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QUESTION: Describe the microanatomy of small and large intestine their functions, segments, layers, general features and epithelium of each part.

ANSWER:

**LARGE INTESTINE:**

The large intestine starts in the right iliac region of the pelvis, just at or below the right waist, where it is joined to the bottom end of the small intestine. It is about 4.9 feet (1.5 m) long, which is about one-fifth of the whole length of the intestinal canal.The appendix is attached to its inferior surface of the cecum. It contains the least lymphoid tissue, and it is a part of mucosa-associated lymphoid tissue that gives it an important role in immunity.On the surface of the large intestine, three bands of longitudinal muscle fibers called taeniae coli, each about 0.2 inches wide, can be identified. They start at the base of the appendix and extend from the cecum to the rectum

* **appendix**: An inner organ without any known use that can become inflamed.
* **cecum**: A pouch, usually peritoneal, that is considered to be the beginning of the large intestine.
* **colon**: The part of the large intestine that is the final segment of the digestive system, after (distal to) the ileum and before (proximal to) the anus.

**FUNCTION OF THE LARGE INTESTINE**

The function of the large intestine (or large bowel) is to absorb water from the remaining indigestible food matter, and then to pass the useless waste material from the body. The large intestine consists of the cecum and colon.

It starts in the right iliac region of the pelvis, just at or below the right waist, where it is joined to the bottom end of the small intestine (cecum). From here it continues up the abdomen (ascending colon), then across the width of the abdominal cavity (transverse colon), and then it turns down (descending colon), continuing to its endpoint at the anus (sigmoid colon to rectum to anus). The large intestine is about 4.9 feet (1.5 m) long—about one-fifth of the whole length of the intestinal canal.

The appendix is attached to its inferior surface of the cecum. It contains the least lymphoid tissue, and it is a part of mucosa-associated lymphoid tissue, which gives it an important role in immunity.

Appendicitis is the result of a blockage that traps infectious material in the lumen. The appendix can be removed with no apparent damage or consequence to the patient.

On the surface of the large intestine, bands of longitudinal muscle fibers called taeniae coli, each about 0.2 inches wide, can be identified. There are three bands, starting at the base of the appendix and extending from the cecum to the rectum.

Along the sides of the taeniae, tags of peritoneum filled with fat, called epiploic appendages (or appendices epiploicae) are found. The sacculations, called haustra, are characteristic features of the large intestine, and distinguish it from the small intestine.

The large intestine has taeniae coli and invaginations (the intestinal glands), unlike the small intestinesThe longitudinal layer of the muscularis of the large intestine is reduced to three, strap-like structures known as the taeniae coli—bands of longitudinal muscle fibers, each about 1/5 in wide.The bands of longitudinal muscle fibers start at the base of the appendix and extend from the cecum to the rectum.The wall of the large intestine is lined with simple columnar epithelium.Both the small intestine and the large intestine have goblet cells, but they are abundant in the large intestine.

CELLS OF THE LARGE INTESTINE

* **goblet cell**:
* **columnar epithelium**: Epithelial cells whose heights are at least four times their width.
* **mucin**: A family of high molecular weight, heavily glycosylated proteins (glycoconjugates) produced by the epithelial tissues in most metazoans.
* **goblet cells**: Glandular, simple, columnar epithelial cells whose sole function is to secrete mucin, which dissolves in water to form mucus.

In histology, an intestinal crypt—called the crypt of Lieberkühn—is a gland found in the epithelial lining of the small intestine and colon. The crypts and intestinal villi are covered by epithelium that contains two types of cells: goblet cells that secrete mucus and enterocytes that secrete water and electrolytes.

The enterocytes in the mucosa contain digestive enzymes that digest specific food while they are being absorbed through the epithelium. These enzymes include peptidases, sucrase, maltase, lactase and intestinal lipase. This is in contrast to the stomach, where the chief cells secrete pepsinogen. In the intestine, the digestive enzymes are not secreted by the cells of the intestine.

**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:

1. 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.
2. The jejunum is the site of a great deal of nutrient absorption and has the most prominent plicae circularis.
3. 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:

1. 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.
2. Goblet cells store and secrete mucous.
3. Paneth cells serve an immune function and are found at the base of the crypts.

4.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.