

## The Respiratory System

You have already learned that the heart pumps blood through the circulatory vessels, from which it delivers oxygen and other important nutrients to all parts of the body. For the blood to obtain the oxygen it carries, our lungs must first make it available by extracting it from the air we breathe. That is the job of the respiratory system.

Most of the oxygen (98.5%) goes into hemoglobin and the rest is absorbed by plasma. The process has to be continuous because the body's tissues cannot store oxygen.

### Word Elements Specific to the Respiratory System

The roots and suffixes shown in Table 1 are often found in terms related to the respiratory system.

**TABLE 1: COMMON WORD ELEMENTS RELATED TO THE RESPIRATORY SYSTEM**

Root or Suffix	Refers to
bronchi/o	bronchus
laryng/o	larynx
nas/o, rhin/o	nose
pharyng/o	pharynx
phren/o	Diaphragm..... diaphragmatic
-pnea (suffix)	breathing (a suffix used in such terms as <i>dyspnea</i> , which means “difficulty in breathing”)
pneum/o, pneumon/o, pulmon/o	lung
sinus/o	sinus cavity
trache/o	trachea

### Breathing

lungs are the biggest of our respiratory organs. Air flows into the lungs through the nose, nasal passage, pharynx, larynx, trachea, and bronchi. The diaphragm also figures prominently in the overall breathing process. The respiratory system is to divide it into two parts: the upper respiratory system and the lower respiratory system (Figure 1).

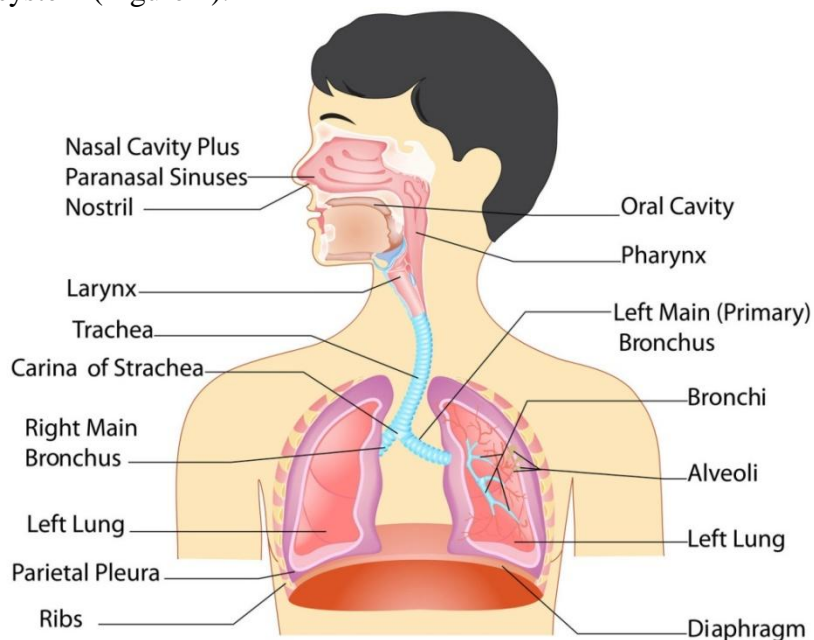


Figure 1: The respiratory system.

## **The Upper Respiratory System**

The upper respiratory system is composed of the nose, nasal cavity, and pharynx, which together act as a series of passageways to move air toward the lungs.

### **The Nose**

Air that enters through the nose encounters the body's first line of defense against contaminants in the air. Any large particulate matter contained in air entering the nose is filtered out by the hairs inside the nose.

### **The Nasal Cavity**

The nasal cavity is the second line of defense against any foreign material trying to get into the respiratory system. The mucus that coats the lining of the nasal cavity filters out particles that are too small to be picked up by the hairs in the nose.

Also, incoming air is warmed and moistened as it passes through the nasal cavity, while outgoing air gives up its heat and water vapor. To maintain good health, it is essential to keep the lower respiratory system warm and humidified.

### **The Pharynx**

Incoming air passes out of the nasal cavity into the pharynx, where it is further purified and filtered to eliminate germs and unwanted chemicals.

## **The Lower Respiratory System**

### **The Larynx**

The larynx marks the beginning of the lower respiratory system. Its job, apart from its other major task of providing us with a means of speech, is to pass the now purified air into the trachea. Along with the epiglottis, which is technically part of the digestive system, the larynx also prevents food and drink from entering the trachea.

