🏆 Let's Take Attendance 🏆

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Comb. VERSION

Digestive Review

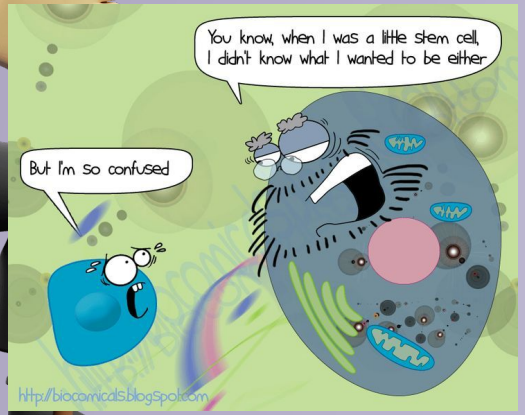
Hope all this knowledge was **easy to digest**!

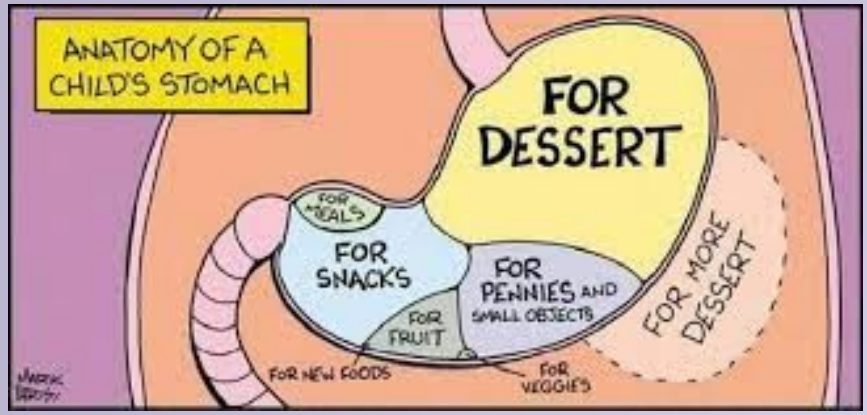
M

Quick Poll

Did you guys study/prepare for the review Kahoot competition?

Answer Yes/No in Chat!





T

Digestive Review: Main Orders/Structure

Stages of consumption: Ingestion, digestion, absorption, elimination

Order of alimentary canal: Mouth, esophagus, stomach, small intestine (duodenum, jejunum, ileum), large intestine (ascending colon, right hepatic flexure, transverse colon, left splenic flexure, descending colon, sigmoid colon, rectum)

Layers of alimentary canal: Mucosa, submucosa, muscularis, serosa,

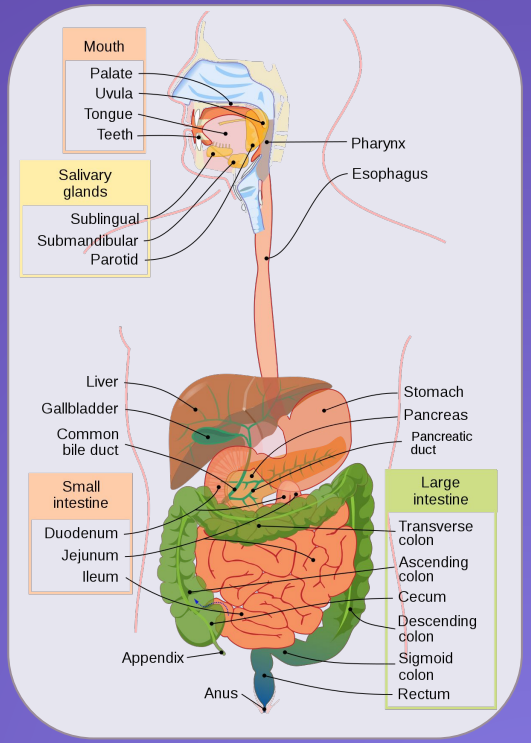
Stomach anatomy order: Esophagus, Fundus, Cardia, Pyloric antrum, Pylorus, Duodenum

