



RESPIRATORY SYSTEM

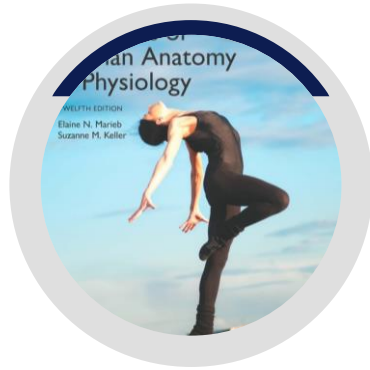
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RESOURCES



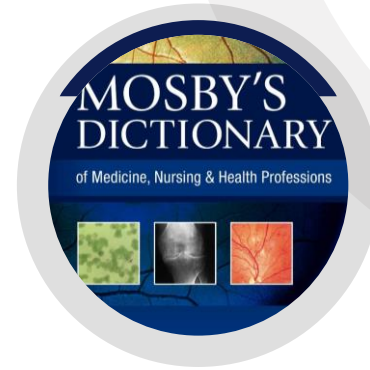
MASTERING MEDICAL TECHNOLOGY

By Sue Walker, Maryann Wood and Jenny Nicol



ESSENTIAL OF HUMAN ANATOMY AND PHYSIOLOGY

Elaine Marieb and Suzanne Keller



MOSBY'S DICTIONARY

By Mosby

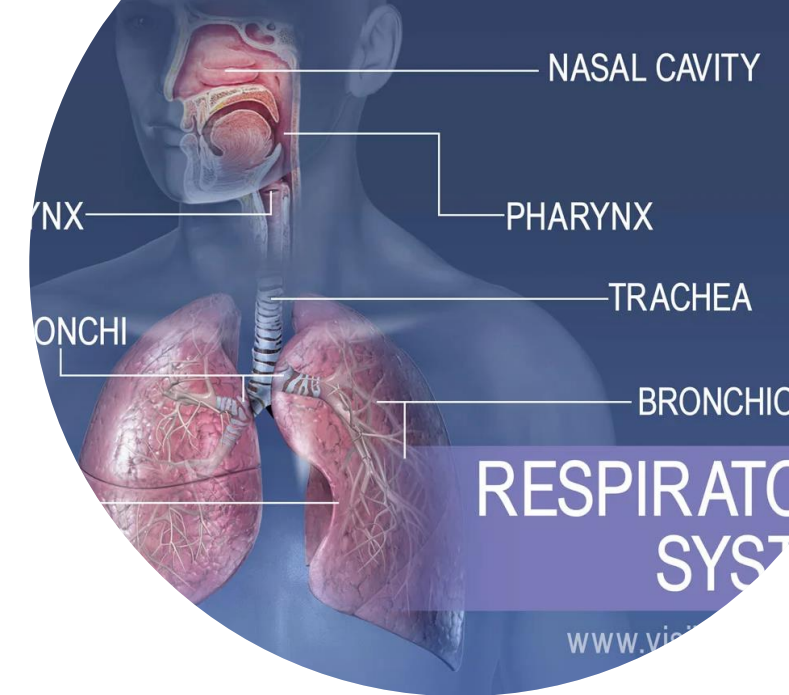


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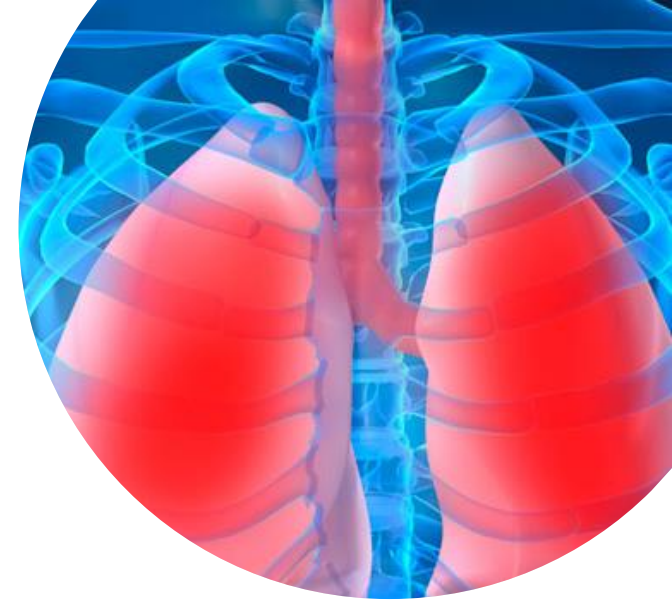
INTRODUCTION

- The system which involves **inspiration** (also called inhalation or breathing in), **expiration** (also called exhalation or breathing out), exchange of gases in the lungs and the transport of gases between the lungs and body tissues is known as the **respiratory system**.
- **Respiration** (also known as ventilation) is the process of breathing in and out through this system.
- All body cells require **oxygen**. Without it, they cannot survive.
- **How does the body get oxygen?**
- It is provided from breathing in air which the blood circulates to all parts of the body.
- The goal of breathing is to deliver oxygen to the cells of the body and to take away carbon dioxide and other waste gases.
- This exchange of gases is vital to life.



FUNCTIONS

- **Inhalation** and **exhalation** - pulmonary ventilation (breathing).
- **External respiration** exchanges gases between the lungs and the bloodstream
- **Internal respiration** exchanges gases between the bloodstream and body tissues.
- **Air vibration** for the vocal cords to create sound.
- **Olfaction** (smelling) is a chemical sensation.



COMBINING FORM

Check page 198-199 from the book “*Mastering Medical Terminology*” for the complete list of combining form.

Combining form	Meaning	Medical term	Meaning of medical term
adenoid/o	adenoids	adenoiditis	
alveol/o	alveolus, air sac	alveolar	
anthrac/o	black, coal	anthracosis	
bronch/i	bronchus	bronchiectasis	
bronch/o		bronchoscopy	
bronchiol/o	bronchiole	bronchiolitis	
capn/o	carbon dioxide	hypocapnia	
coni/o	dust	pneumoconiosis	
cost/o	rib	costochondritis	
cyan/o	blue	cyanosis	
epiglott/o	epiglottis	epiglottitis	
laryng/o	larynx, voice box	laryngectomy	
lob/o	lobe	lobectomy	
mediastin/o	mediastinum	mediastinitis	
nas/o	nose	nasal	
or/o	mouth	oropharyngeal	
orth/o	straight, upright	orthopnoea	

PREFIX

Prefix	Meaning	Medical term	Meaning of medical term
a- <i>an-</i> (used when the combining form starts with a vowel)	no, not, without, absence of	apnoea anoxic	
brady-	slow	bradypnoea	
dys-	bad, painful, difficult	dysphonia	
em- (used when the combining form starts with b, m or p) en-	in	empyema encapsulate	
endo-	within	endotracheal	
inter-	between	intercostal	
tachy-	rapid, fast	tachypnoea	
tele-	distant, end, far, complete	telehealth	

SUFFIX

Suffix	Meaning	Medical term	Meaning of medical term
-capnia	condition of carbon dioxide	hypocapnia	
-centesis	surgical puncture to remove fluid	thoracocentesis	
-eal	pertaining to	pharyngeal	
-ectasia	expansion, dilatation, stretching out	pharyngectasia	
-ectasis		bronchiectasis	
-ema	condition	emphysema	
-osmia	condition of sense of smell	dysosmia	
-oxia	condition of oxygen	hypoxia	
-pnoea	breathing	dyspnoea	
-ptysis	spitting	haemoptysis	
-scope	instrument to view	bronchoscope	
-scopy	process of viewing	laryngoscopy	
-spasm	involuntary contraction	bronchospasm	
-thorax	pleural cavity chest	haemopneumothorax	

PRONUNCIATION

Check page [200-201](#) from the book “*Mastering Medical Terminology*” for the complete list of pronunciation.

Term	Pronunciation
allergic rhinitis	a-LER-jik ry-NY-tis
alveoli	al-vee-OL-eye
asthma	ASS-ma
auscultation	os-kul-TAY-shun
bronchioles	BRON-kee-olz
bronchitis	bron-KY-tis
bronchoscopy	bron-KOS-kop-ee
bronchus (bronchi)	BRON-kus (BRON-ky)
carbon dioxide	KAH-bon dy-OK-syd
chest x-ray	chest EKS-ray
chronic obstructive pulmonary disease	KRON-ik ob-STRUK-tiv PULL-mon-ah-ree diz-eez
computed tomography scan of the chest	kom-PYOO-ted to-MOG- ra-fee skan of the chest
continuous positive airway pressure	kon-TIN-yoo-us POZ-it-iv air-way PRESH-a
coryza	kor-Y-za

ABBREVIATIONS

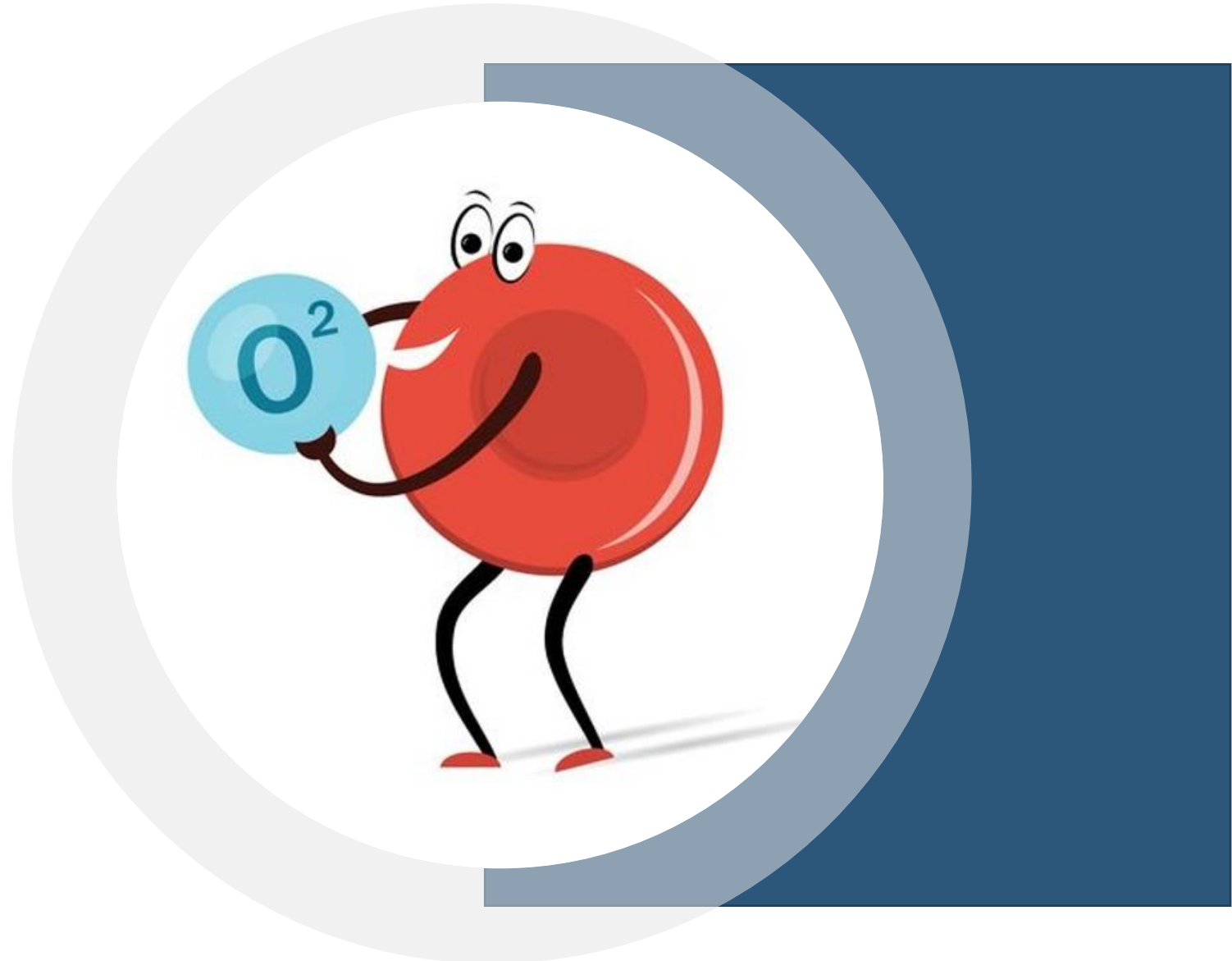
Check page 201 from the book “*Mastering Medical Terminology*” for the complete list of pronunciation.

