Gastrointestinal system

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Function

Primary functions:

- Regulate intake of food and h2o - partly by gut- appetite, thirst
- Conversion food -> nutrients - strut of gut -break -> components absorbed across gut wall
- Absorptions of nutrients & h20- across gut wall -> circulation
- Energy store- intermittent eating- store as can't digest all at once
- Excretion of waste products- substances don't want - out body ->bile -> GI tract -> faeces
- Protect against bact & toxins- stomach 1st line defence

Processes:

- ✧ Sensory inputs: appeptitie, taste, smell, sight - from food in GI tract & b4 . Start digest even b4 eat
- ✧ Mechanical & chem breakdown food -> smaller pieces - reab. Across gut
- ✧ Secretion, absorption & excretion - across lining GI tract
- ✧ Regulation by nerves hormones (by ANS, by GI tract) & local factors (reflexes)

Enteric Nervous System

- Subdivision of ANS
- Self-contained NS
- ⭘ Autonomic nerves w/in gut, w/ ganglia (collection nerve cell bodies) @ myenteric & submucosal plexus
- ⭘ Control smooth musc contraction & exocrine/endocrine gland secretions
- ⭘ Regulated by symp & para nerves & sensory reflexes- baroreceptors - feedback using stretch -> enteric NS - can signal to symp & para
  Sensory reflexes-higher p.ways- send signal up about appetite - if distended/not
- ⭘ Symp & para have synapses onto enteric NS - can switch nerves on/off to req. funct.

Myenteric plexus - control smooth muscle -nerve cell bodies in musc. Externa

Submucosal plexus - nerve cell bod - nerves control secretion from submucosa-> lumen of GI tract

Control gut motility

- ✸ Interstitial cells of Cajal (pace-setter cells) - can depolarize -> change memb pot & transfer to. To smooth muscle cells next to it, smooth muscle cells joined by gap junctions [illegible] will spread to all connected
- ✸ Specialised smooth muscle cells
- ✸ Pace maker activity
- ✸ Det. Freq. of slow waves of gut contraction [illegible] as Irritable bowel syndrome if cells abnormal

Stim para NS -ots spike, stronger signal
Pace setter cells give small dep. - capable cause muscle contrac if exceed threshold, increase stim increase contrac increase no. AP
If get up to threshold for AP - spike pot.
Electrodes in smooth muscle of GI- muscularis externa

Circulation of GI system

hence

- ► Collectively called splanchnic circulation
- ► Contains 15% total blood vol- can divert blood away from gut in emergency- blood flow increase when eating, decrease when exercising
- ► Transports absorbed nut & waste prod for excretion
- ► Portal circulation(small intestine-> liver) bet GI tract & liver
- ► Adjustable resistance & reservoir of blood
- ► Vasodilation by parasymp control
- ► Vasoconst by symp

Liver

Detoxify bad bact and toxins from gut b4 enter vena cava
In drug design need make sure can pass liver

Structure of Oral Cavity

Initial stages of digestion

- ⊙ Mechanical b.down food- teeth, tounge, muscles - jaw - form bolus (small food parcel) to be broken down
- ⊙ Chem b.down food- amylase (breakdown carbs) and lipase (breakdown fats to trigly) in saliva
- ⊙ Swallowing reflex to move bolus -> pharynx and oesophagus - voluntary w/ skeletal musc

Sensory input from food- provide cephalic phase

- ⊙ Chem stim of olfactory receptors in nose and taste buds in tounge

Food and air pass at pharynx - food then to oesophagus

Structure- Major subdivisions of digestive tract

1. Oral cavity, teeth, tounge- mechanical processing, some chem. Breakdown, moistening , mixing w/ salivary secret.
2. Pharynx - muscular propulsion of mat-> oesophagus
3. Oesophagus- transp mat-> stomach- deliver bolus food down
4. Stomach- chem b.down mat via acid &enz. , mech processing through muscular contractions
5. Small intestine- enz digest & absorp. H2o, organic substrates, vit & ions - duodenum, illium, jejunum
6. Large intestine- dehydration and compaction of indigestible mat in prep for elimination -cecum, colon

Accessory Organs of Digestive Tract

Facilitate digestion food- food not pass through it

1. Salivary glands
2. Liver
3. Gallbladder- bile store
4. Pancreas - make enz. To digest

Mucosa layer- in contact w/ food

- ❖ Mucosa epithelium- single layer epithelium
- ❖ Lamina propria- loose conn. Tiss. - blood vess, cap, nerves, lymphatic vess take up nutrients
- ❖ Muscularis mucosa- smooth musc. Around outside- contact & change SA

Submucosa

- ❖ Loose conn. Tiss.
- ❖ Exocrine glands- make enz. ,fluid (alkaline) - empty -> lumen , substances go out of body
- ❖ Nerves, blood and lymph vessels

Muscularis propria

- ❖ Inner circular smooth muscle
- ❖ Outer longitudinal smooth muscle- imp to mix food, contract- allows move down length GI tract

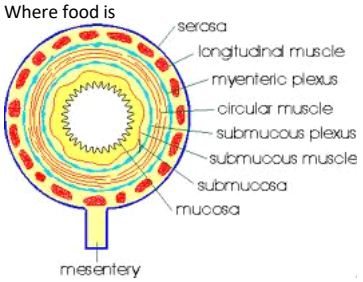
2 layers in most parts GI tract

Serosa

- ❖ Outer conn tiss - fibrous , hold everything tog, anchor gut to abdo wall

Lumen

- ❖ Where food is



Phases of Digestion

Relates to where food is in GI tract
Control digestive processes- gut motility and secretions

Cephalic- if cut vagus nerve doesn't happen

- Anticipation of feeding - feed forward
- Sensory input from food - thought , sight , smell, taste
- Mediated by vagal parasymp nerves- ↑gut motility & secretions, produce gastric acid and enz.

Gastric- when food in stomach

- Sensory input from -stretch, chem, Ph change , peptides from food
- Mediated by parasym & enteric nerve reflexes , hormones (gastric)

Intestinal-

- Food in intestines
- Sensory input from food- strech, chem
- Mediated by para and enteric nerve reflexes, hormones (secretin, cck)