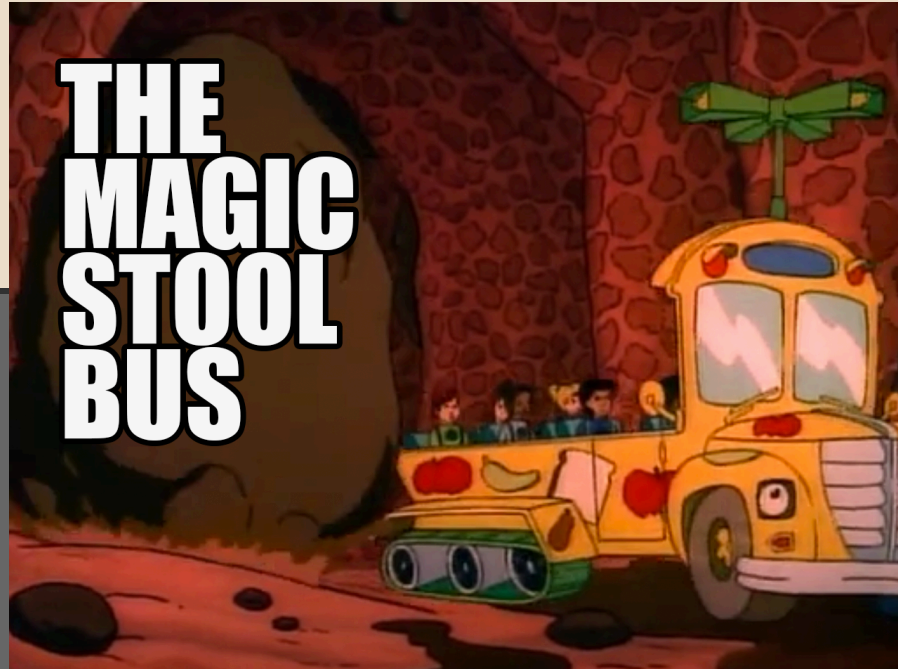


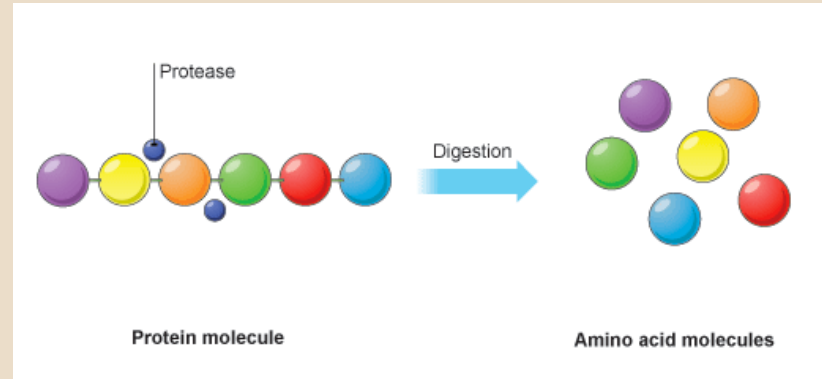
The Digestive System



What is the digestive system?

The digestive system is where the digestion of food and liquids occurs.

Our bodies are not suited to absorbing the energy contained in food as they are ingested, so the digestive system will **break down** food to its molecular form so that the **nutrients can be used** by the rest of the body.



Two parts

The digestive system contains two main parts:

- 1-The digestive tract, (the path food follows).
- 2- The digestive glands, (responsible for the breakdown of foods).

1- The digestive tract

There are many components in the tract.
Each play a specific role in digestion.

