14. Human Nutrition

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1. Choose correct option.

A. Acinar cells are present in …….

a. Liver

b. pancreas

c. gastric glands

d. intestinal glands

B. Which type of teeth are maximum in number in human buccal cavity?

a. Incisors

b. Canines

c. Premolars

d. Molars

C. Selected odd one out on the basis of digestive functions of tongue.

a. Taste

b. Swallowing

c. Talking

d. Mixing of saliva in food

D. Complete the analogy: Ptyalin: Amylase: : Pepsin : ……..

a. Lipase

b. Galactose

c. Proenzyme

d. Protease

2. Answer the following questions.

(1) For the school athletic meet, Shriya was advised to consume either Glucon-D or Fruit juice but no sugarcane juice. Why it must be so ?

Ans. (1) Glucon-D Is the powder of monosaccharide glucose. Fruit juice contains sugar in the form of monosaccharide fructose.

(2) Sugarcane juice on the other hand is disaccharide molecule made from mono saccharides, glucose and fructose.

(3) If Shriya takes sugarcane juice, it will take some time to digest it by breaking its disaccharide molecules into monosaccharides, till it can supply energy. For instant energy, glucon-D or fruit juice is definitely a helpful choice.

(4) Moreover, sugarcane juice from any vendor may not be hygienically squeezed and hence can cause infections of gastro-intestinal tract.

(2) Alcoholic people may suffer from liver disorder. Do you agree ? Explain your answer.

Ans. (1) Alcoholic people always suffer from liver disorders of various types.

(2) Alcohol in any form is a toxin.

(3) Whenever it comes in gastro-intestinal tract, the liver tries to detoxify it.

(4) But after repeated intake or addiction, the liver fails to function due to various disorders caused by alcohol consumption.

(5) Steatosis which means the infiltration of liver cells with fat that results into disturbance of the metabolism is the major problem due to alcoholism.
Commonly it is known as fatty liver.
Also alcoholic hepatitis, fibrosis and cirrhosis are the common problems due to overconsumption of alcohol.

(3) Digestive action of pepsin comes to a stop when food reaches small intestine. Justify.

Ans. (1) Pepsin requires acidic medium for the action of protein digestion. This acidic pH is provided by dilute HCl secreted by the gastric glands.

(2) Once the food enters the duodenal part of the small intestine, there is alkaline condition.
Bile juice being alkaline, makes the food alkaline.

(3) Pepsin cannot act in the alkaline condition.
Hence, the digestive action of pepsin comes to stop when the food reaches small intestine.

(4) Small intestine is very long and coiled.
Even if we jump and run, why it does not get twisted ? What can happen if it gets twisted ?

Ans. The coils of intestine are held in place with the help of mesenteries. In normal case they are not twisted. But under some pathological problems the rotation of viscera may take place around its mesenteric attachments. This is called a condition of volvulus. Sometimes the viscera rotates about its own axis.

3. Write down the explanation

A. Digestive enzymes are secreted at appropriate time in our body. How does it happen ?

Ans. (1) The digestive enzymes and various juices are produced in sequential manner and at a proper time.

(2) These secretions are under neurohormonal control.

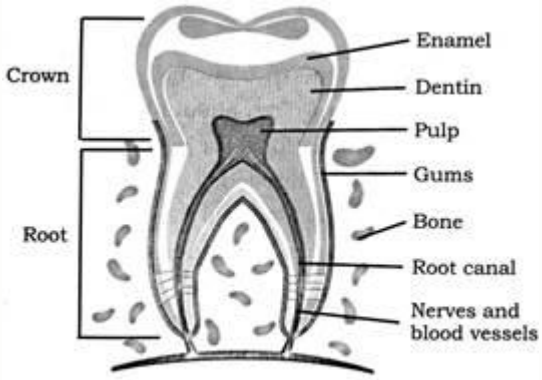
(3) Tenth cranial nerve stimulates secretion of gastric juice in stomach. The neural impulses such as sight, smell and thoughts of favourite food trigger saliva secretion.

(4) The hormonal reflexes also control the secretion of digestive enzymes.

(5) Hormones like gastrin, ghrelin, cholecystokinin, gastric inhibitory peptide and secretin, enterokinase, etc. bring about hormonal coordination for stimulating glands associated with gastro-intestinal tract.

