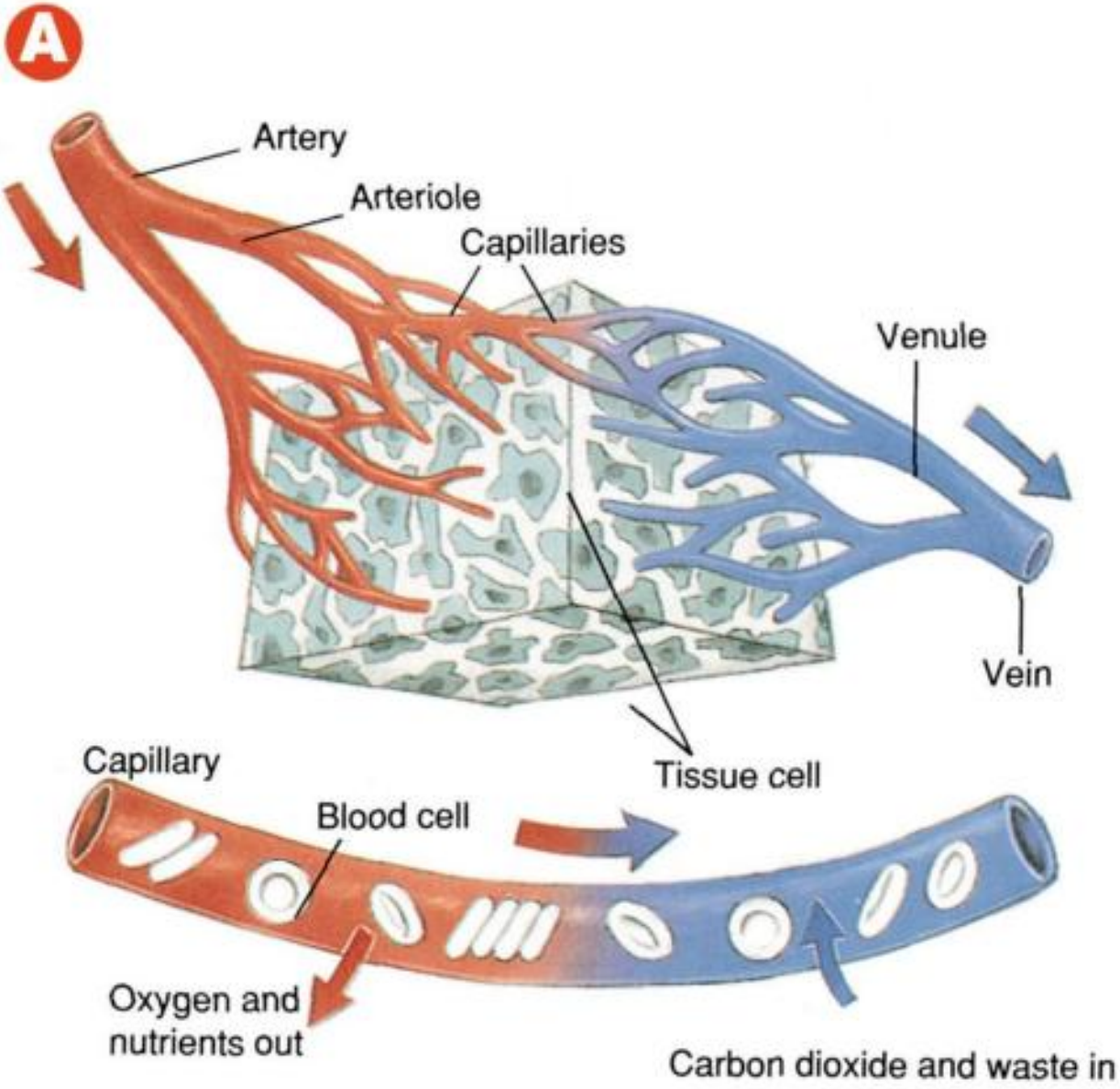
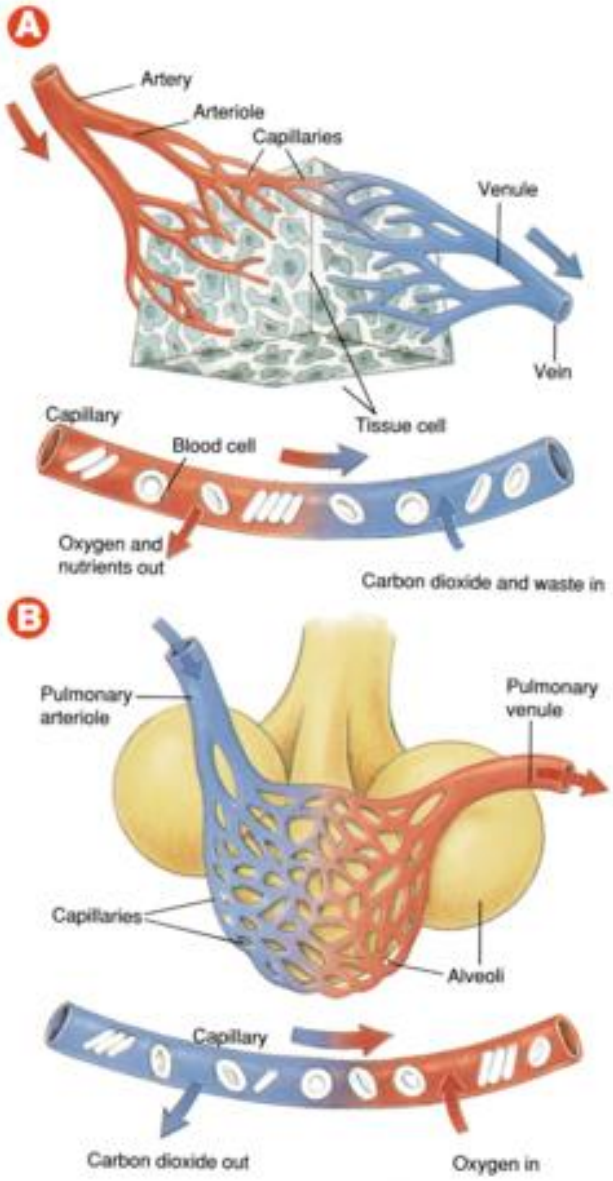

Air
Alveolar duct
Pulmonary venule
Pulmonary alveolus
Pulmonary capillaries
O_2/CO_2 exchange
Pulmonary arteriole


