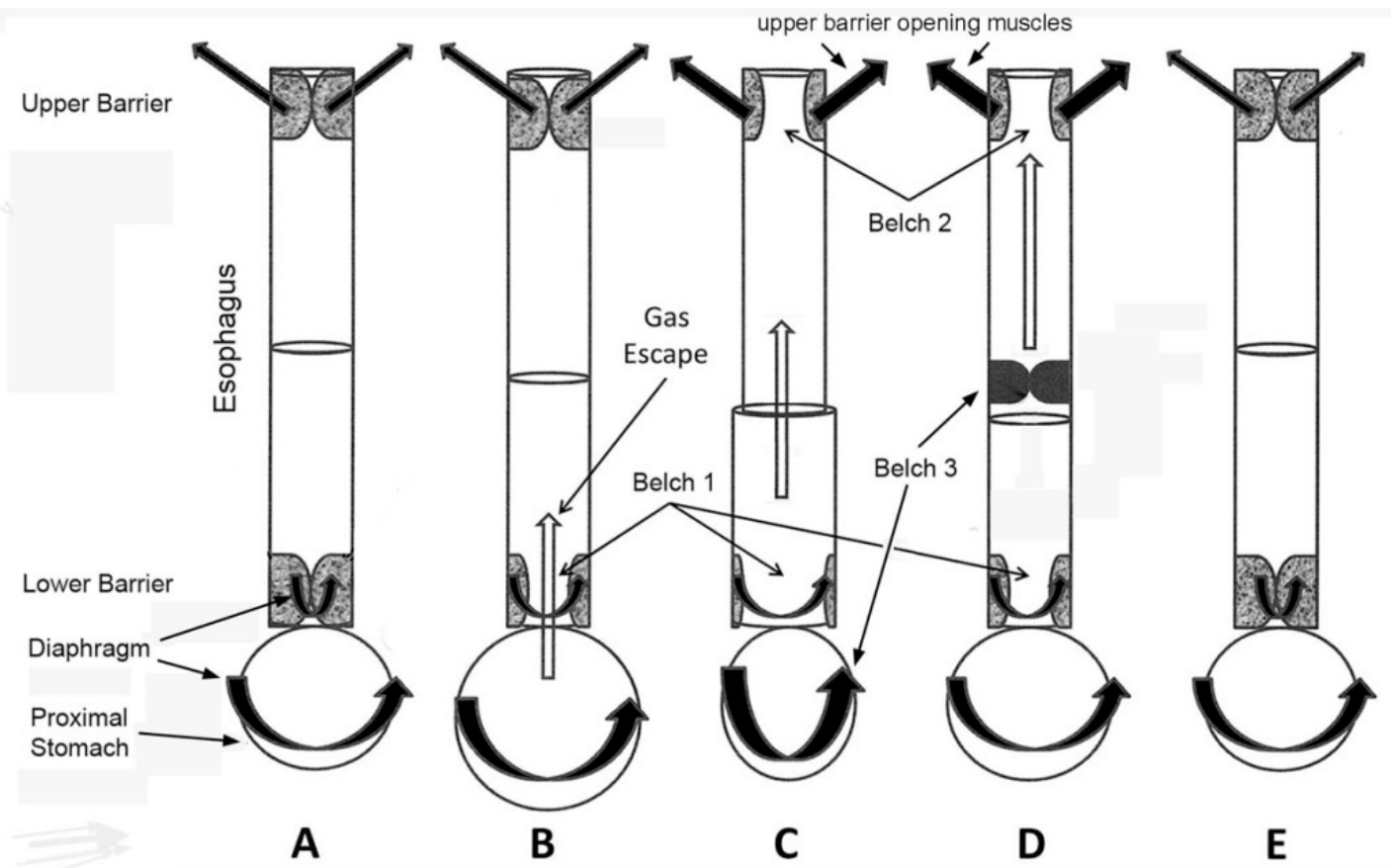


Belching: How does it work?

The belch seems like a simple rapid act with no clinical significance, but many studies suggest otherwise. Although most of the belch response occurs over a period of less than two seconds, the belch is actually composed of three independent reflex responses which involve many organs. In addition, recent studies suggest that the reflexes involved in belching may play a role in reflux disease.

The first reflex response of the belch (Figure: Belch 1) is inhibition of the muscle barrier between the stomach and esophagus that is created by contraction of lower esophagus and diaphragm (Figure: A and E). This reflex is activated by air causing tension in the muscle fibers of the wall of the stomach that is just under the esophagus (Figure: B, C and D). The result is that the air bolus which is under pressure from the stomach wall rapidly escapes into the lower esophagus (Figure: B). This reflex is mediated by the brain through the vagus nerves.



The rapid movement of air into the lower esophagus simultaneously activates two other reflexes. The second belch reflex (Figure: C and D, Belch 2) is the inhibition of the muscle barrier between the esophagus and pharynx, i.e. throat, which is created by pharyngeal muscles. In addition, this reflex also activates muscles which act to pull the esophago-pharyngeal barrier open (Figure: C

and D). It is probably this rapid air movement across the pharynx that causes the sound of the belch. This reflex is also mediated by the brain through the vagus nerves. At the same time, the third belch reflex (Figure: D, Belch 3) is activated which initiates a contraction wave of the upper esophagus that moves upward toward the mouth carrying the air bolus to the top of the esophagus. This reflex is probably mediated by the spinal cord. The result of these two reflexes is to move the air bolus from the lower esophagus into the oral cavity.

The brain area that primarily controls the belch response is the area postrema which is in the medulla or hind brain. This is the most primitive part of the brain and the area that also controls much of the vomit response.

The occasional reflux of acid into the esophagus from the stomach is a normal event in most people. This gastro-esophageal reflux of acid becomes reflux disease when the reflux is excessive and/or when it causes pain and/or damage to the esophagus, pharynx, or larynx, i.e., voice box. Gastro-esophageal reflux disease (GERD) is probably due in part to the inappropriate activation of the initial belch reflex response (Belch 1) that facilitates movement of gastric contents from the stomach into the esophagus. Esophago-pharyngeal or laryngeal reflux disease (EPR), also called supra-esophageal reflux disease (SERD) can occur without GERD. SERD is likely due to the inappropriate activation of the belch reflex (Belch 2) that causes inhibition of the barrier between the esophagus and pharynx. SERD is probably caused, in part, by sensitization of the sensory components of this reflex in the wall of the esophagus by acid that had refluxed from the stomach.

Therefore, although belching is a benign reflex response, the component reflexes of the belch response probably serve as the transport mechanisms for the reflux of acid into the esophagus, pharynx and larynx that results in reflux disease

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