

# Anatomy of the Respiratory System

## Objectives

- List the structures that make up the respiratory system
- Distinguish between the upper respiratory tract and the lower respiratory tract
- Explain the difference between the conducting zone and the respiratory zone, listing the anatomical structures that are a part of each

## Basic Anatomy of the Respiratory System

[\*\[Section 22.1: Organs and Structures of the Respiratory System\]\*](#)

[\*\[Section 22.1.1: Conducting Zone\]\*](#)

[\*\[Figure 22.2: Major Respiratory Structures\]\*](#)

The organs of the respiratory system are divided anatomically into:

The **upper respiratory tract**:

Nose  
Nasal cavity (made of a hard and soft palate)  
Sinuses  
Pharynx

The **lower respiratory tract**:

Larynx  
Trachea  
Bronchi  
Lungs

But, the respiratory system may also be divided functionally into:

The **conducting zone**

organs and structures not involved in gas exchange

The **respiratory zone**

the locations where the exchange of O<sub>2</sub> and CO<sub>2</sub> occur

## Structures of the Conducting Zone

### Nose

[\*\[Section 22.1.1.1: The Nose and its Adjacent Structures\]\*](#)

[\*\[Figure 22.3: Nose\]\*](#)

[\*\[Figure 22.4: Upper Airway\]\*](#)

**External nares** (the nostrils)

- hair in the vestibule removes airborne particles
- primary route for entering air

### **Nasal Septum**

- divides nasal cavity
- bony portion = perpendicular plate of the ethmoid bone and vomer bone union
- works with cartilage to form full septum

### **Nasal conchae** (aka, turbinates)

- cause the air to swirl in the nasal cavity and come in contact with mucous membrane covering (which catches debris/dust)
- heat and humidify the air for respiration – allows diffusion of gases in lungs

## **Pharynx**

[\[Section 22.1.1.2: Pharynx\]](#)

[\[Figure 22.4: Upper Airway\]](#)

[\[Figure 22.6: Divisions of the Pharynx\]](#)

### **Uvula**

flips up during swallowing to prevent fluids from entering the nasopharynx (soft palate also raises to prevent food from entering)

The Pharynx is divided into 3 anatomical regions:

1. **Nasopharynx**
  - Passageway for airflow from nasal cavity
  - Has pseudostratified ciliated columnar epithelium, pharyngeal tonsils, and eustachian tubes
2. **Oropharynx**
  - common passageway for food, water, and air
  - stratified squamous epithelium (in common with oral cavity)
  - Contains palatine and lingual tonsils
3. **Laryngopharynx**
  - Passageway for food
  - stratified squamous epithelium

## **Larynx**

[\[Section 22.1.1.3: Larynx\]](#)

[\[Figure 22.7: Larynx\]](#)

[\[Figure 22.8: Vocal Cords\]](#)

During swallowing, the hyoid bone lifts causing the *epiglottis* to lower and protect the *glottis*, which consists of the opening in the larynx and the vocal cords.

### **Glottis**

- *false vocal cords* (Vestibular ligaments and folds)
  - During coughing or sneezing, close over the glottis
  - Superior to the true vocal cords
- *true vocal cords* (Vocal ligaments and folds)
  - Responsible for sound production

- Only produces sound when air is exhaled over them
- Sounds change when cords are stretched or relaxed

### **Larynx (Voice Box)**

Made up of 9 cartilages:

- 1 thyroid cartilage (Adam's apple)
- 1 cricoid cartilage (connects larynx to trachea)
- 1 epiglottis
- 2 arytenoid cartilages
- 2 corniculate cartilages
- 2 cuneiform cartilages

### **Trachea**

[\*\[Section 22.1.1.4: Trachea\]\*](#)

[\*\[Figure 22.9: Trachea\]\*](#)

### **Lungs**

[\*\[Section 22.1.1.5: Bronchial Tree\]\*](#)

[\*\[Section 22.1.2: Respiratory Zone\]\*](#)

[\*\[Figure 22.9: Trachea\]\*](#)

[\*\[Figure 22.10: Respiratory Zone\]\*](#)

[\*\[Figure 22.11: Structures of the Respiratory Zone\]\*](#)

The right lung of a human has 3 lobes, while the left lung only has 2

### **Bronchial Tree**

- 1° bronchus (R & L)
- 2° bronchus (R & L)
  - R = 3
  - L = 2
  - (corresponds to # of lobes)
- 3° bronchus (R & L)
  - R = 3, 2, 5
  - L = 5, 5 (during development)
  - Fusion events lead to 8 or 9 total after development

### **Bronchioles**

- lack cartilage
- have layer of smooth muscle
- terminal bronchioles
- have cilia, give off 2 or more respiratory bronchioles
- respiratory bronchioles

- divide into 2-10 alveolar ducts

respiratory bronchioles divide into thin walled passages called alveolar ducts alveolar ducts end in grapelike clusters of alveoli called alveolar sacs the alveoli provide large surface area (~70sq.m) for gas exchange

## **Alveoli**

[\[Section 22.1.2: Respiratory Zone\]](#)

[\[Figure 22.10: Respiratory Zone\]](#)

[\[Figure 22.11: Structures of the Respiratory Zone\]](#)

## **Gross Anatomy of the Lungs**

[\[Section 22.2: The Lungs\]](#)

[\[Section 22.2.1: Gross Anatomy of the Lungs\]](#)

[\[Section 22.2.3: Pleura of the Lungs\]](#)

[\[Figure 22.13: Gross Anatomy of the Lungs\]](#)

[\[Figure 22.14: Parietal and Visceral Pleurae of the Lungs\]](#)

CBIO 2210L – Respiratory System

Structure	Location	Description/Function
<b>Nose and nasal cartilages</b>		
Nasal cartilages		
External nares		
Nasal septum		
Nasal turbinates		
Superior, middle and inferior turbinates		
Internal nares/choanae		
<b>Pharynx</b>		
Nasopharynx		
Auditory(Eustachian) tube		
Oropharynx		
Uvula		
Laryngopharynx		
<b>Larynx</b>		
Thyroid cartilage		
Cricoid cartilage		
Arytenoid cartilages		
True vocal folds		
False vocal folds (vestibular folds)		
Corniculate cartilages		

CBIO 2210L – Respiratory System

Cuneiform cartilages		
Epiglottis		
Glottis		
Trachea and bronchi		
Tracheal cartilages		
Carina		
Main bronchus		
Secondary bronchi		
Lungs		
Superior lobe		
Middle lobe		
Inferior lobe		
Cardiac notch		
Mediastinum		
Parietal pleura		
Visceral pleura		
Histology		
Bronchiole		
Respiratory bronchiole		
Alveolar duct		

## CBIO 2210L – Respiratory System

Alveoli		
Alveolar sac		
Type I alveolar cell		
Type II alveolar cell		

You will also need to understand pulmonary ventilation, lung volumes and lung capacities.