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MATRIC NUMBER; 18/MHS01/271

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MICROANATOMY OF THE SMALL INTESTINE

The small intestine, comprising the duodenum, jejunum and ileum, is the primary site for absorption of digested products from the gastrointestinal tract. Digestion begins in the stomach and is completed in the small intestine in association with the absorptive processes. Four factors combine to provide an enormous surface area;

* The small intestine is extremely long
* The mucosa and submucosa are thrown up into circularly arranged folds called plicae circulars or valves of kercking which is particularly numerous in the jejunum.
* The mucosal surface is made up of numerous fingerlike projections called villi
* Thousands of microvilli are present at the luminal surface of the enterocytes, the columnar cells covering the villi. These cells are responsible for the process of absorption and some digestion

The muscularis mucosa lies immediately beneath the mucosal crypts and seperates the mucosa from the submucosa. The vascular submucosa extends into, and forms the core of, the plicae circulars. Inner circular and outer longitudinal layers of the muscularis are responsible for continous peristaltic activity of the small intestine. The peritoneal aspect of the muscularis is invested by the loose collagenous serosa, which is lined on its peritoneal surface by mesothelium identical in appearance to the mesothelial lining of the pleura.

Lymphoid aggregations known as peyers patches are a prominent feature within the lamina propria of the small intestine. The products of protein and carbohydrate digestion, namely amino acids and monosaccharide, respectively, enter the intestinal capillaries and pass via the portal vein to the liver. In contrast, reconstituted triglycerides pass into the intestinal lymphatics known as lacteals, and thence through the thoracic duct to the general circulation, bypassing the liver. For lymphatic transport, the triglycerides become coated with phospholipids and proteins to form the fine globules known as chylomicrons. A minority of lipid digestion products such as short chain fatty acids and glycerol, pass in the portal system to the liver, along with almost all the bile acids which are reabsorbed and recirculated.

The intestinal villi are lined by a simple columnar epithelium which is continuous with that of the crypts. As in other parts of the gastrointestinal tract, the epithelium includes a variety of cell types, each with its own specific function. Cell types in the small intestine epithelium include;

* Enterocytes: the most numerous cell type, are tall columnar cells with surface microvilli that are seen as brush border in light micrographs. These cells are the main absorptive cells.
* Goblet cells: are scattered among the enterocytes and produce mucin for lubrication of the intestinal contents and protection of the epithelium
* Paneth cells: are found at the base of the crypts and are distinguished by their prominent eosinophilic apical granules. These cells have a defensive function.
* Neuroendocrine cells: produce locally acting hormones that regulate gastrointestinal motility and secretion
* Stem cells: found at the base of the crypts, devide continuously to replenish all theabove four cells
* Intraepithelial lymphocytes; which are mostly T cells, provide defence against invasive organisms.

The lamina propria extends between the crypts into the core of each villus and contains a rich vascular and lymphatic network into which digestive products are absorbed. The muscularis mucosae lies immediately beneath the base of the crypts.

MICROANATOMY OF THE LARGE INTESTINE

The large intestine is formed of the following organs; the caceum, the colon, the rectum and the anal canal. The large intestine fuctions in the absorption of water as well as the exclusion of the waste products.

The histological structure of the large intestine;

* the mucosa: the epithelium formed of the simple columnar ciliated epithelium which is folded and form straight glands.
* The epithelium cell formed of two types; mucus cells for secretion of mucus and brush cells for absorption of water. The mucus cells increase and the brush cells decrease towards the anal canal.
* The lamina propria: it is formed of collagen fibers rich in blood vessels and peyers patches. The muscularis mucosa; formed of sheet of smooth muscle. It functions in the conduction of rhe gland secretion. The submucosa; formed of loose areolar tissue contain blood vessels, nerve fibers and lymphatic tissue. The musculosa; formed of two layers of smooth muscle inner circular and outer longitudinal. The inner longitudinal muscle collected into bands called tena colli. The serosa is formed of mesothelium

The appendix; this is a star shaped lumen

Histological structure.

Mucosa; simple columnar epithelium with many goblet cells, lamina propria, muscularis mucosae

Submucosa; contains blood vessels and nerves

Muscularis externa; inner circular and outer longitudinal muscles. No taenia coli

Serosa; visceral layer of peritoneum.

The anal canal; this is the lower part of the large intestine. It functions to give passage for the feaces outside the body

Histological structure

The mucosa; the upper part of the anal canal lined by the simple columnar while the middle part is lined by stratified non- keratinized epithelium and the lower part is lined by skin.

The lamina propria; it is formed of collagen fibers that support the mucosa

The submucosa; it is formed of loose tissue that contain blood vessel, nerve fibers and lymphatics

the musculosa; it is formed of inner circular layer which is thick at the lower part and outer longitudinal layer. There are skeletal muscles which cover the outer longitudinal layer.

Serosa; it is formed of connective tissue to support the anal canal with the surrounded tissue.