

The **lower respiratory tract** consists of the trachea, the **bronchial tree**, and respiratory units. The **trachea** consists of a length of incomplete cartilaginous rings in which each pair is connected by fibroelastic tissue. The ends of each incomplete ring are bound posteriorly by smooth muscle (*trachealis*). The trachea begins at the inferior border of the cricoid cartilage of the larynx at the C6 vertebral level. The trachea continues inferiorly to its *bifurcation*, where it divides into left and right **main (primary) bronchi** at the vertebral level of T4 (level of the aortic arch).

Each main bronchus enters the lung at the *hilum*. The right main bronchus is shorter, more vertical, and wider than the left. The *right* main bronchus generally gives off three **lobar (secondary) bronchi** to three **lobes: superior, middle, and inferior**. The *left* main bronchus divides into two lobar bronchi for the superior and inferior lobes. Each lobe is divided by fibrous septa into pyramid-shaped, surgically resectable, anatomical and functional units called **bronchopulmonary segments**. Each segment has one segmental (tertiary) bronchus, and each segment is supplied by a segmental artery and drained by segmental veins and lymphatic vessels.

There can be some variation in the number of lobes and segments of a lung. Here we show the right and left lung each composed of 10 segments. In this case, segments #4 and #5 of the right lung (R. L.) are not located in the same sites in the left lung (L. L.). In some cases, the **apical** and **posterior** segments are combined as one, and the **anterior basal** and **medial basal** segments are also combined, leaving 8 segments in the left lung (not shown).

Knowledge of the tridimensional arrangement of segments is of special significance to pulmonary surgeons and clinicians seeking a precise localization of a lesion in the lung.

Within each bronchopulmonary segment, a segmental bronchus branches into several **bronchioles**, each less than 1 mm in diameter, absent cartilage, and supported by smooth muscle. These bronchioles branch into smaller terminal bronchioles, characterized by ciliated cuboidal cells *without glands*. If gland (goblet) cells were to exist below the level of cilia, fluid would accumulate in the air cells—not a healthy situation. The terminal bronchioles represent the end of the air-conducting pathway.

Each terminal bronchiole divides into two or more **respiratory bronchioles**, characterized by occasional alveolar sacs on their walls. Each respiratory bronchiole supplies a **respiratory unit**, a discrete group of air cells (**alveoli**) arranged in **alveolar sacs** and fed by **alveolar ducts**. Extending from its source bronchiole, each respiratory bronchiole extending inferiorly has more and more alveolar sacs. The walls of the alveoli, composed of simple squamous epithelia and supported by thin interwoven layers of elastic and reticular fibers, are surrounded by capillaries that arise from **pulmonary arterioles** and become the tributaries of **pulmonary venules**. The walls of these capillaries merge with the structurally similar alveoli. Oxygen and carbon dioxide rapidly diffuse through these walls secondary to pressure gradients.