List of stomach cells: goblet (mucus), parietal (HCl), chief (pepsin), G cell (gastrin), D cell (somatostatin)

Accessory organs (in order of appearance, head to toe): Teeth/tongue, salivary glands (sublingual, submandibular, parotid), liver, gallbladder, pancreas, cecum, appendix

Lipid absorption: Fat + bile salt, Triglyceride, monoglyceride + fatty acids (into micelles), triglyceride, chylomicron, lacteal

Ruminant (foregut/cow): Mouth, rumen, reticulum, mouth, omasum, abomasum



Many of you guys drew models like this one for the course challenge :)

R

Digestive Review: Hormones

STOMACH

Ghrelin - in stomach, produced by enteroendocrine cells, rises before a meal (hunger signal) by increasing gastric motility and stimulate gastric acid secretion, initiate appetite

Gastrin- peptide hormone, produced by G cells in pyloric antrum, increases HCl by parietal cells, aids gastric motility

Motilin -in stomach, released between meals, stimulates contraction of fundus and antrum, accelerates digestion by contracting gallbladder, increases pressure of lower esophageal sphincter

Serotonin - AKA 5-hydroxytryptophan, formed in enterochromaffin cells (which also secrete histamine, kinins), paracrine secretion to inhibit gastric acid, also affects mood, learning, memory (as a neurotransmitter)

SMALL INTESTINE

Secretin- peptide produced by S cells of duodenum, (1) inhibits acid from parietal cells, (2) stimulate bicarbonate from pancreas

Cholecystokinin - intestine, peptide secreted by I cells in response to stomach chyme entering duodenum, causes gallbladder to contract (bile), stimulates pancreatic enzymes, intestinal peristalsis, inhibits movement of chyme to give more time for digestion

Gastric inhibitory peptide - intestine, peptide secreted by K cells to increase insulin production in response to blood sugar, inhibits absorption of water in small intestine, *increased levels* in diabetes

Peptide YY - ileum, colon, released after a meal to suppress appetite

Neurotensin - secreted by N cells of ileum in response to fat in small intestine (for absorption), reduces gastric activity, relaxes lower esophageal sphincter, blocks acid and pepsin secretion (using vagus nerve)

Digestive Review: Hormones

PANCREAS

Somatostatin - released by delta cells in response to fat in duodenum, inhibits acid, pepsin, gastrin, insulin, intestinal hormones, inhibits the motility of gallbladder and secretion of lipase in pancreas

Insulin - released by beta pancreatic cells in response to rise in plasma glucose (absorption to muscle and adipose tissue from hepatic portal vein, biosynthesis of glycogen in liver), used in treating diabetes mellitus

Glucagon (pancreas) - released by alpha pancreatic cells in response to drop in plasma glucose (gluconeogenesis, glycolysis), decreases gastric/pancreatic secretions, used in treating hypoglycemia

Glucagon (intestine) - released by L cells in response to carbohydrate and triglycerides in small intestine, modulates intestinal motility

OTHER

Leptin - produced by adipose cells and enterocytes to inhibit hunger and diminish fat storage, acts on cell receptors in arcuate and ventromedial nuclei, hypothalamus, dopaminergic neurons (ventral tegmental area)

Substance P - produced in vagus nerve, myenteric plexus to stimulate saliva production, contracts smooth muscle, inflammatory response

