



WITHOUT *teachers*
LIFE WOULD HAVE NO CLASS



Types of Movements of GIT

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Life of Medical Students. 🤔🤔

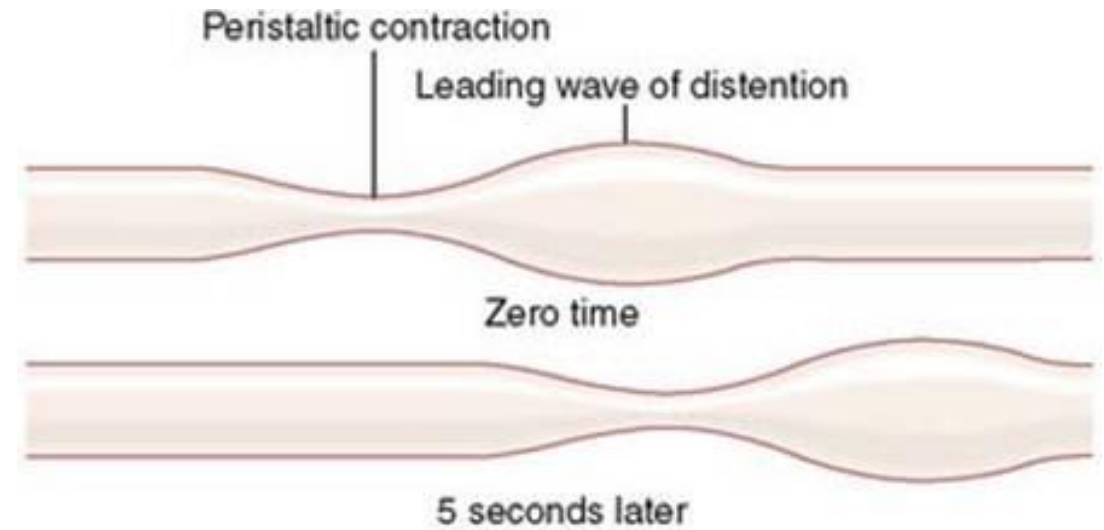


Functional Types of Movements in the Gastrointestinal Tract

- Two types of movements occur in the gastrointestinal tract:
- (1) ***propulsive movements***,
- which cause food to move forward along the tract at an appropriate rate to accommodate digestion and absorption, and
- (2) ***mixing movements***,
- which keep the intestinal contents thoroughly mixed at all times.

Propulsive Movements—Peristalsis

- The basic propulsive movement of the gastrointestinal tract is *peristalsis*
- A contractile ring appears around the gut and then moves forward;
- this is analogous to putting one's fingers around a thin distended tube, then constricting the fingers and sliding them forward along the tube.
- Any material in front of the contractile ring is moved forward.



- Peristalsis is an inherent property of many syncytial smooth muscle tubes; stimulation at any point in the gut can cause a contractile ring to appear in the circular muscle, and this ring then spreads along the gut tube.
- (Peristalsis also occurs in the bile ducts, glandular ducts, ureters, and many other smooth muscle tubes of the body.)

- The usual stimulus for intestinal peristalsis is *distention of the gut*.
- That is, if a large amount of food collects at any point in the gut, the stretching of the gut wall stimulates the enteric nervous system to contract the gut wall 2 to 3 centimeters behind this point, and a contractile ring appears that initiates a peristaltic movement.
- Other stimuli that can initiate peristalsis include chemical or physical irritation of the epithelial lining in the gut.
- Also, strong parasympathetic nervous signals to the gut will elicit strong peristalsis

Directional Movement of Peristaltic Waves Toward the Anus

- Peristalsis, theoretically, can occur in either direction from a stimulated point, but it normally dies out rapidly in the orad (toward the mouth) direction while continuing for a considerable distance toward the anus.
- The exact cause of this directional transmission of peristalsis has never been ascertained, although it probably results mainly from the fact that the myenteric plexus itself is “polarized” in the anal direction

Mixing Movements

- Mixing movements differ in different parts of the alimentary tract.
- In some areas, the peristaltic contractions themselves cause most of the mixing.
- *local intermittent constrictive contractions* occur every few centimeters in the gut wall.
- These constrictions usually last only 5 to 30 seconds; then new constrictions occur at other points in the gut, thus “chopping” and “shearing” the contents first here and then there.
- These peristaltic and constrictive movements are modified in different parts of the gastrointestinal tract for proper propulsion and mixing