Mouth

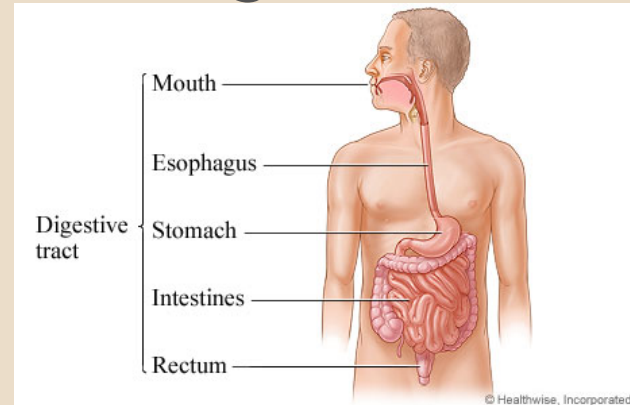
Pharynx

Esophagus

Stomach

Small intestine

Large intestine (with rectum and anus)



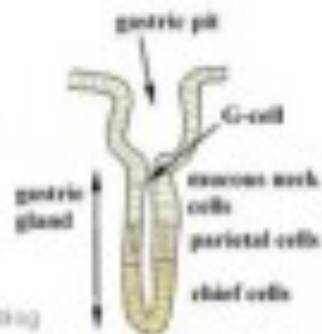
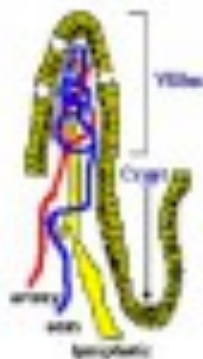
2- The digestive glands

Digestive glands produce **secretions** that **digest** food at different stages of the tract.

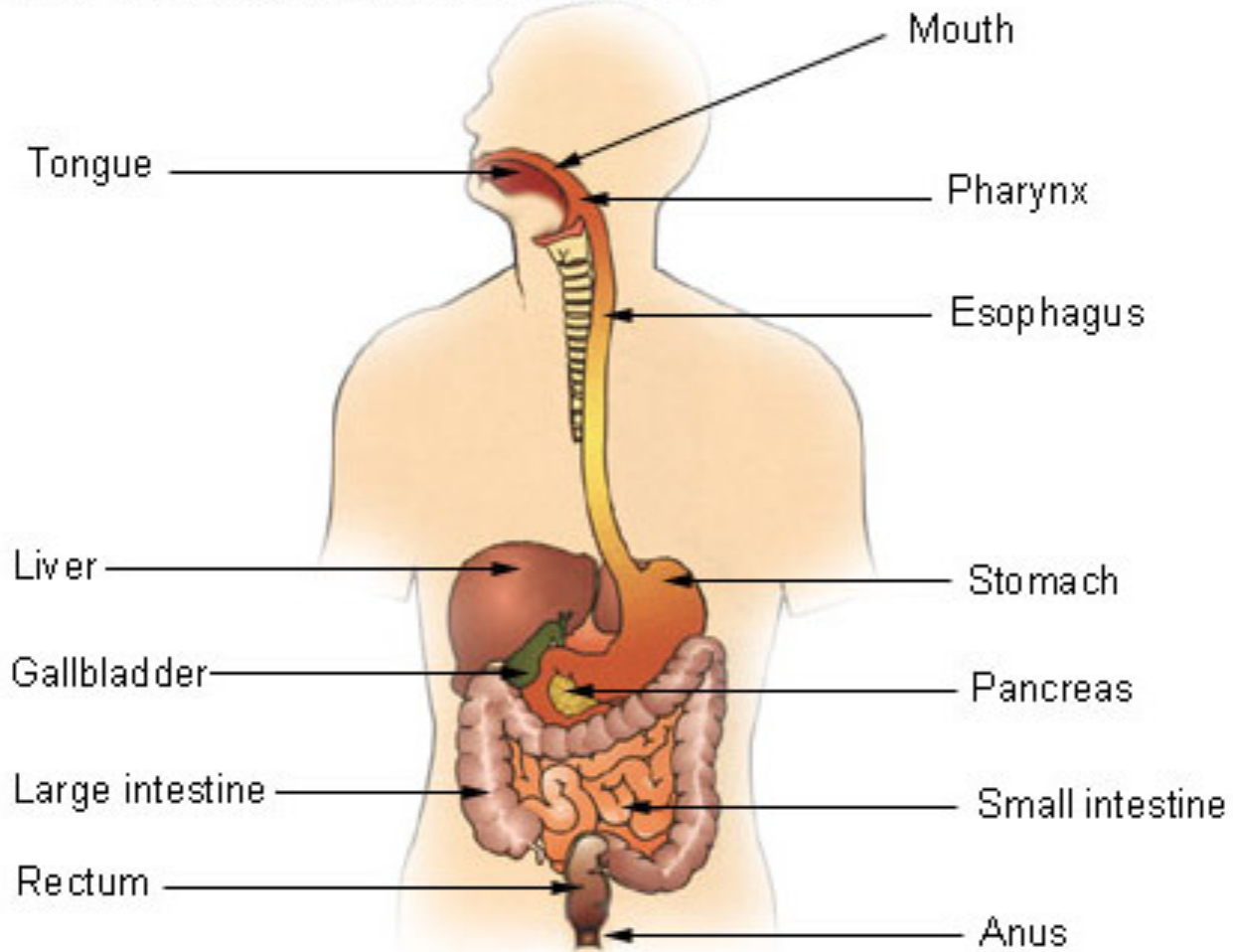
Each secretion is a **chemical** that targets a different element of food, (fats, proteins, carbohydrates).