A
Artery
Arteriole
Capillaries
Venule
Vein
Tissue cell
Capillary
Blood cell
Oxygen and
nutrients out
Carbon dioxide and waste in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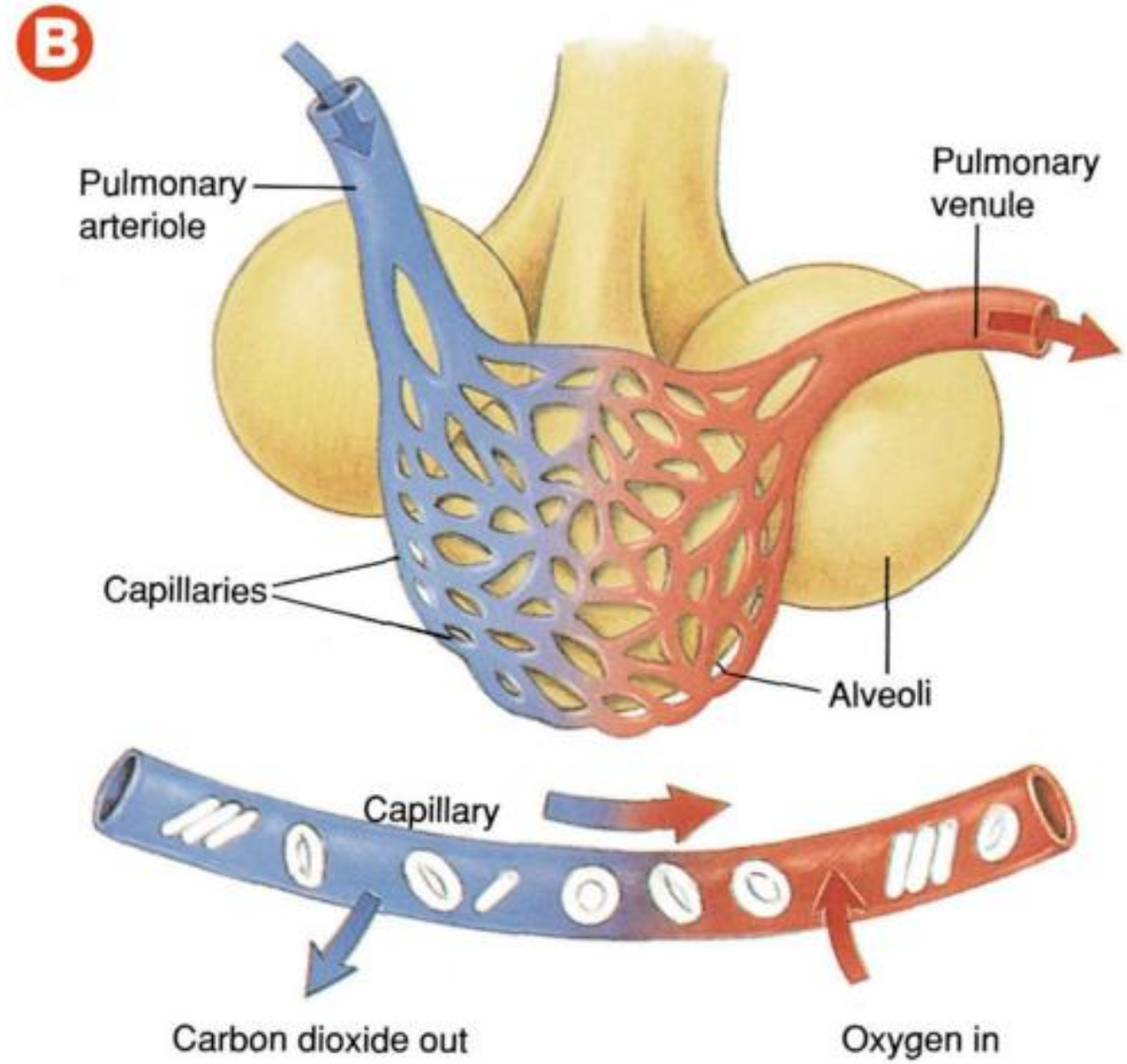
Oxygen and nutrients out
Carbon dioxide and waste in
B
Pulmonary arteriole
Pulmonary venule
Capillaries
Alveoli
Capillary
Carbon dioxide out
Oxygen in


B
Pulmonary arteriole
Pulmonary venule
Capillaries
Alveoli
Capillary
Carbon dioxide out
Oxygen in

Physiology

- Inspiration
- Expiration

Signs of normal breathing

- Normal rate & depth 
- **Regular pattern** of inhaling/exhaling
- “Good” breath sounds bilaterally
- Regular rise and fall of the chest – bilaterally
- “Some” movement of the abdomen
  - Young children are different

Signs of *abnormal* breathing

- RR<8 or RR>24
- Excessive respiratory muscle usage
- Pale or **cyanotic skin**
- Cool, diaphoretic (“clammy”) skin
- Shallow or irregular respiration

Signs of *abnormal* breathing

- Pursed lips
- Nasal flaring
- Tripod positioning
- Tachycardia
- Altered mental status (“AMS”)
  - Agitated → sleepy
  - **Look for the yawn!**