Motor Functions of Stomach

1.Storage

- Until food is processed in stomach and intestine

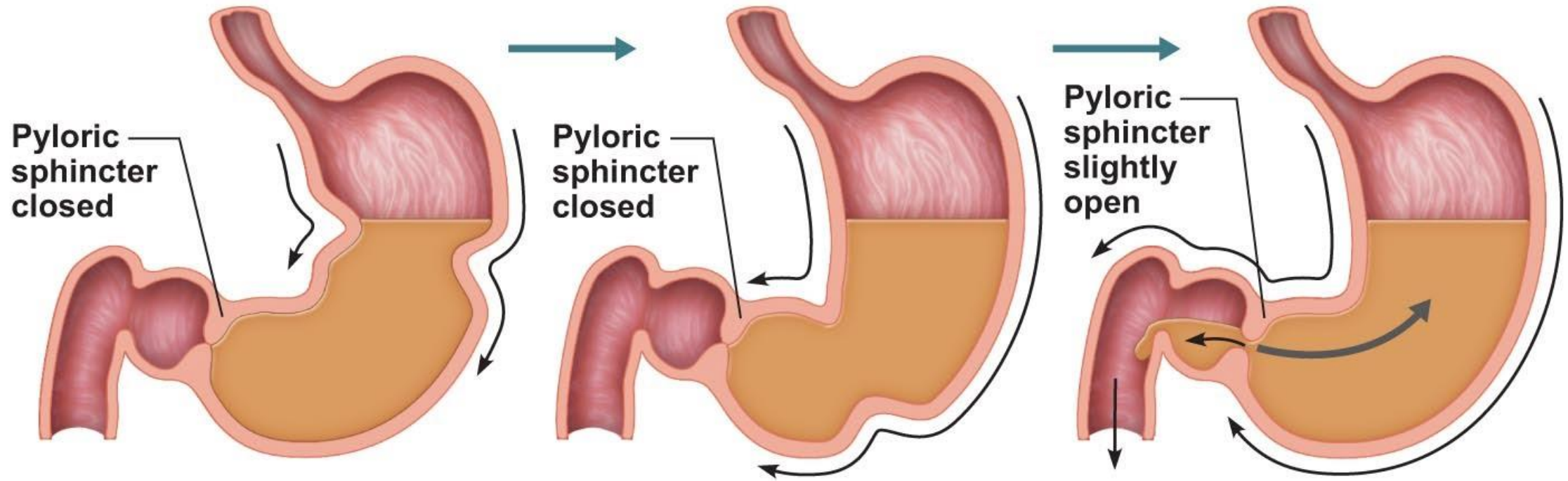
2.Mixing (with gastric secretions)

- Unless semifluid mixture: chyme

3.Slow emptying

- At a rate suitable for digestion and absorption in small intestine

4. Hunger contractions



Pyloric
sphincter
closed

Pyloric
sphincter
closed

Pyloric
sphincter
slightly
open

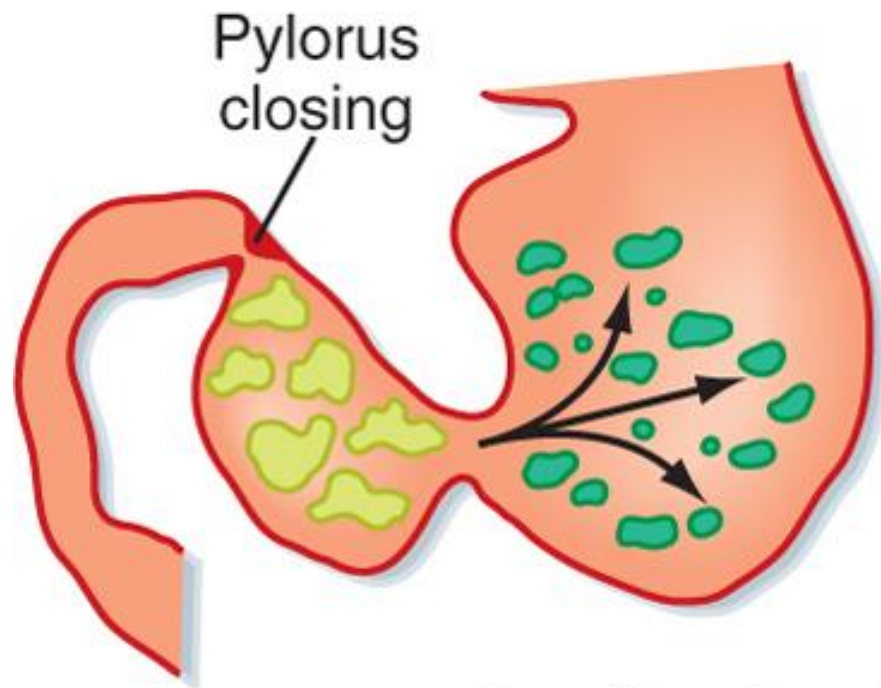
① Propulsion: Peristaltic waves move from the fundus to the pylorus.

② Grinding: The most vigorous peristalsis and mixing action occur close to the pylorus.

