MATRIC NO; 16/MHS06/067

COURSE TITLE; HISTOPATHOLOGY TECHNIQUES AND MUSEUM

COURSE CODE; MLS 408.

QUESTION

1.In a tabular form only, compare and contrast sections of the Gastrointestinal tract.

ANSWER.

1.

| **DIFFERENCES** | **SMALL INTESTINE** | **LARGE INTESTINE** |
| --- | --- | --- |
| Size | Small intestine measures around 4.5 - 7.0 m in size. | Large intestine measures around 1.5 m in size. |
| It is narrow in width of around 3.5 - 4.5 cm. | It has width of around 4 - 6 cm in diameter. |
| Parts | It has three parts, which are duodenum, jejunum and ileum. | It has four parts, which are colon, rectum, caecum and anal canal. |
| Circular folds | Internal surface of small intestine has circular folds, also called as 'palicae circulares'. | Circular folds are absent. |
| Presence of Villi | Villi are present. | Villi are absent. |
| Peyers Patches | Peyers Patches are present. (aggregations of lymphoid tissue). | Peyers patches are absent. |
| Muscle bands | It forms the layer of continuous bands of muscles around it. | It is reduced to three types of muscles bands called as taeniae coli. |
| Taeniae Coli | Taenia coli is absent from the surface of small intestine. | Taenia Coli are present. |
| Motility | It shows small movements in the abdominal cavity . | Large intestine is fixed or show very little mobility. |
| Hastura | Absent | Present |
| Epiploic appendages | Epipolic apppedages is absent in small intestine. | Epipolic appendages are present. |
| Role in digestion | Digestion is complicated. | No role in digestion. |
| Hormones Secreted | Numerous hormones are secreted. | No hormones are secreted. |
| Activity | It absorb the nutrients from the digested food. | It takes part in absorption of water and electrolytes and in production of vitamins. |
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**Oral Cavity and Esophagus**

Food enters the digestive tract in the oral cavity, where it is masticated into particles on which digestive enzymes can act more efficiently. In the mouth, food particles are mixed with saliva, which lubricates them and initiates their digestion. The salivary glands will be discussed in detail in the next laboratory.

The tongue is a muscular organ covered by oral mucosa that manipulates the food and contains the sensory organs for taste. The taste buds will be discussed in detail in the Laboratory on Sensory Systems.

The esophagus is a muscular tube that transports food from the pharynx to the stomach. It is lined by a stratified squamous epithelium and has a prominent muscularis mucosa and thick muscularis externa. The muscularis externa of the esophagus is unique in that it transitions from striated to smooth muscle over the length of the tube. The esophagus ends in the gastro-esophageal junction.

**Stomach**

The stomach is the site where food is mixed with gastric juice and reduced to a fluid mass called chyme. The layers of the stomach wall follow the basic plan described above. The gastric glands are the basic structure of the stomach wall and can be thought of as tiny pits, or indentations, lined by epithelial cells. Gastric glands are structured as a gastric pit that opens into the lumen, followed by an isthmus, neck, and base.

There are several types of cells that are important in producing stomach secretions:

* Mucous-secreting cells produce mucous and bicarbonate ions, which protect the stomach epithelium from the damaging effects of stomach acid. They appear pale and contain obvious mucous droplets. These cells are located in all layers of the gastric gland, but are particularly prominent in the gastric pit and in the neck of the glands.
* Parietal cells secrete hydrochloric acid and intrinsic factor, which is important for the absorption of vitamin B12 in the terminal ileum. They have a characteristic pyramidal shape and are usually found in the isthmus of the gastric gland. Parietal cells have a characteristic tubulovesicular system that fuses with their membrane canaliculi when they become activated.
* Chief cells produce pepsinogen, which is stored in large apical secretory granules. After pepsinogen is secreted, it is converted by the acidic environment of the stomach to pepsin that is an active protease. Chief cells are found in the base of the gastric glands.
* Enterochromaffin-like (ECL) cells produce histamine, which is important in the release of stomach acid. They are typically found in the base of the gastric glands.
* G-cells secrete the peptide hormone gastrin into the blood stream.
* Stem cells divide to replace the other cells in the gastric glands. They are located primarily in the neck of the glands.

