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COURSE TITLE: **HISTOPATHOLOGY TECHNIQUES AND MUSEUM**

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| GI MUCOSA | GI SUBMUCOSA | GI MUSCULARIS PROPIA | GI ADVENTITIA |
| * **GI Mucosa:** Itself made of three layers

*GI Epithelium:* The morphology and architecture of the GI Epithelium changes radically between different segments of the GI tract, correlating with changes in the functionality of these different segments in terms of digestion, absorption, and secretion.* + *GI Lamina Propria:* A largely collagenous mesh which supports the GI epithelium and often contains large clusters of lymphoid tissue known as MALT (Mucosal-associated Lymphoid Tissue).
	+ *GI Muscularis Mucosa:* A thin muscular layer composed of smooth muscle cells that actuates local motions of the GI mucosa.
 | * **GI Submucosa:**
	+ A wide layer of collagenous tissue that contains vasculature and nerves that support and modulate the mucosa. The nerve fibers within the submucosa form a dense network known as the *Submucosal Plexus* which mostly regulates GI secretion from the mucosa
 | * **GI Muscularis Propria:**
	+ A large muscular layer whose inner fibers are arranged in a circular geometry while its outer fibers are arranged in a longitudinal geometry. This layer is largely responsible for bulk movement of food within GI tract and is controlled by a dense nervous network known as the *Myenteric Plexus* which is located between the circular and longitudinal fibers.
 | * **GI Adventitia:**
	+ A layer of collagenous tissue that conducts larger vasculature and nerves that support and modulate the entire GI tract.
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**OVERVIEW**

The entire GI tract from the esophagus to the anus possesses the same basic histological layers. Depending on the particular segment, certain layers may be more or less prominent, or possess specialized features as required for their unique functionality. We first present an overview of the three basic GI tract layers and then discuss the unique histological features of particular segments on their own pages.

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| ESOPHAGUS | STOMACH | SMALL INTESTINE | DUODENUM | JEJUNUM | ILEUM | LARGE INTESTINE | ANAL CANAL |
| Esophagus * esophageal mucosa
	+ non-keratinizing, stratified squamous epithelium
	+ muscularis mucosae is a single layer of longitudinally oriented smooth muscle
* esophageal muscularis externa
	+ upper one third of esophagus
		- striated muscle
	+ middle one third of esophagus
		- striated muscle and smooth muscle
	+ lower one third of esophagus
		- smooth muscle
 | * Stomach
	+ gastric mucosa
		- gastric glands occupy gastric mucosa
			* simple, branched, tubular glands that extend from muscularis externa to bottom of gastric pits
			* consist of mucus neck cells, parietal cells, chief cells, and G cells
			* elaborate gastric secretions into lumen of stomach via gastric pits
 | * Small Intestine
	+ overview
		- small intestinal mucosa
			* exhibits numerous projections, or villi, that protrude from epithelial layer of mucosal surface
				+ villi increase surface area over which digestion and absorption occurs
				+ epithelial layer of small intestinal mucosa is heterogeneous, composed of:

mucus-secreting cells (goblet cells) absorptive cells (enterocytes) exhibit numerous projections, or microvilli, that protrude from apical border microvilli increase surface area over which digestion and absorption occursmicrovilli are responsible for characteristic striated border, or brush border, of enterocytes* + - * frequency of villi and of microvilli in small intestine
				+ jejunum > duodenum and ileum
			* frequency of goblet cells in small intestine increases as you progress down the small intestine
				+ duodenum < jejunum < ileum
 | duodenum * duodenal mucosa
	+ crypts of Lieberkühn, or intestinal glands, occupy duodenal mucosa
		- simple tubular glands that extend from muscularis externa to base of villi
		- elaborate small intestinal secretions into lumen of duodenum
* duodenal submucosa
	+ Brunner's glands, or submucosal glands, occupy duodenal submucosa https://step1.medbullets.com/images/question_step_1.png
		- elaborate alkaline (basic pH) secretions
			* likely function to neutralize acidic chyme propelled from stomach to duodenum of small intestine
		- peptic ulcer disease presents with hypertrophy of Brunner's glands
 | ejunum  * jejunal mucosa
	+ crypts of Lieberkühn, or intestinal glands, occupy jejunal mucosa
* jejunal submucosa
	+ plicae circulares are circularly arranged transverse folds containing a core of submucosa that extend partially around jejunal lumen
 | ileum * ileal mucosa
	+ Peyer's patches, or aggregations of nodules of unencapsulated lymphatic tissue, occupy ileal lamina propria (and ileal submucosa)
		- M cells, overlying Peyer's patches, function as antigen-transporting cells
			* take up microorganisms and macromolecules
			* deliver antigens to antigen-processing macrophages
				+ macrophages present processed antigen to lymphocytes

triggers secretory immunity stimulates B cells in germinal centers of Peyer's patches to differentiate into IgA-secreting plasma cells that reside in ileal lamina propria * + crypts of Lieberkühn, or intestinal glands, occupy ileal mucosa
* ileal submucosa
	+ plicae circulares are circularly arranged transverse folds containing a core ofsubmucosa that extend partially around ileal lumen (proximal ileum)
		- increase surface area over which absorption occurs
 | * + - * + increase surface area over which absorption occurs
* Large intestine
	+ colon
		- colonic mucosa
			* "smooth" surface devoid of villi
			* crypts of Lieberkühn, or intestinal glands, occupy colonic mucosa
		- colonic muscularis externa
			* outer layer of longitudinally oriented smooth muscle is organized into 3 bundles, or teniae coli
 | anal canal * anal canal mucosa
	+ keratinizing, stratified squamous epithelium
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