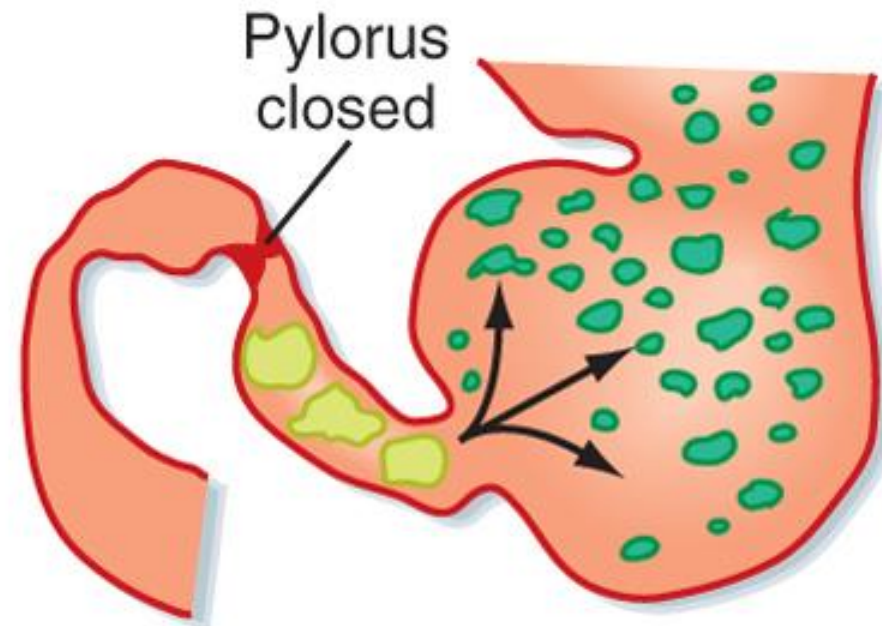
③ Retropulsion: The pyloric end of the stomach pumps small amounts of chyme into the duodenum, while simultaneously forcing most of its contents backward into the stomach.

JETLIKE RETROPULSION THROUGH THE ORIFICE OF THE ANTRAL CONTRACTION TRITURATES SOLID PARTICLES

- **Onset of terminal antral contraction**



- **Complete terminal antral contraction**



Hunger Contractions

- Besides the peristaltic contractions that occur when food is present in the stomach, another type of intense contractions, called *hunger contractions*, often occurs *when the stomach has been empty* for several hours or more.
- They are rhythmical peristaltic contractions in the *body* of the stomach.
- When the successive contractions become extremely strong, they often fuse to cause a continuing tetanic contraction that sometimes lasts for 2 to 3 minutes.
- Hunger contractions are most intense in young, healthy people who have high degrees of gastrointestinal tonus; they are also greatly increased by the person's having lower than normal levels of blood sugar.
- When hunger contractions occur in the stomach, the person sometimes experiences mild pain in the pit of the stomach, called *hunger pangs*.
- Hunger pangs usually do not begin until 12 to 24 hours after the last ingestion of food; in starvation, they reach their greatest intensity in 3 to 4 days and gradually weaken in succeeding days.

Movements of Small Intestine

- Mixing or Segmentation Contractions
- Propulsive Movements
- Peristaltic Rush
- Movement of the muscularis mucosae and Villi
- Migratory Motor complexes

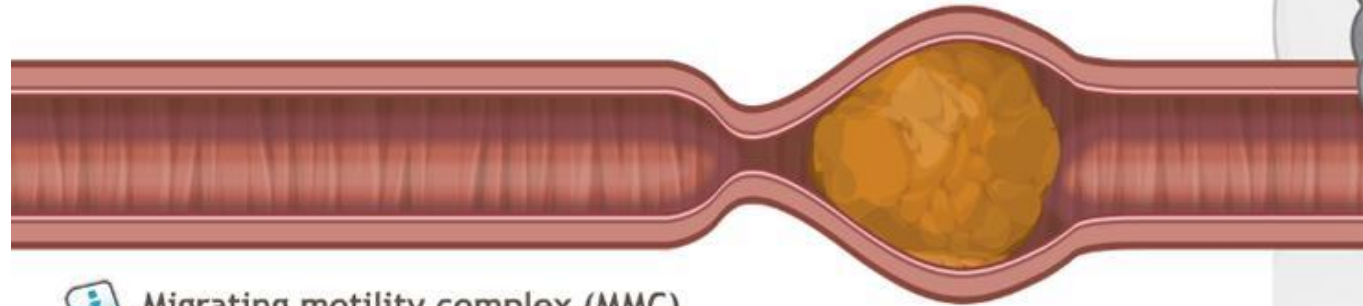
Mechanical Digestion and Motility in the Small Intestine

Mechanical digestion occurs through 2 different muscle movement patterns of the small intestine known as segmentations and the migrating motility complex, or MMC.