The three different regions of the stomach are distinguished on the basis of the histological characteristics of the mucosal glands:

* The cardia is a circumferential ring about 3 centimeters deep distal to the gastro-esophageal junction. Its glands tend to be convoluted and are lined primarily by mucous-secreting cells.
* The body is the main part of the stomach and is bounded by the greater and lesser curvatures. Its glands are straight with limited branching and are lined by a smaller population of mucous-secreting cells than those of the cardia. It also contains chief and parietal cells.
* The pylorus is the distal third of the stomach and terminates at the beginning of the duodenum. It possesses glands with deeper pits and large amounts of coiling and branching. These glands contain many mucous-secreting cells, ECL cells, and G-cells.

The muscularis externa of the stomach is notable because it contains an additional muscular layer. It is structured with inner oblique, middle circular, and outer longitudinal layers. This structure allows for the churning movements that mix the chyme and expose it to the acidic gastric juice produced by the stomach glands.

**Small Intestine**

The small intestine is responsible for the continued digestion and absorption of the GI tract contents. Reflecting its absorptive function, the surface of the small intestine is amplified significantly at three levels:

* At a gross level, the small intestine is a long tube into whose lumen projects the plicae circularis, circular folds of the mucosal epithelium, lamina propria, muscularis mucosa, and submucosa.
* Villi, finger-like projections involving only the epithelium and lamina propria, project into the lumen. They have a central lymphatic vessel known as a lacteal, which is crucial for the absorption of lipids from the intestine.
* Microvilli make up a brush border on the surface of the columnar cells of the mucosal epithelium.

The small intestine begins after the gastro-duodenal junction and is divided into three segments:

* In the duodenum, pancreatic juice and bile are released into the lumen. Digestion is completed by enzymes in the pancreatic juice and on the surface of the epithelial cells where the products of digestion are absorbed. The glands of Brunner, extensive mucous glands that are found in the submucosa, are found exclusively in this segment. The villi of the duodenum are also exceptionally long.
* The jejunum is the site of a great deal of nutrient absorption and has the most prominent plicae circularis.
* The ileum has the shortest villi and is the site of vitamin B12 absorption. It is characterized by abundant Peyer's patches, which are clumps of diffuse lymphoid tissue, in the submucosa.

The intervening depressions between the villi are known as crypts of Lieberkuhn and can be thought of as the intestinal analogs of the gastric glands. They contain several important cell types:

* Enterocytes are the tall columnar epithelial cells that make up most of the intestinal lining and perform most of the intestinal digestive and absorptive functions.
* Goblet cells store and secrete mucous.
* Paneth cells serve an immune function and are found at the base of the crypts.
* Enteroendocrine cells produce hormones that govern motility and secretion, just as they do in the stomach.
* Stem cells replenish the other cell types and are found at the base of the crypts.

The small intestine ends with the ileo-cecal junction.

**Large Intestine**

The large intestine absorbs water and concentrates waste material that is formed into feces. It lacks villi and contains a disproportionately large number of goblet cells. The lamina propria has many macrophages, plasma cells, eosinophils, and lymphoid nodules. The muscularis externa does not have a continuous longitudinal muscle layer, but instead has three thick bands of muscle called the tenia coli. A thick layer of serosa is present and contains pendulous tabs of adipose tissue called appendices epiploicae.

The appendix is a vestigial organ located near the ileo-cecal junction. It shows the same basic organization as the rest of the large intestine, but has particularly abundant lymphatic nodules.

The large intestine feeds into the rectum, which stores the feces and has a columnar epithelium with abundant goblet cells. Feces pass out of the rectum, through the anus, and out of the body. The anus is characterized by a stratified squamous epithelium that undergoes a gradual transition to skin containing sebaceous and apocrine sweat glands.