Abbreviation	Definition
ABGs	arterial blood gases
AFB	acid fast bacilli
ARDS	acute/adult respiratory distress syndrome
ARF	acute respiratory failure
BS	breath sounds
CAL	chronic airways limitation
COAD	chronic obstructive airways disease
COLD	chronic obstructive lung disease
COPD	chronic obstructive pulmonary disease
CF	cystic fibrosis
CO ₂	carbon dioxide
CPAP	continuous positive airways pressure
CPR	cardiopulmonary resuscitation
CT	computed tomography
CXR	chest x-ray
DOE	dyspnoea on exertion
ENT	ear nose and throat



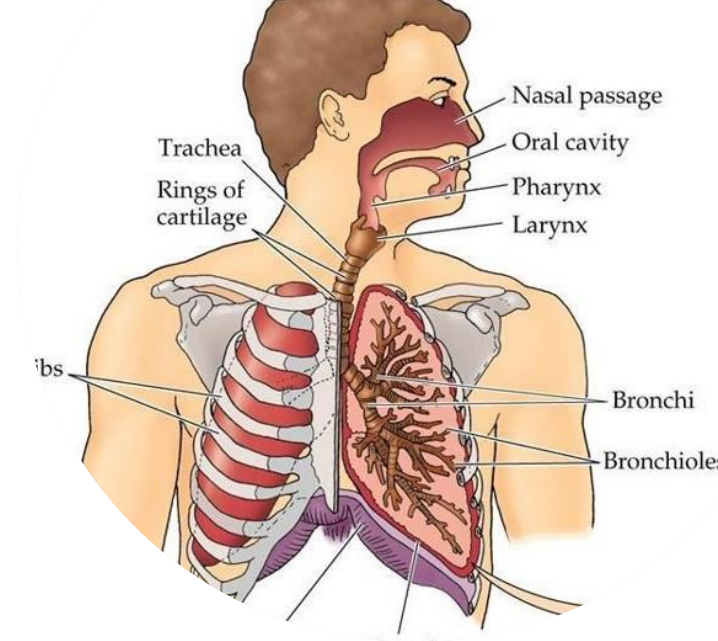
RESPIRATION

- The **erythrocytes** move around the blood stream carrying **oxygen** to the cells of the body.
- In cellular or **internal respiration**, the blood cells release the oxygen and pick up the waste carbon dioxide to return to the lungs for external exhalation.
- Around **one-sixth** (1/6) of the air in the lungs is exchanged for new air with every breath.
- Within the **brain**, the respiratory center controls the process of respiration.
- The upper respiratory tract, which includes the **nose, pharynx, larynx** and **trachea**, is the passageway for oxygen and carbon dioxide during inhalation and exhalation.
- The actual gas exchange process takes place in the lower respiratory tract, consisting of the **bronchi, lungs** and **alveolar sacs**.



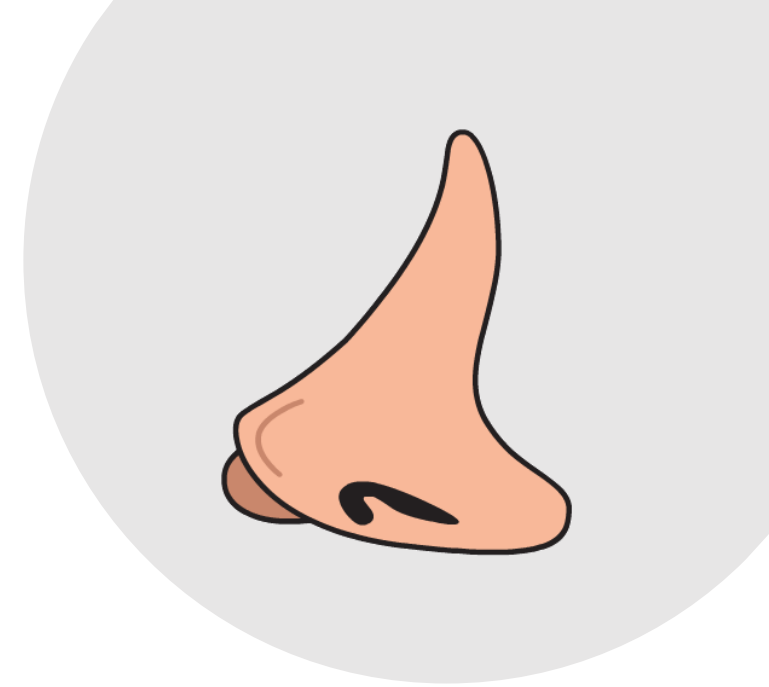
STRUCTURES

- Oxygen enters the respiratory system through the mouth and the nose and then passes through the larynx and the trachea.
- The **larynx** is responsible for the production of sound and protection of the upper part of the trachea.
- The larynx is located just below the part of the **pharynx** which splits into the **trachea** (which carries air to the lower respiratory tract) and the **esophagus** (which carries food to the digestive tract).
- A flap of cartilage known as the **epiglottis** closes over the glottal folds of the larynx during the process of swallowing, preventing food from entering the trachea, causing choking.
- The folds of vocal cords in the larynx are funnel-shaped and have cartilaginous walls and advanced muscle system that allows us to produce various different sounds.
- The **upper respiratory tract** has an important function in moistening and warming air before it reaches the lungs.



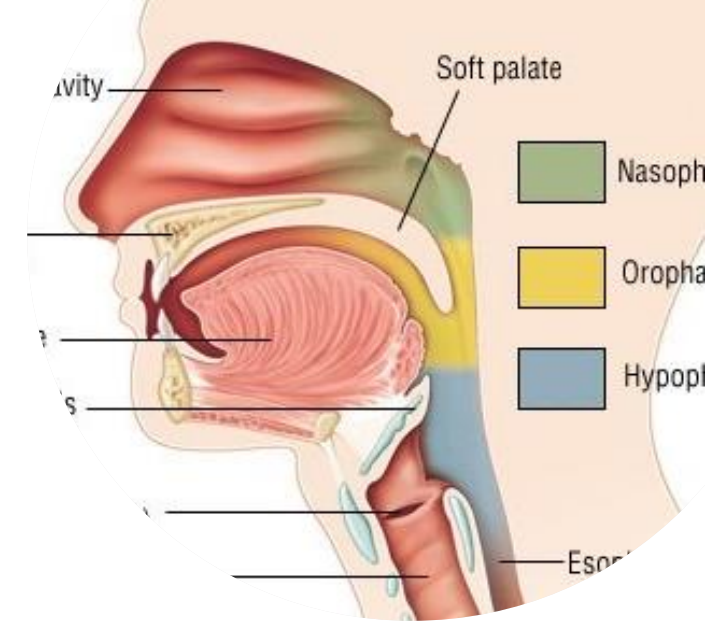
NOSE

- The nose is responsible for the process of **olfaction** or the sense of smell.
- In addition, it filters the air that is inhaled through it, removing dust, pathogens and irritants by trapping them in the cilia or soft hairs on the inside of the nostrils.
- It also helps to warm and moisten the air to prevent the remainder of the respiratory tract from drying out.
- Sneezing is usually caused by foreign particles irritating the nasal mucosa.



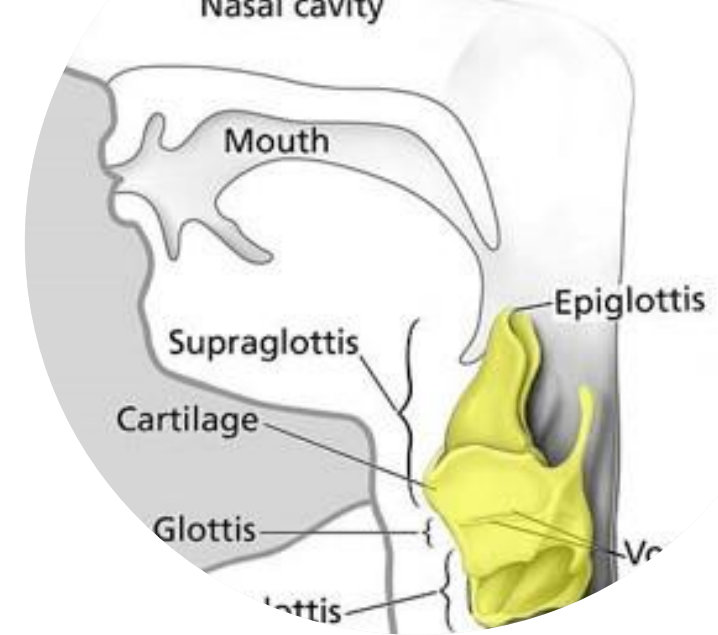
PHARYNX

- The pharynx is divided into three parts known as the **nasopharynx**, **oropharynx** and **laryngopharynx**.
- The nasopharynx lies behind the nose and above the soft palate.
- The mouth leads into the oropharynx.
- The walls of the oropharynx are lined with mucous membrane that has adapted to handling food as well as air.
- It is here that the two types of tonsils are located.
- The human palatine tonsils and the nasopharyngeal tonsils are both made up of lymphoepithelial tissues and are believed to have a role in defending the body against inhaled or swallowed pathogens.
- The laryngopharynx is the common pathway for both air and food and connects to the esophagus.



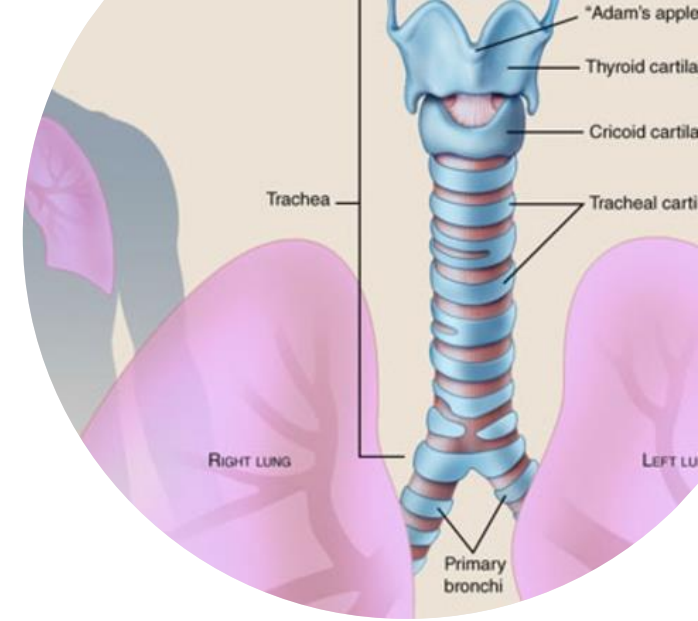
LARYNX

- The larynx contains the **vocal cords** and the **epiglottis** (which acts to protect the trachea from inhaled and swallowed foreign objects and particles).
- The larynx also includes rings of cartilage called **thyroid, arytenoid** and **cricoid** cartilage.
- The laryngeal prominence of the thyroid cartilage is more prominent in males.
- It is commonly called the **Adam's apple**.



TRACHEA

- The trachea in an adult is approximately 10 cm in length and 2.5 cm in diameter.
- It is made up of C-shaped cartilage linked by ligaments extending from the larynx to the bronchi at approximately the level of the 4th or 5th thoracic vertebrae.