Segmentations mix chyme with digestive juices during digestion, while MMC moves the chyme forward once most of the nutrients have been absorbed.



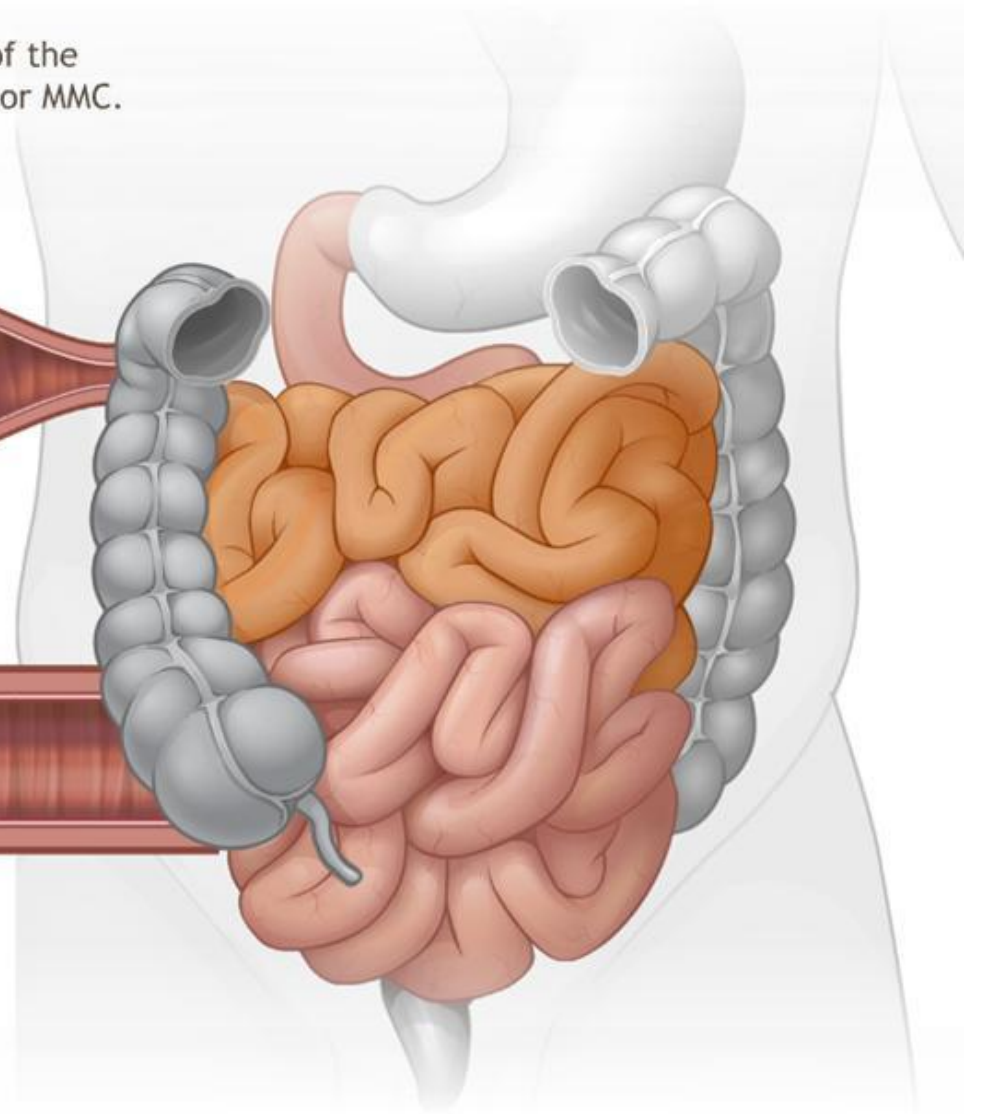
 Segmentations



 Migrating motility complex (MMC)

