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

ANSWER

SMALL INTESTINE

The small intestine is the part of the gastrointestinal tract that follows the stomach, which is in turn followed by the large intestine is the site where almost all of the digestion and absorption of nutrients and minerals from food takes place. The small intestine is approximately 2.5-3cm in diameter, and is divided into three sections:

1. The duodenum is the first section of the small intestine and is the shortest part of the small intestine. It is where most chemical digestion using enzymes takes place.
2. The Jejunum is the middle section of the small intestine. It has a lining which is designed to absorb carbohydrates and protein. The inner surface of the jejunum, its mucous membrane, is covered in projections called villi, which increase the surface area of tissue available to absorb nutrients from the gut contents. The epithelial cells which line these villi possess even larger numbers of microvilli. The transport of nutrients across epithelial cells through the jejunum includes the passive transport of some carbohydrates and the active transport of amino acids, small peptides, vitamins, and most glucose. The villi in the jejunum are much longer than in the duodenum or ileum.
3. The Ileum is the final section of the small intestine. The function of the ileum is mainly to absorb vitamin B12, bile salts, and any products of digestion that were not absorbed by the jejunum. The wall itself is made up of folds, each of which has many tiny finger- like projections known as villi on its surface. The ileum has an extremely large surface area both for the absorption of enzyme molecules and for the absorption of products of digestion.

The small intestine has 4 layers: Mucosa, Sub mucosa, Muscularis externa and Serosa.

1. The Mucosa is the innermost tissue layer of the small intestine and is a mucous membrane that secretes digestive enzymes and hormones. The intestinal villi are part of the mucosa.
2. The Sub mucosa 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.
3. The Muscularis Externa is a region of muscle adjacent to the sub mucosa membrane. It isresponsible for gut movement. It usually has two distinct layers of smooth muscle: circular and longitudinal.
4. 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 epithelial lining of the small intestine is the simple columnar epithelium tissue.

THE LARGE INTESTINE

The primary function of this organ is to finish absorption of nutrients and water, synthesize certain vitamins, form feces, and eliminate feces from the body.

The large intestine runs from the appendix to the anus. It frames the small intestine on three sides. Despite its being about one half as long as the small intestine, it is called large because it is more than twice the diameter of the small intestine, about 3 inches.

The large intestine is sub divided into four main regions: The Cecum, the colon (the ascending colon, transverse colon, descending colon and sigmoid colon), the rectum, and the anus. The ileocecal valve, located at the opening between the ileum and the large intestine, controls the flow of chime from the small intestine to the large intestine.

Most part of the large intestine is lined by the simple columnar epithelium tissue; the anal canal is lined by the stratified squamous epithelium tissue.

The 4 layers of the large intestine from the lumen outward are the mucosa, sub mucosa, muscularis layer, and serosa. The muscularis layer is made up of 2 layers of smooth muscle, the inner, circular layer, and the outer longitudinal layer. These layers contribute to the motility of the large intestine.

DIFFERENCES BETWEEN LARGE AND SMALL INTESTINE.

1. The large intestine differs in the physical form from the small intestine in several ways. The large intestine is much wider, and the longitudinal layers of the muscularis are reduced to three, strap-like structures known as the taeniae coli.
2. The wall of the large intestine is line with the simple columnar epithelium, instead of having the evaginations of the small intestine (villi), the large intestine has invaginations.
3. While both the small intestine and the large intestine have goblet cells, they are more abundant in large intestine.