

18/MHS06/040

MEDICAL LABORATORY SCIENCE

SMALL INTESTINE:

General features:

The small intestine is the part of the gastrointestinal tract that follows the stomach, which is in turn followed by the large intestine.

The average length of the small intestine in an adult human male is 6.9 m (22 feet, 6 inches), and in the adult female 7.1 m (23 feet, 4 inches).

Segments:

The small intestine is divided into the duodenum, jejunum, and ileum.

Much of the small intestine is covered in projections called villi that increase the surface area of the tissue available to absorb nutrients from the gut contents.

Layers:

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.

Functions:

(a) Digestion; The three major classes of nutrients that undergo digestion are proteins, lipids (fats) and carbohydrates.

(b) Absorption; Absorption of the majority of nutrients takes place in the jejunum, with the following notable exceptions:

-Iron is absorbed in the duodenum.

-Folate (Vitamin B9) is absorbed in the duodenum and jejunum.

-Vitamin B12 and bile salts are absorbed in the terminal ileum.

-Water is absorbed by osmosis and lipids by passive diffusion throughout the small intestine.

-Sodium bicarbonate is absorbed by active transport and glucose and amino acid co-transport

-Fructose is absorbed by facilitated diffusion.

(c) Immunological; The small intestine supports the body's immune system. The presence of gut flora appears to contribute positively to the host's immune system.

Epithelium: simple columnar epithelium

LARGE INTESTINE:

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.

Segments:

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.

Layers:

The 4 layers of the large intestine from the lumen outward are the mucosa, submucosa, muscular layer, and serosa. The muscular layer is made up of two layers of smooth muscle; the inner circular layer and the outer longitudinal layer.

Functions:

The large intestine absorbs water and any remaining absorbable nutrients from the food before sending the indigestible matter to the rectum. The colon absorbs vitamins that are created by the colonic bacteria, such as vitamin K (especially important as the daily ingestion of vitamin K is not normally enough to maintain adequate blood coagulation), thiamine and riboflavin. It also compacts feces, and stores fecal matter in the rectum until it can be discharged via the anus in defecation. The large intestine also secretes K^+ and Cl^- . Chloride secretion increases in cystic fibrosis. Recycling of various nutrients takes place in colon. Examples include fermentation of carbohydrates, short chain fatty acids, and urea cycling.

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