DIGESTIVE GLANDS

- Salivary glands
- Pancreas
- Liver
- Gastric glands
- Intestinal glands



Organs of the Digestive System



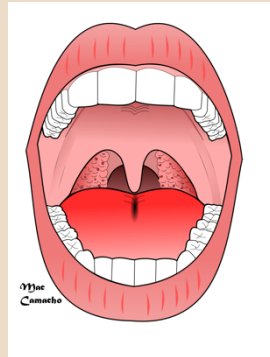
Roles of the organs in the digestive system

Mouth and pharynx

Ingestion.

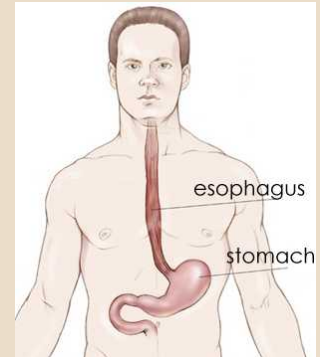
Chewing and swallowing food.

Breaking down starches with saliva.



Esophagus

Moving food by peristalsis, (muscular contractions), into the stomach.



...



Stomach

Churning and mixing of food.

Breaking down proteins with gastric juices.

Movement of food by peristalsis into the small intestine.

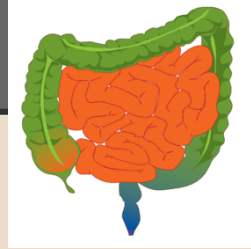
Small Intestine

Churning and mixing of food.

Breaking down of fats, proteins and carbohydrates by juices, (bile, pancreatic and intestinal juices).

Absorption of most nutrients.

Movement of mixture into the large intestine.

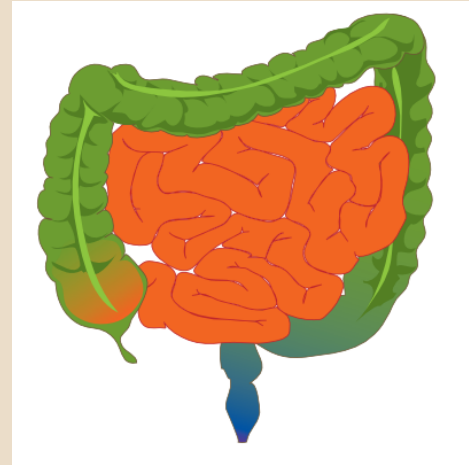




Large Intestine

Absorption of water.

Propulsion of residue by peristalsis to the anus.



Steps of digestion

There are four main steps and functions in the digestive process.

- Ingestion and propulsion of food.
- Digestion of food.
- Absorption of nutrients.
- Elimination of fecal matter.