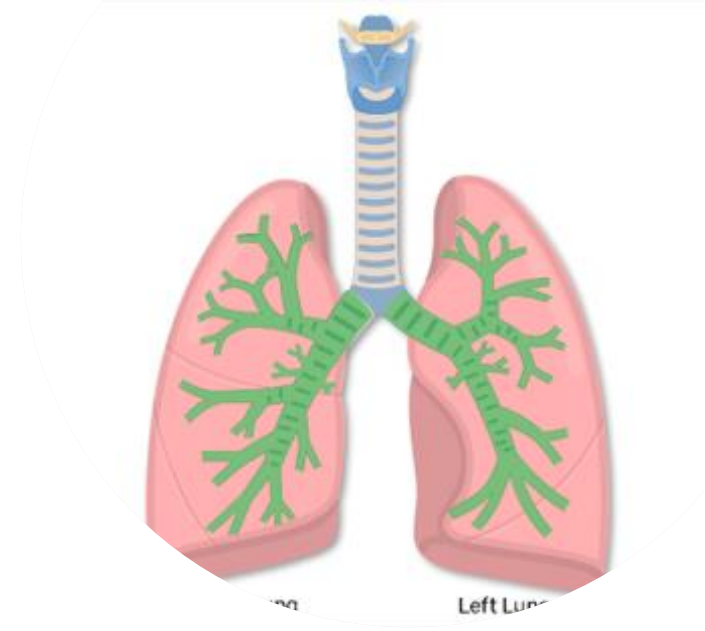
LUNGS

- The lungs take up most of the thoracic cavity and are protected by **12 ribs** on either side of the cavity.
- Although they are similar in appearance, the lungs are not identical.
- Both are separated into **lobes** with **three lobes** in the right lung and **two lobes** in the left.
- The reason for the left lung having two and not three lobes is so that there is sufficient space in the left of the thoracic cavity for the heart.
- The thoracic cavity includes the mediastinum and pleural cavity.
- The heart and major vessels are in the mediastinum.
- On either side of the mediastinum is the specific part of the thoracic cavity where the lungs are located, known as the **pleural cavity**.
- There is a membrane that covers the thoracic cavity known as the **pleura**.
- A small amount of fluid normally fills the gap between the parietal and visceral pleural layers.
- This fluid lubricates the surface of the layers to prevent friction when the lungs move within the thoracic cavity.



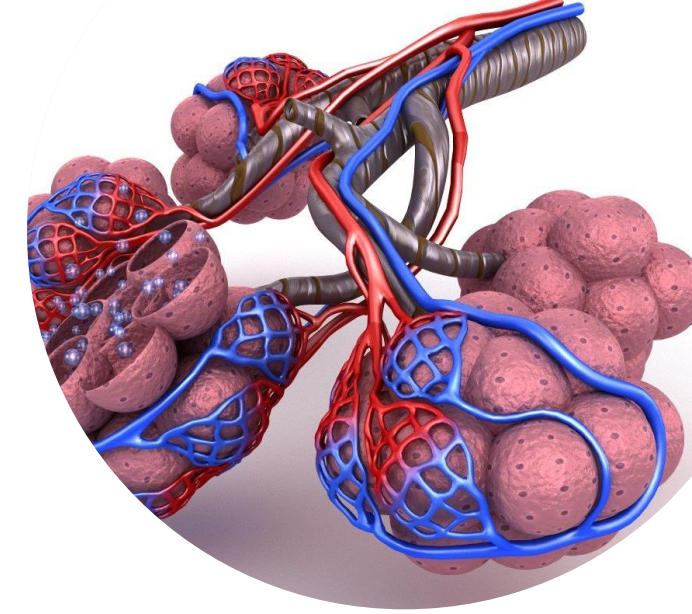
BRONCHI

- The trachea splits into two similarly structured tubes, known as the right and left **bronchi**, at a position known as the **carina**.
- The bronchi are made up of rings of **hyaline** membrane which become irregular and become smaller until the tubes are approximately 1 mm in diameter, when the cartilage disappears.
- Smooth muscle covers the length of the bronchi.
- This muscle becomes thicker when the hyaline membrane stops at the level of the **bronchioles**.
- The bronchioles branch into smaller and smaller passageways until they terminate in tiny air sacs called **alveoli**.



ALVEOLI

- The alveoli are the final branches of the respiratory tract and act as the **primary gas exchange** units of the lungs.
- They are shaped like bunches of grapes.

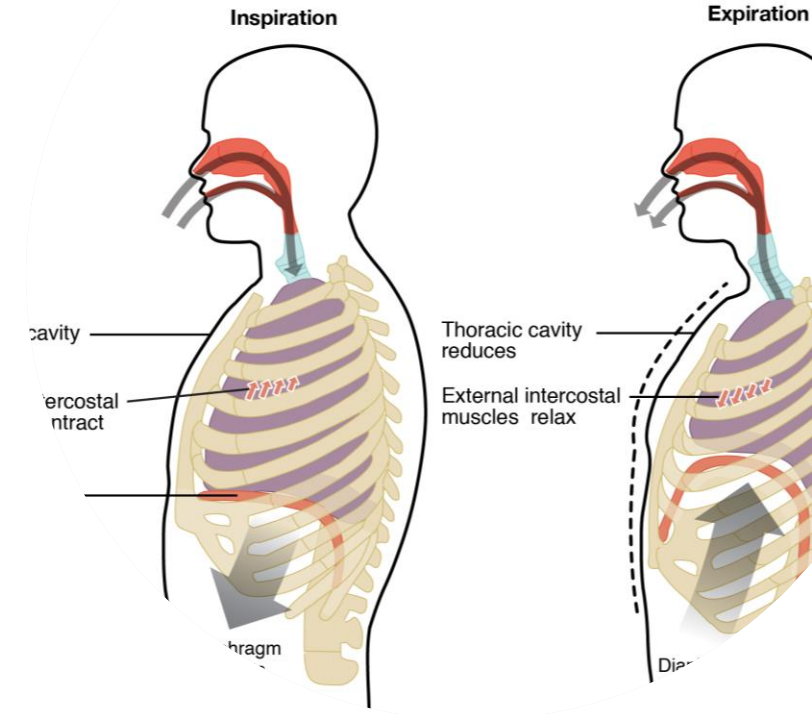




PHYSIOLOGY

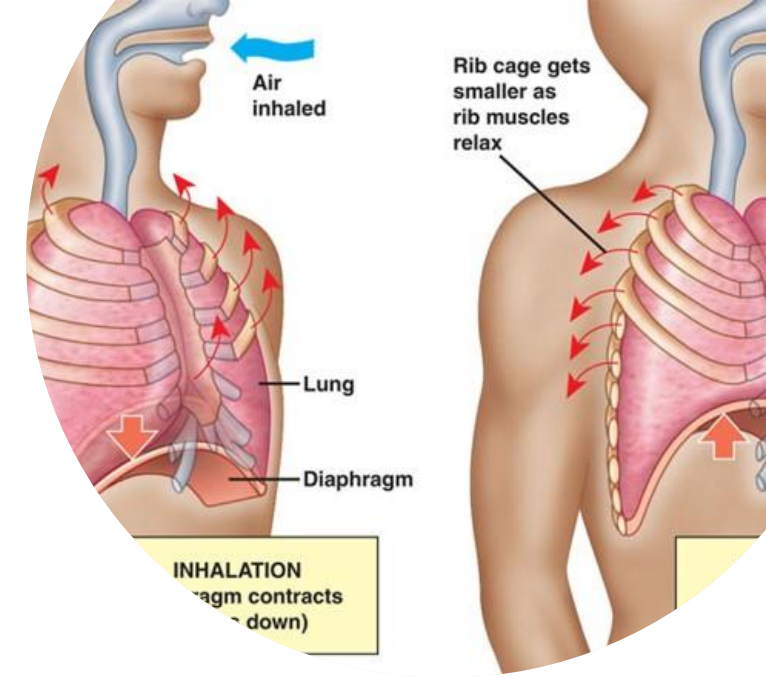
EVENTS OF RESPIRATION

- The major function of the respiratory system is to supply the body with **oxygen** and to dispose of **carbon dioxide**.
- To do this, four distinct events, collectively called **respiration**, must occur:
 - **Pulmonary ventilation**. Air must move into and out of the lungs so that the gases in the alveoli of the lungs are continuously refreshed. This process of pulmonary ventilation is commonly called **breathing**.
 - **External respiration**. **Gas exchange** (oxygen loading and carbon dioxide unloading) between the pulmonary *blood and alveoli* must take place. Remember that in external respiration, gas exchanges are being made between the blood and the body exterior.
 - **Respiratory gas transport**. Oxygen and carbon dioxide must be transported to and from the lungs and tissue cells of the body via the bloodstream.
 - **Internal respiration**. At systemic capillaries, gas exchange occurs between the *blood and cells* inside the body.



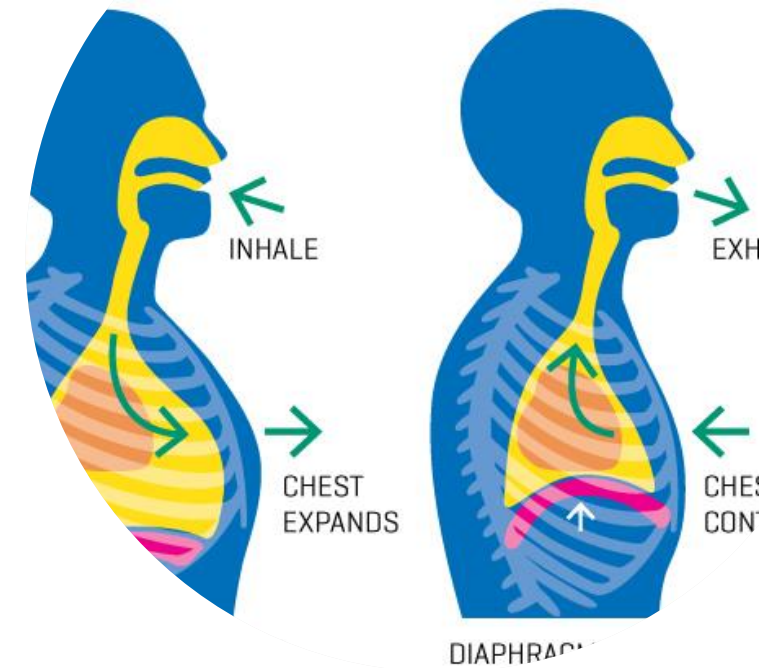
MECHANICS OF BREATHING

- **Breathing**, or pulmonary ventilation, is a mechanical process that depends on volume changes occurring in the thoracic cavity.
- Keep this rule in mind about the mechanics of breathing: **Volume** changes lead to **pressure** changes, which lead to the flow of gases to equalize the pressure.
- **Gas** always conforms to the shape of its container, however, unlike a liquid, a gas fills its container.
- Therefore, in a large volume, the gas molecules will be far apart, and the pressure (created by the gas molecules hitting each other and the walls of the container) will be low.
- Assuming the amount of gas remains constant, if the volume is reduced, the gas molecules will be closer together, and the pressure will rise.



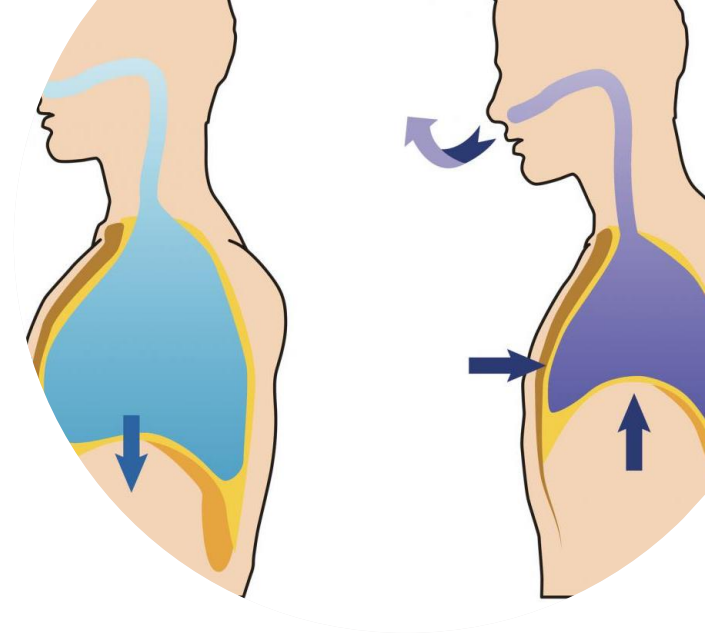
INSPIRATION

- When the inspiratory muscles, the **diaphragm** and **external intercostals**, contract, the size of the thoracic cavity increases.
- As the dome-shaped diaphragm contracts inferiorly, the superior-inferior dimension (height) of the thoracic cavity increases.
- Contraction of the external intercostals lifts the rib cage and thrusts the sternum forward, which increases the antero-posterior and lateral dimensions of the thorax.
- The lungs adhere tightly to the thorax walls (because of the surface tension of the fluid between the pleural membranes), so they are stretched to the new, larger size of the thorax.
- As **intrapulmonary volume** (the volume within the lungs) increases, the gases within the lungs spread out to fill the larger space.
- The resulting decrease in gas pressure in the lungs produces a partial vacuum (pressure less than atmospheric pressure outside the body), which causes air to flow into the lungs.
- Air continues to move into the lungs until the intrapulmonary pressure equals atmospheric pressure.
- This series of events is called **inspiration** (inhalation).



