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Intestinal Motility

Wednesday, January 16, 2008

11:00 AM

1. Describes the characteristics of the Basic Electrical Rhythm (BER) of the small intestine, its origin in the ICC cells, and its relation to the smooth muscle contractile activity.
 - a. Functions: mixing, facilitating contact w/ mucosa, propulsion
 - b. Slow waves occur 12/min in duodenum, 9/min in ileum
 - c. Amplitude of slow wave is modulated by neurotransmitters
 - d. When slow wave crosses threshold, spike of APs --> contraction
 - e. ICC cells are origin of slow wave
 - i. Spontaneous electrical activity
 - ii. Form a network and couple to smooth muscle cells by gap junctions
 - iii. Bear c Kit receptor (stem cell factor ligand); mutations in either leads to loss of intestinal slow waves in mouse models
2. Describes the pattern of intestinal motility seen during the absorptive phase (segmentation).
 - a. Food present in lumen
 - b. Lasts 4-6 hours
 - c. Contractions occur in adjacent or empty segments --> neural reflex or hormones involved
 - d. Locally mix and circulate intestinal contents
 - e. Contractions of muscularis mucosa alter folds
 - f. Villar contractions occur to mix unstirred layer and empty lacteals
 - g. Starts to exit 2 hours after meal because of increased contraction frequency in upper small intestine and peristaltic movements in aboral direction; slow enough for digestion/absorption to continue
 - h. Some anti-diarrheal drugs act by inhibiting net intestinal transit
3. Describes the pattern of intestinal motility seen during the post-absorptive phase between meals (the migrating motility complex, MMC).
 - a. Peristalsis
 - i. Distension --> contraction upstream of bolus, relaxation downstream
 - ii. Substance P, ACh cause contraction
 - iii. Opioids blocks relaxation --> constipation
 - iv. VIP causes relaxation (somatostatin suppresses release of VIP)
 - b. MMC
 - i. Initiated in antrum of stomach
 - ii. Takes 90 min
 - iii. Pylorus relaxes allowing larger material, bacteria to pass
 - iv. Onset of each MMC coincides with peak in plasma motilin levels
 - v. Motilin can initiate MMC
 - vi. Feeding inhibits MMC
4. Describes the effects of parasympathetic and sympathetic nervous activity on small intestinal motility.
 - a. Increased parasympathetic activity increases motility
 - b. Increased sympathetic activity decreases motility
5. Describes the effects of distention on small intestinal motility.
 - a. Distension increases motility via neural reflexes
6. Defines the gastroileal reflex.
 - a. Increase in ileal motility after food enter empty stomach
 - b. Mediated by gastrin release from stomach
7. States effects of increased pressure in the ileum and cecum on the ileocecal sphincter.
 - a. Increased pressure in ileum causes ileocecal sphincter to open to allow food to pass through
 - b. Increased pressure in cecum closes sphincter to ensure no backflow of food
8. Describes haustral shuttling.

- a. Feeding causes contractions to increase
 - b. First have haustral shuttling w/ no net movement (neural hormonally mediated)
 - c. Haustral shuttling then propels chyme along
 - d. Mutlihaustral propulsion w/ movement of chyme through several haustra
9. Compares colonic motor activity with the motor activity in the small intestine.
 - a. Colonic motor activity uses haustral shuttling
 - b. Colon empties when stomach fills in order to prepare for next volume of chyme to arrive
 10. Describes the colonic motor activity during a mass movement.
 - a. Gastro-colic reflex is emptying of colon when stomach is filling
 11. Describes the sequence of events occurring during reflexive defecation.
 - a. Distension initiates rectal contraction by local reflexes in ENS
 - b. Increased P triggers reflex relaxation of internal anal sphincter (smooth muscle)
 - c. External sphincter contracts until voluntary relaxation
 12. Describes the voluntary control of defecation.
 - a. External anal sphincter under voluntary control
 - b. You have to initiate the act of defecation (won't happen unless you start it)
 - c. Spinal cord injuries can take away control