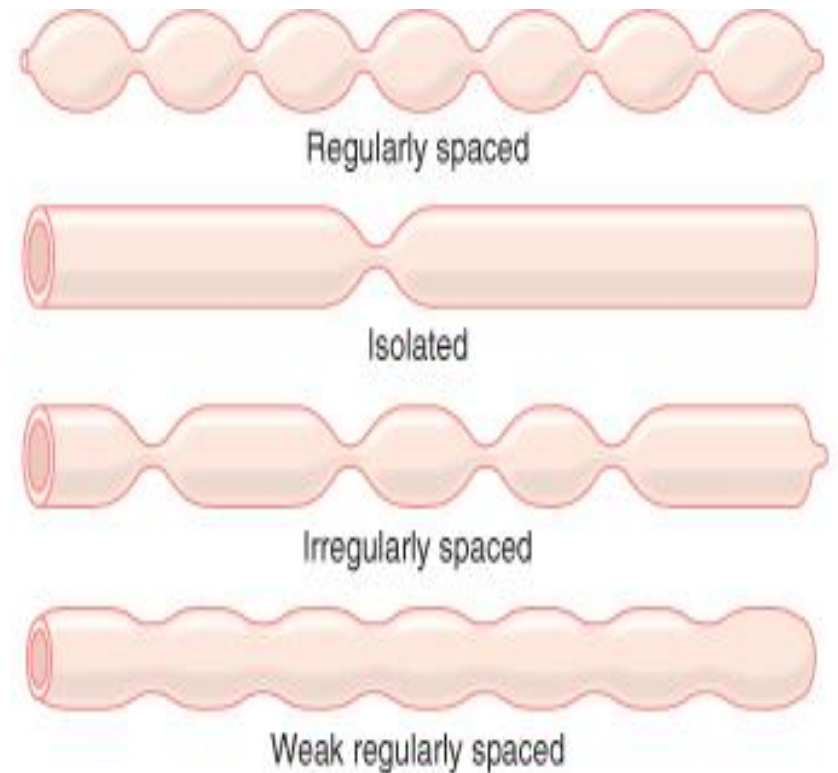
Select the slideshow icon to learn more about segmentations.

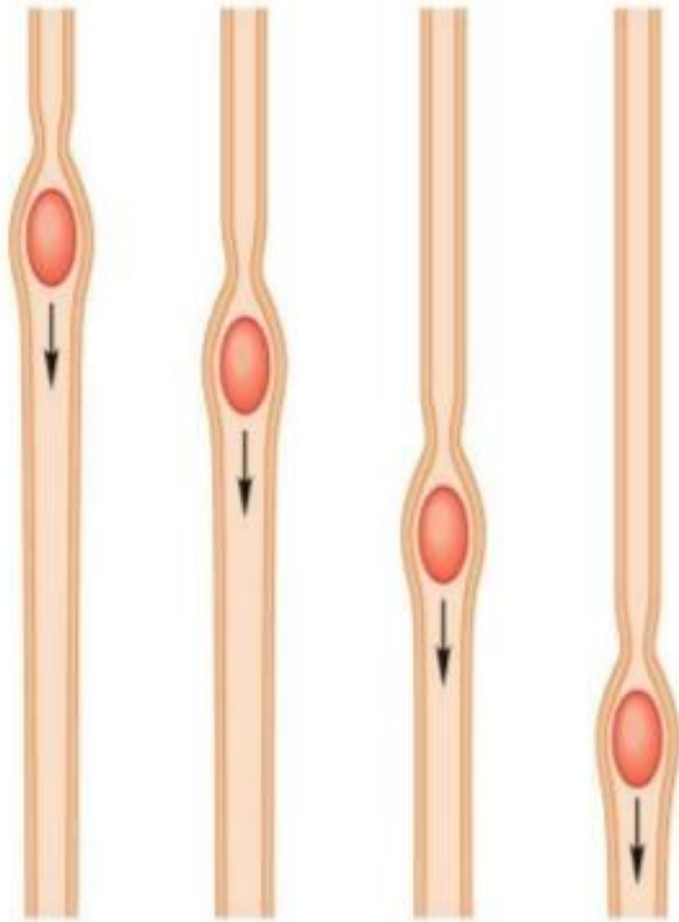
Select the “i” icon for more information on MMC.



