

# Respiratory tract

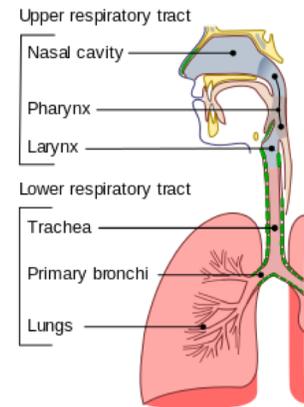
From Wikipedia

## Structure

The respiratory tract is divided into the **upper airways** and **lower airways**. The upper airways or upper respiratory tract includes the nose and nasal passages, paranasal sinuses, the pharynx, and the portion of the larynx above the vocal cords. The lower airways or lower respiratory tract includes the portion of the larynx below the vocal cords, trachea, bronchi and bronchioles. The lungs can be included in the lower respiratory tract or as separate entity and include the respiratory bronchioles, alveolar ducts, alveolar sacs, and alveoli.

The respiratory tract can also be divided into a conducting zone and a respiratory zone, based on the distinction of transporting gases versus exchanging them.

From the bronchi the dividing tubes become progressively smaller with an estimated 20 to 23 divisions before ending at an alveolus.



## Upper respiratory tract

The **upper respiratory tract**, can refer to the parts of the respiratory system lying above the sternal angle (outside of the thorax),[1] above the glottis (vocal cords), or above the cricoid cartilage.[2][3] So that the larynx is sometimes included in the upper airway and sometimes in the lower airway.[4] The larynx is also called the voice box and has the associated cartilage that produces sound. The tract consists of the nasal cavity and paranasal sinuses, the pharynx (nasopharynx, oropharynx and laryngopharynx) and sometimes includes the larynx.

## Lower respiratory tract

The lower respiratory tract or lower airway is derived from the developing foregut and consists of the trachea, bronchi (primary, secondary and tertiary), bronchioles (including terminal and respiratory), and lungs (including alveoli).[5] It also sometimes includes the larynx.

## Respiratory tree

The respiratory tree or tracheobronchial tree is a term also used to refer to the branching structure of airways supplying air to the lungs and includes the trachea, bronchi and bronchioles.

At each division point or **generation**, one airway branches into two or more smaller airways. The human respiratory tree may consist on average of 23 generations, while the respiratory tree of the mouse has up to 13 generations.

Proximal divisions (those closest to the top of the tree, such as the bronchi) mainly function to transmit air to the lower airways. Later divisions including the respiratory bronchiole, alveolar ducts and alveoli, are specialized for gas exchange.

The **trachea** is the largest tube in the respiratory tract and consists of tracheal rings of hyaline cartilage. It branches off into two bronchial tubes, a left and a right main bronchus.

The bronchi branch off into smaller sections inside the lungs, called bronchioles. These bronchioles give rise to the air sacs in the lungs called the alveoli.[6]

The **lungs** are the largest organs in the lower respiratory tract. The lungs are suspended within the pleural cavity of the thorax. The pleurae are two thin membranes, one cell layer thick, which surrounds the lungs. The inner (visceral pleura) covers the lungs and the outer (parietal pleura) lines the inner surface of the chest wall. This membrane secretes a small amount of fluid, allowing the lungs to move freely within the pleural cavity while expanding and contracting during breathing. The lungs are divided into different lobes. The right lung is larger in size than the left, because of the heart being situated to the left of the midline. The right lung has three lobes - upper, middle, and lower (or superior, middle and inferior), and the left lung has two - upper and lower (or superior and inferior), plus a small tongue-shaped portion of the upper lobe known as the lingula. Each lobe is further divided up into segments. Each lung has a costal surface, which is adjacent to the ribcage; a diaphragmatic surface, which faces downward toward the diaphragm; and a mediastinal surface, which faces toward the center of the chest, and lies against the heart, great vessels, and the carina where the two mainstem bronchi branch off from the base of the trachea.

The **alveoli** are tiny air sacs in the lungs where gas exchange takes place. There are “about 150 million per lung”. (1) When the diaphragm contracts, a negative pressure is generated in the thorax and air rushes in to fill the cavity. When that happens, these sacs fill with air, making the lung expand. The alveoli are rich with capillaries, called alveolar capillaries. Here the red blood cells absorb oxygen from the air and then carry it back in the form of oxyhaemoglobin, to nourish the cells. The red blood cells also carry carbon dioxide (CO<sub>2</sub>) away from the cells in the form of carboxyhaemoglobin and releases it into the alveoli through the alveolar capillaries. When the diaphragm relaxes, a positive pressure is generated in the thorax and air rushes out of the alveoli expelling the carbon dioxide (CO<sub>2</sub>).