### **The Trachea and Bronchi**

The trachea is often called the windpipe because air flows through it into the bronchi. Leaving the bronchi, incoming air passes into the lungs. The trachea is a bit more than 4 inches long, and the bronchi start at about shoulder level.

The bronchi become smaller and smaller as they move into the lungs, and both secondary (second-order) and tertiary (third-order) bronchi are terms you should become familiar with, along with bronchioles, which are somewhat like the capillaries in the cardiovascular system. That is, they get smaller and smaller as they extend deeper into the lungs, eventually reaching a diameter of about half a millimeter.

### **The Lungs**

The right lung looks something like half of a bigger-than-normal football with the tip, called the apex, pointing upward and the bottom part, called the base, resting on top of the diaphragm. The left lung looks almost the same except for an indentation on its inner side to accommodate the heart.

As air flows deep inside the lungs, it branches off from the bronchioles into tiny passageways and sacs called alveoli (singular: alveolus). The alveoli contained in the lungs receive oxygen from the air so that it can be picked up by the blood in the capillaries associated with them (pulmonary alveoli). The lungs also contain arteries and veins (pulmonary) (Figure 2).

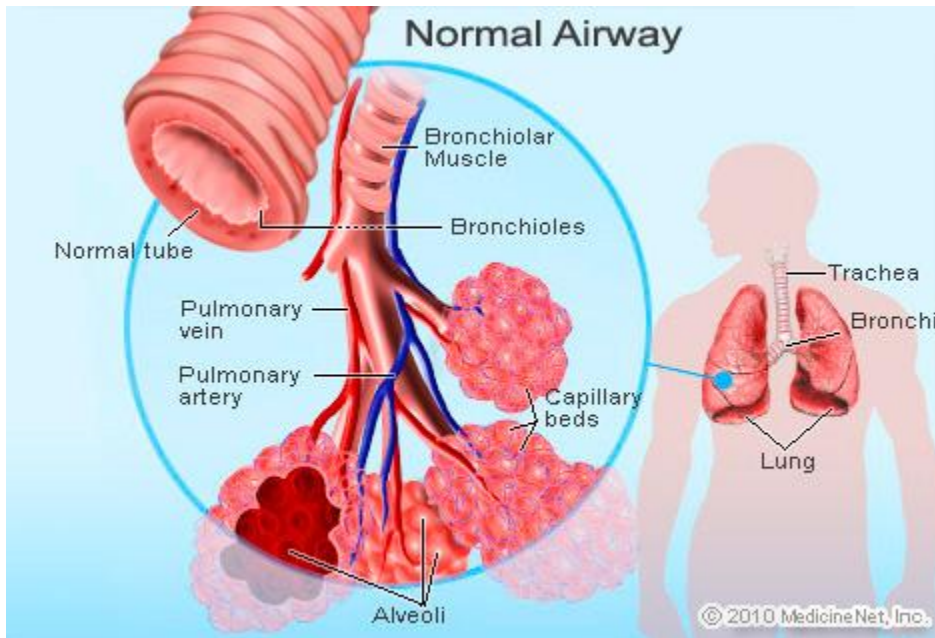


Figure 2: Location of the bronchioles and alveoli.

### **The Diaphragm**

Although the diaphragm is located at the very bottom of the respiratory system, it initiates the breathing process. When the diaphragm moves downward, the partial vacuum thus formed draws air into the lungs. When it pushes upward, air is expelled from the lungs.

### **Common Abbreviations: The Respiratory System**

<b>Abbreviation</b>	<b>Meaning</b>
AARC	American Association for Respiratory Care
AART	American Association for Respiratory Therapy
AIURT	acute infections of the upper respiratory tract
ALR	acute lower respiratory infection
CNRD	chronic nonspecific respiratory diseases
ERV	expiratory reserve volume (as measured with test equipment)
IRV	inspiratory reserve volume (as measured with test equipment)
PFT	pulmonary function test
RV	residual volume (as measured with test equipment)
T&A	tonsils and adenoids (also tonsillectomy and adenoidectomy)
TLC	total lung capacity (as measured with test equipment)
TV	tidal volume (as measured with test equipment)
SOB	shortness of breath
COPD	chronic obstructive pulmonary disease

\* Read the following excerpt from an admitting statement, and answer the questions that follow.