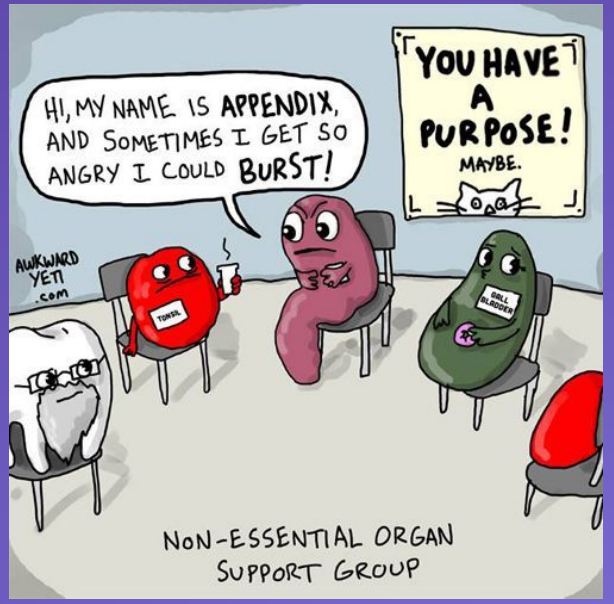
Endorphin, enkephalin - peptide (5 amino acids) in vagus nerve, myenteric plexus, opiates, modulate smooth muscle activity

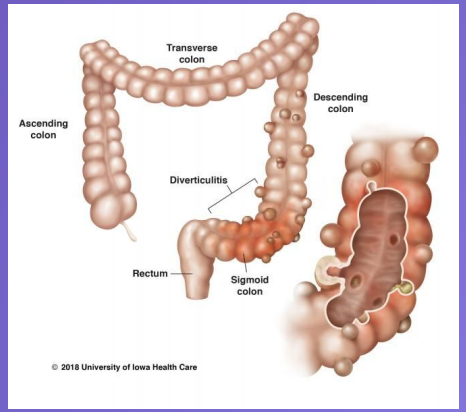
Bombesin - peptide in intrinsic nerves of GI tract, stimulate gastrin, pancreatic enzymes, gallbladder contraction (similar function to CCK)

Prostaglandin - contract and relax smooth muscle of GI, protect mucosa by increasing mucus and bicarbonate from mucosa layer

Digestive Review: Diseases

Stomach (peptic), duodenal ulcer - erosions of the mucosa due to the acidic HCl, involves *H. pylori*
Diabetes Mellitus - high blood sugar, type 1 (autoimmune which destroys insulin-producing beta cells of the pancreas) and 2 (decreased responsiveness to insulin and lowered synthesis)
Diarrhea - loose, watery stools
Lactose intolerance - inability to digest dairy (lactase deficiency)
Hepatitis -inflammation of liver due to virus, alcohol, or autoimmune
Appendicitis (see pic) - blocked appendix due to tumors, infection, blockage
Diverticular disease (see pic) - small pouches push out through weak spots in your colon (diverticulum), get inflamed
GERD - Gastroesophageal Reflux Disease, irritated esophagus produced by malfunction of gastroesophageal sphincter (leakage)
Obesity - reduced basal metabolic rate, caused by foods with high glycemic load, artificial sugars and additives, different neural plasticity than starvation situation; could resolve by gastrointestinal surgery (gastric bypass), transplant microbiome, implant neurons to suppress leptin on brain





Digestive Review: Diseases

Crohn's Disease - autoimmune, inflamed digestive tract, scarred intestine and GI, abdominal cramp
Celiac Disease - small intestine, gluten intolerance, autoimmune, causes inflammatory reaction (villous atrophy) due to resistance to prolamin (can't be broken down by proteases, destroying tight junctions)
Scurvy - vitamin C deficiency, pale skin, sunken eyes, loss of teeth, eat fruits and veggies
Rickets - vitamin D deficiency, affects bone development, eat eggs, meat, oily fish, leads to osteomalacia in adults
Steatorrhea - fat-filled feces, could be due to pancreatitis or gallstones
Gallstones - hard, pebble-like material (cholesterol, bilirubin), block the bile duct (don't confuse with kidney stones

