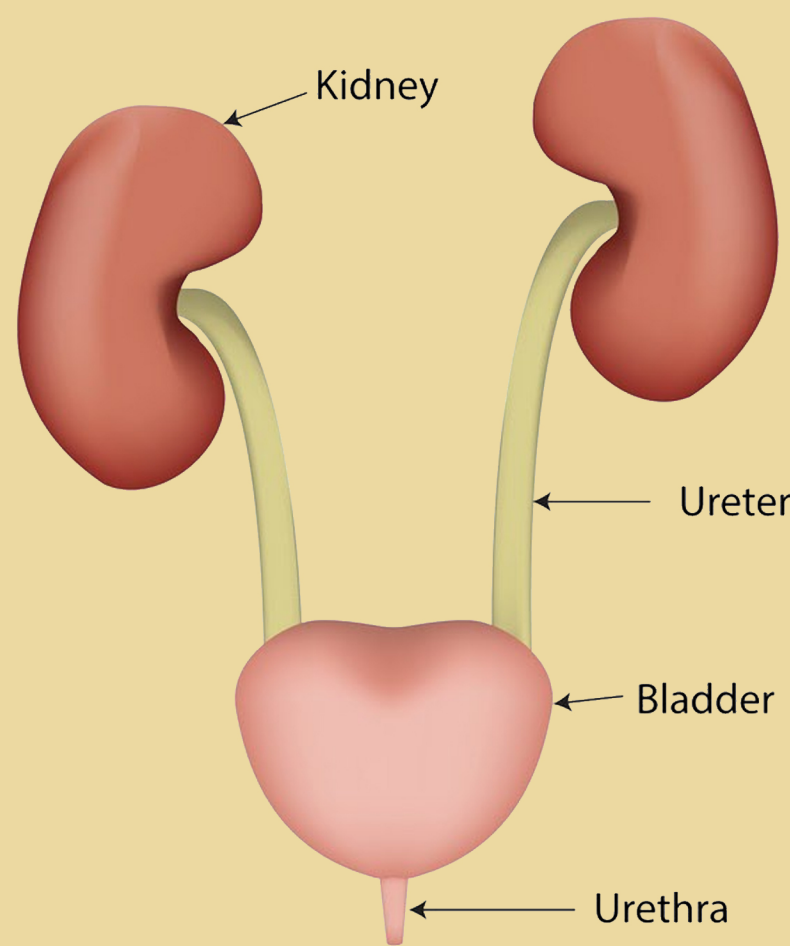
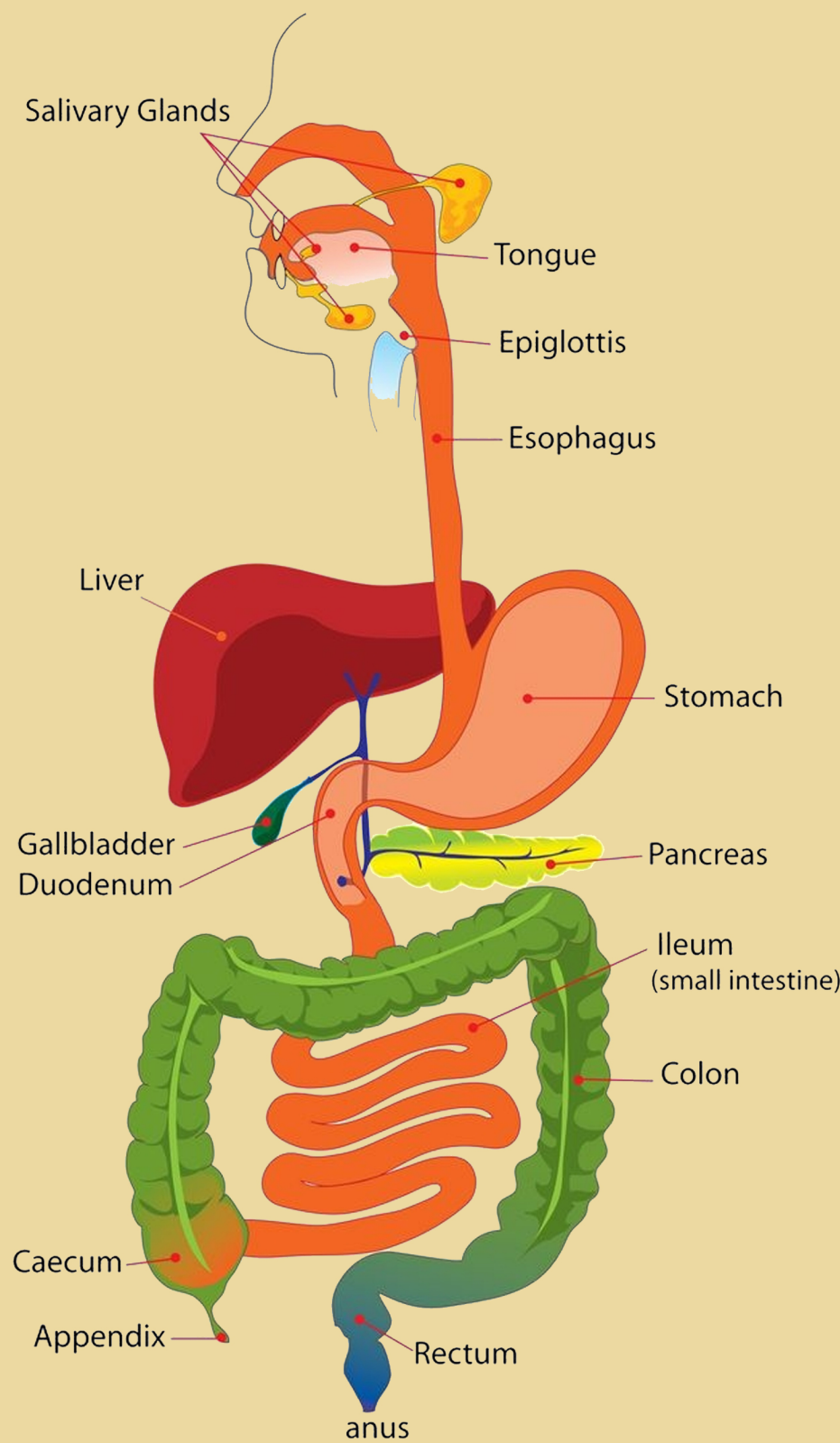




