**Mouth and Oesophagus**

The process of digestion starts off in the mouth where it starts the process chemically and mechanically. It first begins with mechanical digestion as the teeth grinds on the rice and physically breaking it down into smaller pieces. As the teeth grinds on the rice, salivary glands secrete saliva at the back of the mouth. It contains mucus and a digestive enzyme, salivary amylase. This begins the chemical digestion as the salivary amylase breaks down starches, the rice, and its carbohydrate into sugars. Once the rice has been broken down and mixed with saliva, it forms into a ball like structure called bolus.

Through the movement of upward and backwards, the tongue pushes the bolus into the pharynx for swallowing. As the bolus enters the pharynx and oesophagus, the epiglottis covers the larynx to prevent the bolus from entering the trachea. The oesophagus has a double layer of muscle made up of circular muscle. This muscle contracts to form a constriction, and the constriction moves in a wave along the esophagus, pushing the bolus forward. This wave of constriction is called peristalsis. As the bolus moves along the oesophagus, it is lubricated by the secretion of the mucus from the inner lining of the oesophagus. The process takes around 10-15 seconds or more, depending on the pace the person eats and 5-10 seconds down the oesophagus.

**Stomach:**

The mechanical digestion in the stomach begins as a wave of muscular contraction that move along the stomach wall, allows the stomach to contract in varies of way to churn the bolus. As the bolus is churned, it is mixed with the gastric juice. Gastric juice is secreted from the stomach lining, which contains hydrochloric acid, mucus, and digestive enzymes. The bolus is converted into to a thick, soupy liquid called chyme.

The chemical digestion occurs through the enzymes in the gastric juice. The enzyme pepsin, also known as gastric protease, breaks bonds between certain amino acids. As the bonds break, the long chains of amino acids that make up the protein molecules are broken into shorter chains called polypeptides. Nutrients are not absorbed through the stomach due to the internal surface area being covered by a thick layer of mucus. There is a thickening at the lower end of the stomach of the circular muscle resulting in a constriction (pyloric sphincter). This constriction prevents the chyme from being pushed through unless being pushed along by the peristalsis. The process takes around 30 minutes to 4 hours, then the stomach contents are gradually pushed through to the small intestines.

**Small Intestine:**

### Breakdown

The process of rice digestion continues in the small intestine. The first part of the small intestine is called the duodenum, where the chyme is received as it is pushed through the pyloric sphincter from the stomach. The chyme is blended with various digestive juices from the pancreas and liver. Digestive juices such as intestinal juice secreted by glands in the lining, pancreatic juice secreted by the pancreas, and bile stored in the gall bladder and secreted by the liver. The pancreatic amylase, from pancreatic juice, breaks down starch into disaccharides and trypsin or pancreatic protease (also from pancreatic juice), breaks proteins into small chains of amino acids. The intestinal juice, containing many enzymes, breaks down the complex carbohydrate into simple sugars. Bile contains no digestive enzymes but break fat into droplets, which increases surface area which lipases can act to chemically break down fat. The fluid chyme then travels into the jejunum and subsequently the ileum of the small intestine, where majority of the water and nutrients like glucose and amino acids are absorbed.

### Absorption

The mucosa, inner lining the small intestine, has folds that extends into the interior. Mucosa has villi, a small finger-like projection, that extends from the folded surface. Each villi have microvilli that covers its surface. These microvilli are cells that have tiny, microscopic projection. These increase a large surface area as efficient absorption require large surface area. Villi constantly come into contact with various components of the intestinal contents due to the continuous movement of the villi caused by the muscular contractions of the intestinal wall.

From the walls of the intestine amino acid and simple sugars, such as glucose, are absorbed through active transport. They pass through the cells on the outside of the villi and into the blood capillaries. Water and water-soluble vitamins are absorbed into the blood capillaries through diffusion. Fatty acids and glycerol are absorbed by simple diffusion. Product is absorbed through the walls, villa and microvilli, of the small intestine into the bloodstream. Any remainder of semi-solid substances that is still in the colon after water absorption, it is forced by peristalsis into the rectum. The process takes about 2-6 hours.

**Material breakdown and use.**

Rice has roughly 90% carbohydrates, 8% protein, and 2% fat. Magnesium, phosphorus, manganese, selenium, iron, folic acid is among nutrients that can be found in white rice in good amounts. Rice also mainly breaks down into niacin and thiamine.

Niacin, also known as vitamin B3, converts food into energy. Nicotinic acid and nicotinamide are the two types of niacin that are frequently found in food. It benefits skin, digestive system, and neurological system. The coenzyme nicotinamide adenine dinucleotide (NAD), which is the predominant metabolically active form of niacin, is produced by all bodily tissues from ingested niacin. Thiamine, often known as vitamin B1, helps the body convert food (carbohydrates) into fuel (glucose), which the body uses to produce energy. It is essential for different cells to grow and operate properly.

**The large intestine**

Majority of the remaining water, vitamins, and minerals from the chyme is absorbed, the semi- solid material left after water absorption and bacterial action makes up the faeces. Remaining compounds are broken down in the large intestine by bacteria. Some bacteria produce vitamins that are absorbed into the bloodstream, as well as mineral nutrients. Gut bacteria ferment it during this process. Through this mechanism, the bacteria can consume the majority of the undigested complex carbohydrates as fuel and create gas as a by-product.

Trillions of bacteria in the large intestine generate vitamins and defend our digestive system to prevent infection and pathogen attack. By fermenting nutrients, the bacteria in the colon produce significant amounts of vitamins. The bacteria in the colon make biotin, vitamin K, and other B vitamins. The blood is then absorbed with these vitamins. Its main job is to recover energy from carbohydrates that aren't fully digested in the upper stomach. Stage of process may take 18-24 hours for material to pass through and an average of 36 hours for material to pass through the whole colon.

**Excretion**

The compacted waste is sent from the large intestine to the rectum as faeces. The rectum is the largest portion of the large intestine, and it is where faeces are kept until removed. Peristalsis forces semi-solid material that is still in the colon after water absorption into the rectum. Defecation is a reaction brought on by the rectum's walls stretching. As the muscles surrounding the anus loosen, excrement can be expelled. Faeces are eliminated through the anus. The anus is the external opening at the end of the rectum and has a circular muscle called the anal sphincter. Faeces are expelled from the rectum through the anus (and hopefully out of the body into the toilet).

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