Important terms

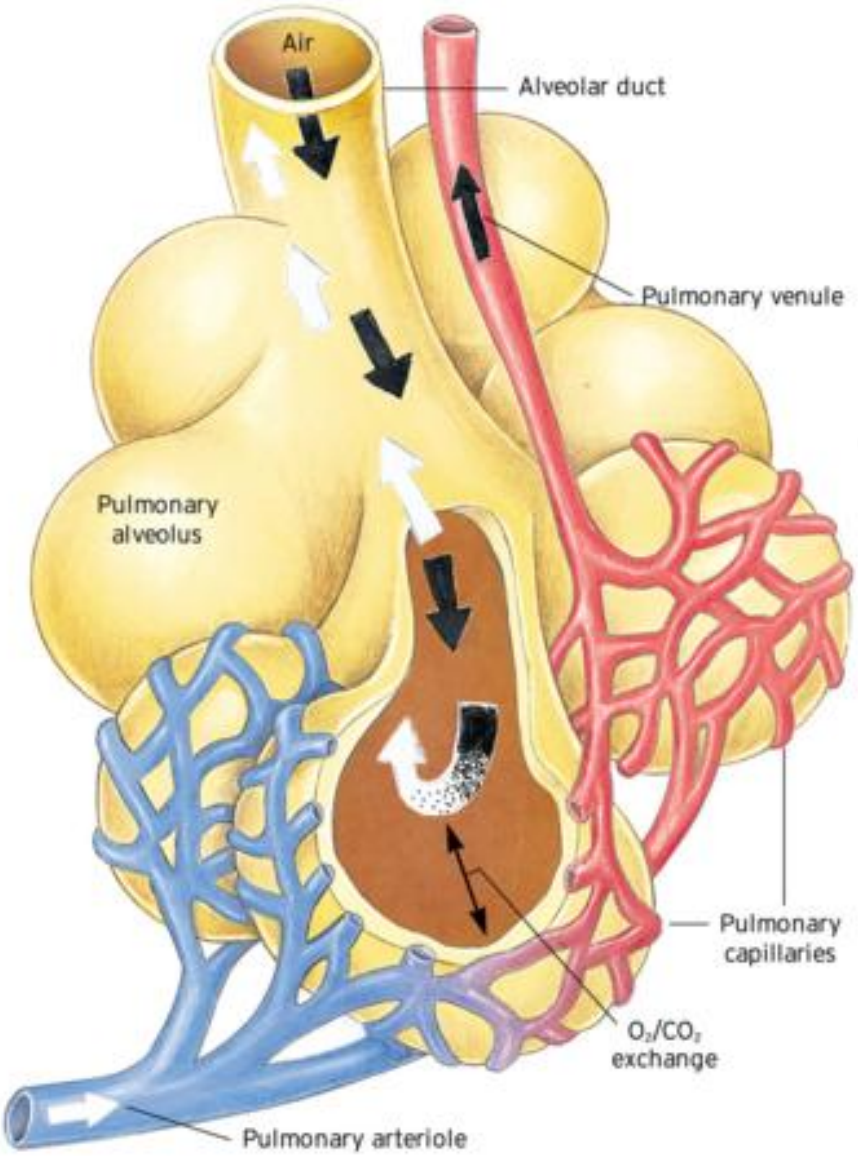
- Dyspnea
  - Difficulty breathing
  - Shortness of breath (SOB)
- Apnea
  - No breathing
- Hypoxia
  - Not enough oxygen
- Hypoxemia
  - Not enough oxygen in the bloodstram

What causes us to breath

- Normal individuals
  - Excessive CO_2 levels in arterial blood detected by "chemoreceptors"
- COPD patients
  - Low levels of O_2 in arterial blood
- COPD
  - **C**hronic **O**bstructive **P**ulmonary **D**isease
    - Emphysema
    - Chronic bronchitis

Causes of dyspnea

- Obstructed lower airways
  - Due to fluid, infection, collapsed **alveoli**
- Damaged **alveoli**
- Damaged **cilia** in lower airways
- Spasms, **mucus plugs**, floppy airways
- Obstructed blood flow to lungs
- **Pleural space** filled with air or fluid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Common respiratory disorders causing dyspnea

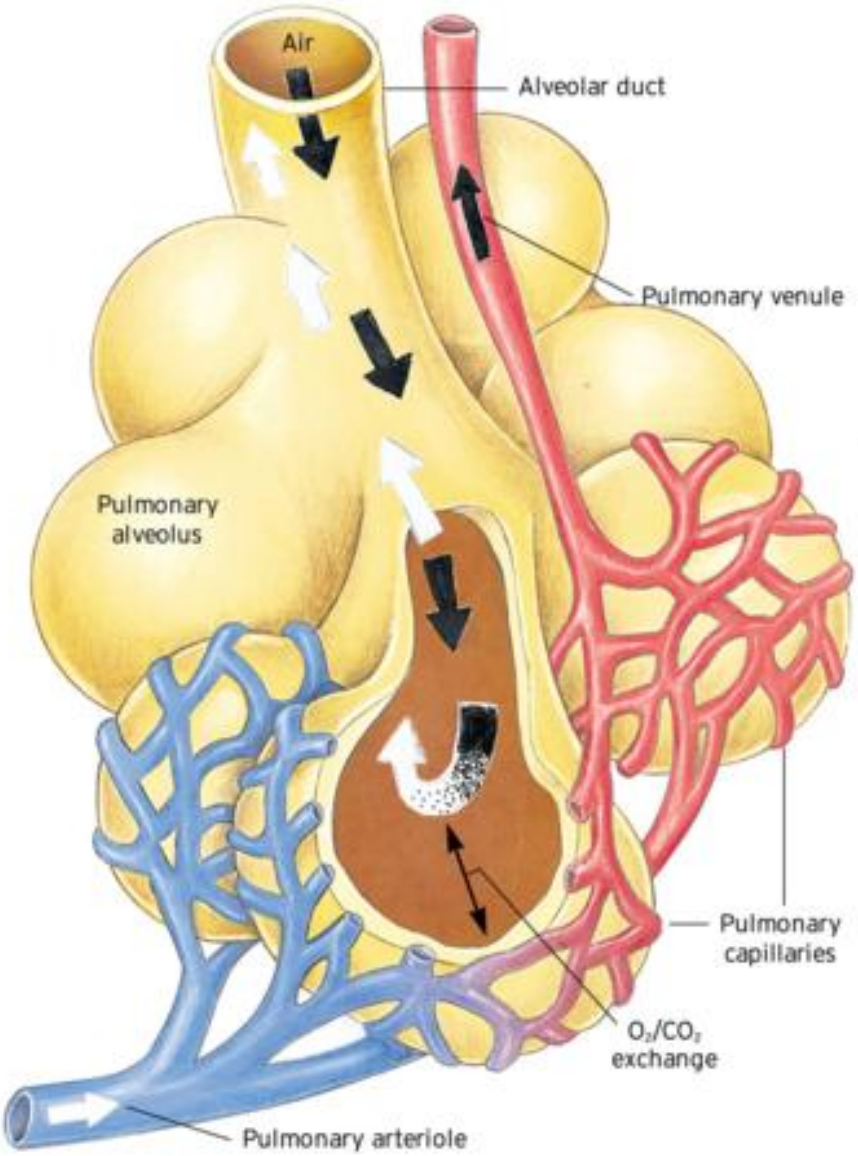
- Airway infections
- Acute Pulmonary Edema (“APE”)
- COPD
- Spontaneous pneumothorax
- Asthma, allergies, anaphylaxis
- Pleural effusion
- Prolonged seizures
- FBAO
- Pulmonary embolism
- **Hyperventilation syndrome**
- Severe pain

Infections

- Colds/flu
- Bronchitis
- Bronchiolitis
- Pneumonia
- Croup
- Epiglottitis
- → **History will often “tell the story”**

