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Histology of the Small Intestine

The small intestine wall has four layers: the outermost serosa, muscularis, submucosa, and innermost mucosa.

The outermost layer of the intestine, the serosa, is a smooth membrane consisting of a thin layer of cells that secrete serous fluid, and a thin layer of connective tissue.

The muscularis is a region of muscle adjacent to the submucosa membrane. It is responsible for gut movement (also called peristalsis ). It usually has two distinct layers of smooth muscle: circular and longitudinal.

The submucosa is the layer of dense irregular connective tissue or loose connective tissue that supports the mucosa; it also joins the mucosa to the bulk of underlying smooth muscle.

The mucosa is the innermost tissue layer of the small intestines and is a mucous membrane that secretes digestive enzymes and hormones. The intestinal villi are part of the mucosa.

The three sections of the small intestine look similar to each other at a microscopic level, but there are some important differences. The jejunum and ileum do not have Brunner’s glands in the submucosa, while the ileum has Peyer’s patches in the mucosa, but the duodenum and jejunum do not.

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.