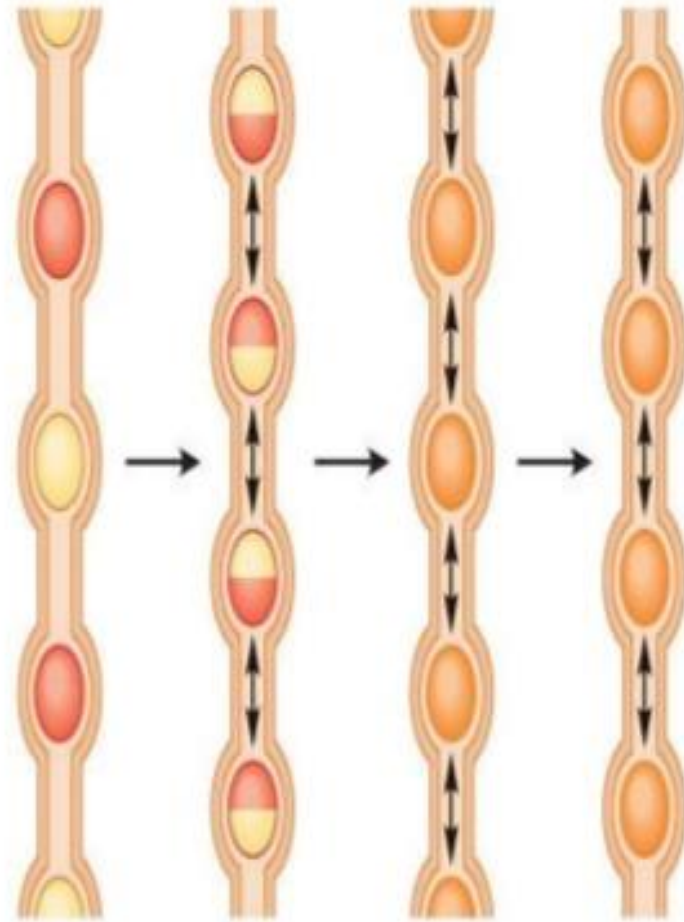
Segmentation Contractions

- stretching → localized concentric contractions
- Spaced at intervals
- Fraction of a minute
- “Chop” 2-3 times per minute
- Maximum frequency= 12/minute
- Myenteric nerve plexus + extrinsic control
- Propulsive effect

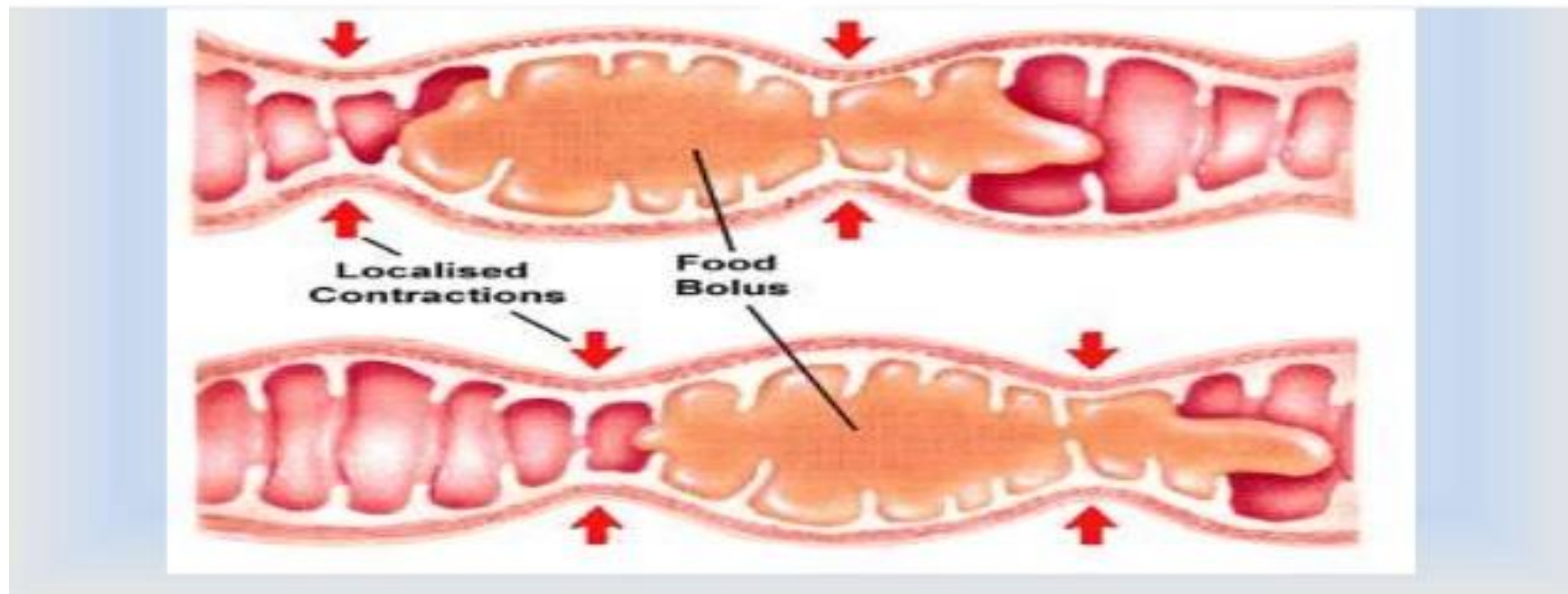
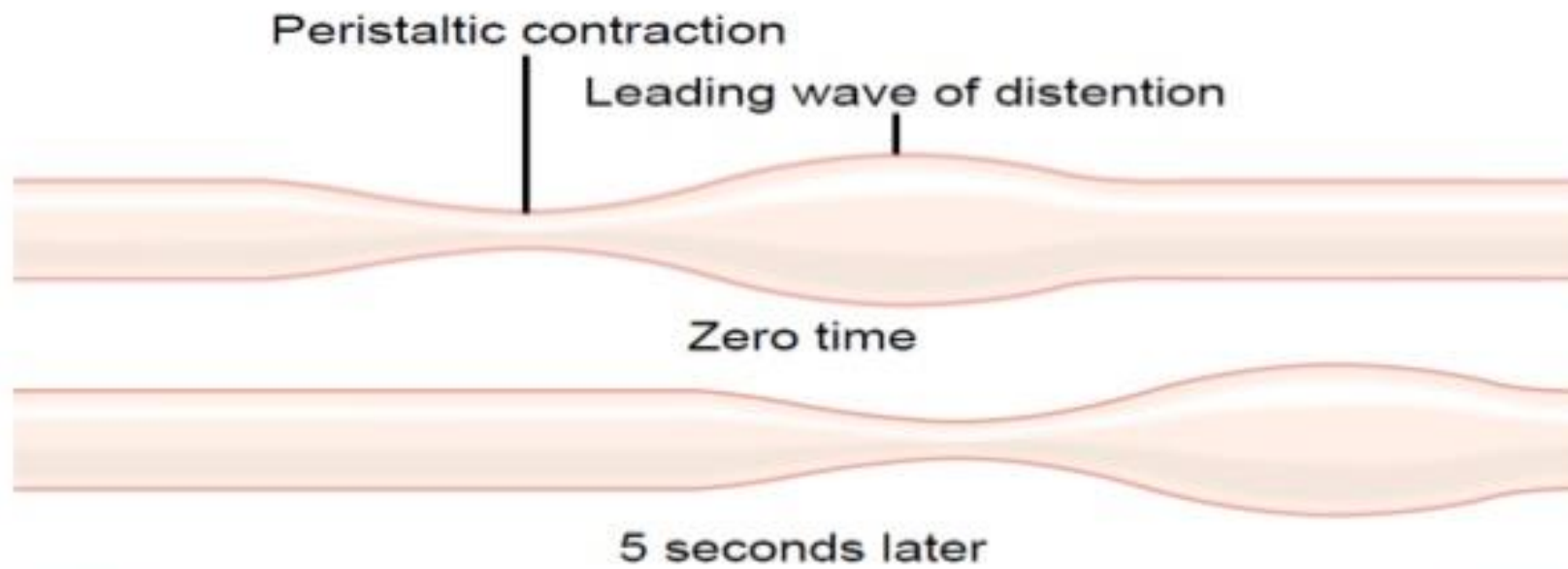