Our teeth cut and grind food into small pieces
(Mechanical Process)

At the same time, Salvia is released out of three salivary glands in response to the taste, smell, or thought of food. (Chemical Process)

Saliva contains the enzyme Amylase which begins the breakdown of starches into sugar and the bacteria killing enzyme and antibodies that guard against infection. (Chemical Process)

Food molecules dissolved in saliva are carried to taste buds on the tongue that identify the type and quality of the food. (Mechanical Process)

Food lubricated and softened by salvia is manipulated into a round mass by the tongue and pressed back and down into the pharynx. (Mechanical Process)

the pharynx connects the mouth and the esophagus and via the larynx, nose, and mouth to the trachea, which conducts air to the lungs. (Mechanical Process)

During swallowing, the epiglottis blocks off the respiratory passage, and directs food into the esophagus. (Mechanical Process)

Circular muscles surrounding the esophagus contracts in sequences above the food, squeezing it down into the stomach. this muscular action is called peristalsis. It also moves the food through the stomach and intestines. (Mechanical Process)

As food reaches the stomach (an expandable muscular sack and can hold two-three liters of food/liquid), a number of things happens

H) Peristaltic waves occurring at about twenty seconds intervals propell the chyme into the small intestine. (Mechanical Process)

I) Pyloric Sphincter - It's at the base of the stomach, and allows only a teaspoon of chyme to pass through to the small intestine with each wave. Depending on the size of the meal, it can take two to six hours to empty the stomach.

Small Intestine - It's a coiled metered tube about six meters long and about two to five centimeters in diameter.

Duodenum - This is what the first twenty-five meters of the small intestine is called.

Two major functions of small intestine:

- * Breakdown food into small molecules
- * Then to absorb these molecules into the blood streams.

This digestion of food is accomplished with the help of digestive secretion of three sources:

- Liver
- Pancreas
- Cells of the small intestine

Liver - Largest and most versatile organ in the body. In digestion, it produces bile that is stored and concentrated in the Gall Bladder and released into the duodenum through the Bile Duct. (Chemical Process)

- a) Storage of fats and carbs
- b) Regulation of blood glucose levels
- c) Synthesis of blood proteins
- d) Storage of iron and certain vitamins
- e) conversion of ammonia to urea
- d) Detoxification of harmful substances

Bile - A complex mixture composed of bile salt, water, other salts, and cholesterol. Bile salts are synthesized in the liver from cholesterol and amino acids. Although they assist in the breakdown of lipids, bile salts are not enzymes. Instead they act as emulsifying agents surrounding microscopic fat particles in the chyme and preventing them from joining fat globules. It's important to keep fat particles from joining into globules so that they can be more easily broken into small molecules by lipases.

Lipases - These are lipid digesting enzymes produced by the pancreas.

Pancreas - Produces a digestive secretion called pancreatic juice which (like Bile) is released into the duodenum.