Acute pulmonary edema

- Not really a respiratory problem
  - **A cardiac problem**
  - **Left Sided Congestive Heart Failure (“CHF”)**
- Severe dyspnea
- Pink frothy, blood-tinged sputum
- **One of the most life threatening calls that we get**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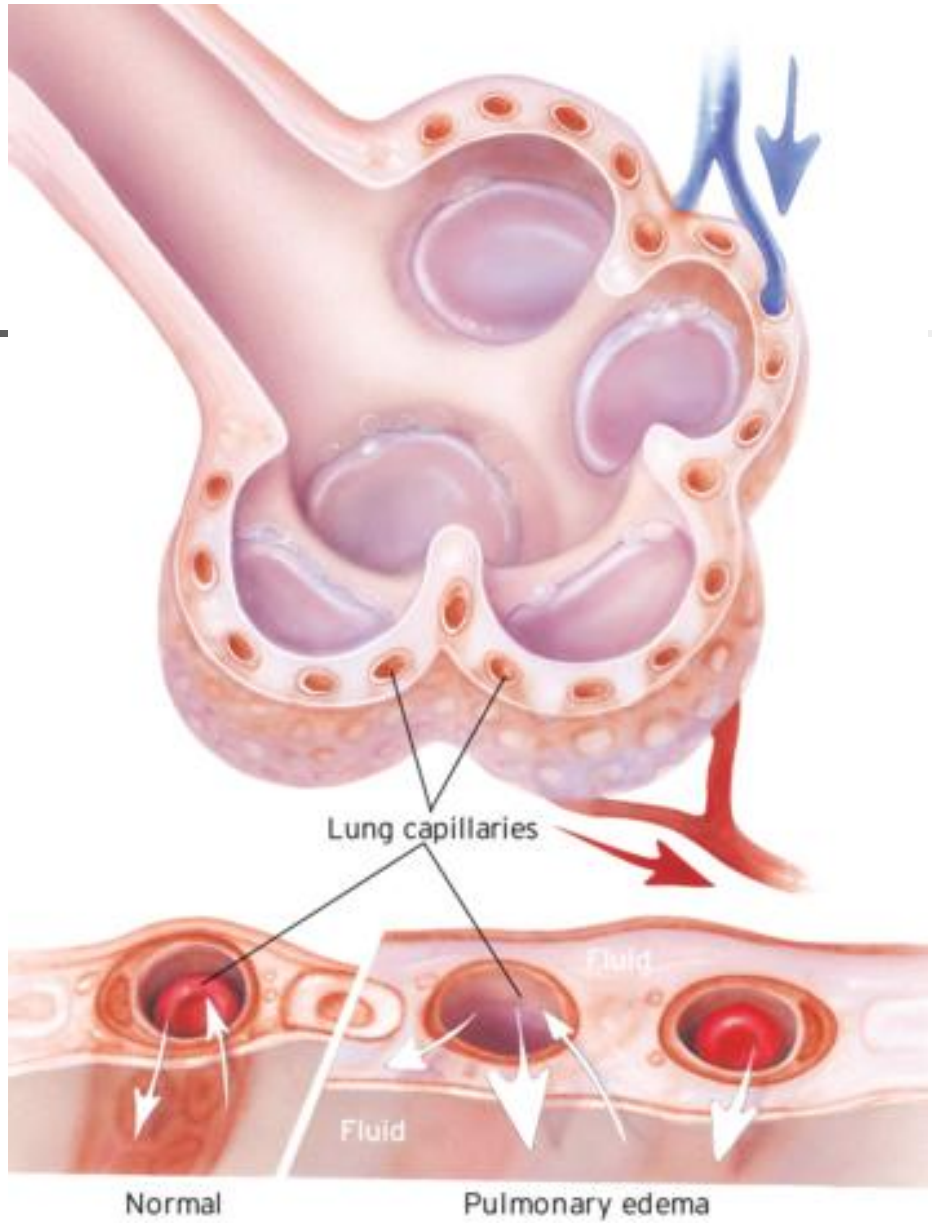
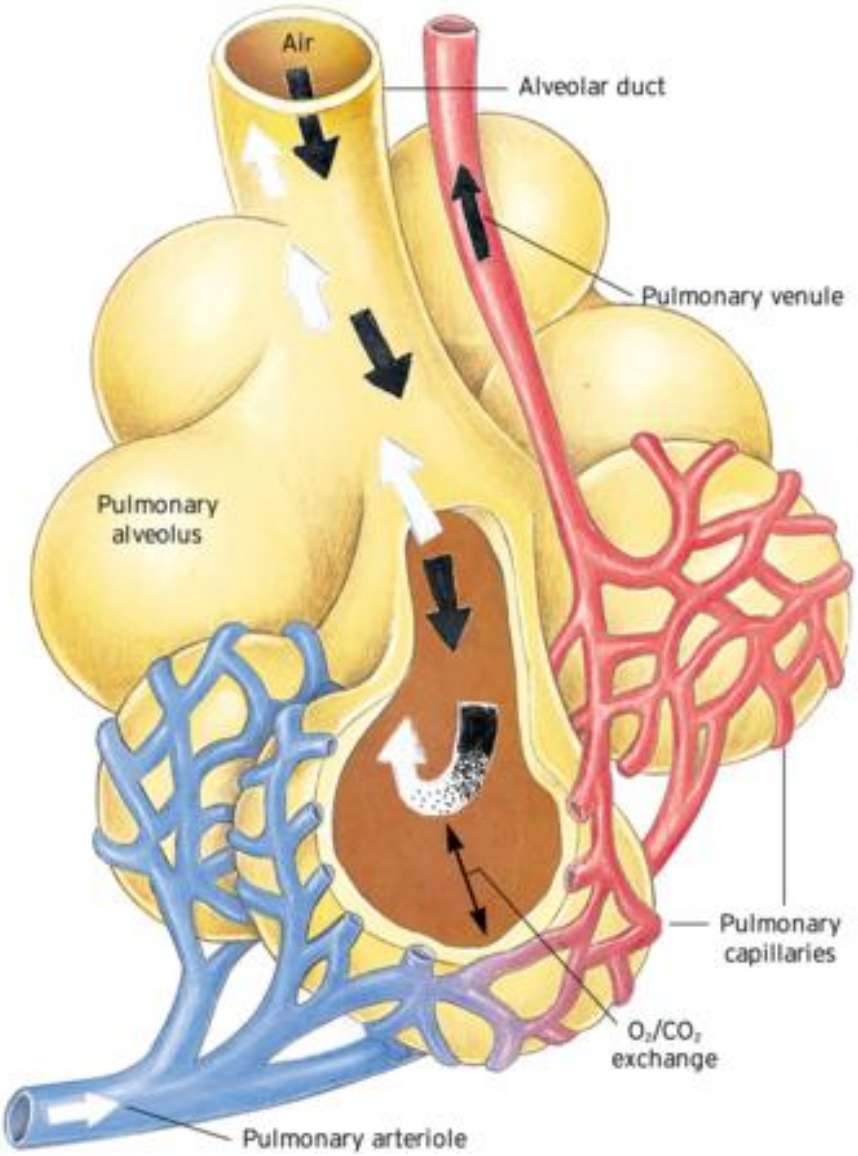