Digestive Review: Q&A + Glossary of Terms

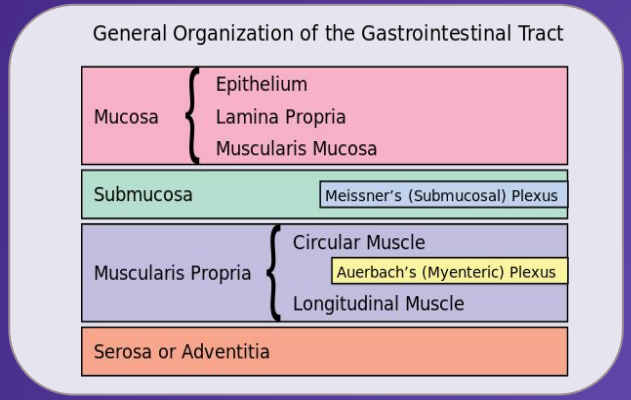
Serosa
Myenteric (Auerbach) plexus
Submucosa
Meissner's (submucosal) plexus
Muscularis mucosae
Lamina propria //
Gastric gland
Enterochromaffin-like **Cells**
Goblet **cell**
Parietal **cell**
Chief/Zymogenic **cell**
D **cell**
G **cell**
Extrinsic vs intrinsic
Cephalic phase
Gastric phase
Intestinal phase //
Intestinal crypts of Lieberkühn

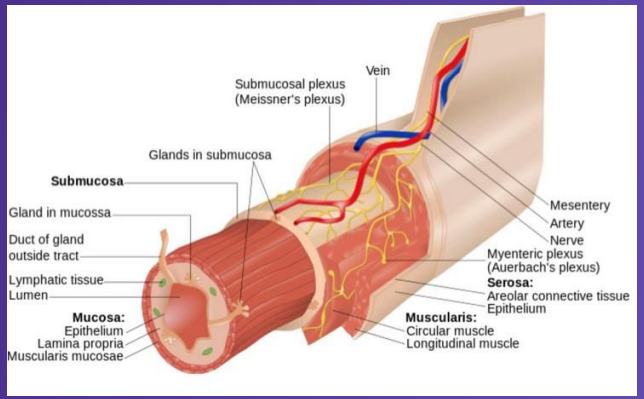
Paneth **cell**
Celiac trunk
Superior mesenteric artery
Haustra
Duodenum
Brunner's gland
Peyer's patch
Islets of Langerhans
Alpha **cell**
Beta **cell**
Delta **cell**
PP **cell**
Villi
Microvilli (brush border)
Peristalsis
Brush border enzymes
Vitamin B12 + intrinsic factor
Trypsin

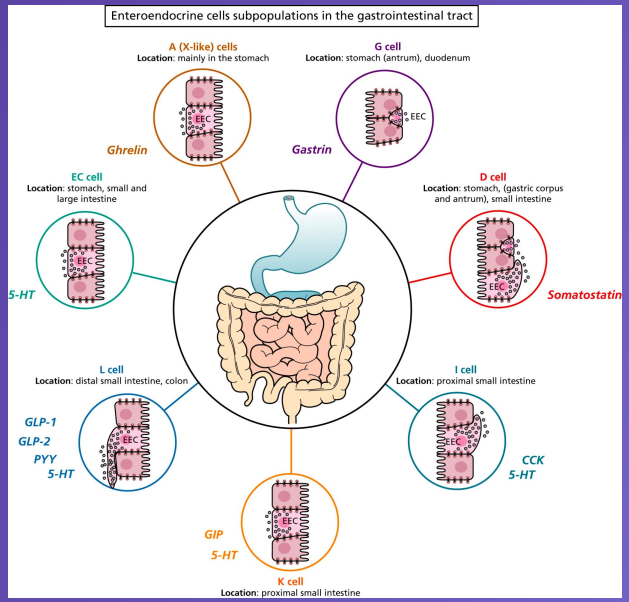
Chymotrypsin
Cecum//
Liver hepatocyte
Kupffer **cell**
Sinusoids
Bile
Bilirubin
Hepatic stellate **cells**
Bile duct
Hepatic portal vein
Enterohepatic circulation //
Substrate feeding
Filter feeding
Fluid feeding
Bulk feeding

