MATRIC NUMBER: 15/MHS/034

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QUESTION: in a tabular form only compare and contrast section of the gastrointestinal tract.

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|  | ORAL CAVITY | OESOPHAGUS | STOMACH | DUODENUM | JEJUNUM | ILEUM | CECUM | APPENDIX | COLON | ANAL CANAL |
| MUCOSA | [Epithelium](http://www.siumed.edu/~dking2/erg/giguide.htm#epith) is protective (stratified squamous, partially keratinized on gums and hard [palate](http://www.siumed.edu/~dking2/erg/oralcav.htm#palate) and on filiform papillae of [tongue](http://www.siumed.edu/~dking2/erg/oralcav.htm#tongue), non-keratinized elsewhere) | E The esophageal epithelium is an unkeratinized stratified squamous epithelium designed to protect the esophagus as it conducts food downwards.  Esophageal Lamina Propria: Fairly thin and contains a few lymphoid aggregates  Esophageal Muscularis | The surface epithelium is a [simple columnar epithelium](https://www.kenhub.com/en/library/anatomy/simple-epithelium). It lines the inside of the stomach as surface mucous cells and forms numerous tiny invaginations, or **gastric pits**, which appear as millions of holes all throughout the stomach lining. | The **mucosa** consists of simple columnar [epithelium](https://www.kenhub.com/en/library/anatomy/overview-and-types-of-epithelial-tissue) (**lamina epithelialis**), a [connective tissue](https://www.kenhub.com/en/library/anatomy/loose-connective-tissue) layer (**lamina propria**) and a [smooth muscle](https://www.kenhub.com/en/library/anatomy/smooth-muscle) layer (**lamina muscularis**). The intestinal epithelial cells (**enterocytes**) are overlaid by a layer of glycoproteins and mucin.  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 mucosa is lined by **simple columnar epithelium** towards the lumen (lamina epithelialis). It contains enterocytes and [goblet cells](https://www.kenhub.com/en/library/anatomy/intraepithelial-glands). Characteristic features are the **crypts of Lieberkuhn** and **finger-like villi** protruding in the intestinal lumen. Similar to the duodenum paneth cells are found deep in the crypts. | The **mucosa** is lined by [simple columnar epithelium](https://www.kenhub.com/en/library/anatomy/simple-epithelium) (lamina epithelialis) comprising enterocytes and goblet cells. Underneath lies a [connective tissue](https://www.kenhub.com/en/library/anatomy/loose-connective-tissue) layer (**lamina propria**) and a muscle layer (**lamina muscularis mucosae**). Compared to the rest of the small intestine the circular folds are rather flat and the villi relatively short.  A [mucous membrane](https://en.wikipedia.org/wiki/Mucous_membrane), itself formed by three different layers:  A single layer of [tall cells](https://en.wikipedia.org/wiki/Simple_columnar_epithelium) that line the [lumen](https://en.wikipedia.org/wiki/Lumen_(anatomy)) of the organ. The [epithelium](https://en.wikipedia.org/wiki/Epithelium) that forms the innermost part of the mucosa has five distinct types of cells that serve different purposes, these are: [enterocytes](https://en.wikipedia.org/wiki/Enterocytes) with [microvilli](https://en.wikipedia.org/wiki/Microvilli), which digest and absorb nutrients; [goblet cells](https://en.wikipedia.org/wiki/Goblet_cell), which secrete [mucin](https://en.wikipedia.org/wiki/Mucin), a substance that lubricates the wall of the organ; [Paneth cells](https://en.wikipedia.org/wiki/Paneth_cell), most common in the terminal part of the ileum, are only found at the bottom of the [intestinal glands](https://en.wikipedia.org/wiki/Intestinal_glands) and release antimicrobial substances such as [alpha defensins](https://en.wikipedia.org/wiki/Alpha_defensin) and [lysozyme](https://en.wikipedia.org/wiki/Lysozyme); [microfold cells](https://en.wikipedia.org/wiki/Microfold_cells), which take up and transport [antigens](https://en.wikipedia.org/wiki/Antigen) from the lumen to lymphatic cells of the lamina propria; and [enteroendocrine cells](https://en.wikipedia.org/wiki/Enteroendocrine_cell), which secrete [hormones](https://en.wikipedia.org/wiki/Hormones).  An underlying [lamina propria](https://en.wikipedia.org/wiki/Lamina_propria) composed of [loose connective tissue](https://en.wikipedia.org/wiki/Loose_connective_tissue) and containing [germinal centers](https://en.wikipedia.org/wiki/Germinal_center) and large aggregates of lymphoid tissue called [Peyer's patches](https://en.wikipedia.org/wiki/Peyer%27s_patches), which are a distinctive feature of the ileum. | **The mucous is lined by**  columnar [epithelium](https://www.kenhub.com/en/library/anatomy/overview-and-types-of-epithelial-tissue) with crypts, contains goblet and endocrine cells   the mucosa, is made of smooth mucous membrane with many goblet cells. Goblet cells secrete mucus to lubricate and protect the surface of the cecum. Absorption of nutrients is performed by the epithelial cells forming the surface of the mucous membrane. | The glands are lined with simple columnar epithelium and a high number of mucin producing goblet cells that are characterized by a large globule of mucus located in the apical portion of the cell. The lamina propria typically contains lymphocytes that partly obscure the underlying muscularis mucosae, which separates the mucosa from the submucosa. | The **mucosa** is lined by [simple columnar epithelium](https://www.kenhub.com/en/library/anatomy/simple-epithelium) (lamina epithelialis) with long microvilli. It is covered by a layer of mucus which aids the transport of the feces. The mucosa does not contain villi but many **crypts of Lieberkuhn** in which numerous **goblet cells** and enteroendocrine cells are found.  