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The large intestine is that part of the digestive tube between the terminal ileum and anus. Depending on the species, ingesta from the small intestine enters the large intestine through either the ileocecal or ileocolic valve. Within the large intestine, three major segments are recognized:

* the **cecum** is a blind-ended pouch that in humans carries a worm-like extension called the vermiform **appendix**.
* the **colon** constitutes the majority of the length of the large intestine and is subclassified into ascending, transverse and descending segments.
* the **rectum** is the short, terminal segment of the digestive tube, continuous with the anal canal.

The variation in relative dimension of the large intestine is largely correlated with diet. In herbivores like horses and rabbits which depend largely on microbial fermentation, the large intestine is very large and complex. Omnivores like pigs and humans have a substantial large intestine, but nothing like that seen in herbivores. Finally, carnivores such as dogs and cats have a simple and small large intestine.

There are many similarities in the histologic structure of the mucosa in large and small intestine. The most obvious difference is that the mucosa of the large intestine is devoid of villi. It has numerous crypts which extend deeply and open onto a flat lumenal surface. The stem cells which support rapid and continuous renewal of the epithelium are located either at the bottom or midway down the crypts. These cells divide to populate the cryptal and surface epithelium.

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. From here it continues up the abdomen, across the width of the abdominal cavity, and then it turns downward, continuing to its endpoint at the anus.

The large intestine differs in physical form from the small intestine in being much wider. The longitudinal layer of the muscularis is reduced to three strap-like structures known as the taeniae coli—bands of longitudinal muscle fibers, each about 1/5 in wide. These three bands start at the base of the appendix and extend from the cecum to the rectum.

Along the sides of the taeniae are tags of peritoneum filled with fat; these are called epiploic appendages, or appendices epiploicae. The wall of the large intestine is lined with simple columnar epithelium.

Instead of having the evaginations of the small intestine ( villi ), the large intestine has invaginations (the intestinal glands). While both the small intestine and the large intestine have goblet cells that secrete mucin to form mucus in water, they are abundant in the large intestine.

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.

Also, new epithelium is formed here, which is important because the cells at this site are continuously worn away by the passing food. The basal portion of the crypt, further from the intestinal lumen, contains multipotent stem cells.

The small intestine is an organ located in the gastrointestinal tract, between the stomach and the large intestine. It is, on average, 23ft long and is comprised of three structural parts; the duodenum, jejunum and ileum.

Functionally, the small intestine is chiefly involved in the digestion and absorption of nutrients. It receives pancreatic secretions and bile through the hepatopancreatic duct which aid with its functions.

The histological structure of the small intestine is similar to the other organs in the digestive tract. There are four main layers:

* **Mucosa** (Innermost layer) – Contains the epithelium, lamina propria and muscularis mucosae.
* **Submucosa**– Connective tissue layer, which contains blood vessels, lymphatics and the submucosal plexus.
* **Muscularis externa**– Consists of two smooth muscle layers; the outer longitudinal layer and inner circular layer. The myenteric plexus lies between them.
* **Adventitia**(Outermost layer) –  Comprised of loosely arranged fibroblasts and collagen, with the vessels and nerves passing through it. The majority of the small intestine adventitia is covered by mesothelium and is commonly called the serosa.

The small intestine is the major absorptive site in the gastrointestinal tract, and therefore has a number of modifications to aid its function. The mucosa and submucosa form large numbers of folds (or **plicae**) arranged in a circular fashion in the lumen (therefore called plicae circulares). Additionally, the plicae contain microvilli to further increase the surface area, which increases absorption.

The epithelium of the small intestine lines the luminal surface. There are a number of components to the epithelium:

* **Enterocytes**– Tall columnar cells, which have an absorptive function. They contain brush border enzymes on the surface which have an important digestive function.
* **Goblet cells**– Exocrine glands which secrete mucin.
* **Crypts of Lieberkuhn**

The Crypts of Lieberkuhn are glands found in the epithelial lining. They contain numerous cells such as stem cells to produce new cells to replenish the cells lost due to abrasion, as well as**enteroendocrine cells** to synthesise and secrete hormones.

To protect from pathogens, there are **Paneth cells** which secrete protective agents (such as defensins and lyzozymes) and Peyer’s patches which are only found in the ilium. Peyer’s patches contain mucosal-associated lymphatic tissue (MALT) which house white blood cells and lymphocytes. These cells can produce antibodies to further protect the small intestine from infection.

### **Enteroendocrine Cells**

The enteroendocrine cells are located within the Crypts of Lieberkuhn. They secrete hormones in response to various stimuli. There are four main classes of enteroendocrine cell, each with a different secretory product. These are I cells, S cells, K cells and enterochromaffin cells.

I Cells secrete Cholecystokinin **(CCK)** in response to the presence of fat in the small intestine. CCK stimulates the contraction of the gallbladder (which pushes bile out into the cystic duct) and the release of pancreatic enzymes. Both bile and pancreatic enzymes have a key role in lipid digestion. S Cells secrete Secretin in response to the low pH of chyme in the small intestine. Secretin induces HCO3– secretion from the pancreas and inhibits gastric emptying.