

## THE DIAPHRAGM

### What is the Diaphragm?

The diaphragm is the primary muscle used in respiration, which is the process of breathing. This dome-shaped muscle is located just below the lungs and heart. It contracts continually as you breathe in and out.

### Diaphragm Anatomy and Function

The diaphragm is a thin skeletal muscle that sits at the base of the chest and separates the abdomen from the chest. It contracts and flattens when you inhale. This creates a vacuum effect that pulls air into the lungs. When you exhale, the diaphragm relaxes and the air is pushed out of lungs.

It also has some nonrespiratory functions as well. The diaphragm increases abdominal pressure to help the body get rid of vomit, urine, and feces. It also places pressure on the oesophagus to prevent acid reflux.

The phrenic nerve, which runs from the neck to the diaphragm, controls the movement of the diaphragm.

There are three large openings in the diaphragm that allow certain structures to pass between the chest and the abdomen.

These openings include the:

- Esophageal opening. The oesophagus and vagus nerve, which controls much of the digestive system, pass through this opening.
- Aortic opening. The aorta, the body's main artery that transports blood from the heart, passes through the aortic opening. The thoracic duct, a main vessel of the lymphatic system, also passes through this opening.
- Caval opening. The inferior vena cava, a large vein that transports blood to the heart, passes through this opening.

### Diaphragm Conditions

A range of health conditions can affect or involve the diaphragm.

#### Hiatal Hernia

A hiatal hernia happens when the upper part of the stomach bulges through the oesophageal opening of the diaphragm. Experts aren't sure why it happens, but it could be caused by:

- age-related changes in the diaphragm
- injuries or birth defects
- chronic pressure on surrounding muscles from coughing, straining, or heavy lifting
- They're more common in people who are over the age of 50 or obese.

Small hiatal hernias usually don't cause any symptoms or require treatment. But a larger hiatal hernia may cause some symptoms, including:

- heartburn
- acid reflux
- trouble swallowing
- chest pain that sometimes radiates to the back

Larger hiatal hernias sometimes require surgical repair, but other cases are usually manageable with over-the-counter antacid medication. Proton pump inhibitors can also help to reduce acid production and heal any damage to the oesophagus.

### **Diaphragmatic Hernia**

A diaphragmatic hernia happens when at least one abdominal organ bulges into the chest through an opening in the diaphragm. It's sometimes present at birth. When this happens, it's called a congenital diaphragmatic hernia (CDH).

Injuries from an accident or surgery can also cause a diaphragmatic hernia. In this case, it's called an acquired diaphragmatic hernia (ADH).

Symptoms can vary depending on the size of the hernia, the cause, and the organs involved. They may include:

- difficulty breathing
- rapid breathing
- rapid heart rate
- blueish-coloured skin
- bowel sounds in the chest

Both an ADH and CDH require immediate surgery to remove the abdominal organs from the chest cavity and repair the diaphragm.

### **Cramps and Spasms**

A diaphragmatic cramp or spasm can cause chest pain and shortness of breath that can be mistaken for a heart attack. Some people also experience sweating and anxiety during a diaphragm spasm. Others describe feeling like they can't take a full breath during a spasm.

During a spasm, the diaphragm doesn't rise back up after exhalation. This inflates the lungs, causing the diaphragm to tighten. This can also cause a cramping sensation in the chest. Vigorous exercise can cause the diaphragm to spasm, which often results in what people call a side stitch.

Diaphragm spasms usually go away on their own within a few hours or days.

### **Diaphragmatic Flutter**

Diaphragmatic flutter is a rare condition that's often mistaken for a spasm. During an episode, someone might feel the fluttering as a pulsing sensation in the abdominal wall.

It can also cause:

- shortness of breath
- chest tightness
- chest pain
- abdominal pain

### **Phrenic Nerve Damage**

Several things can damage the phrenic nerve, including

- traumatic injuries
- surgery
- cancer in the lungs or nearby lymph nodes
- spinal cord conditions
- autoimmune disease
- neuromuscular disorders, such as multiple sclerosis
- certain viral illnesses

This damage can cause dysfunction or paralysis of the diaphragm. But phrenic nerve damage doesn't always cause symptoms. When it does, possible symptoms include:

- shortness of breath when lying flat or exercising
- morning headaches
- trouble sleeping
- chest pain

### **Symptoms of a Diaphragm Condition**

A condition affecting the diaphragm can cause symptoms similar to those of a heart attack. Seek emergency treatment if you experience chest pain or pressure that extends to your jaw, neck, arms, or back.

Symptoms of a diaphragm condition may include:

- difficulty breathing when lying down
- shortness of breath
- chest, shoulder, back, or abdominal pain
- pain in your lower ribs
- a fluttering or pulsing sensation in the abdomen
- bluish-colored skin
- heartburn
- trouble swallowing
- regurgitation of food

- upper abdominal pain after eating
- hiccups
- side pain

### **Tips for a healthy Diaphragm**

The diaphragm is one of the body's most important muscles because of its crucial role in breathing.

- Protect your diaphragm by:
  - limiting foods that trigger heartburn or acid reflux
  - eating smaller portions of food at a time
  - stretching and warming up before exercise
  - exercising within your limits

Like any muscle, you can also strengthen your diaphragm with special exercises. Diaphragmatic breathing or abdominal breathing is the best way to do this. It involves inhaling deeply and slowly through the nose so that your lungs fill with air as your belly expands. Along with strengthening your diaphragm, diaphragmatic breathing can also reduce stress and lower blood pressure.