(a) Peristalsis



(b) Segmentation



Peristaltic Rush

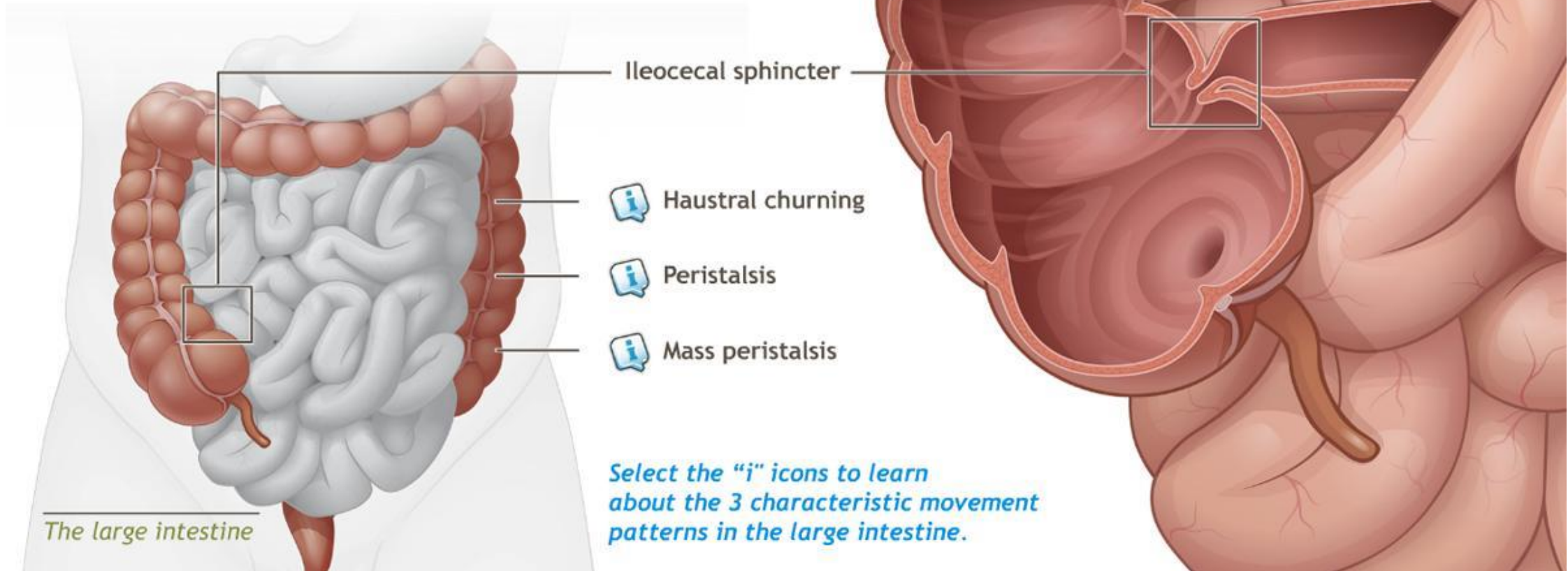
- Although peristalsis in the small intestine is normally weak, intense irritation of the intestinal mucosa, as occurs in some severe cases of infectious diarrhea, can cause both powerful and rapid peristalsis, called the *peristaltic rush*.
- This is initiated partly by nervous reflexes that involve the autonomic nervous system and brain stem and partly by intrinsic enhancement of the myenteric plexus reflexes within the gut wall itself.
- The powerful peristaltic contractions travel long distances in the small intestine within minutes, sweeping the contents of the intestine into the colon and thereby relieving the small intestine of irritative chyme and excessive distention.

