

## **HYPERCAPNEA**

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**Introduction:** Hypercapnea is a respiratory condition indicating the presence of higher quantities of carbon dioxide in blood. Hypercapnea happens in some conditions that results in depressing respiratory centres leading to asphyxia. It is also observed while breathing air with more content of carbon dioxide.

### **Effects of hypercapnea**

**1. Effects on Respiration:** During hypercapnea, the respiratory centres are stimulated excessively. It leads to dyspnea.

**2. Effects on Blood:** The pH of blood reduces and blood becomes acidic.

**3. Effects on Cardiovascular System:** Hypercapnea is associated with tachycardia and increased blood pressure. There is flushing of skin due to peripheral vasodilatation.

**4. Effects on Central Nervous System:** During hypercapnea, the nervous system is also affected, resulting in headache, depression and laziness. These symptoms are followed by muscular rigidity, fine tremors and generalized convulsions. Finally, giddiness and loss of consciousness occur.

**Symptoms of Hypercapnea:** The symptoms include anxiety, dizziness, drowsiness, more fatigue, shortness of breath, daytime sluggishness. Other symptoms is daytime sleepiness even when you slept a lot at night (Doctors opinion is related to hyper-somnolence).

**Conditions under which hypercapnea is suspected:** Hypercapnea always should be suspected in a very few conditions. Examples are related to the persons who are at risk for hypoventilation i.e. history of sleep apnoea and the usage of sedation. Other examples are enhanced physiological dead space and restricted pulmonary reserve (chronic obstructive pulmonary disease - COPD) who exhibits shortness of breath also.

**Severe Hypercapnea:** Severe hypercapnea leads to the occurrence of noticeable and distressing effects also. Immediate symptoms of severe hypercapnea: Acute paranoia, confusion or depression, coma, dilatation (widening) of blood vessels in the skin, fainting, hyperventilation, panic attack, respiratory failure, seizure and swelling of the optic nerve (papilledema).

***Causes for hypercapnea:*** Hypercapnea is nothing but the over carbon dioxide production or decreased carbon dioxide expulsion from the lungs. Hypercapnea leads to the occurrence of lung disease namely bronchiectasis, COPD, cystic fibrosis, emphysema, and interstitial lung disease. Hypercapnea can lead to the occurrence of a very few muscular as well as neurological disorders.

***Causes of excess carbon dioxide production:*** Hypothermia (very low body temperature), improper settings on a ventilator, scuba diving ( due to pressure changes) and severe illness, infections or trauma.

***Hypercapnea in chronic conditions:*** Bronchiectasis, COPD, cystic fibrosis, emphysema, interstitial lung disease (eg., pulmonary fibrosis), muscle weakness i.e, neuromuscular disorders namely amyotrophic lateral sclerosis (ALS) and muscular dystrophy. Myasthenia gravis is also another neuromuscular cause of hypercapnea.

***Brain disorders in hypercapnea:*** Drugs used with overdoses namely opioid or benzodiazepine (utilized for treating anxiety). Hypercapnea is also seen in nervous system abnormalities like encephalitis (a brain infection) or a big stroke.

### ***Diagnosis of hypercapnea***

**Blood test:** Blood test is useful in measuring your carbon dioxide level. An arterial blood gas (ABG) test is useful in measuring a person's blood oxygen, carbon dioxide, bicarbonate as well as pH. Typically, blood tests use blood samples particularly taken from a vein. An ABG test needs a sample of blood from your artery. Other diagnostic tests include breathing mask or mechanic ventilator.

***Other diagnostic tests:*** In addition to blood tests, other tests namely imaging test are useful. Imaging tests such as chest x- ray, and chest computerized tomography (CT) scans are also useful to evaluate the severity of pulmonary conditions like emphysema and pneumonia. If the cause is related to brain, a magnetic resonance imaging (MRI).

***Pulmonary function tests (PFTS):*** Several measures of a person's respiratory function can assist in assessing lung functions also. Examples include a person's vital capacity (the maximum amount of air that can be inhaled or exhaled from the lung) and forced expiratory volume in one second. This test is useful in measuring about the forceful exhalation of air in one second.

***Pulse Oximetry:*** A person's oxygen levels can be treated as normal even when that person shows hypercapnea, but Pulse Oximetry is an non-invasive test that is more useful in monitoring sudden changes.

**Treatment:** Treating hypercapnea relies mostly on improving ventilation, so that person can remove excess carbon dioxide. This type of treatment is based on severity of the condition. The methods include.

**a. Mechanical ventilation:** It requires the use of a mechanical ventilator that involves over the act breathing of any person.

**b. Non-invasive ventilation:** Non-invasive ventilation gives breathing assistance through the upper air ways. A tightly fitted mask is kept on any person face or nose. The mask is connected to a machine that releases gentle air pressure and oxygen from a flow generator, even though person can still breathe his/ get own.

**c. Oxygen therapy:** Oxygen therapy provides a person's freedom of movement while that person is being treated for hypercapnea. The person must wear a device that is similar to an over the shoulder purse or break pack with a tube that releases oxygen into the person's nose.

**d. Pulmonary rehab:** It may vary from one patient to another but can include a mix of breathing exercises, diet, physical exercise and nutritional consultations.

**Summary:** Mild hypercapnea is difficult to recognize. Because of the presence of too much carbon dioxide in the body can lead to the occurrence of nonspecific symptoms like fatigue, headache. Often, it clears up speedily on its own. With sever hypercapnea the blood can't restore carbon dioxide balance and the symptoms are show more seriousness. The sooner severe hypercapnea is identified, the sooner the person get treatment.

