**Topic D.2: Digestion**

**Essential Idea: Digestion is controlled by nervous and hormonal mechanisms.**

**Statements & Objectives:**

**D.2.U1 Nervous and hormonal mechanisms control the secretion of digestive juices.**

Describe when the secretion of digestive juices must be controlled.

(**Describe** Give a detailed account or picture of a situation, event, pattern or process.)

State to mechanisms by which secretion of gastric juices is controlled.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

**D.2.U2 Exocrine glands secrete to the surface of the body or the lumen of the gut.**

Define alimentary canal.

**(Define** Give the precise meaning of a word, phrase, concept or physical quantity.)

Contrast endocrine glands with exocrine glands.

**(Contrast** Give an account of the differences between two (or more) items or situations, referring to

both (all) of them throughout.)

Label a diagram of an exocrine gland with the following terms: secretory cells, lumen, duct, secretory vesicles, basement membrane and acinus.

(**Label** Add title, labels or brief explanation(s) to a diagram or graph.)

Discuss the relationship between the structures of an exocrine gland cell and the function of the cell.

(**Discuss** Offer a considered and balanced review that includes a range of arguments, factors or

hypotheses. Opinions or conclusions should be presented clearly and supported by

appropriate evidence.)

State the name and location of three exocrine glands associated with the alimentary canal.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

State the composition of saliva, gastric juice and pancreatic juice.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

**D.2.U3 The volume and content of gastric secretions are controlled by nervous and hormonal mechanisms.**

Using a flow chart or concept map, diagram the interactions between nervous and hormonal mechanisms that regulated the secretion of gastric juices

**D.2.U4 Acid conditions in the stomach favour some hydrolysis reactions and help to control pathogens in ingested food.**

Outline three roles of acid in the stomach.

(**Outline** Give a brief account or summary.)

**D.2.U5 The structure of cells of the epithelium of the villi is adapted to the absorption of food.**

Outline the role of the following structures of villi epithelial cells: tight junctions, microvilli, mitochondria, pinocytic vesicles, proteins imbedded on the apical surface and proteins imbedded on the basal surface.

(**Outline** Give a brief account or summary.)

**D.2.U6 The rate of transit of materials through the large intestine is positively correlated with their fibre content.**

List benefits of fibre in a healthy diet.

(**List** Give a sequence of brief answers with no explanation.)

State the relationship between food fibre contents and rate of transit through the large intestine.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

**D.2.U7 Materials not absorbed are egested.**

Define dietary fibre.

**(Define** Give the precise meaning of a word, phrase, concept or physical quantity.)

State two examples of dietary fibre.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

Define egestion.

**(Define** Give the precise meaning of a word, phrase, concept or physical quantity.)

List materials that are egested from the body.

(**List** Give a sequence of brief answers with no explanation.)

**D.2.A1 The reduction of stomach acid secretion by proton pump inhibitor drugs.**

State the role stomach mucus.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

State the cause of ulcer and acid reflux.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

Outline the role of the H+, K+ -ATPase protein pump in the production of an acidic stomach.

(**Outline** Give a brief account or summary.)

Outline the use, function and effect of proton pump inhibitors to treat gastric disease.

(**Outline** Give a brief account or summary.)

**D.2.A2 Dehydration due to cholera toxin.**

Outline the cause and consequences of cholera infection.

(**Outline** Give a brief account or summary.)

Explain the effect of cholera toxin on intestinal cells.

(**Explain**: Give a detailed account including reasons or causes)

**D.2.A3 Helicobacter pylori infection as a cause of stomach ulcers.**

Define stomach ulcer.

**(Define** Give the precise meaning of a word, phrase, concept or physical quantity.)

Outline evidence that suggest Helicobacter pylori infection has a role in stomach ulcer and stomach cancer.

(**Outline** Give a brief account or summary.)

**D.2.S1 Identification of exocrine gland cells that secrete digestive juices and villus epithelium cells that absorb digested foods from electron micrographs.**

List three features that can be used to identify exocrine gland cells as viewed in electron micrographs.

(**List** Give a sequence of brief answers with no explanation.)

List four features that can be used to identify villus epithelium cell as viewed in electron micrographs.

(**List** Give a sequence of brief answers with no explanation.)

**D.2.NOS Serendipity and scientific discoveries—the role of gastric acid in digestion was established by William Beaumont while observing the process of digestion in an open wound caused by gunshot.**

Describe how William Beaumont was able to determine the role of the stomach in chemical digestion of food.

(**Describe** Give a detailed account or picture of a situation, event, pattern or process.)

**Key Terms**

Digestion

​gastric juices

​alimentary canal

​secretory vesicles

tight junctions

basal surface

​small intestine

​protein pump

​dehydration

​William Beaumont

ingestion

​enzymes

endocrine glands

​basement membrane

​hormonal mechanisms

​pinocytic vesicles

​large intestine

​stomach mucus

​cholera

​somatostatin

egestion

exocrine glands

secretory cells

​pancreatic juice

epithelial cells

​mitochondria

​fiber

​ulcer

​saliva

​chemoreceptors

absorption

​lumen

​acinus

​nervous mechanisms

hydrolysis reactions

apical surface

​constipation

​acid reflux

*Helicobacter pylori*

Pepsin

Hormones

​Gut

​duct

stomach

villi

​microvilli

​dietary fiber

​gastric disease

​secretin

​