Lung capillaries
Fluid
Fluid
Normal
Pulmonary edema

COPD

- **Almost always caused by long-term smoking**
  - Sometimes caused by long term exposure to chemicals in the workplace
- Chronic bronchitis
- Emphysema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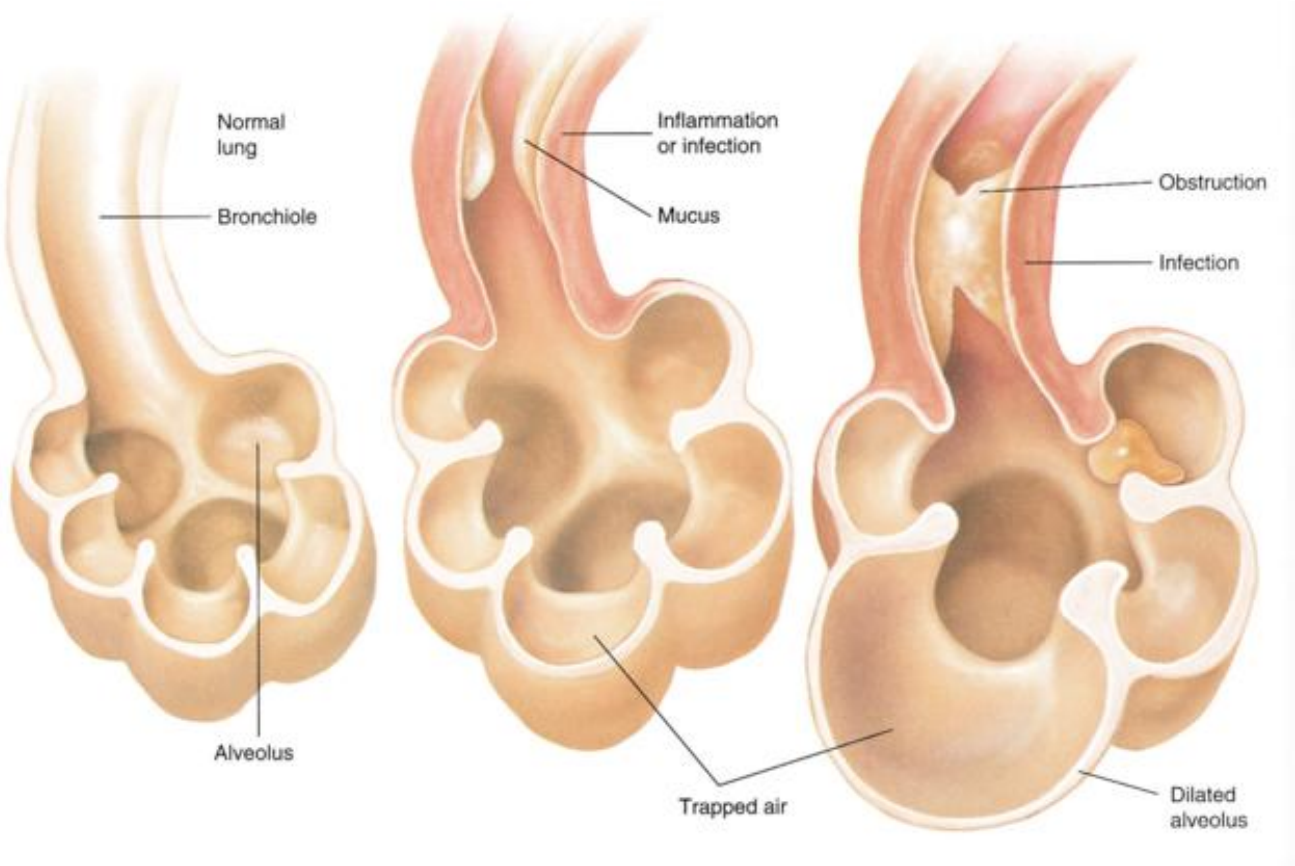
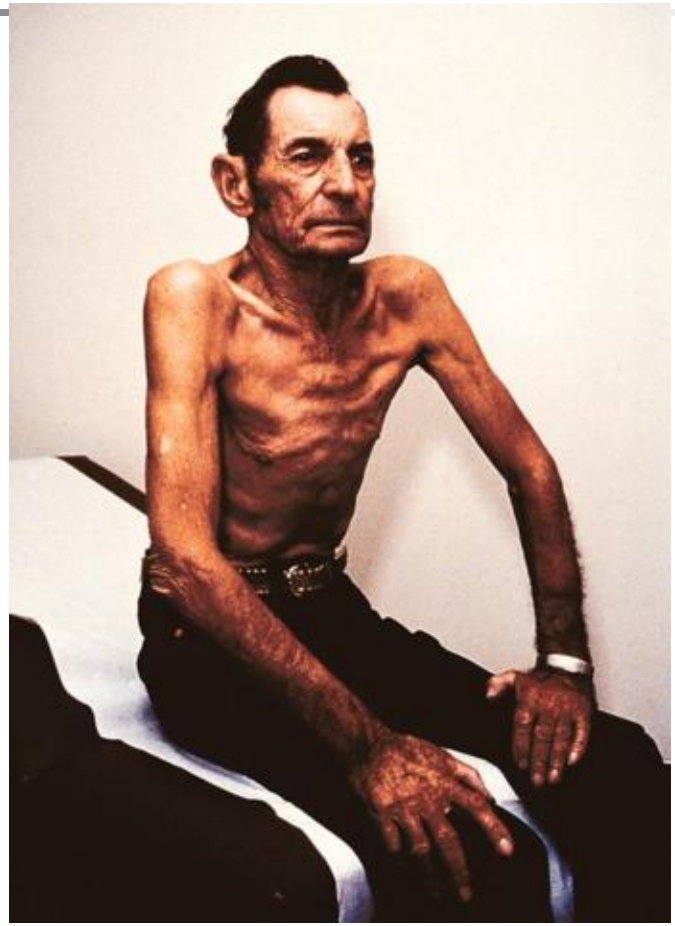

Normal lung
Bronchiole
Alveolus
Inflammation or infection
Mucus
Trapped air
Obstruction
Infection
Dilated alveolus

“Joe COPD”



Chronic bronchitis

- Damaged respiratory pathway cilia
- Excessive mucus production
  - **Can “spit up” in excess of a quart a day of mucus**
- Can’t “cough out” effectively
- **Very frequent** bronchitis/pneumonia
- On antibiotics for more that 3-4 months each year