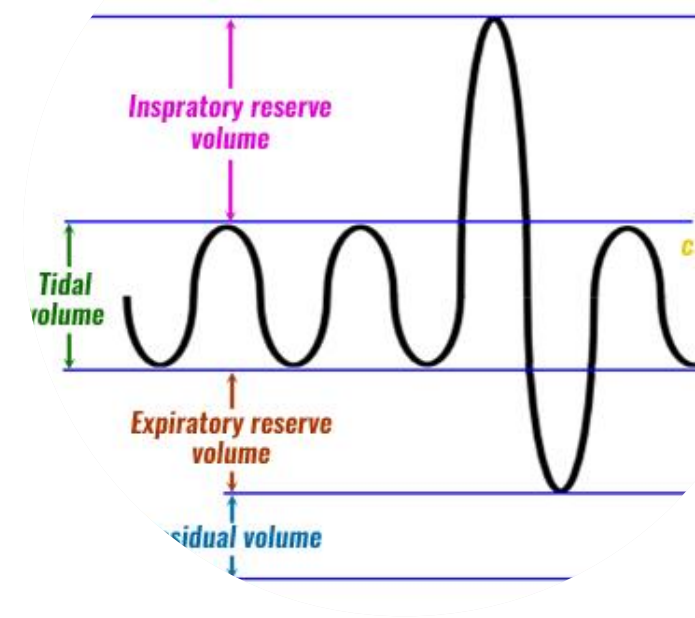
EXPIRATION

- **Expiration** (exhalation) in healthy people is largely a passive process that depends more on the natural elasticity of the lungs than on muscle contraction.
- As the inspiratory muscles relax and resume their initial resting length, the rib cage descends, the diaphragm relaxes superiorly, and the lungs recoil.
- Thus, both the thoracic and intrapulmonary volumes decrease.
- As the intrapulmonary volume decreases, the gases inside the lungs are forced more closely together, and the intrapulmonary pressure rises to a point higher than atmospheric pressure.
- This causes the gases to passively flow out to equalize the pressure with the outside.
- However, if the respiratory passageways are narrowed by spasms of the bronchioles (as in asthma) or clogged with mucus or fluid (as in chronic bronchitis or pneumonia), **expiration** becomes an **active process**.
- In such cases of forced expiration, the internal intercostal muscles are activated to help depress the rib cage, and the abdominal muscles contract and help to force air from the lungs by squeezing the abdominal organs upward against the diaphragm.



RESPIRATORY VOLUMES

- Many factors affect **respiratory capacity**, for example, a person's size, sex, age, and physical condition.
- Normal quiet breathing moves approximately **500 ml** of air into and out of the lungs with each breath.
- This respiratory volume is referred to as the **tidal volume** (TV).
- As a rule, a person is capable of inhaling much more air than is taken in during a tidal breath.
- The amount of air that can be taken in forcibly above the tidal volume is the **inspiratory reserve volume** (IRV), which is around 3,100 ml.
- Similarly, after a normal expiration, more air can be exhaled.
- The amount of air that can be forcibly exhaled beyond tidal expiration, the **expiratory reserve volume** (ERV), is approximately 1,200 ml.
- Even after the most strenuous expiration, about 1,200 ml of air remains in the lungs and cannot voluntarily be expelled.
- This is the **residual volume**, and it is important because it allows gas exchange to go on continuously even between breaths and helps to keep the alveoli open (inflated).
- The total amount of exchangeable air (around 4,800 ml in healthy young men and 3,100 ml in healthy young women) is the **vital capacity** (VC), and it is the sum of:
 - **Tidal Volume + Inspiratory Reserve Volume + Expiratory Reserve Volume.**



RESPIRATORY CAPACITIES

- Respiratory capacities are measured with a **spirometer**.
- As a person breathes, the volumes of air exhaled can be read on an indicator, which shows the changes in air volume inside the apparatus.
- Spirometer testing is useful for evaluating losses in respiratory functioning and in following the course of some respiratory diseases.
- In pneumonia, for example, inspiration is obstructed, and the IRV and VC decrease.
- In emphysema, where expiration is obstructed, the ERV is much lower than normal, and the residual volume is higher.



NONRESPIRATORY AIR MOVEMENTS

- Many situations other than breathing move air into or out of the lungs and may modify the **normal respiratory rhythm**.
- Coughs and sneezes clear the air passages of debris or collected mucus.
- Laughing and crying reflect our emotions.
- For the most part, these non-respiratory air movements are a result of reflex activity, but some may be produced voluntarily.



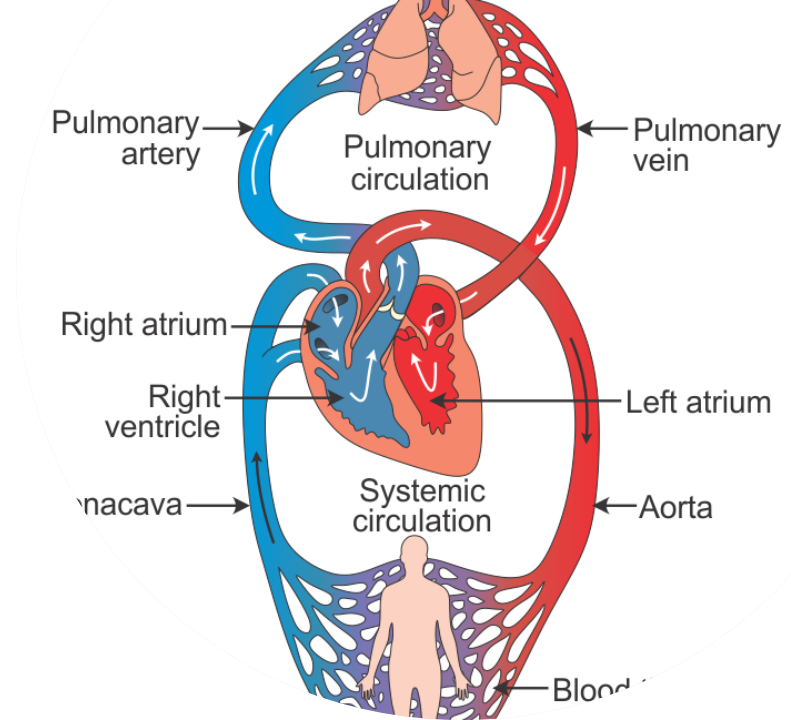
RESPIRATORY SOUND

- As air flows into and out of the respiratory tree, it produces two recognizable sounds that can be picked up with a stethoscope.
 - **Bronchial sounds** are produced by air rushing through the large respiratory passageways (trachea and bronchi).
 - **Vesicular breathing** sounds occur as air fills the alveoli. The vesicular sounds are soft murmurs that resemble a muffled breeze.



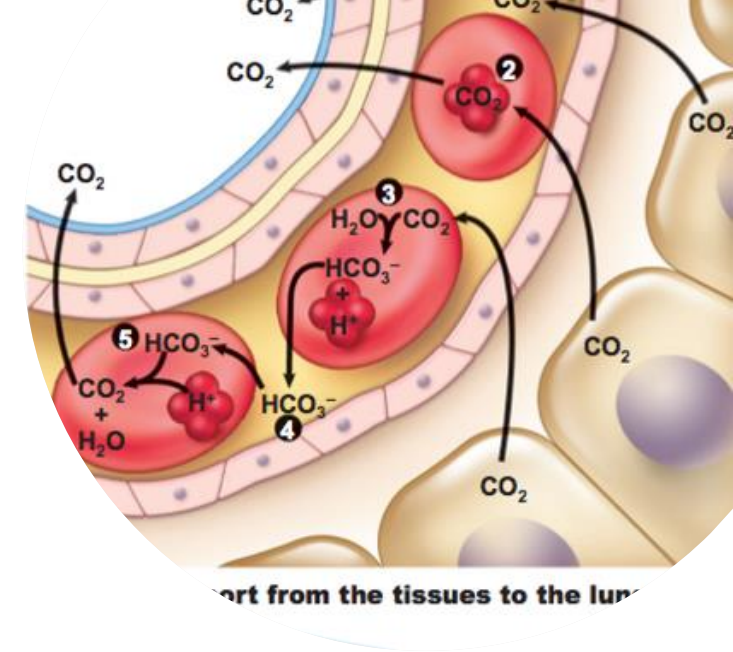
EXTERNAL AND INTERNAL RESPIRATION

- As explained earlier, external respiration is the actual exchange of gases between the alveoli and the blood (pulmonary gas exchange), and internal respiration is the gas exchange process that occurs between the blood and the tissue cells (systemic capillary gas exchange).
- Keep in mind that all gas exchanges obey the laws of diffusion; that is, movement occurs toward the area of lower concentration of the diffusing substance.



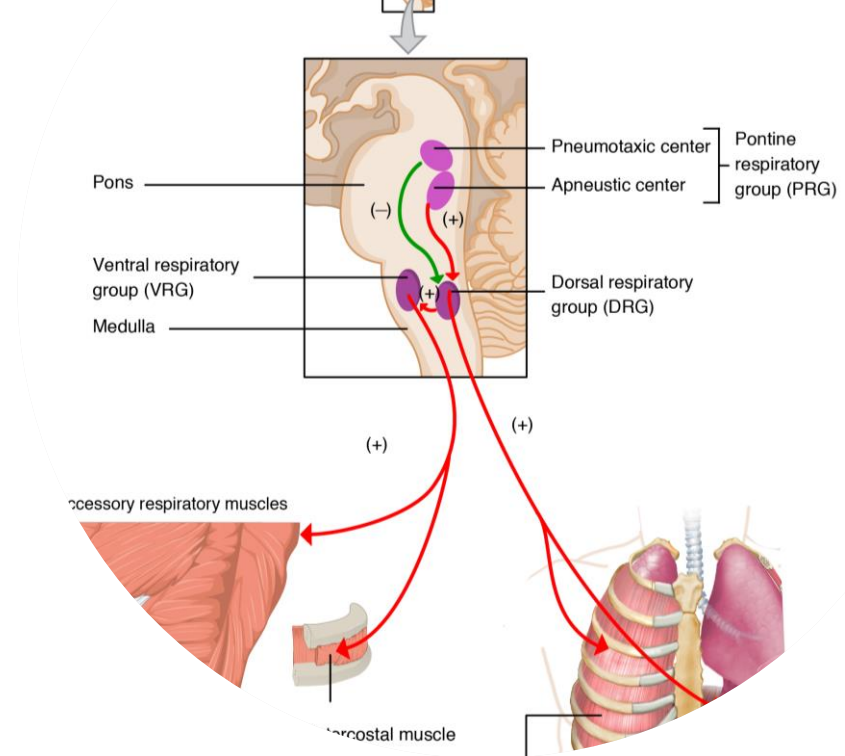
GAS TRANSPORT IN THE BLOOD

- Oxygen is transported in the blood in two ways.
 - Most attaches to hemoglobin molecules inside the red blood cells (RBCs) to form oxyhemoglobin (HbO₂).
 - A very small amount of oxygen is carried dissolved in the plasma.
- Carbon dioxide is twenty times more soluble in plasma compared to oxygen.
- As a result, most carbon dioxide is transported in plasma as bicarbonate ion (HCO₃⁻), which plays a very important role in buffering blood pH.
- Carbon dioxide is enzymatically converted to bicarbonate ion within red blood cells; then the newly formed bicarbonate ions diffuse into the plasma.