A mucosa within which exists the epithelium, the intestinal glands (glands of Lieberkuhn), lamina propria and muscularis mucosa. Note that there are NO plicae circulares or villi in the colon but temporary folds exist instead. | The mucosa has the **typical intestinal**[epithelium](https://www.kenhub.com/en/library/anatomy/overview-and-types-of-epithelial-tissue) with simple columnar enterocytes and numerous [goblet cells](https://www.kenhub.com/en/library/anatomy/intraepithelial-glands). At the **anal transitional zone** the columnar epithelium flattens more and more and eventually becomes **stratified squamous non-keratinized epithelium**. |
| SUBMUCOSA | A [submucosa](https://en.wikipedia.org/wiki/Submucosa) may or may not be present deep in the dense layer of the lamina propria, depending on the region of the oral cavity. If present, the submucosa usually contains loose connective tissue and may also contain [adipose tissue](https://en.wikipedia.org/wiki/Adipose_tissue) or [salivary glands](https://en.wikipedia.org/wiki/Salivary_glands), as well as overlying bone or muscle within the oral cavity. | Esophogeal submucosa is fairly loose and can be significantly distended in order to accommodate passing food boluses. Small glands are also visible in this layer that secrete mucus which lubricates the passage of food. | Deep to the mucosa is a thick layer of connective tissue known as the **gastric submucosa**. Its arrangement means that it is durable, yet flexible and mobile. Aside from rich [vasculature](https://www.kenhub.com/en/library/anatomy/histology-of-the-vascular-network) and lymphatics, this layer also holds the submucosal (Meissner’s) plexus. | The **submucosa** comprises loose connective [tissue](https://www.kenhub.com/en/library/anatomy/introduction-to-tissues-epithelial-connective-muscle-and-nervous-tissue), numerous blood vessels and the **Meissner's plexus**.  The submucosa is the layer of dense, irregular connective tissue or loose connective tissue that supports the mucosa, as well as joins the mucosa to the bulk of underlying smooth muscle. | The **submucosa** consists of loose connective tissue with blood vessels, lymph nodes and the Meissner’s plexus. | Underneath the mucosa lies a [connective tissue](https://www.kenhub.com/en/library/anatomy/loose-connective-tissue) layer (**lamina propria**) and a muscle layer (**lamina muscularis mucosae**). Compared to the rest of the small intestine the circular folds are rather flat and the villi relatively short  A [submucosa](https://en.wikipedia.org/wiki/Submucosa) formed by [dense irregular connective tissue](https://en.wikipedia.org/wiki/Dense_irregular_connective_tissue) that carries the larger [blood vessels](https://en.wikipedia.org/wiki/Blood_vessels) and a nervous component called [submucosal plexus](https://en.wikipedia.org/wiki/Submucosal_plexus), which is part of the [enteric nervous system](https://en.wikipedia.org/wiki/Enteric_nervous_system). | **Submucosa** - with blood vessels and lymph nodes  the submucosa layer that contains the blood vessels and nerves that support the surrounding tissues. | The submucosa is almost fully occupied by lymphoid tissue mainly arranged in lymphatic nodules. The lymphatic nodules are recognized by a circular aggregation of densely packed lymphocytes that stains dark with HE. The center of the lymphoid nodules stain lighter and are termed germinal centers. The germinal center contains the larger dividing lymphoblasts, similar to the arrangement in lymph nodes. The outer portions of the submucosa harbor larger vessels and have less dense infiltrates of immune cells. | The **submucosa** comprises blood vessels, lymph nodes and particularly fat tissue. | The **submucosa** contains loose connective tissue with blood vessels, lymph follicles and the Meissner's plexus. It has a dense network of veins (rectal venous plexus) and is thickened at the transverse folds. |
