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18/MHS01/192

ANA 204

QUESTION: Describe the microanatomy of small and large intestine.

Overview: Every organ in the body has these following layers namely;

* Mucosa – Epithelium, Lamina propria, Muscularis mucosa
* Submucosa
* Muscularis externa
* Adventicia or serosa

**SMALL INTESTINE**

The small intestine mucosa is architecturally arranged as a forest of intestinal villi whose bases are termed the *Crypts of Lieberkuhn*. The surface of the villi and crypts of lieberkuhn are defined by the intestinal epithelium while their flesh is composed of the mucosal lamina propria. The bottom border of the mucosa is defined by the muscularis mucosa which does not extend into the fingers of the villi but rather is arranged as a flat surface.

Mucosa:

* Small Intestine Epithelium:

The small intestinal epithelium is composed of a ***tall simple columnar epithelium*** made up of mostly enterocytes which possess extensive subcellular microvilli that substantially increase their resorptive surface area and appear as a fuzzy brush border on microscopy. Occasional goblet cells which secrete protective mucus are also observed within the epithelium as well as intraepithelial lymphocytes which appear to be [T-cells](http://www.pathwaymedicine.org/T-cell) as well as [B-cells](http://www.pathwaymedicine.org/B-cell) that secrete [IgA](http://www.pathwaymedicine.org/IgA). The Crypts of Lieberkuhn are densely populated with highly mitotic stem cells that rapidly replenish the population of enterocytes and goblet cells within the villous epithelium.

* Small Intestine Lamina Propria:

The Lamina Propria is a loose collagenous matrix lying at the center of the intestinal villi which contains a dense capillary network necessary for the rapid transport of absorbed nutrients. Additionally, a single large lymphatic vessel, termed the lacteal, lies at the center of each villous that drains chylomicrons secreted by enterocytes. Finally, throughout the lamina propria of the small intestine lie lymphoid aggregates more commonly known as Peyer's Patches.

* Small Intestine Muscularis Mucosa

The small intestinal muscularis mucosa is a thin, flat layer of smooth muscle cells which lies just under the bottom edge of lieberkuhn's crypts and forms the border of the small intestinal mucosa.

Submucosa:

* Duodenum

The duodenal submucosa is uniquely wide in order to accommodate the mass of Brunners glands whose necks pass through the intestinal mucosa and open into the duodenal lumen. The epithelium of the Brunners glands is continuous with that of the intestinal epithelium and is composed of a simple columnar epithelium that secretes an alkaline mucus critical for protecting the intestinal mucosa from stomach acid.

* Jejunum and Ileum

The submucosa of the jejunum and Ileum is much thinner than that of the duodenum due to the absence of Brunners glands. It is a largely collagenous layer which conducts vasculature, lymphatics, and nerves.

MUSCULARIS EXTERNA

The small intestine muscularis propria is composed of the traditional inner circular layer and outer longitudinal layer of smooth muscle cells and actuates propulsion of intestinal contents through peristalsis.

ADVENTICIA

The small intestine adventitia is a thin layer covered with the serosa of the peritoneum.

**Functions**

* The small intestine is the site where up to ninety percent of our total nutrient and mineral absorption takes place with the digestive system.

**LARGE INTESTINE**

The large intestine, also known as the large bowel, is the last part of the [gastrointestinal tract](https://en.wikipedia.org/wiki/Gastrointestinal_tract) and of the [digestive system](https://en.wikipedia.org/wiki/Digestive_system) in [vertebrates](https://en.wikipedia.org/wiki/Vertebrate). Water is absorbed here and the remaining waste material is stored as [feces](https://en.wikipedia.org/wiki/Feces) before being removed by [defecation](https://en.wikipedia.org/wiki/Defecation).

The colon is the largest portion of the large intestine, so many mentions of the large intestine and colon overlap in meaning whenever precision is not the focus. Most sources define the large intestine as the combination of the [cecum](https://en.wikipedia.org/wiki/Cecum), colon, [rectum](https://en.wikipedia.org/wiki/Rectum), and [anal canal](https://en.wikipedia.org/wiki/Anal_canal). Some other sources exclude the anal canal.

Mucosa:

The large intestinal mucosa is architecturally arranged as a layer of deep, densely packed, straight glands that do not extend villi into the lumen. The large intestine epithelium is a simple columnar epithelium composed of two basic cell types responsible for the distinct functions of water resorption and mucus secretion. Near the neck of the large intestinal glands lie cells primarily responsible for water resorption while the base is populated with Goblet cells that produce a mucous critical for lubricating the propulsion of increasingly solidified feces.

Large numbers of intraepithelial lymphocytes are observed throughout the epithelium and combat the rich bacterial flora of the colon. The large intestine lamina propria lies between the densely arranged colonic glands and is richly invested with capillaries and lymphatics necessary for fluid resorption. Occasionally lymphoid aggregates of MALT are observed. The large intestine muscularis mucosa is a flat surface that lies just beneath the terminal portions of colonic glands, known as intestinal crypts, and is composed of a thin layer of smooth muscle cells.

* Submucosa:

The large intestinal submucosa is a largely collagenous layer with occaional aggregations of MALT and larger vasculature and lymphatics.

* Muscularis Externa:

This is perhaps the most prominent layer of the large intestine and is responsible for the powerful peristaltic activity of the colon, required for propulsion of increasingly solid feces. The muscularis propria possesses the traditional inner circular layer and outer longitudinal layer of smooth muscle cells common to all GI tract segments. However, except for the rectum, the majority of the large intestine's outer longitudinal layer is bundled into three equidistant strips running the length of the colon termed taeniae coli.

**Function**

The large intestine being the final section of the gastrointestinal tract that performs the vital task of absorbing water and vitamins while converting digested food into feces.\

REFERENCE

* Wikipedia.com
* **PathwayMedicine.org**