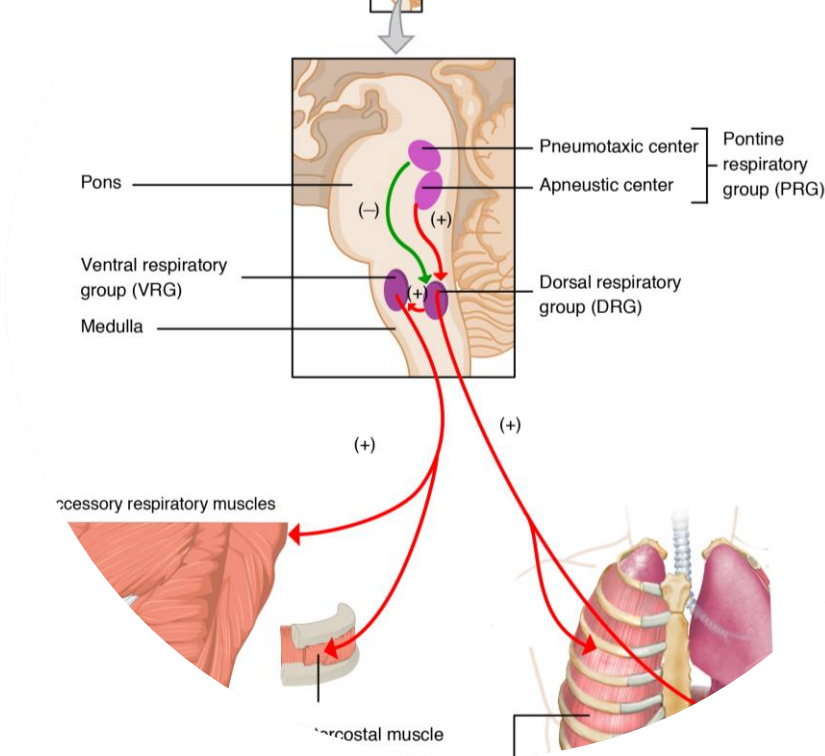
CONTROL OF RESPIRATION

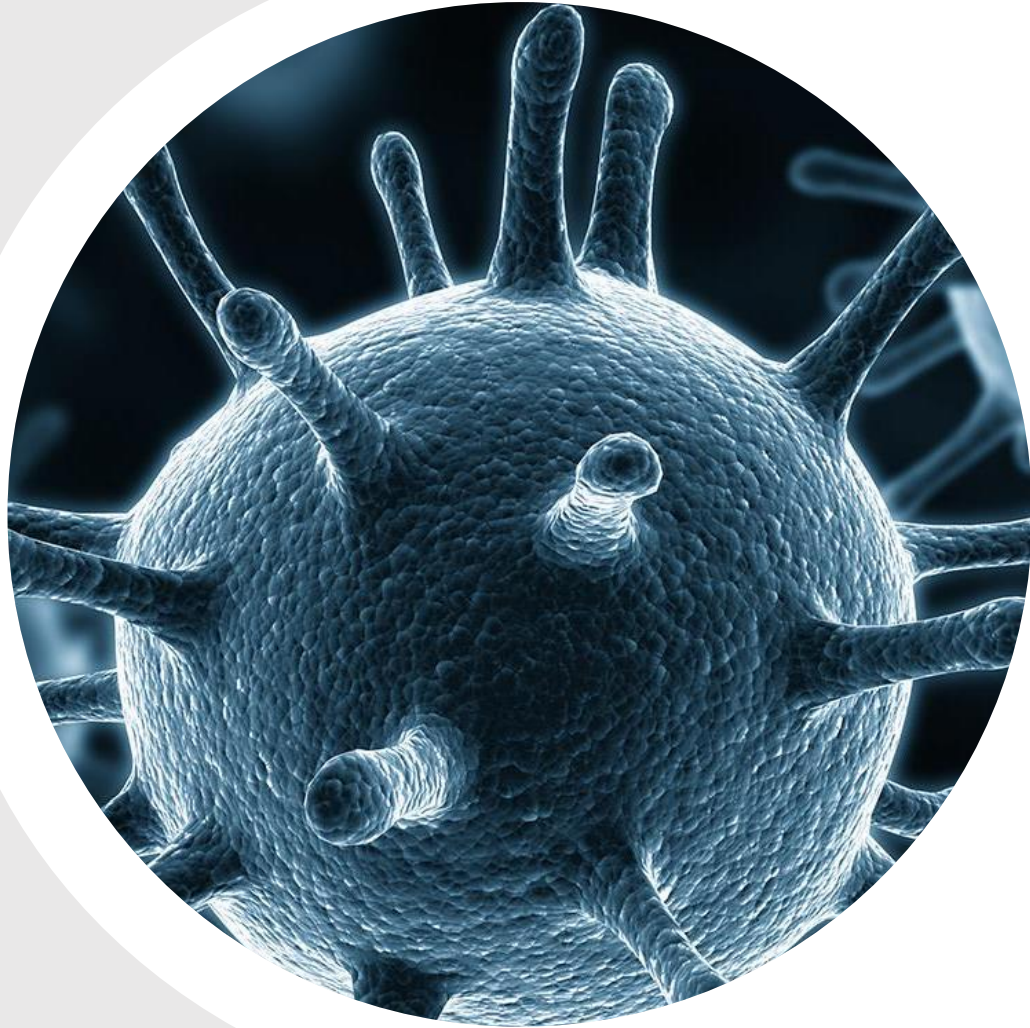
- **Neural Regulation: Setting the Basic Rhythm**
- The activity of the respiratory muscles, the diaphragm and external intercostals, is regulated by nerve impulses transmitted from the brain by the **phrenic nerves** and **intercostal nerves**.
- Neural centers that control respiratory rhythm and depth are located mainly in the **medulla** and **pons**.
- The **medulla** contains the **ventral respiratory group (VRG)**, with both inspiratory and expiratory neurons that alternately send impulses to control the rhythm of breathing.
- The **inspiratory neurons** stimulate the diaphragm and external intercostal muscles via the phrenic and intercostal nerves, respectively, during quiet breathing.
- Impulses from the **expiratory neurons** stop the stimulation of the diaphragm and external intercostal muscles, allowing passive exhalation to occur.
- Impulses from the **VRG** maintain a normal quiet breathing rate of 12 to 15 respiration/minute, a rate called **eupnea**
- The **pons** respiratory centers, which also communicate with the VRG, help to smooth the transitions (modify timing) between inhalation and exhalation during activities such as singing, sleeping or exercising.



CONTROL OF RESPIRATION

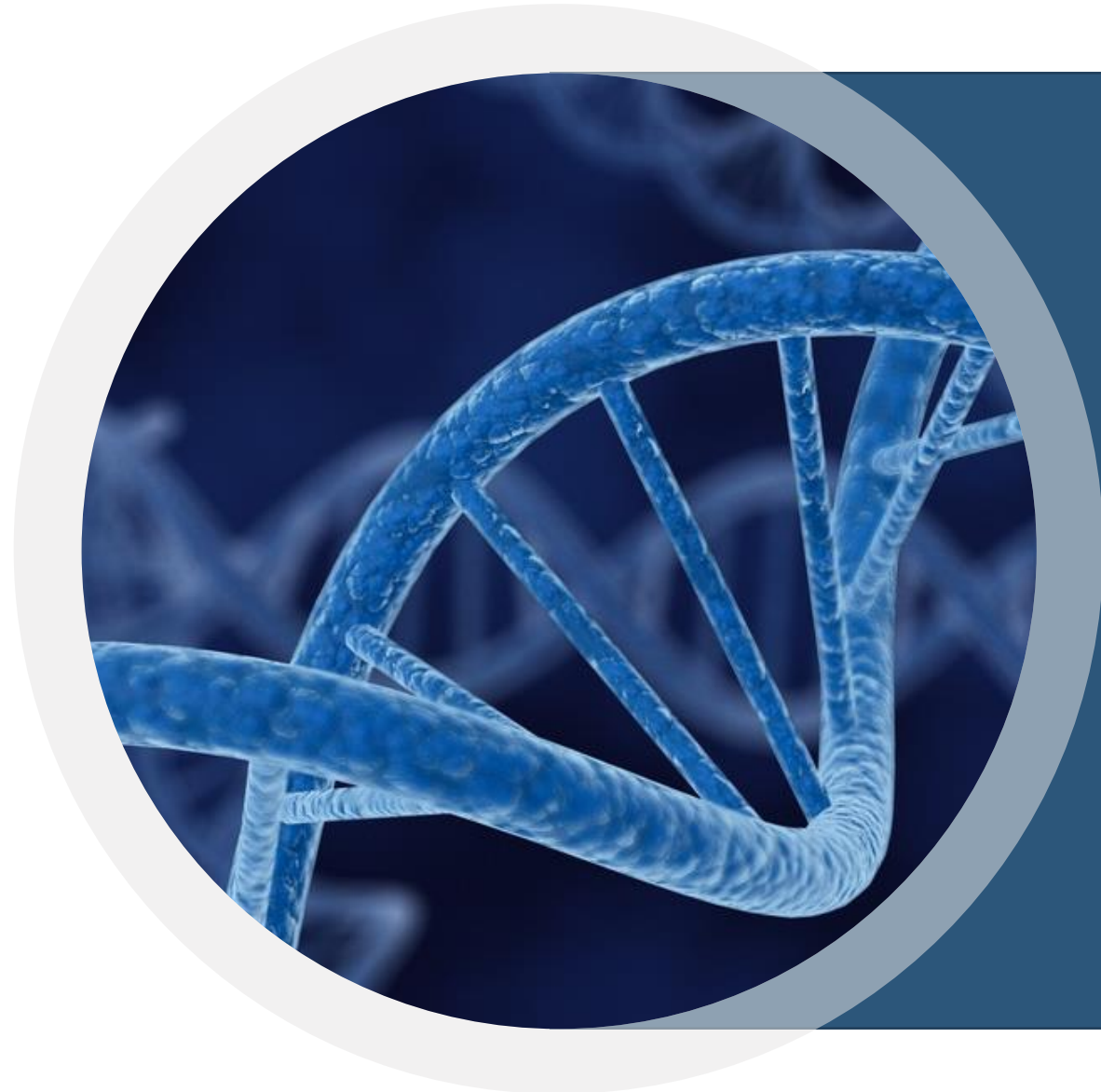
- The bronchioles and alveoli have stretch receptors that respond to extreme **overinflation** (which might damage the lungs) by initiating protective reflexes.
- In the case of overinflation, the **vagus nerves** send impulses from the stretch receptors to the medulla; soon thereafter, inspiration **ends** and expiration **occurs**.
- This is one example of **dorsal respiratory group (DRG)** integration during respiratory control.
- During exercise, we breathe more forcibly and deeply because the brain centers send more impulses to the respiratory muscles.
- This respiratory pattern is called **hyperpnea**.
- After strenuous exercise, expiration becomes active, and the abdominal muscles and any other muscles capable of depressing the ribs are used to aid expiration.





