Diaphragm Encyclopedia Article

Diaphragm

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Contents

Diaphragm Encyclopedia Article.....1

Contents.....2

Diaphragm.....3

Diaphragm

In general anatomical terms, a diaphragm is a membrane-like mixture of membrane and muscle that forms a partition that separates two chambers. Although most commonly associated with the musculo-membranous diaphragm that separates the thorax and abdomen--a structure that also plays an important role in the mechanics of respiration--there are other important anatomical diaphragms including the muscular pelvic diaphragm, and urogenital diaphragm. In addition to describing a structure that imparts a physical separation, the term diaphragm is often applied to structures that establish an adjustable opening.

The musculo-membranous diagram that separates the thoracic cavity from the abdominal cavity is a major component in the mechanical movement of air during the respiration cycle. Movements of the respiratory diaphragm create pressure differences that drive inspiration and expiration.

The thoraco-abdominal diaphragm attaches to the lower ribs, **sternum**, and vertebral processes that make up the spine. As the boundary between the thorax and **abdomen**, the diaphragm contains an opening (hiatus) through which the **blood** vessels (e.g., the aorta and vena cava), nerves and the esophagus pass.

During inspiration, the muscles of the diaphragm and associated muscles attached to the diaphragm contract in such a manner that the diagram flattens from its natural convex or dome shape. The flattening enlarges the chest (thoracic) cavity and causes a reduction of pressure relative to the ambient (normal, existing) atmospheric pressure. The differences in pressure provide a pressure gradient that draws air into the **lungs**. Because of increased thoracic volume, the lungs are able to expand during inspiration. Conversely, as the diaphragm returns to it convex state, it reduces thoracic cavity volume and imparts a force that pushes air out of the lungs during expiration.

The diaphragm is composed strictly of **skeletal muscle**. There are no **smooth muscle** fibers. Accordingly, the diaphragm does not contract spontaneously and is under nervous control. Just as **breathing** can be controlled voluntarily or unconsciously, control of the diaphragm may be voluntary or be directed by lower **brain** stem structures that respond to changing levels of oxygen, carbon dioxide, and acids in the blood associated with the respiratory cycle. The phrenic nerve (without sympathetic or parasympathetic nerves) innervates the diaphragm.