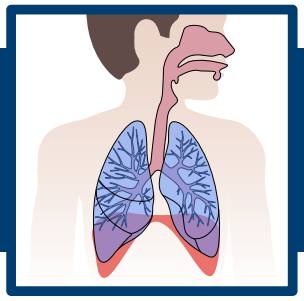
PULMO PARK

LESSON 3: RESPIRATORY EXPLORATORY – DIVING DEEPER

Activity 3B: Branching Out



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HEALTH STARTS WITH SCIENCE

Branching Out

As air moves into and through the lungs, it travels through increasingly smaller tubes (bronchi → bronchiole) until the air makes it way to the sac-like alveoli. Frequently referred to as the pulmonary tree, the branching structure within the lungs actually increases the efficiency of the lungs by increasing the surface area available for gas exchange. Although increased surface area within the lung benefits gas exchange, it also increases the areas to which pollutants and pathogens can attach. In other words, the structure which optimizes our ability to breath also increases risk of exposure to pollutants and disease. Just as tree branches sway and move when the wind blows, the branches within the lungs also exhibit a type of movement. The spongy lung tissue which surrounds the bronchi and bronchioles is called the ***parenchyma*** (pa-RENK-ah-ma). The parenchyma holds the bronchi and bronchioles in place which limits movement of the bronchi and bronchioles. Rather than swaying, the parenchyma limits movement of the pulmonary tree, allowing only expansion and contraction of the tubes. Diseases, such as asthma cause the bronchi and bronchioles to contract too much which distorts the parenchyma. During an asthma attack, the constricting tubes pull the parenchyma inward which increases the pressure inside the bronchi and bronchioles. It is this distortion which contributes to feeling a tightness in the chest and causes difficulty breathing. Similar tightness can be felt when the lungs are exposed to pollutants like smog (surface ozone, O_3) or if pathogens have made their way past the lungs' defenses.

Pathogens can infiltrate or enter cells which line the bronchi and bronchioles. The toxins produced by some pathogens causes irritation. The resulting inflammation triggers the lymphatic system to release immune cells. The immune cells are delivered to the area by lymphatic fluid. However, the pathogens can overwhelm the immune system, causing the body to send even more immune cells and more lymphatic fluid. In extreme cases, lung function can be compromised by the excess fluid creating respiratory distress.