Emphysema

- Loss of alveolar elasticity and shape
- Air pockets
  - Can not expel CO_2

COPD

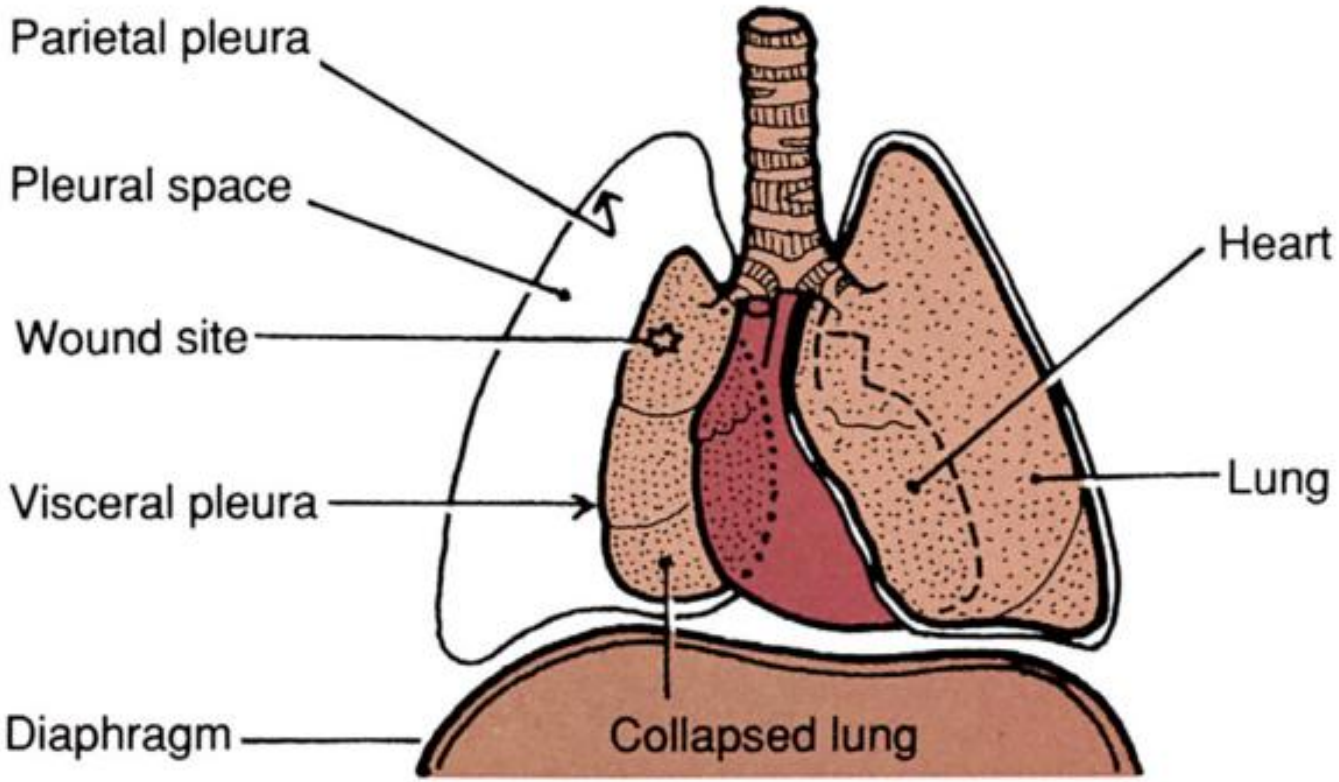
- Most have elements of both diseases
- Fairly normal inspiratory phase
- Prolonged expiratory phase
- Most common lung sound
  - Expiratory wheeze
- Minor respiratory problems exacerbates COPD
- Patient is usually old

COPD

- Altered mental state over time
  - Due to CO_2 retention
- Barrel shaped chest
- Well developed respiratory muscles
- Long term COPD may cause heart failure