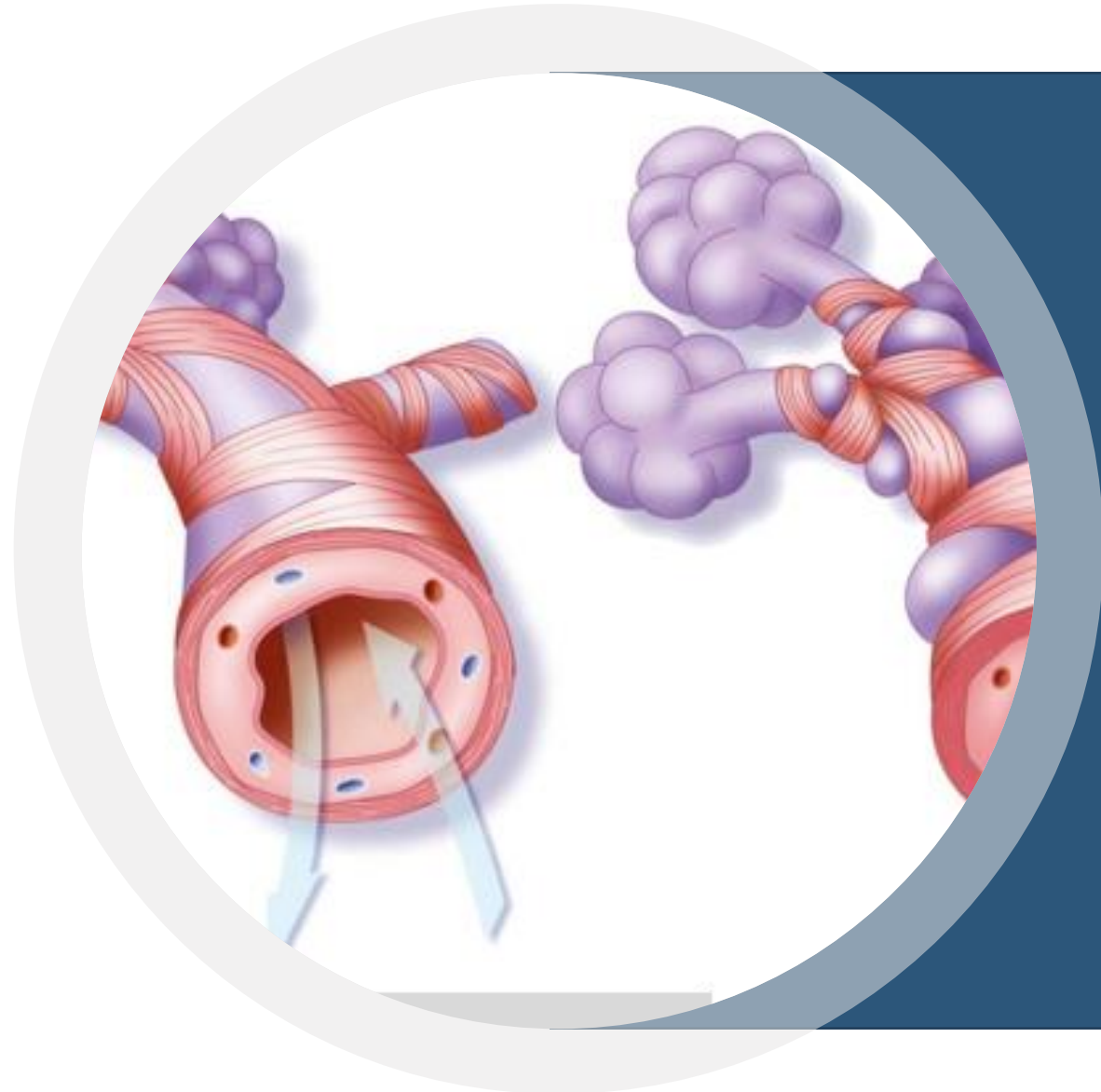
PATHOLOGY & DISEASES

Check page [204-209](#) from the book
“*Mastering Medical Terminology*”
for the complete list of pathology
and diseases



ASTHMA

- Asthma is a chronic inflammatory condition of the airways characterized by airway obstruction.
- Asthma causes **bronchoconstriction, shortness of breath, wheezing, chest tightness, increased mucus production and coughing**.
- Asthma symptoms can be triggered by inhaling allergens such as: animal dander, dust mites, mould spores, pollens, certain chemicals and tobacco smoke.
- Other factors such as cold weather, exercise, stressful situations and respiratory infections can trigger an attack of asthma.
- During an asthma attack a person may experience cyanosis, tachycardia, difficulty breathing and severe anxiety.
- Patients should try to avoid exposure to allergens or factors that can trigger an attack.
- There are two types of treatment for asthma: **drugs** such as corticosteroids to prevent an attack and **quick-relief drugs** such as bronchodilators for use during an attack.
- The complications of poorly controlled and/or inadequately treated asthma can be severe.
- Patients may experience a persistent cough, inability to exercise or perform activities of daily living, permanent lung damage and even death.



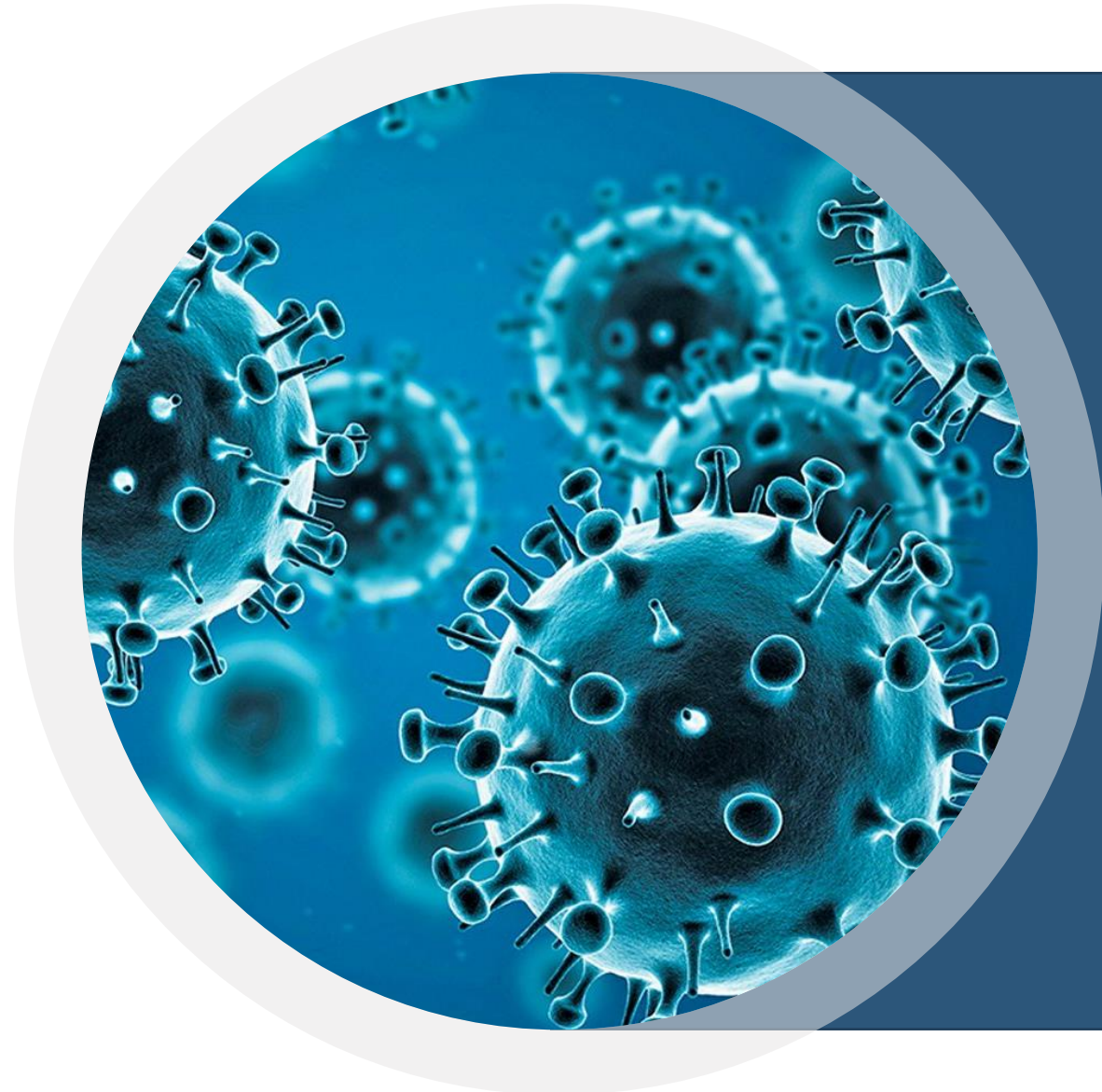
BRONCHITIS

- Bronchitis is an **inflammation** of the bronchi.
- There are two main types of bronchitis: **acute** and **chronic**.
- Acute bronchitis is caused by a **bacterial** infection or, more commonly, a **viral** infection.
- Exposure to tobacco smoke, air pollution, dust and fumes can also cause acute bronchitis.
- Symptoms include a productive cough, shortness of breath, wheezing, and chest tightness due to obstruction of the bronchi.
- Acute bronchitis is usually self-limiting with most people recovering within a few days.
- Treatments such as rest, fluids and a bronchodilator can help relieve symptoms.
- **Antibiotics** are only effective for **bacterial** infections.
- Chronic bronchitis is the chronic inflammation of the bronchi.
- It is defined as a persistent productive cough that occurs for at least three months per year for 2 consecutive years.
- It is one of the components of chronic obstructive pulmonary disease (COPD).
- Symptoms, treatment and prognosis are the same as for COPD (*Chronic Obstructive Pulmonary Disease*).



INFLUENZA

- Influenza, commonly known as “**the flu**”, is a contagious (kən'tājəs) **viral** infection of the respiratory tract.
- It is passed from person to person by droplets produced by sneezing or coughing.
- Influenza tends to occur mostly in the colder months.
- Symptoms include a high fever, myalgia, headache and severe malaise.
- Some patients will have a non-productive cough, pharyngitis and rhinitis.
- Influenza tends to be self-limiting with most patients recovering within 1 to 2 weeks without medical treatment.
- In susceptible people such as babies, the elderly or those with underlying medical conditions, complications such as pneumonia and even death can occur.
- Each year, different strains of influenza appear.
- Vaccinations are developed for each strain.



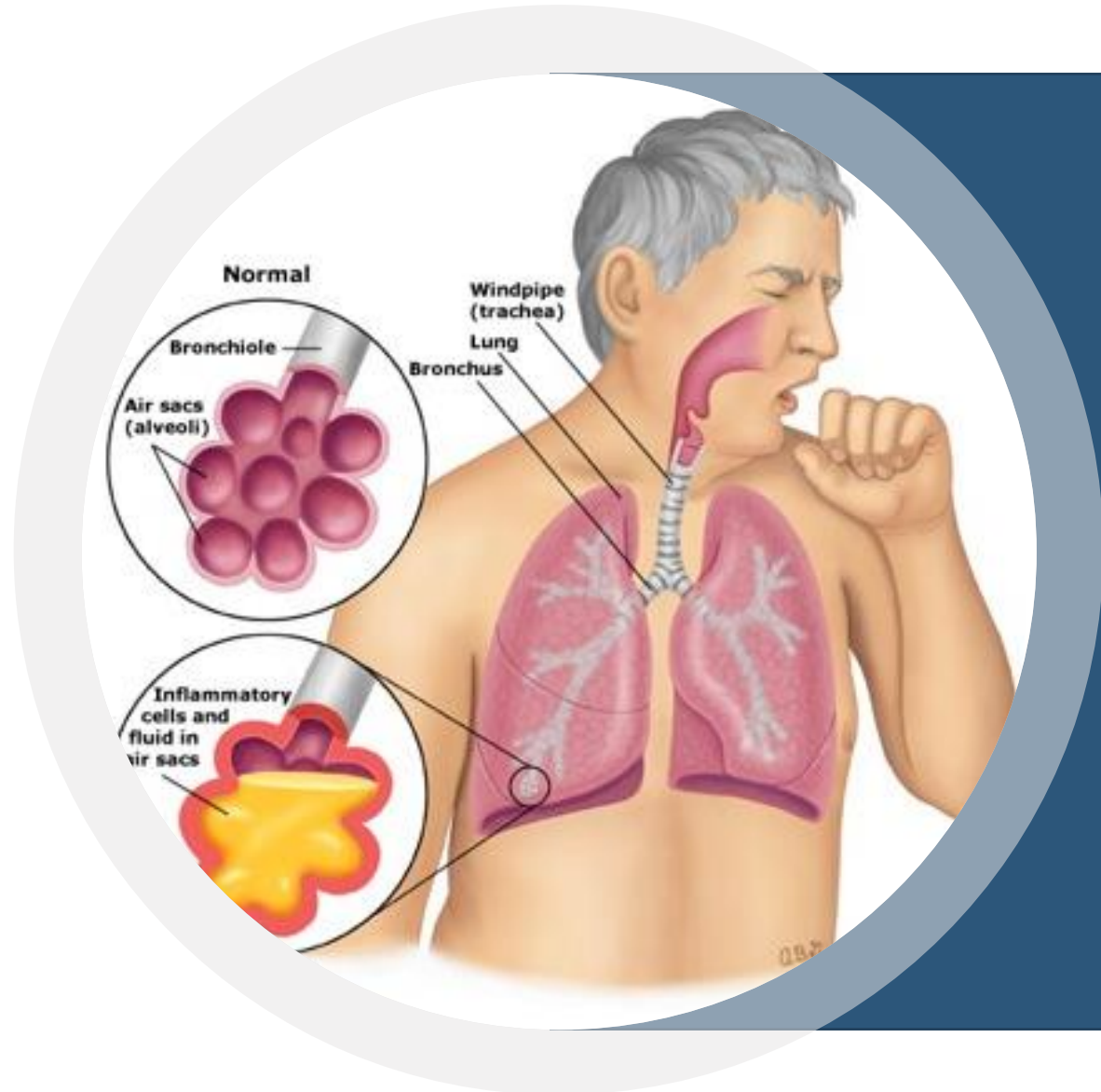
LUNG CANCER

- Lung cancer is also called bronchogenic carcinoma.
- It is a common cancer in both males and females in Australia.
- There are four main histological types: **small cell carcinoma** (20% of all lung cancers) is the most aggressive and rapidly growing of all lung cancers.
- **Squamous cell carcinoma** (50%), **adenocarcinoma** (20%) and **large cell anaplastic carcinoma** (10%) are the other main types.
- Tobacco smoking is the most common cause of lung cancer, particularly small cell carcinoma, but other factors such as inhalation of other irritants such as asbestos or the presence of other lung diseases such as COPD or tuberculosis also contribute to the incidence of this disease.
- Signs and symptoms include a persistent cough, haemoptysis, dyspnoea and weight loss.
- Diagnosis is normally by chest x-ray, CT scan, MRI, bronchoscopy, sputum culture and lung biopsy.



