

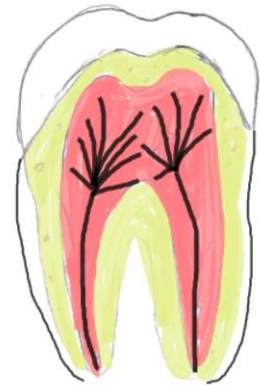
BI103 Spring 2024

Digestion Process

The first step in the digestive system is obviously eating food. Food comes into the mouth and immediately encounters the pearly whites or teeth. When a bite is taken, the mouth chews and chews, teeth slice and dice so food becomes smaller and is capable of going down the esophagus (more on that later). Teeth is the main driving force in this initial stage, mechanical breakdown of food.



Teeth are very impressive because they, like bones, are organs. There are 3 main layers when it comes to teeth, the enamel (shown in white), the dentin (shown in yellow) and the pulp (shown in red). Enamel is the protective layer of the tooth, protecting it as it encounters food and chews it by way of many minerals. Hot or cold drinks, hard or chewy foods, acidic or basic foods, the enamel protects the inner tooth from everything we may eat. The dentin just below supports the enamel. Providing minerals to the enamel and allowing it to do its role in protecting the tooth. The final layer in red is the pulp, responsible for all the sensations and blood (nutrients) the tooth needs so it can function as a whole.



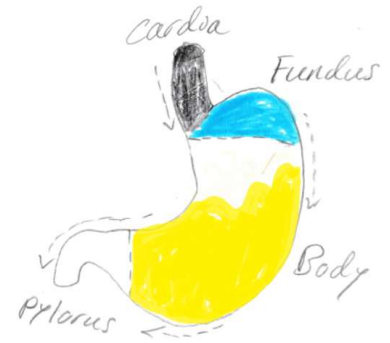
There is also chemical breakdown by way of saliva, which works to break down food with enzymes. Saliva glands, primarily located under/towards the back of the tongue are responsible for turning simple carbohydrates in food into sugar, making it very easy for the body to absorb.

Once food has been broken down it is ready to go down into the stomach. For that to occur it has to go down the esophagus. It is a relatively small pathway, so for food to not get stuck or congested there are many smooth muscle tissues capable of quickly expanding and contracting. There is also special care that food goes down the esophagus and not the trachea or windpipe, so a special tissue called the epiglottis exists to close the pathway into the trachea while eating. Almost like a train going down a railroad, a junction exists so that the train goes where it needs to go instead of taking a wrong turn.

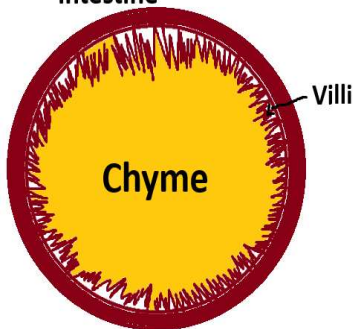


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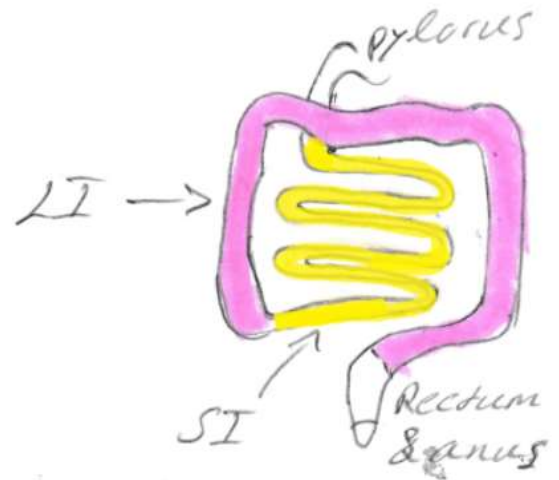
Once food goes down through the esophagus it passes the cardia, the initial section of the stomach. The cardia is important because as food comes in a valve opens and closes, preventing food from flowing back. This leads to the fundus where food could potentially be stored for long term if the body, the next section of the stomach, is full. Otherwise the body is where all the action happens. Stomach muscles and acid/enzyme combinations get to work, further breaking down food and turning into a yellow semi-thick liquid called chyme. Gradually as more and more chyme is made, it prepares to leave the stomach through the pylorus and head into the intestines.



Section cut of small intestine



The intestines are a real complex system. It all starts with the small intestine, a very thin diameter tube with many folds and loops. As the now chyme passes through the small intestine it encounters many villi, many folds or ribbed textures. These villi are responsible for coming into contact with more chyme, allowing the intestine to extract more nutrients.



The small intestine can't solely rely on the villi to absorb nutrients, but it also asks for assistance from other organs such as the liver, gallbladder and pancreas. They each provide additional chemical substances to assist in further digestion.

Once most of the easier nutrients have been absorbed, the chyme flows into the large intestine to extract the last bits needed, water being the focus. The large intestine is of large diameter compared to the large intestine and it loops back up then down again. During this process the ever vital water is extracted from the remaining chyme, eventually leaving behind the mainly solid waste the body could not extract any more nutrients from. This becomes stool or feces, and it heads to the last section of the large intestine into the rectum. Here the stool sits idle until voluntary muscle movement occurs and defecation occurs, exiting the digestive system and the body entirely via the anus