

What to know about hypercapnia

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By Suzanne Falck, MD, FACP



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Hypercapnia, or hypercarbia, as it is sometimes called, is a condition arising from too much carbon dioxide in the blood.

It is often caused by hypoventilation or disordered breathing where not enough oxygen enters the lungs and not enough carbon dioxide is emitted. There are other causes of hypercapnia, as well, including some lung diseases.

This article discusses the symptoms and causes of hypercapnia and outlines some of the treatment options available to help manage the condition.

Fast facts on hypercapnia:

- Hypercapnia symptoms can range from mild to severe.
- To diagnose it a doctor will take a blood sample and examine lung and breathing function.
- There are many potential causes of hypercapnia.

Symptoms

In cases where symptoms are mild and develop slowly over time, people may not even realize they have hypercapnia. Therefore, it is important to be aware of both mild and severe symptoms.

Mild symptoms



Symptoms of mild hypercapnia may include headaches, dizziness, and fatigue.

The following are considered to be mild symptoms of hypercapnia:

- dizziness
- drowsiness
- excessive fatigue
- headaches
- feeling disoriented
- flushing of the skin
- shortness of breath

These symptoms of hypercapnia may arise from shorter periods of shallow or slow breathing, such as during deep sleep.

They may not always be a cause for concern, as the body is often able to correct the symptoms and balance carbon dioxide levels in the bloodstream without intervention.

However, if the above symptoms persist for several days, it is advisable to see a doctor.

Severe symptoms

The symptoms of severe hypercapnia require immediate medical attention, as they can cause long-term complications. Some cases may be fatal.

Severe hypercapnia symptoms include:

- confusion
- coma
- depression or paranoia
- hyperventilation or excessive breathing
- irregular heartbeat or arrhythmia
- loss of consciousness
- muscle twitching
- panic attacks
- seizures

Causes

There are many causes of hypercapnia including the following:

Chronic obstructive pulmonary disease or COPD



Various respiratory conditions, including COPD, may cause hypercapnia.

COPD is an umbrella term for several conditions that affect the breathing. Common forms of COPD include chronic bronchitis and emphysema.

Chronic bronchitis leads to inflammation and mucus in the airways, while emphysema involves damage to the air sacs or alveoli in the lungs.

Both conditions can cause increased levels of carbon dioxide in the bloodstream.

The main cause of COPD is long-term exposure to lung irritants. According to the National Heart, Lung, and Blood Institute, cigarette smoke is the most common lung irritant that causes COPD in the United States. Air pollution and exposure to chemicals or dust may also cause COPD.

Although not everyone with COPD will develop hypercapnia, a person's risk increases as their COPD progresses.

Sleep apnea

The National Sleep Foundation report that between 5 and 20 percent of adults have sleep apnea.

This common condition is characterized by shallow breathing, or pauses in breathing, during sleep. It can interfere with the level of oxygen in the bloodstream and throw off the body's balance of carbon dioxide and oxygen.

Sleep apnea symptoms include daytime sleepiness, headaches upon waking, and difficulty concentrating.

Genetics

Rarely, a genetic condition where the liver fails to produce enough alpha-1-antitrypsin (AAT) can cause hypercapnia. Alpha-1-antitrypsin is a protein that is necessary for lung health, so AAT deficiency is a risk factor for COPD development.

Nerve disorders and muscular problems

In some people, the nerves and muscles necessary for proper lung function may not work correctly. For example, muscular dystrophy can cause the muscles to weaken, eventually leading to breathing problems.

Other disorders of the nervous or muscular systems that can contribute to hypercapnia include:

- Amyotrophic lateral sclerosis (ALS), a progressive disease that affects nerve cells in the brain and spinal cord.
- Encephalitis or when a person has inflammation of the brain.
- Guillain-Barré syndrome that can be caused by an abnormal immune response.
- Myasthenia gravis, a chronic disease that can weaken the skeletal muscles responsible for breathing.

Other causes

Other causes of high blood levels of carbon dioxide include:

- Activities that impact breathing, including diving or ventilator use.
- Brainstem stroke, which can affect breathing.
- Hypothermia, a medical emergency caused by rapid heat loss from the body.
- Obesity hypoventilation syndromes when overweight people cannot breathe deeply or quickly enough.
- An overdose of certain drugs, such as opioids or benzodiazepines.

What are the risk factors

Some people are more at risk than others for the development of hypercapnia, especially if they:

- **Smoke:** People who smoke, especially heavy smokers, are at greater risk of COPD, hypercapnia, other breathing difficulties, and lung diseases.
- **Have asthma:** Because asthma causes the airways to become inflamed and narrowed, it may impact breathing and the levels of carbon dioxide in the body when it is not well controlled.

- **Work with lung irritants:** Those who work with chemicals, dust, smoke, or other lung irritants are at greater risk of hypercapnia.
- **Have COPD:** Having COPD, especially if diagnosed at a later stage of disease progression, increases the likelihood of getting hypercapnia.

Diagnosis

Some tests used to diagnose hypercapnia include:

- **Arterial blood gas test:** This checks for blood levels of carbon dioxide and oxygen.
- **Spirometer test:** This test involves blowing into a tube to assess how much air a person can move out of their lungs, and how fast they can do this.
- **X-ray or CT scan:** These imaging tests can check for the presence of lung damage and lung conditions.

[COPD: Symptoms, causes, and management](#) □

[One of the causes of hypercapnia is chronic obstructive pulmonary disease or COPD.](#)

[Learn more about it here.](#)

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Treatments

The treatment for hypercapnia will depend on the severity of the condition and the underlying cause.

Options include:

Ventilation



Non-invasive ventilation, such as a CPAP mask, may help to treat hypercapnia.

There are two types of ventilation used for hypercapnia:

- **Non-invasive ventilation:** Breathing is assisted by a flow of air that comes through a mouthpiece or nasal mask. This is helpful for people with sleep apnea to keep the airways open at night and is also known as CPAP or continuous positive airway pressure.
- **Mechanical ventilation:** The person will have a tube inserted through their mouth into their airway. This is called intubation.

People with severe hypercapnia symptoms may be put on a ventilation device to assist with breathing.

Medication

Certain medications can assist breathing, such as:

- antibiotics to treat pneumonia or other respiratory infections
- bronchodilators to open the airways
- corticosteroids to reduce inflammation in the airway

Oxygen therapy

People who undergo oxygen therapy regularly use a device to deliver oxygen to the lungs. This can help balance out the levels of carbon dioxide in their blood.

Lifestyle changes

To reduce symptoms and avoid complications, a doctor may recommend changes to diet and physical activity. They will also encourage people with hypercapnia to avoid lung irritants by quitting smoking and limiting their exposure to chemicals, dust, and fumes.

Surgery

If the lungs or airways are damaged, then surgery may be required. Options include lung volume reduction surgery to remove damaged tissue or a lung transplant where a damaged lung is replaced by a healthy lung from a donor.

How is it prevented

Hypercapnia can be prevented by:

- treating existing lung conditions
- quitting smoking
- maintaining a healthy weight
- working out regularly
- avoiding exposure to toxic fumes and chemicals

Takeaway

Hypercapnia is caused by too much carbon dioxide in the blood. There are several reasons why this might happen, and addressing these is key to managing symptoms and improving a person's quality of life.

As symptoms can be mild and progress slowly over time, it is important to be aware of the symptoms of hypercapnia and to consult a doctor if breathing difficulties or other symptoms are noticed.

Those who require long-term treatment or surgery for their hypercapnia should follow their treatment regimen carefully to reduce the risk of complications.