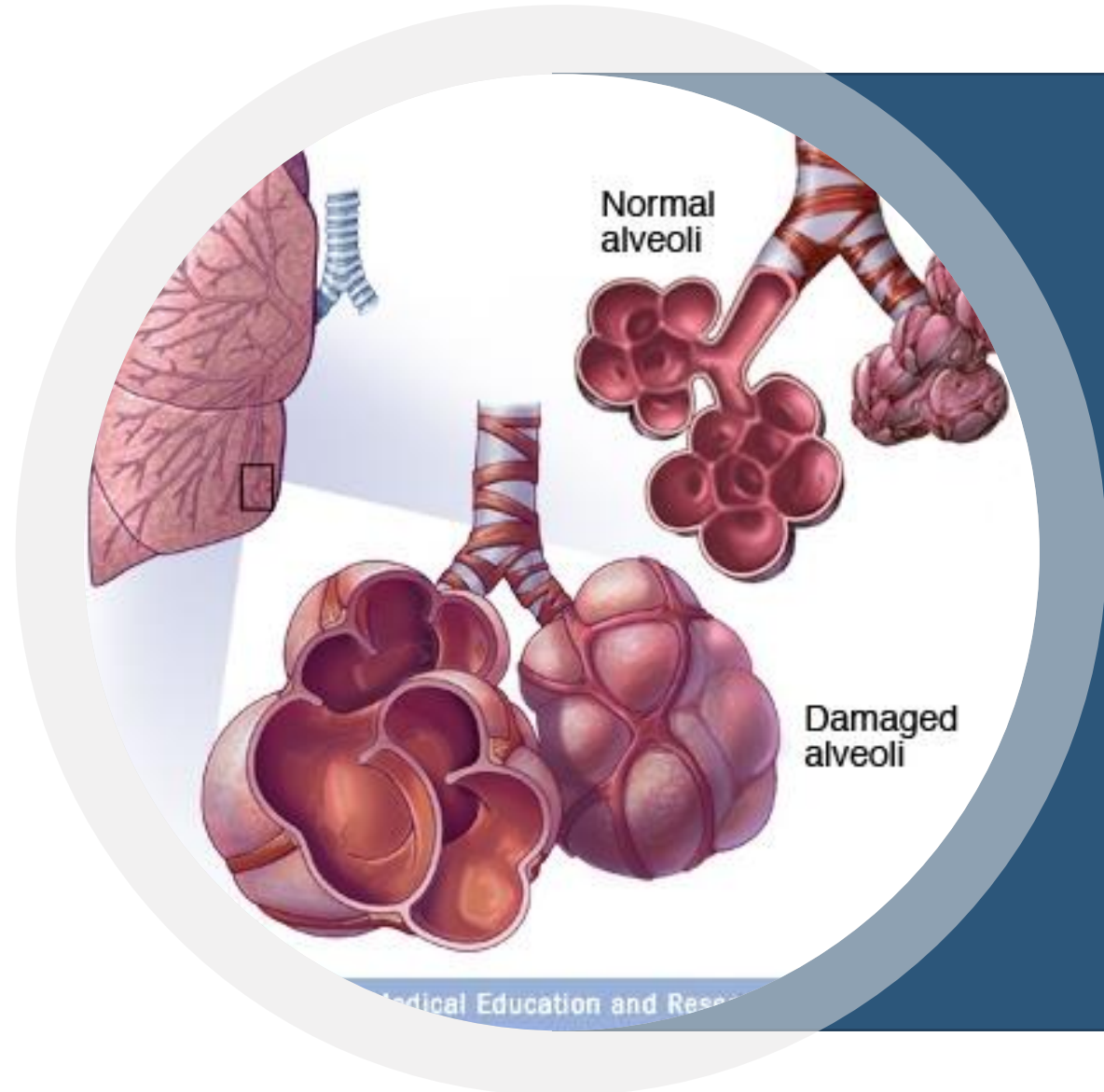
PNEUMONIA

- Pneumonia is an acute inflammation of the lungs affecting one or both sides of the chest, often occurring as a result of an infection.
- The infection can be caused by several different microorganisms such as **bacteria** (pneumococci, staphylococci), **viruses** (such as respiratory syncytial virus), **fungi** (such as histoplasmosis) and **parasites** or by the inhalation of chemicals, smoke or dust.
- **Aspiration pneumonia** is caused by foreign matter such as food stuffs or vomitus entering the respiratory tract.
- **Lobar pneumonia** involves one or more entire lobes; bronchopneumonia involves patchy consolidation in the lung parenchyma.
- Diagnosis of pneumonia is by chest **x-ray** and **sputum culture**.
- Treatment includes **antibiotics**, **oxygen** and **physiotherapy**.



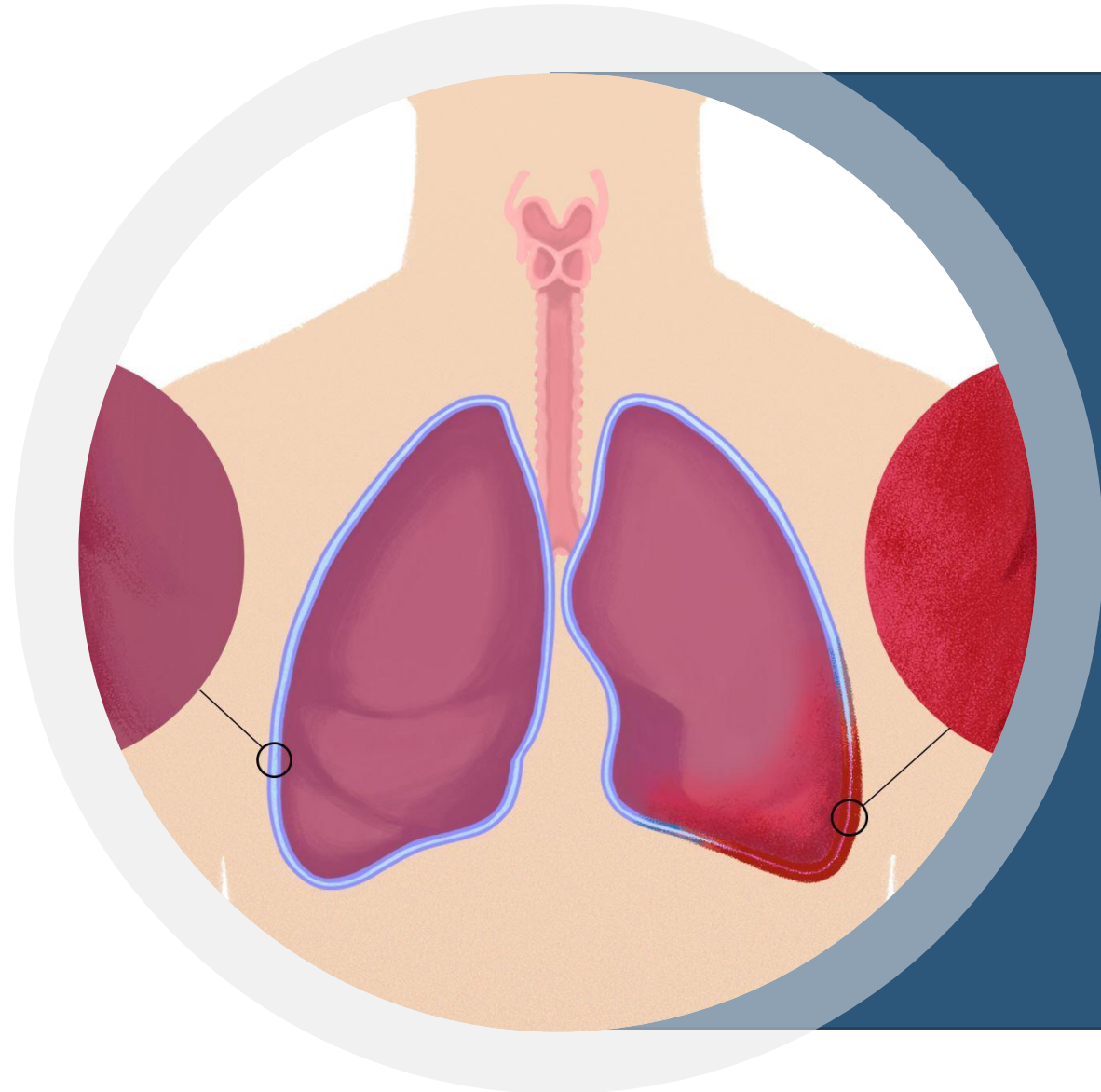
EMPHYSEMA

- The walls of some alveoli are destroyed, causing the remaining alveoli to be enlarged.
- In addition, chronic inflammation promotes fibrosis of the lungs
- As the lungs become less elastic, the airways collapse during expiration and obstruct outflow of air.
- As a result, these patients use an incredible amount of energy to exhale, and they are always exhausted.
- Because air is retained in the lungs, oxygen exchange is surprisingly efficient, and cyanosis does not usually appear until late in the disease.
- Consequently, emphysema sufferers are sometimes referred to as “**pink puffers.**”
- However, overinflation of the lungs leads to a permanently expanded barrel chest.



PLEURISY

- Pleurisy is inflammation of the pleurae, and it can be caused by insufficient secretion of pleural fluid.
- The pleural surfaces become dry and rough, resulting in friction and stabbing pain with each breath.
- Conversely, the pleurae may produce excessive amounts of fluid, which exerts pressure on the lungs.
- This type of pleurisy prevent breathing movements, but it is much less painful than the dry rubbing type.



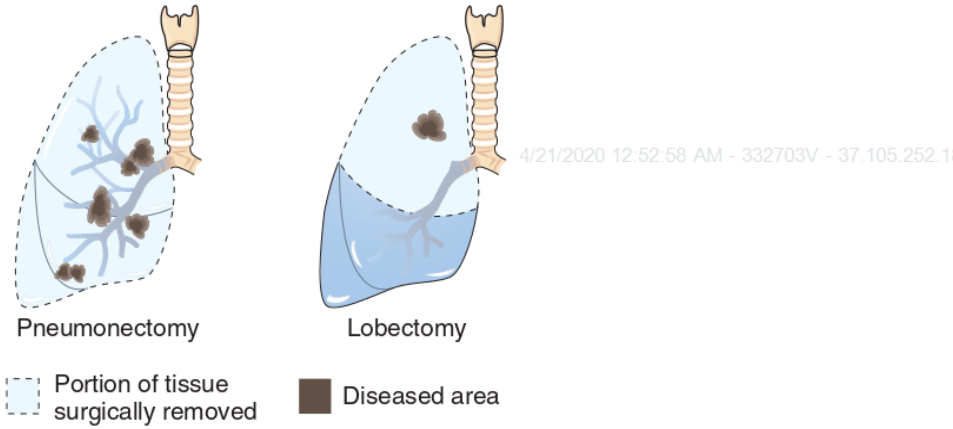


TESTS & PROCEDURES

Check page [209-213](#) from the book
“Mastering Medical Terminology”
for the complete list of tests and
procedures.