A 68-year-old woman is admitted from her home with acute SOB due to exacerbated COPD, decompensated congestive heart failure, and pneumonia. Taken by the attending physician, her history reveals a former 40-year smoking history, and she is status post–previous stroke with residual dysphagia. During her hospital stay, the patient received intravenous steroids for COPD exacerbation and ALR, diuretics for decompensated CHF, and antibiotics for pneumonia.

- What prefix, root, and suffix combine to make up the word dysphagia? What does it mean?
- What is COPD?
- What is ALR?

View Answer

1.dys-; phag/o; -ia; difficulty in eating or swallowing

2.chronic obstructive pulmonary disease

3.acute lower respiratory infection

### **Respiratory System Disorders and Procedures**

Table 2 lists common abnormal respiratory conditions, along with some of the procedures used to diagnose and correct them.

**TABLE 2: COMMON DISORDERS AND PROCEDURES ASSOCIATED WITH THE RESPIRATORY SYSTEM**

<b>Term</b>	<b>Definition</b>
apnea	absence of breathing
asthma	a lung disease characterized by reversible inflammation and constriction
bronchial pneumonia (also called <i>bronchopneumonia</i> )	inflammation of the smaller bronchial tubes
bronchiolitis	inflammation of the bronchioles
bronchiostenosis (note the difference and <i>bronchostenosis</i> ) in meaning between this word	narrowing of the bronchial tubes
bronchitis	inflammation of the mucous membrane of the bronchial tubes
bronchomalacia	degeneration or softening of the bronchi
bronchoplasty	surgical repair of a bronchus
bronchopneumonia (also called <i>bronchial pneumonia</i> )	inflammation of the smaller bronchial tubes
bronchorrhaphy	suturing of a bronchus
bronchorrhea	excessive mucus production by a bronchus
bronchoscope	a device used for visual inspection of the interior of a bronchus
bronchoscopy	inspection with a bronchoscope
bronchospasm	abnormal contraction of bronchi
bronchostenosis (note the difference in meaning between this word and <i>bronchiostenosis</i> )	chronic narrowing of a bronchus
bronchotomy	incision into a bronchus
dyspnea	difficult breathing
emphysema	condition in which the alveoli are inefficient because of distension
laryngectomy	excision of the larynx
laryngitis	inflammation of the larynx

laryngology	study of the larynx and its abnormalities
laryngoplasty	surgical repair of the larynx
laryngoscope	instrument with a light at the tip to aid in visual inspection of the larynx
laryngoscopy	visual inspection of the larynx with the aid of a laryngoscope
laryngospasm	involuntary contraction of the larynx
laryngostenosis	a narrowing of the larynx
laryngotomy	incision into the larynx
pharyngitis	inflammation of the pharynx
pharyngocele	a hernia or diverticulum in the pharynx
pharyngoplasty	surgical repair of the pharynx
pharyngoplegia	paralysis of the pharynx
pharyngoscope	instrument with a light at the tip to aid in the visual inspection of the pharynx
pharyngoscopy	visual inspection of the pharynx with the aid of a pharyngoscope
pharyngospasm	involuntary contraction of the pharynx
pharyngostenosis	narrowing of the pharynx
pharyngotomy	surgical incision into the pharynx
phrenalgia	pain in the diaphragm
phrenoplegia	paralysis of the diaphragm
pneumolith	calculus in a lung
pneumonectomy	removal of pulmonary lobes from a lung
pneumonia, pneumonitis	inflammation of a lung caused by infection, chemical inhalation, or trauma
pneumonopexy	surgical fixation of a lung
pneumonorrhaphy	suturing of a lung
pneumonotomy	incision into a lung
rhinalgia	pain in the nose
rhinitis	inflammation of the inner lining of the nasal cavity
rhinodynia	rhinalgia; pain in the nose
rhinology	study of the nose and its abnormalities
rhinopathy	any disease of the nose
rhinoplasty	surgery performed on the nose
rhinorrhea	discharge from the rhinal mucous membrane
rhinoscope	a small mirror with a thin handle; used in rhinoscopy
rhinoscopy	visual inspection of the nasal areas
rhinostenosis	narrowing or obstruction occurring in the nasal passages
rhinotomy	surgical incision into the nose
sinusitis	inflammation of the sinuses
sinusotomy	incision into a sinus
tracheitis	inflammation of the trachea
tracheomalacia	softening (degeneration) of tracheal tissue
tracheomegaly	abnormal dilation of the trachea
tracheoplasty	surgical repair of the trachea
tracheorrhagia	hemorrhage of the trachea
tracheostenosis	abnormal narrowing of the trachea
tracheotomy	incision into the trachea