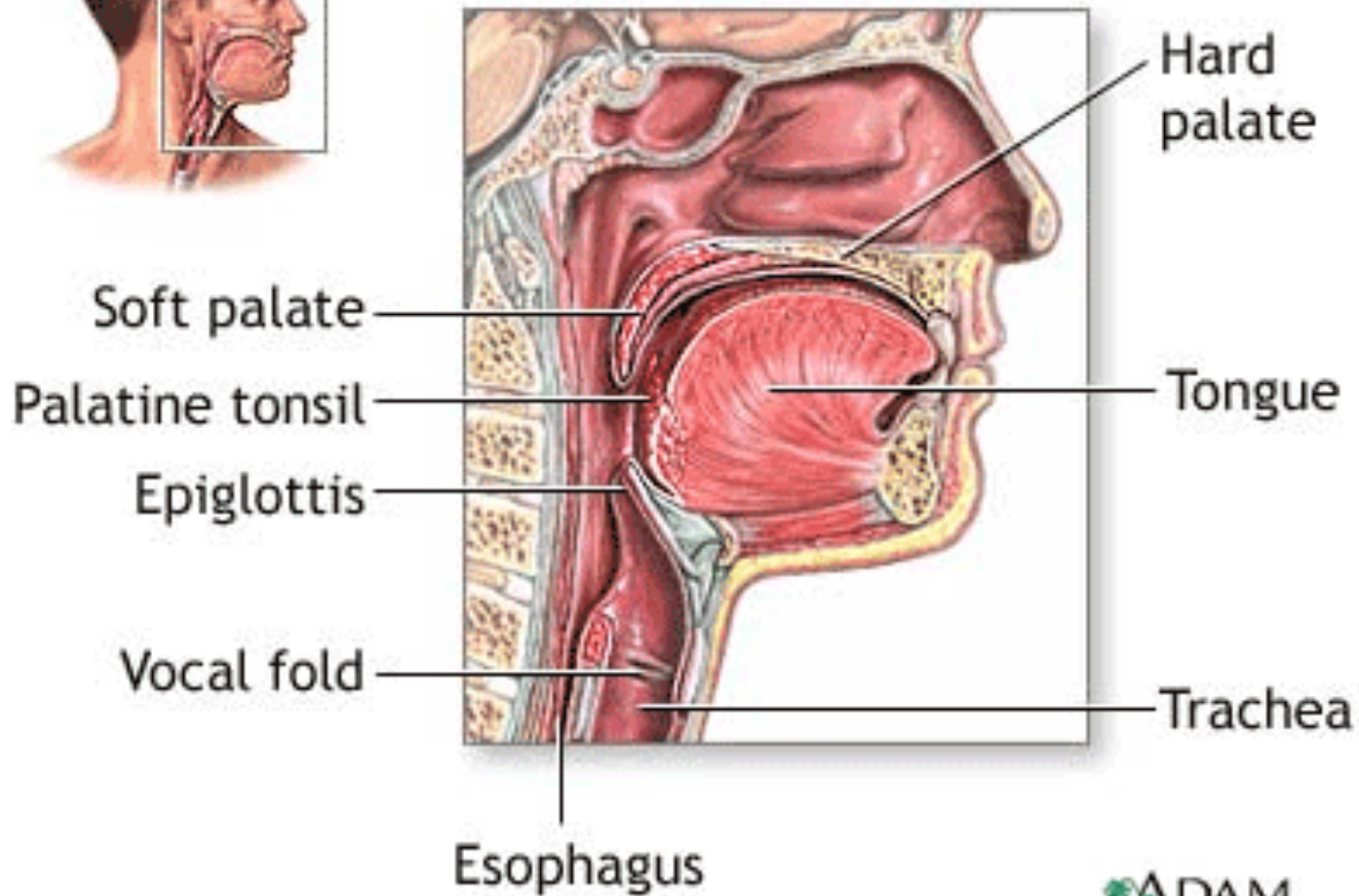
Step #1 - Ingestion and propulsion of food.

Ingestion is the act of taking food and liquids into the mouth.