| MUSCULARIS | The oral mucosa has no muscularis mucosae, and clearly identifying the boundary between it and the underlying tissues is difficult. | The muscularis of the esophagus is the most prominent layer and allows for powerful peristalsis. The upper third of the esophageal muscularis is composed of skeletal muscle cells while the lower third is made of smooth muscle cells. | The gastric **muscularis externa**, also known as tunica muscularis, is the [smooth muscle](https://www.kenhub.com/en/library/anatomy/smooth-muscle) located deep to the submucosa. It is made up of 3 layers: inner oblique, middle circular and outer longitudinal. The muscularis externa layer produces churning movements required for mechanical digestion. | The **muscularis** consists of an **inner circular** and an **outer longitudinal** musculature between which the **Auerbach’s plexus**lies.  The muscularis is a region of muscle adjacent to the submucosa membrane. It is responsible for gut movement, or peristalsis. It usually has two distinct layers of smooth muscle: circular and longitudinal. | the **muscularis** has an inner circular and outer longitudinal layer of smooth musculature between which the Auerbach’s plexus lies. | The **muscularis** consists of an inner **circular** and outer **longitudinal** muscle layer.  An [external muscular layer](https://en.wikipedia.org/wiki/Muscularis_externa) formed by two layers of [smooth muscle](https://en.wikipedia.org/wiki/Smooth_muscle) arranged in circular bundles in the inner layer and in longitudinal bundles in the outer layer. Between the two layers is the [myenteric plexus](https://en.wikipedia.org/wiki/Myenteric_plexus), formed by nervous tissue and also a part of the [enteric nervous system](https://en.wikipedia.org/wiki/Enteric_nervous_system). | **Muscularis** - strongly pronounced inner circular musculature, outer longitudinal musculature almost restricted to the taeniae.  the muscularis, contains bands of smooth muscle tissue arranged in longitudinal and transverse bands to contract the walls of the cecum. Contraction of the muscularis results in the mixing of chyme with bacteria and the propulsion of chyme into the ascending colon. | Similar to the colon, an inner circular muscle layer and a thin external longitudinal muscle layer comprise the muscularis externa that encircles the appendix. | The inner circular musculature of the **muscularis** is strongly pronounced whereas the outer longitudinal musculature is practically only found in the taeniae  A muscularis externa containing inner circular and outer longitudinal smooth muscle layers. Note that taeniae coli are not present in this section of colon (Taeniae coli represent 3 broad longitudinal bands of smooth muscle). | The **muscularis** has the typical inner circular and outer longitudinal musculature between which the Auerbach’s plexus lies. The ring musculature continues as the sphincter ani externus muscle within the sphincter system whereas the outer longitudinal musculature continues as the corrugator cutis ani muscle inserting at the skin around the anus. |
| SEROSA | It is not found in the oral cavity. | Is a relatively thin layer of collagenous tissue which invests the entire esophagus. | **Gastric serosa**is the outermost layer of the stomach wall. It consists of a layer of simple squamous epithelium, known as **mesothelium**, and a thin layer of underlying connective tissue. The mesothelium produces serous fluid, which lubricates the outer wall of the stomach and ensures its smooth movement in the abdominal cavity. | The serosa is 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. Serous fluid is a lubricating fluid that reduces friction from the movement of the muscularis. | The entire jejunum is covered by **serosa** from the outside which consists of simple squamous epithelium and a connective tissue layer underneath (lamina propria serosae). | The ileum is entirely covered by **serosa** from the outside.  A [serosa](https://en.wikipedia.org/wiki/Serosa) composed of [mesothelium](https://en.wikipedia.org/wiki/Mesothelium), a single layer of [flat cells](https://en.wikipedia.org/wiki/Simple_squamous_epithelium) with varying quantities of underlying [connective](https://en.wikipedia.org/wiki/Connective_tissue) and [adipose tissue](https://en.wikipedia.org/wiki/Adipose_tissue). This layer represents the [visceral peritoneum](https://en.wikipedia.org/wiki/Peritoneum) and is continuous with the [mesentery](https://en.wikipedia.org/wiki/Mesentery). | The outermost layer of the cecum is the serosa, a layer of simple squamous epithelial tissues. The serosa produces a slick serous fluid that lubricates the exterior of the cecum and protects it from friction with the surrounding tissues of the abdomen Histologically the appendix looks quite similar to the colon and cecum. A distinctive feature is however the numerous **lymph follicles** and the **parafollicular tissue** in the [connective tissue](https://www.kenhub.com/en/library/anatomy/overview-and-types-of-connective-tissue) layer of the mucosa (lamina propriae mucosae) and the submucosa. The crypts are particularly deep so that the follicles are in close contact to the intestinal lumen. **M-cells** (microfold cells) are found in the epithelium which access antigens from the intestinal lumen.. | Outside of the muscular layers there is a subserosa containing loose connective tissue, vasculature and nerves. The outermost located peritoneum consists of a thin lining of mesothelial cells.  As the appendix lacks taeniae it has a regular **outer longitudinal musculature** | The outermost serosa (Note that the serosa covers the transverse and sigmoid colon and are attached to the body wall by a mesentery which contains loose CT, adipocytes, blood vessels and nerves. The ascending and descending colon are retroperitoneal and the outer layer on their posterior surface is the adventitia) | It is not found in the anal canal |