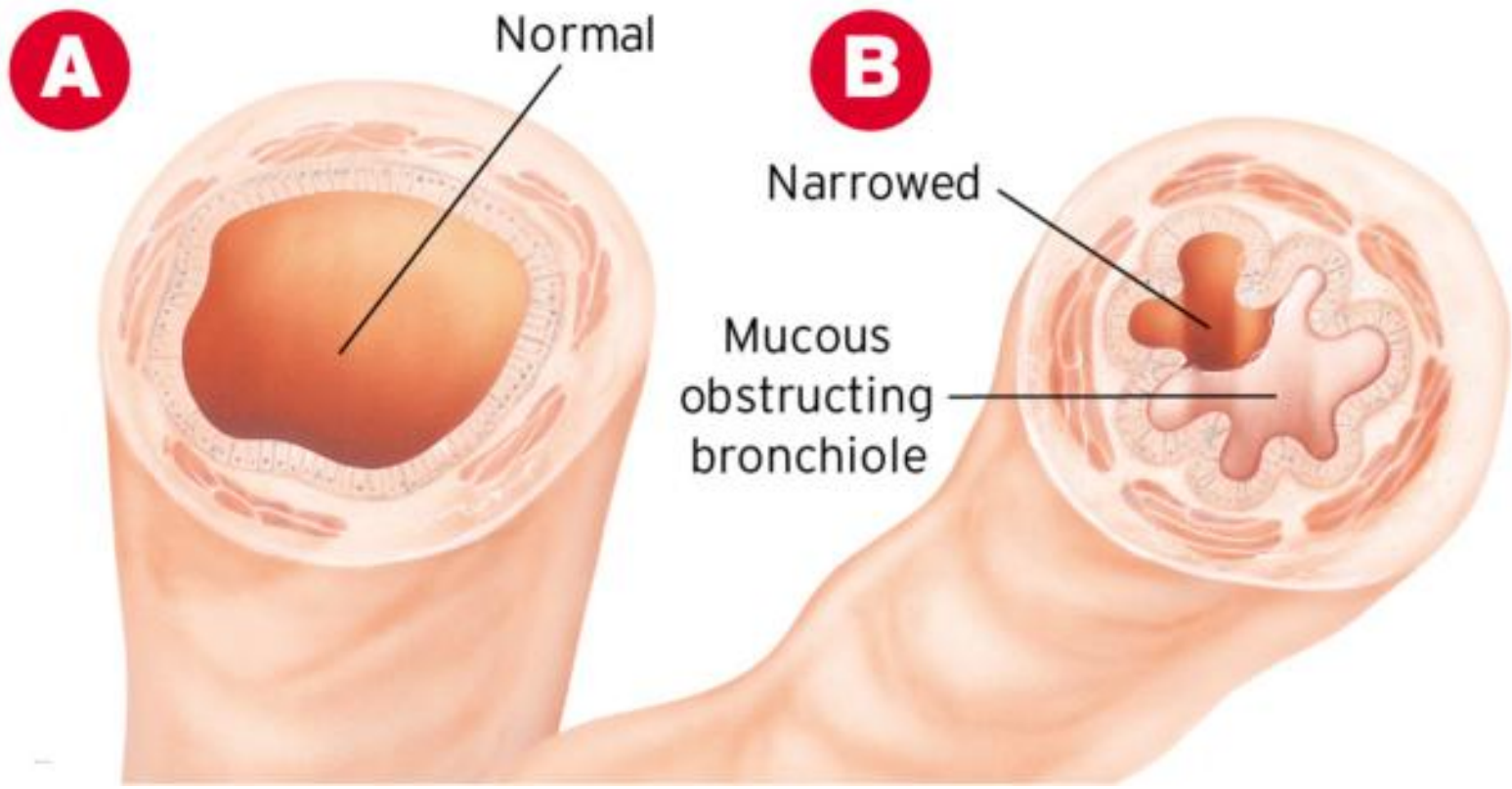
Spontaneous pneumothorax

- Collapsed portion of lung due to weakness in lung tissue
- No apparent cause
- **Sudden SOB**
- **Pleuritic chest pain**
- Common in asthmatic/COPD
- Common in tall thin men


Parietal pleura
Pleural space
Wound site
Visceral pleura
Diaphragm
Heart
Lung
Collapsed lung

Asthma/allergies

- **Reversible** spasm of bronchioles
- Excessive mucus production
- Normal inspiration
- Difficult expiration
- **Expiratory wheezing – common**
- **A quiet chest is an ominous sign**
  - **Be prepared for respiratory arrest**
  - **Be prepared to use BVM**

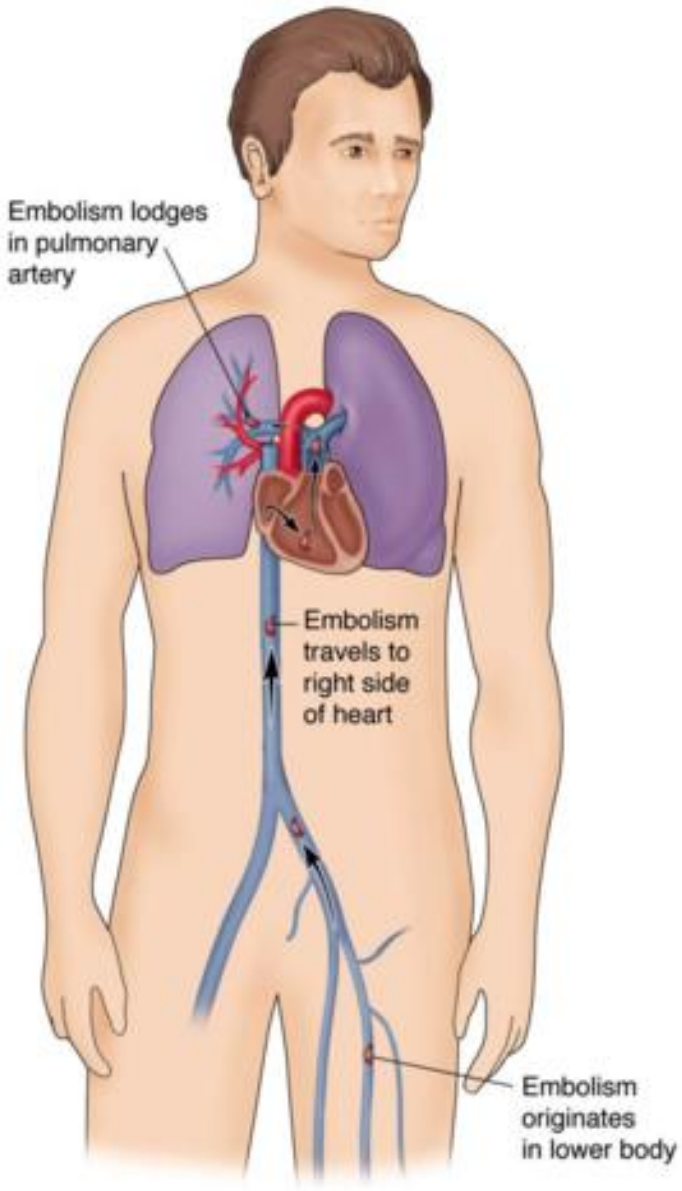

A
Normal
B
Narrowed
Mucous
obstructing
bronchiole

Status asthmaticus

- An asthma attack that cannot be “broken” after repeated doses of bronchdilators
- **Needs aggressive airway management**
- **Needs rapid transport**
- **Needs BVM**