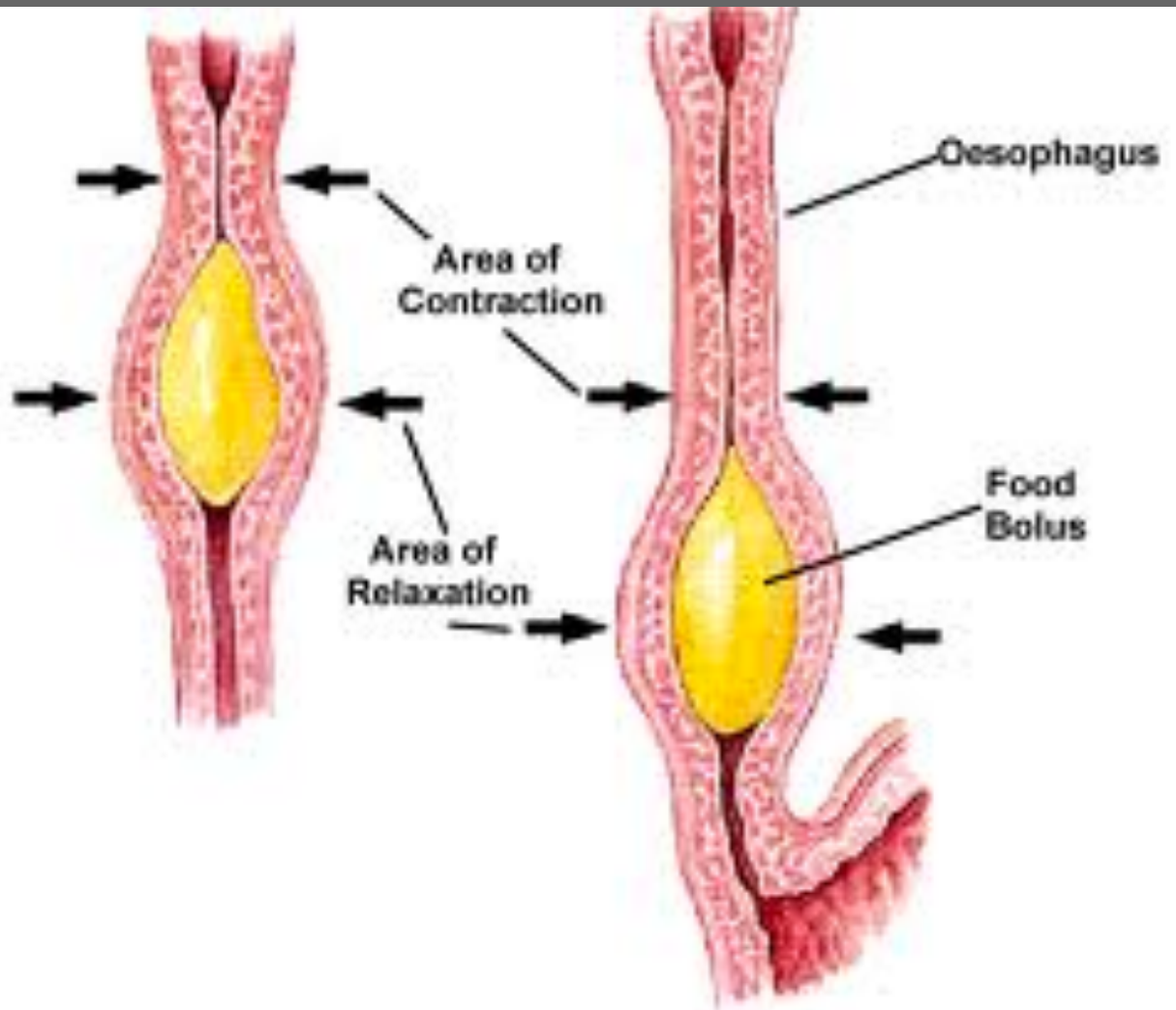
There are two processes that move the food into the body and along the digestive tract.

 Deglutition, (aka swallowing).

