

# The Four Layers of the Gastrointestinal Tract

The Gastrointestinal **LUMEN** is the cavity through which foodstuffs pass. The GI tract has a well-lubricated **mucosal** membrane, and thick muscular walls.

## Layers (starting at the lumen):

1. **MUCOSA** – an epithelial layer that has many folds called villi. Not only that, but the individual columnar cells have wrinkles on their surfaces called microvilli (also known as the brush border). These wrinkly cells are on a wrinkly surface (the villi) in order to maximize surface area for efficient catabolism and absorption.
  - **Simple Columnar Epithelium** makes up the mucosal layer, interspersed with goblet cells to make mucus to ease the passage of foodstuffs. Enzymes found on these cells in the small intestine are referred to as brush border enzymes. Lactase is an example of one of these enzymes.
  - The lumen and its mucosal surface are populated with many species of friendly bacteria (such as *Bifidobacterium*, *E.coli* and *Lactobacillus*), as well as opportunistic pathogens such as *Candida albicans*. The majority of these bacteria colonize the large intestine. When their balance is upset, it is linked with: autoimmune disease (for example, Rheumatoid Arthritis); autism; IBS, and weight gain—to name a few.
2. **SUBMUCOSA:**
  - Composed of areolar connective tissue (loose collagen and other fibers)
  - Blood vessels to absorb nutrients – these blood vessels drain into the hepatic portal vein
  - Peyer’s Patches (lymph nodes) filled with leukocytes to fight infection
  - Lymphatic vessels to absorb lipids in the form of chylomicrons
  - Mast cells that can release histamine and are implicated in food allergies.
  - Mucous glands that protrude up through mucosae
3. **SMOOTH MUSCLE**
  - Circular and Longitudinal Layers perform peristalsis and segmentation. These muscles can be stimulated by parasympathetic input from the **Vagus** (CN X) or govern themselves independently via their enteric nerves. In the stomach, there is a third layer going in an oblique direction.
4. **PERITONEUM (the Serosa of the GI tract)**
  - Parietal layer – lines the abdominal cavity wall
  - Visceral layer – covers the abdominal organs
  - Peritoneal cavity – potential space between the parietal and visceral layers
  - Mesentery – a fold of the peritoneum that attaches the intestines to the posterior (dorsal) abdominal wall. It contains the blood vessels that supply and drain the intestines, as well as lymph nodes.
  - Omentum – hangs like an apron from the stomach and over the intestines. It stores fat and contains lymph nodes.
  - Serous membrane should be sterile.
  - Serous fluid reduces friction between the coils of intestines as they move within our abdominal cavity.

**Peritonitis** is inflammation of this serous membrane. It is typically caused by a trauma (e.g. knife wound, car accident), or infection caused by a perforated bowel (e.g. burst appendix).