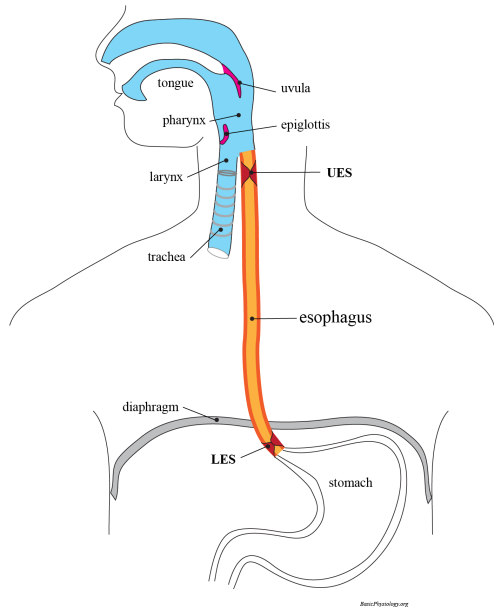


E.3. The Esophagus

A. Introduction

1. The function of the esophagus is actually very simple: transport a food bolus from the mouth to the stomach!	2. It sounds very simple, but it actually performs an important transit as the esophagus transports the food through a large space in our body; the thorax, bypassing the lungs and the heart, through a hole in the diaphragm, finally into the stomach.	
3. But is also takes care that, normally, the transport only occurs in one direction, from mouth to stomach, not the other way around!	4. However, sometimes, if there is a real problem in the stomach, too full, or an infection, or whatever, it must be possible for the body to get rid of the problem in the stomach. Then the bolus gets thrown back towards the mouth; vomiting!	

B. Anatomy of the Esophagus

1. The esophagus runs from the end of the larynx (at the back of the mouth), through the thorax, crosses the diaphragm and ends in the stomach.	
2. Remember your anatomy of the larynx and the pharynx (<i>link</i>). This is the crossroad between the airflow that you inhale and expire, with your lungs and the food that you want to eat and that has to go to the stomach.	
3. Two structures are very important to regulate this transit properly: the uvula and the epiglottis.	
4. The uvula closes the nasal cavity from the mouth cavity when a bolus of food is swallowed. This is to prevent that the bolus gets in the nose!	
5. The epiglottis is there to close the pharynx and the trachea when the food passes by on its way to the esophagus.	

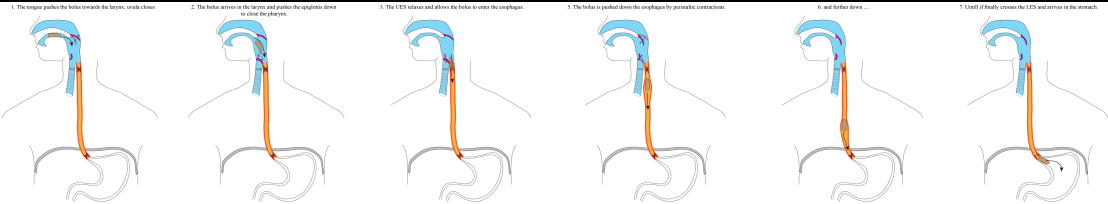
6. There are also two sphincters in the esophagus itself. The upper esophageal sphincter (= UES) and the lower esophageal sphincter (= LES).	7. These two are normally closed to prevent air from going into the stomach (or else you would be belching all the time!) but will open to allow the food bolus to pass through the esophagus towards the stomach.
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Link: C. Respiratory System/C.2. Upper Respiratory Airways/E. Respiration vs. Swallowing