 Peristalsis, (muscular contractions that occur throughout the digestive tract, sending food from one organ to another).



Peristalsis



Step #2 - Digestion

Digestion involves the **transformation of food into nutrients**.

As food travels through the digestive tract, it breaks down at different places so that our bodies can **absorb the nutrients**. The **leftovers are evacuated** at the end of the digestive tract.

Types of transformation

Food undergoes two different types of transformation:

1-Mechanical: the physical breakdown of food into smaller pieces without changing its nature.

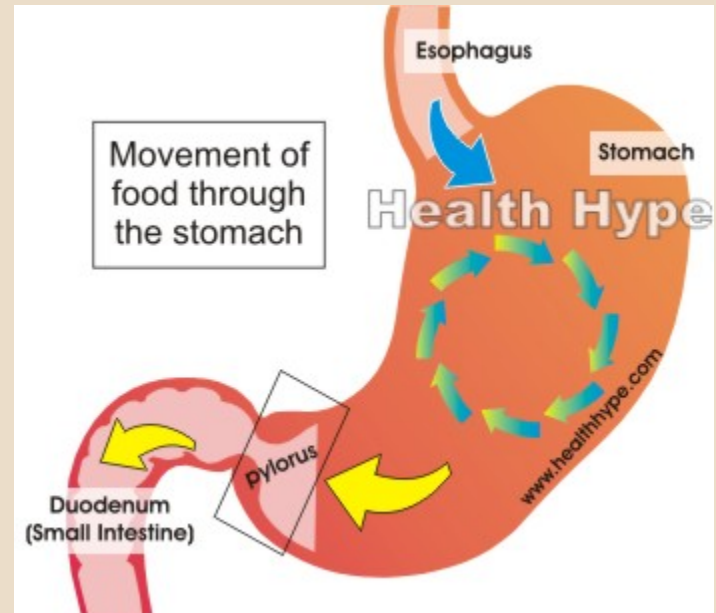
2- Chemical: the chemical breakdown of food to its molecular form. This occurs due to secretions in the tract.

Mechanical

Mechanical transformation of food happens twice in the digestive tract:

1-Chewing: Food is crushed and ground by the teeth in the mouth.

2-Churning: Food is mixed with stomach and intestinal juices due to muscle contractions.



Chemical

Chemical transformation of food occurs at many stages through the digestive tract.

The purpose is to **breakdown the complex molecules** into simple ones that the body can absorb, like proteins, carbohydrates and fats.

Vitamins, water and minerals are able to be immediately absorbed by the body.

Nutrient	Molecule	Purpose	Foods
Protein	Amino acids	Muscle building Metabolism Building proteins in the body	Animal by-products, (meat, eggs, dairy). Legumes, (peas, chickpeas). Nuts, (almonds, pistachios).
Carbohydrate	Simple carbohydrates like glucose	Obtaining fiber, vitamins, good sugars Energy	Fruits and vegetables Whole grains Processed foods
Fats	Fatty acids	Energy Growth Absorption of vitamins	Oils Nuts and seeds Some fish Fried food, margarine, some animal by-product

Digestive Glands	Secretions	Location	Targets
Salivary glands	Saliva	Mouth	Starch, (complex carbohydrate).
Gastric glands	Gastric juice	Stomach	Proteins
Intestinal glands	Intestinal juice	Small intestine	Proteins, carbs, fats
Pancreas	Pancreatic juice	Small intestine	Proteins, carbs, fats
Liver	Bile	Small intestine	Fats

Food digestion ends in the small intestine. From there, the nutrient molecules are absorbed and sent throughout the body.