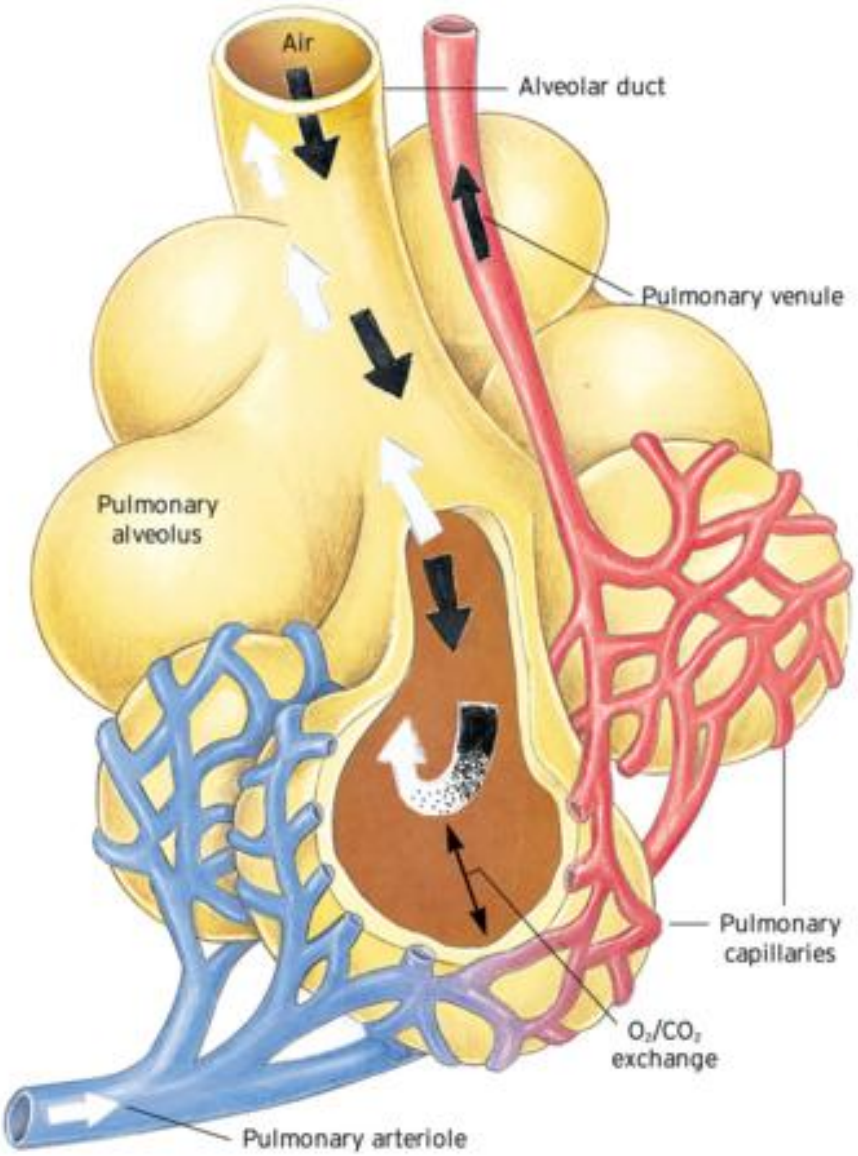
Pulmonary embolism

- Embolus: something in the circulatory system that travels from one place to a distant place – **and lodges there**
- Effective inspiration/expiration – **BUT**
- Vessels leading to alveoli are blocked by:
  - Blood clots
    - Often following long bed rest
  - Air bubbles
    - Often following open neck injuries
  - Bone marrow
    - Often following a long-bone fracture
  - Amniotic fluid
    - Often following an “explosive delivery”


Embolism lodges in pulmonary artery
Embolism travels to right side of heart
Embolism originates in lower body

Pulmonary embolism

- Very often a dangerous complication of a “DVT”
  - Common in pt with varicose veins
- **“perfusion/ventilation mismatch”**
- Small emboli may cause no S/S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Pulmonary embolism

- Common S/S
  - Dyspnea
  - Pleuritic chest pain
  - Hemoptysis
  - Cyanosis
  - Tachycardia
  - Tachypnia
- **A large embolus may cause sudden cardiac arrest**

Hyperventilation

- Overbreathing – reduces CO_2 level excessively
- **May be** emotional in nature
- ***May be a sign of <u>MANY</u> serious medical conditions***
- **DO NOT WITHOLD Oxygen!**
- **Do not allow RMA**
- **DO NOT HAVE THEM BREATH INTO A BAG!**

Hyperventilation

- Patient may describe:
  - Numbness/tingling in hands/feet
  - Spasms in hands and feet
  - Called “carpal-pedal” syndrome
- **If all medical causes have been ruled out *IN THE HOSPITAL*, the condition is called “Hyperventilation Syndrome”**

Treating the dyspneic patient

- **Request ALS**
- Calm approach!
- Position of comfort
  - Almost always sitting upright
  - NEVER lie them down
    - Especially an APE patient
- **High concentration oxygen**
  - ***Even for COPD patients***
  - **NRB – if rate & depth are adequate**
  - **BVM – if not ➔ Note: New protocols do not indicate when to bag based on "Numbers".**
- **IF any wheezing, give them albuterol**

Treating the dyspneic patient

- Monitor V/S – especially resp rate
- **Look for signs of sleepiness**
  - Yawning
  - Slowing RR – especially in COPD pt.
  - → pt is becoming too tired to breathe
  - **Respiratory failure**
  - **Breathe for them → BVM**

Treating the dyspneic patient

- The “counting test”
- SAMPLE HISTORY
- OPQRST – medical assessment Q’s
  - **O**nset
  - **P**rovocation/**P**alliation
  - **Q**uality (of any pain)
  - **R**adiation
  - **S**everity
  - **T**ime
- **Interventions**
  - **Also, help them with prescribed inhalers**

Treating the Wheezing Patient

- **** Note: This protocol covers patients over age 1 ****
  - **Now covers asthmatic, COPD and in some cases “early” APE patients.**
- Request ALS
- ABCs
  - If breathing is inadequate, be prepared to ventilate with a BVM
- **O_2**
- …

Wheezing Treatment – cont'd

- Position of comfort
- **Do not allow physical activity**
- Assess V/S, accessory muscle usage, ability speak full sentences, wheezing
- ...

Wheezing Treatment – cont'd

- Administer one standard unit dose of albuterol via nebulizer at a flow rate to deliver the albuterol in 5-15 minutes (about 6 LPM)
- **Begin transport**
- Reassess V/S and airway/breathing
- If S/S persist during transport, administer albuterol up to 2 more times

ALS Treatments for Respiratory Emergencies

- Respiratory Arrest
- Obstructed Airway
- Asthma
- COPD

Respiratory Arrest - ALS

- **BLS**
- TPT? Needle decompression
- Intubate – sedate PRN
- Cardiac monitoring
- IV/SL NS

Obstructed Airway - ALS

- **BLS**
- Direct laryngoscopy
  - Attempt removal with Magill Forceps
- Needle Cricothyroidectomy, if unsuccessful – **To be eliminated shortly**

Asthma - ALS

- Albuterol SUD up to 3 doses over 5-15 minutes
- Ipratropium Bromide SUD with each Albuterol dose **→Note soy/nut allergy**
  - May mix Albuterol and Ipratropium Bromide
- Impending respiratory failure? Epi 0.3mg 1:1000 IM
- Cardiac history? Cardiac monitoring
- Severe respiratory distress?
  - IV/SL NS
  - Magnesium Sulfate 2g in 50-100ml NS over 10-20 minutes → **Typical drip rate?**
  - Solumedrol 125mg IV/IM **or**
  - Dexamethasone 12mg IV/IM
- **MC Options**
  - Repeat Albuterol
  - Repeat Epi 0.3mg 1:1000 IM

COPD - ALS

- Cardiac monitoring
- Albuterol SUD up to 3 doses over 5-15 minutes
- Ipratropium Bromide SUD with each Albuterol dose
  →Note soy/nut allergy
  - May mix Albuterol and Ipratropium Bromide
- IV/SL NS
- Severe respiratory distress?
  - Solumedrol 125mg IV/IM **or**
  - Dexamethasone 12mg IV/IM
- **MC Options**
  - Repeat Albuterol