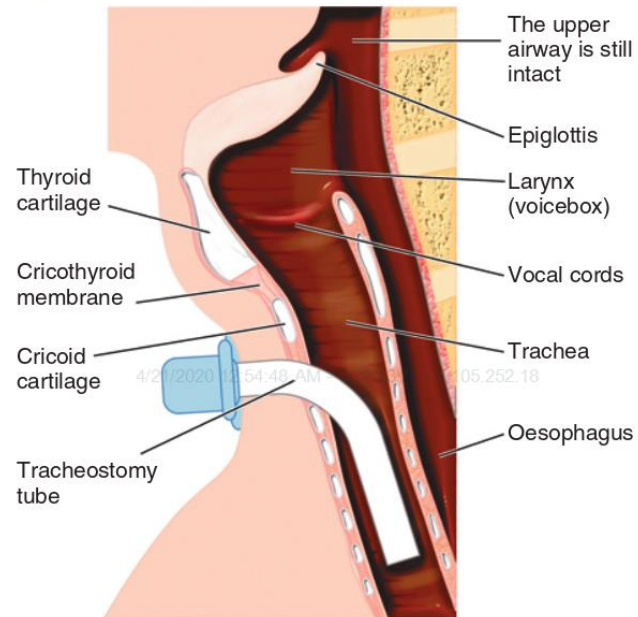
Test/procedure	Pronunciation	Definition
auscultation	os-kul-TAY-shun	Auscultation is the process of listening to the sounds within the body through the use of a stethoscope. It is used in the diagnosis of conditions of the respiratory, cardiovascular and digestive systems as well as assessing the fetus during pregnancy.
bronchoscopy	bron-KOS-kop-ee	Bronchoscopy is a procedure that allows for visual examination of the bronchi and for the sampling of tissue via biopsy. The bronchoscope (either rigid or flexible) is inserted into the bronchi via the throat, larynx and trachea.
chest x-ray	chest EKS-ray	A chest x-ray involves taking radiographic images of the thoracic cavity by passing small amounts of radioactive particles through the body and recording the resultant images on a computer or film. The two most common views of the thorax are taken in the coronal plane (images taken from the anterior-posterior view or posterior-anterior view) and those taken in the sagittal plane (taking a lateral view).
computed tomography (CT) of the chest	kom-PYOO-ted to-MOG-ra-fee	A CT is a diagnostic test to identify disorders of the thoracic structures. Cross-sectional images are taken using a digital computer in conjunction with x-ray beams.
continuous positive airway pressure (CPAP)	kon-TIN-yoo-us POZ-it-iv air-way PRESH-a	CPAP is a type of ventilation therapy that allows for the delivery of air into the airways through the use of a nasal mask or pillow to ensure that the airways remain open. CPAP is used to treat patients with breathing problems such as sleep apnoea or infants with respiratory distress syndrome or bronchopulmonary dysplasia.
tube thoracostomy	tyoob thor-a-KOS-tom-ee	A tube thoracostomy is a procedure that involves the insertion of an intercostal catheter into the pleural space following an incision into the chest wall. The tube acts as a mechanism for drainage of a pleural effusion.
tuberculin test	too-BERK-yoo-lin test	A tuberculin test is also known as a Mantoux test and is done to identify infection (either old or current) by tuberculosis. It is performed by injecting a tuberculin intradermally and measuring the skin response at 48 hours and 72 hours.
ventilation-perfusion (V/Q) scan	ven-til-AY-shun-per-FYOO-shun skan	A ventilation-perfusion scan is used to measure the flow of air (ventilation) and the flow of blood (perfusion) in to the lung by using inhaled and injected radioactive material. This form of scan is generally performed to identify blockages in the vessels, such as that caused by a pulmonary embolism.

Test/procedure	Pronunciation	Definition
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pneumonectomy	nyoo-mo-NEK-to-mee	<p>A pneumonectomy is a surgical procedure that involves the resection of a lung, which may also include removal of mediastinal nodes.</p> <p>Figure 10.9 Pneumonectomy and lobectomy (Shiland, 2006)</p>  <p>4/21/2020 12:52:58 AM - 332703V - 37.105.252.18</p>
positron emission tomography(PET)	POZ-i-tron e-MISH-en to-MOG-raf-ee	A PET scan is a non-invasive nuclear medicine imaging technique which produces three-dimensional images of the chest.
pulmonary angiography	PULL-mon-ah-ree an-jee-OG-raf-ee	Pulmonary angiography uses radio-opaque contrast material to record x-ray images of pulmonary circulation to identify obstructions or pathological conditions, including pulmonary emboli.

Test/procedure	Pronunciation	Definition
pulmonary function tests	PULL-mon-ah-ree FUNK-shun tests	Pulmonary function tests are a group of tests used to measure how well the lungs take in and release air, as well as how well they move gases such as oxygen from the atmosphere into the body's circulation. They are undertaken to diagnose certain types of lung disease such as asthma, bronchitis and emphysema; identify the cause of shortness of breath and measure whether contaminants have affected lung function.
thoracocentesis	thor-a-koh-sen- TEE-sis	A thoracocentesis is a surgical procedure which involves the removal of fluid from the pleural cavity following incision. It can be performed as a method of diagnosis or to drain fluid from a pleural effusion.
thoracoscopy	thor-a-KOS- kop-ee	A thoracoscopy is a procedure that allows for the visual examination of the pleural and thoracic cavities via a thoracoscope. It is used to obtain biopsies or for the resection of lesions.
thoracotomy	thor-a-KOT- om-ee	A thoracotomy is a surgical procedure involving an incision into the chest to allow for access to the thoracic organs. It is the method of entry for procedures such as lung resections.
tracheostomy	trak-ee-OS- tom-ee	A tracheostomy involves making an incision into the trachea to allow for the insertion of a tube to create an artificial airway. ^{703V - 37-105.252.18}

Figure 10.10 Tracheostomy

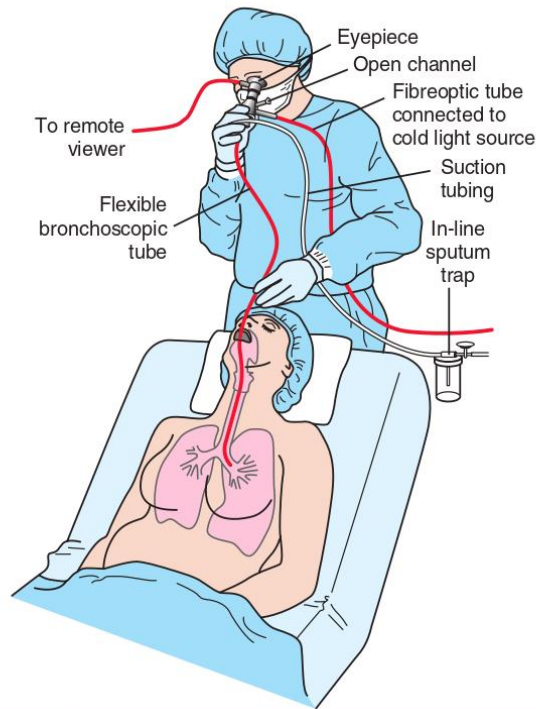
(Blamb/Shutterstock)



Test/procedure	Pronunciation	Definition
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Figure 10.7 Bronchoscopy

(Elkin et al, 2007)



chest x-ray	chest EKS-ray	A chest x-ray involves taking radiographic images of the thoracic cavity by passing small amounts of radioactive particles through the body and recording the resultant images on a computer or film. The two most common views of the thorax are taken in the coronal plane (images taken from the anterior-posterior view or posterior-anterior view) and those taken in the sagittal plane (taking a lateral view).
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EXERCISES

EXERCISES

Exercise 10.1: Label the Diagram

Using the information provided in this chapter, label the anatomical parts in the figure below.

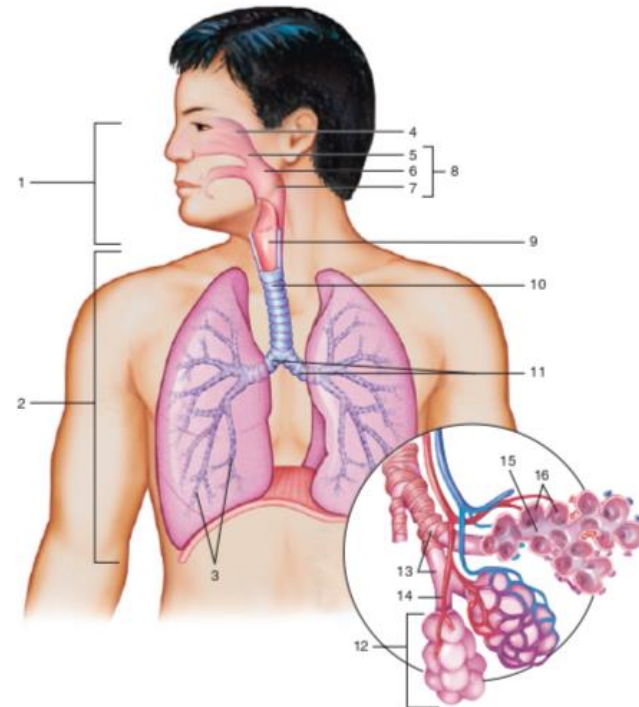


Figure 10.11
(Mosby's Dictionary, 2014)

1 _____	9 _____
2 _____	10 _____
3 _____	11 _____
4 _____	12 _____
5 _____	13 _____
6 _____	14 _____
7 _____	15 _____
8 _____	16 _____

Exercise 10.2: Match Word Elements and Meanings

Match the prefix, suffix or word root in Column A with its meaning from Column B.

Column A	Answer	Column B
1. -capnia		A. diaphragm, mind
2. pneumat/o		B. black, coal
3. -oxia		C. nose
4. phren/o		D. carbon dioxide
5. steth/o		E. bad, painful, difficult
6. spir/o		F. expansion, dilatation, stretching out
7. -osmia		G. blue
8. anthrac/o		H. air, respiration, lung
9. pharyng/o		I. lobe
10. con/i/o		J. oxygen
11. orth/o		K. septum
12. dys-		L. spitting
13. rhin/o		M. straight, upright
14. -ectasis		N. voice
15. -ptysis		O. distant, end, far, complete
16. tele-		P. breathe
17. cyan/o		Q. pharynx
18. sept/o		R. dust
19. phon/o		S. chest
20. lob/o		T. sense of smell

Exercise 10.3: Word Analysis and Meaning

Break up the medical terms below into their component parts (prefixes, suffixes, word roots, combining vowels). Provide the meaning for each word element and each term as a whole.

Example:

rhinorrhoea

rhin/o = nose

-rrhoea = discharge, flow

Meaning = discharge from nose

1. laryngeal _____

2. dysosmia _____

3. intercostal _____

4. apnoea _____

5. thoracoscopy _____

6. tracheotomy _____

7. pneumothorax _____

8. pleuritis _____

Exercise 10.5: Expand the Abbreviations

Abbreviation	Expanded abbreviation
ABGs	
ARF	
BS	
COAD	
CPAP	
CXR	
DOE	
ETT	
FEV ₁	
LUL	
O ₂	
PCP	
PE	
RDS	
RLL	
SARS	
SOBOE	
T&A	
TB	
URTI	

Exercise 10.6: Match Medical Terms With Meanings

Match the medical term in Column A with its meaning in Column B.

Column A	Answer	Column B
1. dysphonia		A. absence of the sense of smell
2. bronchiectasis		B. thin, watery discharge from nose
3. status asthmaticus		C. nasal stone
4. laryngostomy		D. inflammation of all the sinuses
5. sinus actinomycosis		E. fungus infection in sinus
6. pleural effusion		F. permanent opening through the neck into the larynx
7. hyperventilation		G. hoarseness
8. rhinolith		H. dilatation of a bronchus or bronchi
9. anosmia		I. lung disease due to prolonged inhalation of coal dust
10. anthracosis		J. removal of a pulmonary lobe
11. pyopneumothorax		K. coughing up and spitting out material from the lungs
12. bradypnoea		L. excess of CO ₂ in the circulating blood
13. hypercapnia		M. slow breathing
14. expectoration		N. pus and air in the pleural cavity
15. lobectomy		O. abnormal accumulation of fluid in the pleural space
16. pansinusitis		P. prolonged state of severe asthma
17. rhinorrhoea		Q. spitting of blood
18. haemoptysis		R. excessive movement of air in and out of lungs
19. thoracocentesis		S. irregular breathing
20. Cheyne-Stokes respiration		T. tapping of pleural cavity to remove fluid





QUESTIONS?



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