

What is Asthma?

Asthma is a condition that affects the respiratory system, particularly the smaller airways within the lungs called bronchi and bronchioles. The bronchi are the main passageways for air to enter and exit the lungs. Oxygen is inhaled and necessary for metabolic processes to create energy. Carbon dioxide is a by-product of cellular respiration and is exhaled. The bronchi further branch into smaller airways called the bronchioles.

Both of these tube-like passageways have an inner lining called the mucosa. The mucosa is surrounded by a layer of smooth muscle. Goblet cells and cilia live within these narrow airways. Goblet cells produce mucus within the lungs. The mucus acts as a trap that catches clear particles, like pollen or dust, that a person breathes in and prevents them from entering the lungs. Once these particles have been trapped, the cilia, small hair-like projections that dwell on the surface of the airway cells, help move the mucus up and out of the lungs through coughing.

The bronchi and other airways in an asthmatic's lungs are chronically inflamed which can cause them to be hyper-responsive to certain triggers. Common triggers for asthma are cigarette smoke, pollen, pollution, mold, dust, strong fragrances and fumes, exercise, cold weather, stress, lack of sleep, and infections like the common cold or flu.

An asthma attack can occur when an asthmatic experiences one of these triggers. During an attack, the bronchi's smooth layer of muscles constricts and become drastically narrower and the mucosa lining swells making the passageway even tighter. Finally, the goblet cells begin to produce more mucus which fills the narrow airways making it difficult for oxygen to properly reach the lungs making breathing difficult.

An asthma attack can cause a feeling of chest tightness, discomfort, and pain. Some attacks result in coughing and wheezing, a whistling sound caused by air moving through the narrowed airways. These symptoms can make the individual feel like they're running out of air to breathe.

The inflammation within the airways can make it harder to exhale which can lead to an excess amount of carbon dioxide in the lungs. This is called hyperinflation. The trapped carbon dioxide inside the lungs forces the body to work harder to move oxygen in and carbon dioxide out. This can lead to reduced oxygen delivery to the body's organs and tissues. In some untreated severe asthma attacks this can lead to death from lack of oxygen.

So how does an individual get asthma? The truth is that there is no one simple answer. Asthma can occur in people for a variety of reasons:

- Asthma tends to run in families and may be inherited
- Respiratory infections in infancy and early childhood can cause inflammation and harm lung tissue. The damage that is caused by these early childhood illnesses can affect lung function and long-term health

- Environment factors also play a major role as people who live in areas with allergens, have exposure to viral infections during childhood, are exposed daily to poor air quality, or work where certain chemicals and dusts are inhaled on the job have a higher risk of developing asthma
- People who live in poverty are at a higher risk of becoming asthmatic due to not being able to afford medical care or because those who live in poverty tend to live in areas that have poorer air quality

According to the Asthma and Allergy Foundation of America (AAFA): Black, Hispanic, and Native Americans have the highest asthma rates, hospitalizations, and deaths. These groups are also more likely to be affected by poverty, air pollution, lack of access to specialists, and lack of health insurance.

AAFA also warned that the ongoing COVID-19 pandemic and climate change crisis has caused a colossal health impact on individuals with asthma and may lead to more individuals developing asthma. The climate crisis has led to more extreme weather, like wildfires, which have led to severe health impacts related to natural disasters and air quality.

Currently, there is no cure for asthma, but there are treatments and ways to prevent asthma attacks. The biggest way to prevent them is to avoid asthmatic of triggers. Inhalers are the primary medical treatment for asthma. They help control, prevent, and stop asthma symptoms and attacks. Inhalers releases a liquid powder and are inhaled.

There are two types of inhalers- reliever and preventative. Reliever inhalers treat symptoms immediately and contain beta-agonists. Beta-agonists relax the constricting muscles within the lungs and allow the airways to widen so oxygen and carbon dioxide can move in and out of the lungs more easily. Preventative inhalers contain corticosteroids and treat asthma symptoms in the long-term. They reduce airway inflammation and sensitivity. They are critical for preventing long-term damage from chronic inflammation which harms and scars the airways.

Asthma can be a life-threatening condition, but if treated and controlled properly an asthmatic can live a relatively normal life without any serious restrictions or problems.