GUT MOTILITY

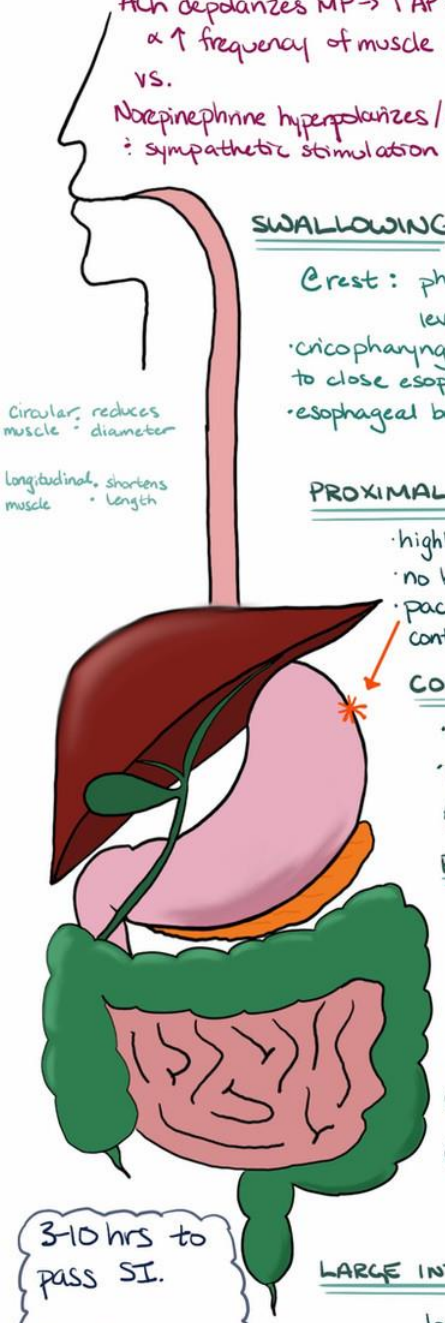
- GI smooth muscle MP Δ w/ time - unstable ∴ oscillates → slow waves initiated by interstitial cells of Cajal in muscle layer
- smooth muscle @ basal muscle tension
- if slow wave peak > threshold for AP → AP occurs @ top of slow wave for muscle contraction or tension

Frequency of slow wave modulated by:
ACh depolarizes MP → ↑ AP frequency ∝ ↑ frequency of muscle contraction/tone

vs.

Norepinephrine hyperpolarizes/↓ MP ∴ sympathetic stimulation

stomach - 3 waves/min
duodenum - 11-13 waves/min
ileum - 8-9 waves/min
colon - 6 waves/min



Circular muscle: reduces ∴ diameter

Longitudinal muscle: shortens ∴ length

SWALLOWING

@ rest: pharyngeal muscle @ basal level of muscle tone
- cricopharyngeous muscle contracts to close esophageal inlet against cricoid cartilage
- esophageal body is flaccid w/o appreciable tone

① oral voluntary phase:
- jaws clench
- tongue elevates against hard palate
- soft palate pushed back
- food bolus forced into pharynx
- stimulates tactile receptors in pharynx

② pharyngeal involuntary phase:
- upper esophageal sphincter relaxes for 1 sec for food to pass
- epiglottis covers trachea
- UES contracts back to baseline (high pressure)

③ esophageal involuntary phase
- primary peristalsis - controlled by swallowing center
- UES → LES wave of contraction 6-9 sec.
- LES relaxes as UES contracts waiting for primary peristalsis
- swallowing → relaxes LES ∴ proximal stomach for food to enter "receptive relaxation"

PROXIMAL STOMACH = "reservoir"
- highly distensible
- no basal electrical activity
- pacemaker region cycles slow waves continuously through distal stomach

CORPUS = "grinding chamber"
- basal electrical activity
- phasic peristaltic contractions - reduces size of digestible solids/promotes emptying

ANTRUM - food slams against antrum to break into pieces

PYLORUS - regulates emptying

- ↑ hypertonicity ∴ acidity impair emptying of liquids
- meals rich in protein ∴ fat empty slowly to prevent overloading duodenum capacity to digest/absorb via enterogastric reflexes

SMALL INTESTINE - muscularis externa

① PERISTALSIS: coordinated contraction ∴ relaxation of short lengths to move chyme

② SEGMENTATION: back ∴ forth movement, closely spaced rhythmic contractions
little propulsive power, presents new chyme closest to mucosal surface for further digestion ∴ absorption to mix chyme

⊕ laxatives
⊖ codeine, opiates

3-10 hrs to pass SI.

18-50 hrs to pass LI

LARGE INTESTINE

low motility (4-6 waves/min) to maximize absorption

① segmentation: mixes contents ∴ divides colon

② mass movement: strong peristaltic wave (colonic segments may remain contracted) to push contents distally 1-3x/day
- mediated by ACh/vagus nerve stimulation ↑ ACh
- sympathetic stimulation → ↓ motility

RECTUM
- defecation reflex = modulated by sacral region via pelvic nerves (voluntary control)
- filling of rectum → relax IAS (circular smooth muscle) ∴ contract EAS (striated ∴ innervated by somatic nerves) → urge to defecate