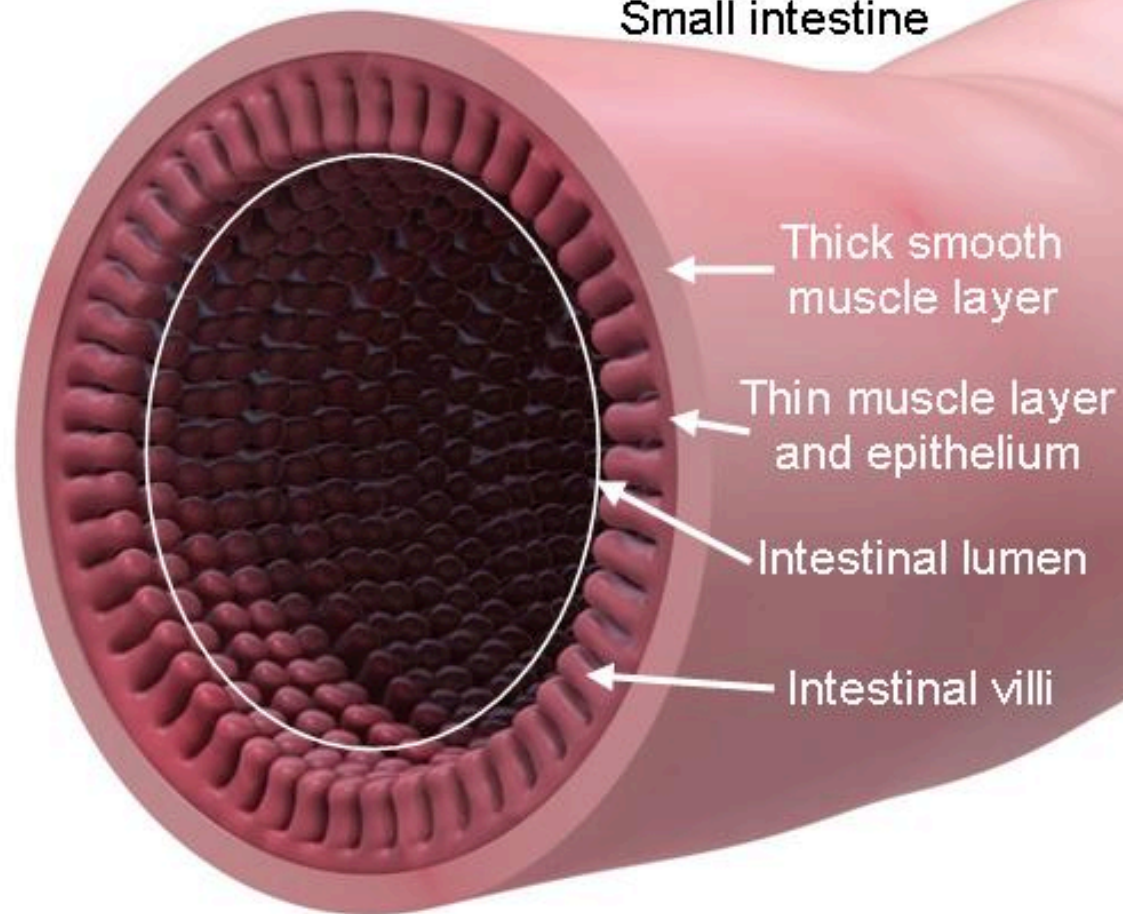
Step #3 - Absorption of nutrients

Once nutrients have been broken down, they are absorbed by the small intestine and sent to the blood.

The interior of the small intestine contain many folds called villi. Each villus contains blood.

The **blood will transmit the nutrients throughout the body** to where they are needed.

Small intestine



Step #4 - Elimination of fecal matter

- Most absorption occurs in the small intestine.
- Once that has occurred, the residue will be sent to the large intestine by **peristalsis**.
- Here, the **water will be absorbed** and the residue will compact.
- When the residue reaches the rectum, it will be **expelled via the anus**.

Organ	Food
Mouth	Chewed up and mixed with the saliva. Food bolus is soft and easy to swallow.
Stomach	Food bolus becomes <u>chyme</u> . Mixed with gastric juices. High liquid content.
Small intestine	Chyme is further broken down and mixed with bile, pancreatic and gastric juices. High liquid content, very little nutrition.
Beginning of large intestine	Water from the chyme is absorbed.
End of large intestine	Most liquid has been absorbed. Fecal matter is mostly solid.