Digestion and Absorption Notes

What is Digestion?

The food we eat gives us energy as it contains carbohydrates, proteins, fats, vitamins, and minerals necessary for our functioning. Biomacromolecules present in the food do not convert into energy directly but have to be broken into simple substances. The digestive system converts the complex food substances into simple absorbable forms, and this process is termed as digestion.

Digestion and Absorption: Digestive System in Humans

As per the chapter Digestion and Absorption, the digestive system of humans consists of a variety of organs and sub-processes which together makes it possible to digest the food. The alimentary canal and associated glands make up for the digestive system. The alimentary canal (digestive tract) consists of tube-like structures that make a pathway from the mouth to the anus. Let us have a look at various digestive system organs and their functions present in the alimentary canal-

Mouth and Oral Cavity

The oval-shaped cavity through which humans eat and speak is called the mouth. The mouth leads to an oral cavity which consists of tongue, palate, and teeth. The movable muscular organ at the base of the oral cavity is called the tongue, and they have small projections called papillae, leading to taste buds. Being diphyodont, we humans have two sets of teeth throughout our life. Children have temporary milk or deciduous teeth and adults have a set of 32 permanent teeth classified as incisors, canine, premolars, and molars.

Pharynx

The pharynx permits the passage of food to the oesophagus and circulation of air to the trachea (windpipe) during respiration. The epiglottis tissue flap at the top of the trachea stops the food from entering the trachea (windpipe) during swallowing.

Stomach

The oesophagus leads to the stomach, which is present on the top-left portion of the abdominal cavity. The stomach is further divided into four parts – cardiac part, fundus, body (central region) and pyloric (opens into the intestine).

Small Intestine

The longest portion of the alimentary canal is the small intestine which can be identified as Duodenum (c-shaped structure), Jejunum (middle portion), and Ileum (opens into the large intestine).

Large Intestine

The Ileum portion of the small intestine opens to the large intestine. The large intestine is divided into Caecum (small sac-like structure), Colon, and Rectum (descending part leading to anus).

Digestion and Absorption: Digestive Glands

The chapter Digestion and Absorption thoroughly elucidate the digestive glands involved in the process of digestion. The digestive glands of the alimentary canal include the salivary glands, the liver, and the pancreas. Mentioned below is a detailed description of glands used in the digestion-

Salivary Glands: These glands produce saliva in our mouth and are classified as parotid glands, submandibular glands, and sublingual glands.

Liver: Located in the abdominal cavity, the liver is the largest gland weighing 1.2 to 1.5 kgs and is divided into left lobe and right lobe. The liver filters the blood received through the digestive tract and disperses it to the rest of the body. The liver works in tandem with the gallbladder, pancreas, and intestine

Pancreas: The pancreas is divided into endocrine and exocrine glands. The exocrine glands generate enzymes that break down carbs, fats, proteins, and acids in the duodenum. The endocrine glands secrete insulin and glucagon hormones that regulate glucose levels in the blood.

Digestion and Absorption: Digestion of Food

The digestion process starts in the oral cavity. The different digestive enzymes act on food at different stages through the digestive process. The body breaks its food through mechanical and chemical digestion functions. Let us have a look at what the digestion and absorption chapter says about it-

Mechanical Digestion

This stage begins when the food morsel is chewed in the mouth and reaches the stomach where it is churned and gets segregated in the small intestine. During

Peristalsis, the muscles of the oesophagus, stomach, and intestines involuntarily contract and relax while breaking down the food.

Chemical Digestion

Once the food moves to the small intestine, the chemical digestion takes place. Here Enzymes are secreted that break down the fats into fatty acids, carbohydrates into monosaccharides, proteins into amino acids, and nucleic acid into nucleotides.

Absorption of Digested Products

Here are some important pointer with respect to the process of digestion and absorption of food-

- Absorption happens when the end digestive product passes through the intestine into the bloodstream or lymph
- Fructose and amino acids are absorbed with special carriers like ions (Na+), and this is termed as facilitated transport
- The insoluble components like fatty acids and glycerol are converted into small droplets called micelles before moving into the intestinal mucosa
- These micelles reform into a protein called chylomicrons and are then transported to the lacteals in the vill
- Assimilation is when the tissues utilize the absorbed substance for their activities
- The removal of faeces through the anus is a voluntary action and is carried out by the peristaltic movement

Digestion and Absorption: Disorder of the Digestive System

Gastrointestinal diseases or disorders interfere with the digestion process and give rise to various ailments. Inflammation of the intestinal tract is attributed to bacteria and viral infections from parasites like tapeworm, threadworm, hookworm, and roundworms. Here are some of the main disorders or diseases mentioned in the chapter digestion and absorption-

Jaundice

Also termed as yellow fever, jaundice releases high levels of bilirubin (yellowish-orange bile pigment) which turns the skin, sclera and mucous of the affected patient yellow in colour.

Vomiting

Nausea and vomiting are not diseases by itself. They are underlying symptoms of various other diseases or illnesses. An uneasiness in the stomach causes one to forcibly throw out the contents of the stomach through the mouth. The medulla oblongata often controls the vomiting reflex.

Diarrhoea

The frequent discharge of loose, watery stools is called diarrhoea, and it reduces the absorption of nutrients and fluids in the body.

Constipation

Constipation occurs when bowel movement becomes less frequent, and faeces are retained in the colon due to changes in daily routine or inadequate intake of water and fibre.

Indigestion

Indigestion is an upset stomach causing discomfort and abdominal pain, leading to a feeling of fullness. This happens when inadequate enzymes are secreted, due to which the person suffers from food poisoning, anxiety, overeating or intake of spicy food.