B. Explain the structure of tooth. Explain why human dentition is considered as thecodont, diphyodont and heterodont.

Ans.



Tooth anatomy

(1) Structure of tooth:

(a) The part of tooth that projects above the gum is called crown.

(b) The root is made up of two or three projections. These are embedded in gum.

(c) Crown is connected with the root by short neck.

(d) The crown is covered by enamel. Enamel is the hardest substance in the body and is made up of calcium phosphate and calcium carbonate.

(e) Basic shape of tooth is derived from dentin, a calcified connective tissue.

(f) The dentin encloses a cavity called pulp cavity containing blood vessels and nerves.

(g) It is filled with connective tissue pulp.

(h) Root canal is the extension of the root in the pulp cavity of tooth.

(i) The dentin of the root of tooth is covered by cementum, a bone like substance that attaches the root to the surrounding socket in the gum.

(2) Thecodont, diphyodont and heterodont :

(a) Human dentition is thecodont, diphyodont and heterodont.

(b) Thecodont because, the human teeth are fixed in a separate socket present in jaw bones by gomphosis which is also called a peg and socket joint.

(c) During life time humans get two sets of teeth, named as milk teeth and permanent teeth. That is why it is called diphyodont dentition.

(d) Heterodont dentition means having different types of teeth. Humans have incisors, canines, premolars and molars. Therefore, humans are heterodont.

C. Explain heterocrine nature of pancreas with the help of histological structure.

Ans. (1) Pancreas is called heterocrine gland because, it is exocrine as well as endocrine in function.

(2) Therefore, there are two parts in the tissue of pancreas. The exocrine part of pancreas is made up of acini. Acini consist of acinar cells.
They secrete alkaline pancreatic juice which have digestive enzymes such as trypsinogen, chymotrypsinogen, pancreatic amylase and pancreatic lipase.

(3) In between acini there are interlobular ducts that carry pancreatic juice to common pancreatic duct.

(4) The islets of Langerhans are present in between the acini. The islets contain three types of cells viz. α -cells, β -cells and δ-cells. Each type produces particular hormone which are concerned with following functions:

(5) α-cells produces glucagon, β-cells produce insulin and δ-cells produce somatostatin.

(6) Insulin lowers the blood sugar level while glucagon raises the blood sugar level. Thus both hormones control the blood-sugar level.

(7) Somatostatin hormone inhibits glucagon and insulin secretion.

4. Write short note on.

A. Position and function of salivary glands:

Ans. (1) The salivary glands are multicellular glands situated in the buccal cavity.

(2) There are three pairs of salivary glands, viz. sublingual located below the tongue, submandibular located below the lower jaw and parotid located in front of the ear.

(3) There are two types of secretory cells in the salivary glands, viz. serous cells and mucous cells.

(4) The serous cells produce watery fluid called saliva which contains digestive enzyme called ptyalin or salivary amylase, while mucous cells produce mucus.

Functions :

(1) Saliva helps in partial digestion of starch to maltose.

(2) The Mucus and watery fluid makes swallowing easier by binding the morsel of food.

B. Jaundice:

Ans. (1) Jaundice is a condition in which there is abnormal bilirubin metabolism and excretion.

(2) There is some abnormality at some stage in the metabolic sequence taking place in the liver.

(3) This is caused by excess haemolysis of red blood cells, which results in excessive production
of bilirubin. The higher level of bilirubin is not tolerated by the liver.

(4) The obstruction of bile flow from the liver to the duodenum, also results in overall abnormal liver function.

(5) Bilirubin exists in two forms, water soluble and fat soluble bilirubins. Water soluble bilirubin or fat soluble bilirubin is formed by the breakdown of haemoglobin. Water soluble part is excreted out along with the urine.

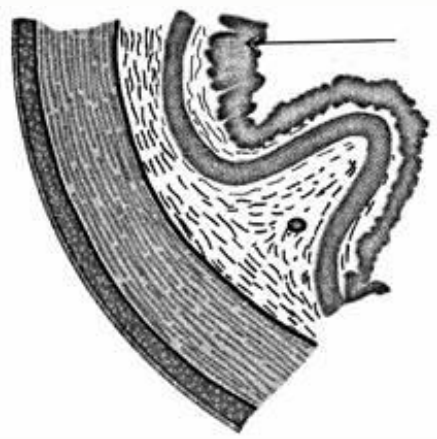
(6) Fat soluble bilirubin causes harmful effect on the brain cells.

