open.michigan

Author(s): Aken Desai, Michael Mathis, 2008

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. Opiods 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