Pancreatic Juice Role: to neutralize the acidic chyme. It also breaks down carbohydrates, lipids and proteins

About one liter of water, sodium bicarbonate, and digestive enzymes is released each day. These ingredients make up the pancreatic juice.

Sodium Bicarbonate: Neutralizes the acidic chyme and produces a slightly basic pH required for the proper functioning of digestive enzymes in the pancreatic juice.

There are a number of pancreatic enzymes which are found in Pancreatic Juice:

- * Amylase - A digestive enzyme that breaks down carbohydrates
- * Lipases - Breaks down lipids
- * Proteases - Breaks apart proteins and peptides (Protease includes Trypsin, Chymotrypsin, and Carboxypeptidase.)

Both Trypsin and Chymotrypsin break proteins and polypeptides into shorter peptide chains.

Then Carboxypeptidase completes protein digestion by separating the individual amino acids from the ends of the peptide chains.

Like the stomach, the small intestine is protected from digestive enzymes by large amounts of mucus.

Specialized cells studding the wall of the small intestine complete the digestive process and absorb the small molecules that result.

These cells have various enzymes on their external membranes:

Proteases: complete the breakdown of peptides into amino acids, sucrose, lactose, and maltase. These break disaccharides down into monosaccharides, and lipases which further digest lipids.

Villi: Tiny finger-like structures project inwards from the lining of the small intestine. Their function is to increase the absorption of nutrients molecules from the blood passing through the small intestine. they move back and forth and give a velvety feel to the small intestine.

Microvilli : Also assist in the absorption of nutrients. They are also microscopic projections.

Taken together Villi and Microvilli nutrient contact is increased by the rhythmic unsynchronized muscular contractions of the wall of the small intestine which slowly slosh the chyme back and forth with villi and micro villi lining the small intestine. (Mechanical Process)

Small Intestine absorbs these nutrients:

- Water - absorbed by osmosis
- Monosaccharides
- Amino acids
- Short Peptides
- Fatty acids
- Vitamins and minerals

In most cases, the energy is expended to transport nutrients into the Intestinal cells. (Mechanical Process)

From the intestinal cells, the nutrients diffuse the Interstitial Fluid where they then enter the blood stream via the capillaries.

Each Villus of the small intestine is provided by a rich supply of blood capillaries and a single lymph capillary called a Lacteal to carry off the absorbed nutrients and to distribute them throughout the body.

Most of the nutrients enter the blood through the capillaries, but fat subunits take on a different route.

After diffusing into the Epithelial Cells, Fat subunits are resynthesized into fats, combine with other molecules, and then released as droplets into the Interstitial Fluid.

These droplets are too large to enter the capillaries and so they enter the Lacteal and are eventually delivered into the blood stream when the Lymph Vessels empty into larger veins.

When absorption in the small intestine is complete, coordinated Peristaltic Waves conduct the remaining chyme into the large intestine.

Large Intestine - About 1.5 meters and 7.5 centimeters in diameter. For most of its length the large intestine is referred to as the colon. However, the final 15 centimeters is referred to as the Rectum.

Into the large Intestine flow the left over of the digestion which includes:

- * Water
- * Fat and proteins
- * Indigestible fibers (such as the cell walls of veggies and fruits)

The Large intestine contains a flourishing population of bacteria that live on unabsorbed nutrients.

Bacteria earn their keep by synthesizing Vitamin B12, Thiamin, Riboflavin, Vitamin K which would be deficient in a normal diet.

The cells lining the large intestine absorb these Vitamins as well as leftover water and salts.

Once the absorption is complete, the results are semisolid feces consisting of indigestible wastes and bodies of bacteria which account for half of the dry weight of feces.

The feces are transported by Peristaltic movements until they reach the Rectum. The expansion of the rectum stimulates the desire to defecate. (Mechanical Process)

There are two rectal sphincters at the end:

- one that opens involuntarily under rectal stimulation.
- another that is stimulated voluntarily.

Kidneys - they are paired kidney bean shaped organs located on either side of the spinal column, extending just above the waste.

When blood is carrying waste enters each kidney through renal artery after it has been filtered blood exits through the Renal Vein. (Chemical Process)

Urine - A mixture of water, dissolved toxins and some excess nutrients leaves each kidney through a narrow muscular tube called Ureter. (Mechanical Process)

The contractions drive the urine through the ureter and into the bladder.

Urine is retained in the bladder by two sphincter muscles just above the urethra.

When the bladder becomes full, receptors in the wall trigger reflexive contractions. the sphincter nearest to the bladder (the internal sphincter) is open during these contractions. However the lower external sphincter is under voluntary control. the reflex can be suppressed by the brain.

The urine completes its journey by passing a narrow tube called the Urethra.