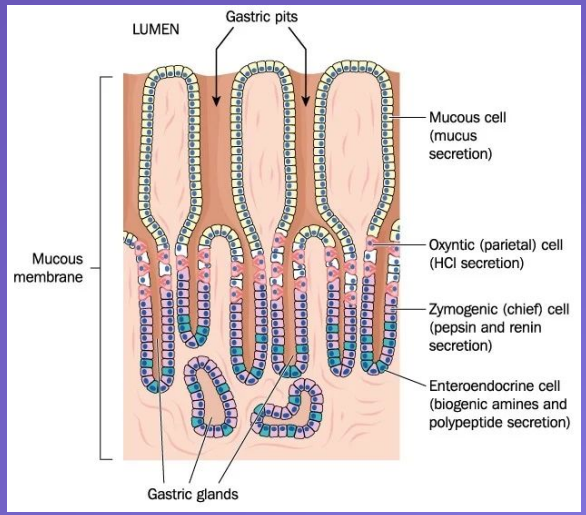
aaand more!

Digestive Review: Q&A + Helpful Diagrams

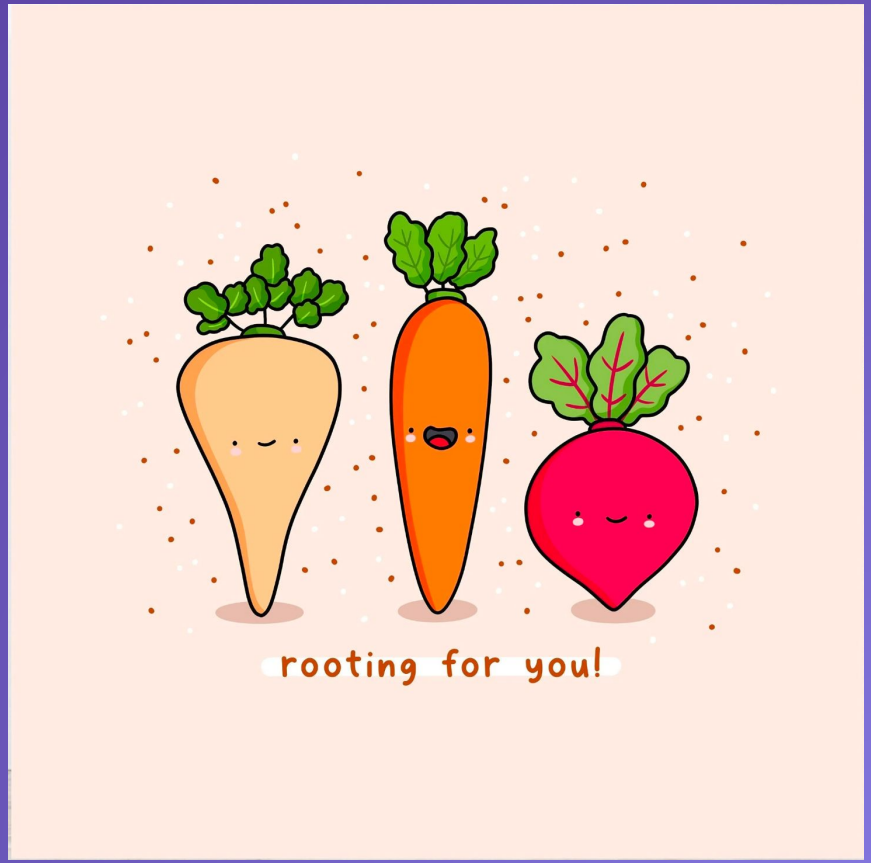









GOUDA LUCK!


rooting for you!

Kahoot!

https://play.kahoot.it/v2/?quizId=eb912326-bd7e-4951-82d1-521e1fbf1e81