C. Mucous secretion in the esophagus

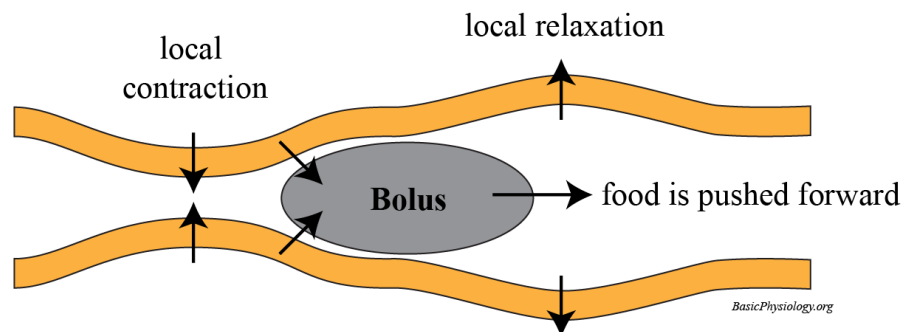
1. The wall of the esophagus also contains mucous glands, which secrete mucus. This is useful in lubricating the transportation of the swallowed bolus.	2. At the beginning of the esophagus, this mucus is useful to avoid excoriation (=damage) of the mucosa by the food.
3. At the end of the esophagus, the mucus prevents by the acidic gastric juices, which occasionally may reflex, through the LES, from the stomach.	

D. The process of Swallowing

1. The process of swallowing a bolus goes into several steps, as shown below.	2. First, as the tongue pushes the bolus into the back of the mouth (the larynx), the uvula and the epiglottis close.
3. Then, the bolus arrives at the beginning of the esophagus and the UES relaxes (=opens) to allow the bolus to enter the esophagus.	4. Then the wall of the esophagus contracts to push the bolus towards the stomach (= peristalsis).
	
5. As the bolus approaches the stomach, the LES will also open/relax (the UES has already closed of course).	6. Finally, the bolus has reached the stomach and the LES quickly closes to avoid stomach acid juices to stream into the esophagus.

E. Peristalsis:

1. The pushing of the bolus down the esophagus is called ' peristalsis '.	2. This is a common feature in the GI system that the wall contracts and relaxes in such a way that the food or the bolus is pushed towards the distal part of the gut.
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Peristalsis:*animation?*

3. Peristalsis is performed by the contraction of the smooth muscles in the wall of the esophagus. Local nerves perform this process.	4. By the way, you should know that the wall of the esophagus consists of two types of muscles: skeletal (= striated) muscles and smooth muscles.	
5. At the oral part of the esophagus, the wall consists of skeletal muscles. At the distal part, close to the stomach, the muscle cells are smooth muscles.	6. Halfway the esophagus, there is a gradual transition from skeletal to smooth muscles.	
7. This difference is crucial because our brains control the skeletal muscles. Just like the muscles in our arms and legs.	8. Therefore, we decide when we want to swallow something (or not).	

9. But once the swallowing has started, the peristalsis of the smooth muscles will push the food bolus automatically down the esophagus.	10. So, the 'start' of the GI-system is controlled by our brain, by our 'will'. Once the food is inside, the rest is performed 'automatically' by local contractions performed by the smooth muscles.	11. The same is also true at the other end of the GI-system; the anal sphincter. These muscles are also made of skeletal muscle cells and are controlled by our brain. For more on this go to link .
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F. Pathophysiology of the esophagus:

1. It is important that the two esophageal sphincters, the UES and the LES, remain closed when they are not passing a bolus to the stomach.	2. The UES remains closed to avoid air to go into the stomach etc. This is usually not a problem.
3. However, the LES more often creates problems in patients; in achalasia and in GERD .	4. Achalasia occurs when the sphincter does not relax sufficiently when a bolus arrives. This means that the food has difficulty entering the stomach and stays too long in the esophagus. In the long run this may lead to malnutrition and loss of weight.
5. The opposite happens when the LES does not close properly. This will then allow the acid juices in the stomach, which have a very low pH, to enter the distal esophagus.	6. These juices will damage the mucosa and the wall of the esophagus, which is very painful and will make it more difficult to swallow your food.
7. This disease is called GERD (= Gastro esophageal reflux disease) also known as 'acid reflex'.	