(7) Pale face, dark urine, yellowing of eyes and whitish stool are main symptoms of jaundice.

(8) Jaundice can be treated by supportive care, bed rest, proper diet and treating the cause.

(9) However there is neither specific drug available for jaundice nor specific treatment for jaundice.

5. Observe the diagram. This is histological structure of stomach. Identify and comment on significance of the layer marked by arrow.



Ans. The structure marked by arrow is mucosa of the stomach. It has gastric glands which secrete gastric juice that helps in digestion.

6. Find out pH maxima for salivary amylase, trypsin, nucleotidase and pepsin and place on the given pH scale.

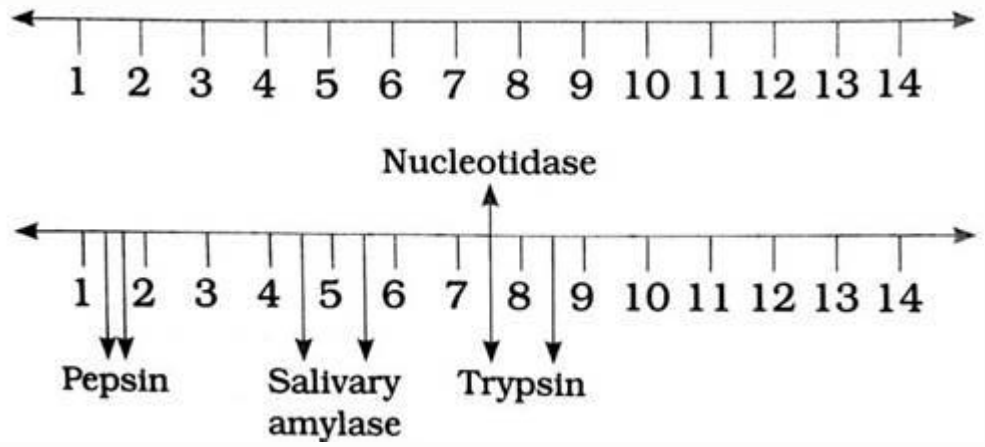
Ans. pH maxima for the given are as follows:

(1) Salivary amylase : 4.6 to 5.2

(2) Nucleotidase : 7.5

(3) Trypsin : 7.8 to 8.7

(4) Pepsin : 1.5 to 1.6



7. Write the name of a protein deficiency disorder and write symptoms of it.

Ans. (1) Kwashiorkor is the disorder caused due to protein deficiency in diet. It is a common problem among malnourished infants and children between 1 and 3

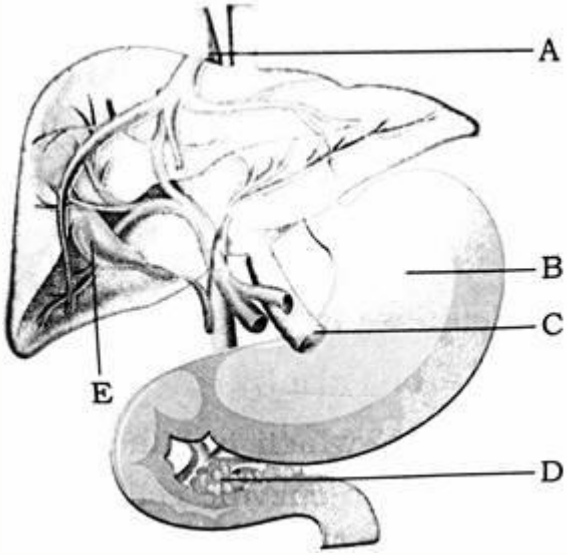
years of age.

(2) Symptoms of Kwashiorkor:

(a) Underweight (b) Stunted growth (c) Poor brain development (d) Loss of appetite

(e) Anaemia (1) Protruding belly (g) Slender legs (h) Bulging eyes (1) Oedema of lower legs and face (1) Change in the skin (b) Stunted growth and hair colour.

8. Observe the diagram given below, label the A, B, C, D, E and write the function of A, C in detail.



Ans. A: Bile ducts,

B : Stomach,

C: Mesenteric Artery,

D: Pancreas,

E: Gall bladder.

Functions : Bile ducts carry bile juice to gall bladder. Mesenteric artery supplies blood to liver.