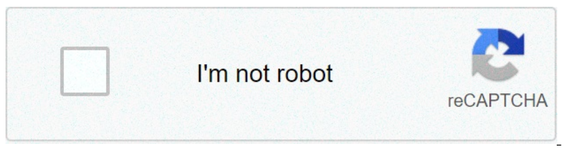

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The gastrointestinal tract includes the

The digestive system is made up of the gastrointestinal (GI) tract—also called the digestive tract—and the liver, pancreas, and gallbladder. The GI tract is a series of hollow organs joined in a long, twisting tube from the mouth to the anus. The hollow organs that make up the GI tract are the mouth, esophagus, stomach, small intestine, large intestine—which includes the rectum—and anus. Food enters the mouth and passes to the anus through the hollow organs of the GI tract. The liver, pancreas, and gallbladder are the solid organs of the digestive system. The digestive system helps the body digest food. The diagram shows the main parts of the digestive system including the areas most likely to be affected by CD or UC. Bacteria in the GI tract, also called gut flora or microbiome, help with digestion. Parts of the nervous and circulatory systems also play roles in the digestive process. Together, a combination of nerves, hormones, bacteria, blood, and the organs of the digestive system completes the complex task of digesting the foods and liquids a person consumes each day. IMPORTANT POINTS Digestion is important for breaking down food into nutrients, which the body uses for energy, growth, and cell repair Digestion works by moving food through the gastrointestinal (GI) tract Digestion begins in the mouth with chewing and ends in the small intestine As food passes through the GI tract, it mixes with digestive juices, causing large molecules of food to break down into smaller molecules. The body then absorbs these smaller molecules through the walls of the small intestine into the bloodstream, which delivers them to the rest of the body Waste products of digestion pass through the large intestine and out of the body as a solid matter called stool Digestive juices contain enzymes that break food down into different nutrients The small intestine absorbs most digested food molecules, as well as water and minerals, and passes them on to other parts of the body for storage or further chemical change. Hormone and nerve regulators control the digestive process References Gastrointestinal system is composed of digestive tract and the accessory organs, salivary glands, pancreas, gallbladder, and liver. The upper gastrointestinal (GI) tract consists of buccal cavity (mouth), pharynx, esophagus, stomach, and duodenum. Duodenum can be divided in four segments: bulb, and descending, horizontal, and ascending duodenum. The lower GI tract includes the rest of the small intestine, and large intestine. The small intestine can be divided into three segments: duodenum (part of the upper intestine), jejunum, and ileum. The large intestine consists of cecum; ascending, transverse, descending, and sigmoid colon; rectum, and anal canal. The layers of the GI tract surrounding lumen are mucosa, containing: epithelium, lamina propria, and muscularis mucosae; submucosa, containing: vasculature, lymphatic vessels, and Meissner's plexus; (tunica) muscularis, containing: circular muscle, myenteric (Auerbach's) plexus, and longitudinal muscle; and (tunica) serosa (serous layer), containing: areola connective tissue, and epithelium. The smooth muscles of the GI tract are regulated by sympathetic and parasympathetic autonomous nervous system, and by an extensive network of intrinsic neurons of the gut, located in the submucosal plexus and in the myenteric plexus with glial cells. Vasculature of the GI tract belongs to splanchnic circulation, which includes gastric and intestinal, and hepatic, pancreatic, and splenic circulations. Splanchnic circulation is supplied by celiac, superior mesenteric, and inferior mesenteric arteries, and is drained via portal vein to the liver. Chylomicrons (chylomicra), synthesized by enterocytes in the intestines, do not enter the splanchnic circulation and liver, but are released into the intestinal lymphatics, and enter the circulation via thoracic duct. Most of the blood flow of GI tract is directed to the mucosa and submucosa, where perfusion can be ~0.2-1.2 mL/(mL*min), while perfusion in outer layers is ~0.3 mL/(mL*min) or less (Hultén et al., 1976a, 1976b, and 1977; Ivarsson et al., 1982). Perfusion in GI tract can increase substantially after a meal, and reduce during exercise and cold or heat stress. Oxygen consumption is relatively constant, as oxygen extraction changes according to perfusion changes. Enterocytes absorb luminal contents and deliver some of that as chyle into lymphatic capillaries of the GI tract (lacteals). Lacteals connect to the submucosal lymphatic vessels, and with lymphatic vessels from the muscular layer drain into collecting lymphatic vessels, and from there to lymph nodes. Lymph nodes from the intestinal and lumbar trunks drain into a dilated sac, cisterna chyli, and from there into the thoracic duct. Chyle contains lymph, lymphocytes, immunoglobulins, albumin, and chylomicrons. Most of the lymph produced in the body is derived from the GI tract, ~2 L/day, especially after a fat-containing meal (Alexander et al., 2010). Lymph flow is increased also during acute and chronic inflammation, partly because venous outflow may be blocked. During a meal, glucose sensing activates sympathetic nervous system, which stimulates glucose uptake and glycogenesis in skeletal muscle, and synthesis and storage of lipids in white adipose tissue (WAT). Neuropeptides ghrelin, peptide YY (PYY), and GLP-1 are secreted from entero-endocrine cells in response to meal and nutrients in intestinal lumen. Gut hormones can directly modulate triglyceride metabolism in adipocytes; for instance, PYY inhibits lipolysis, and secretin stimulates lipolysis. All macronutrients elicit meal-associated thermogenesis. Cholecystokinin (CKK) and GLP-1 stimulate sympathetic innervation in brown adipose tissue (BAT), activating meal-associated thermogenesis. Secretin directly stimulates BAT thermogenesis (Li et al., 2018). PET can be used to dynamically follow fluid distribution in the GI tract by giving orally a nonabsorbable radiopharmaceutical, such as [18F]deoxyfluoropoly(ethylene glycol) (Takashima et al., 2013). Metabolism in intestinal and colon tissue can be studied with PET: [18F]FDG has been used to assess glucose uptake, and [18F]FDG has been used to measure perfusion. [18F]FTHA has been administered orally to study organ-specific dietary fatty-acid uptake (Labbé et al., 2011). Intravenous administration of [18F]FTHA has been used to study the FFA uptake rate in intestine (duodenum and jejunum) and colon (Motiani et al., 2017; Koffert et al., 2018). [18F]FDG has been used in imaging of inflammatory bowel disease (IBD) (Perlman et al., 2013), including the staging, treatment planning, and follow-up of Crohn's disease (Palatka et al., 2018). In small animals models of IBD also TSPO tracer [11C]PBR28 has been used, but colitis was not detected with PET because of insufficient resolution (Kurtys et al., 2017). The same issue was noticed with [18F]FDG unless urinary bladder was continuously flushed during imaging (Deleye et al., 2014). Bowel motion and movement of gas during the PET study, and between transmission and PET scan, can cause image artifacts (Nakamoto et al., 2004; Lodge et al., 2010). Image registration may also be hampered by the physiological motion (Nakamoto et al., 2003). Combined PET/CT still improves the overall accuracy of diagnostic studies (Kamel et al., 2004). Peritoneum and peritoneal cavity The peritoneum is a large, normally