Movements of the Colon

- The principal functions of the colon are
- (1) absorption of water and electrolytes from the chyme to form solid feces and
- (2) storage of fecal matter until it can be expelled.
- The proximal half of the colon is concerned principally with absorption, and the distal half with storage.
- Because intense colon wall movements are not required for these functions, the movements of the colon are normally sluggish.
- Yet in a sluggish manner, the movements still have characteristics similar to those of the small intestine and can be divided once again into mixing movements and propulsive movements.

Mechanical Digestion and Motility in the Large Intestine

Chyme enters the large intestine through a valve called the ileocecal sphincter. This valve is normally partially closed, but opens up following a meal in response to the hormone gastrin, and to strong muscle contractions in the small intestine. This is known as the gastroileal reflex. Once in the large intestine, chyme is moved along by 3 characteristic movement patterns.



Movements of Colon

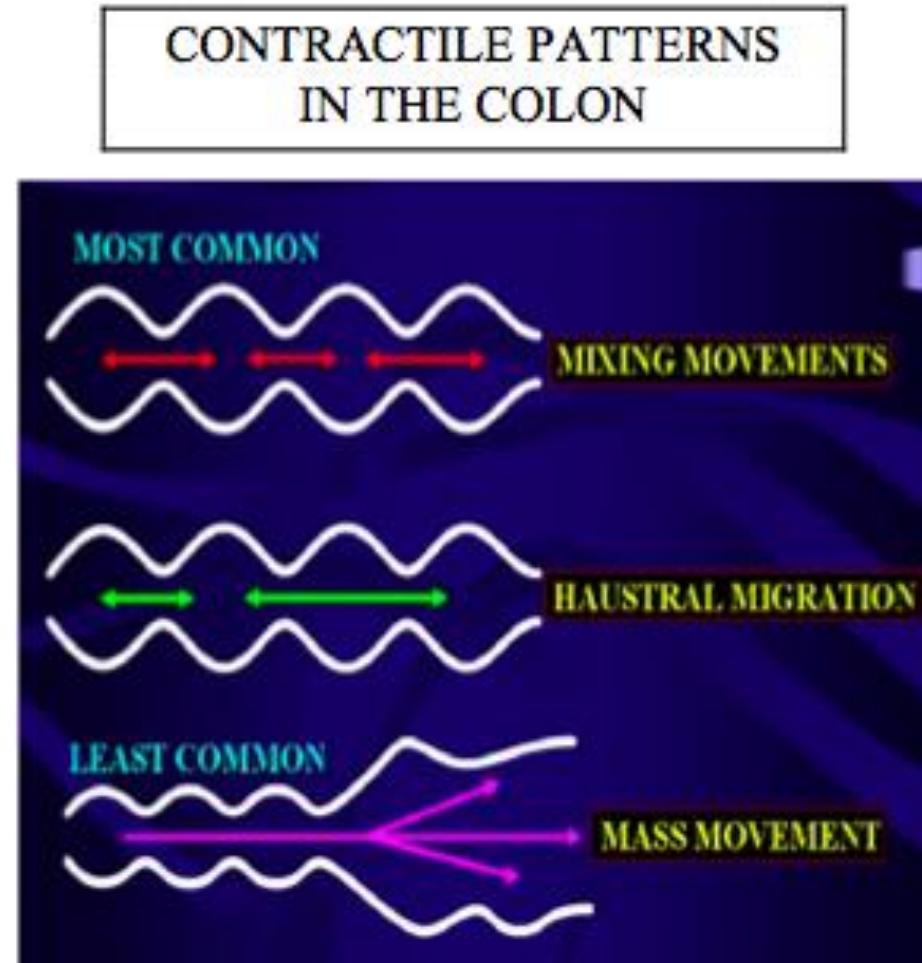
- **Mixing Movements (Haustrations)**
 - Proximal half
- **Propulsive Movements (Mass Movements)**
 - Distal half

Functions of colon:

- Absorption
- Storage of fecal matter

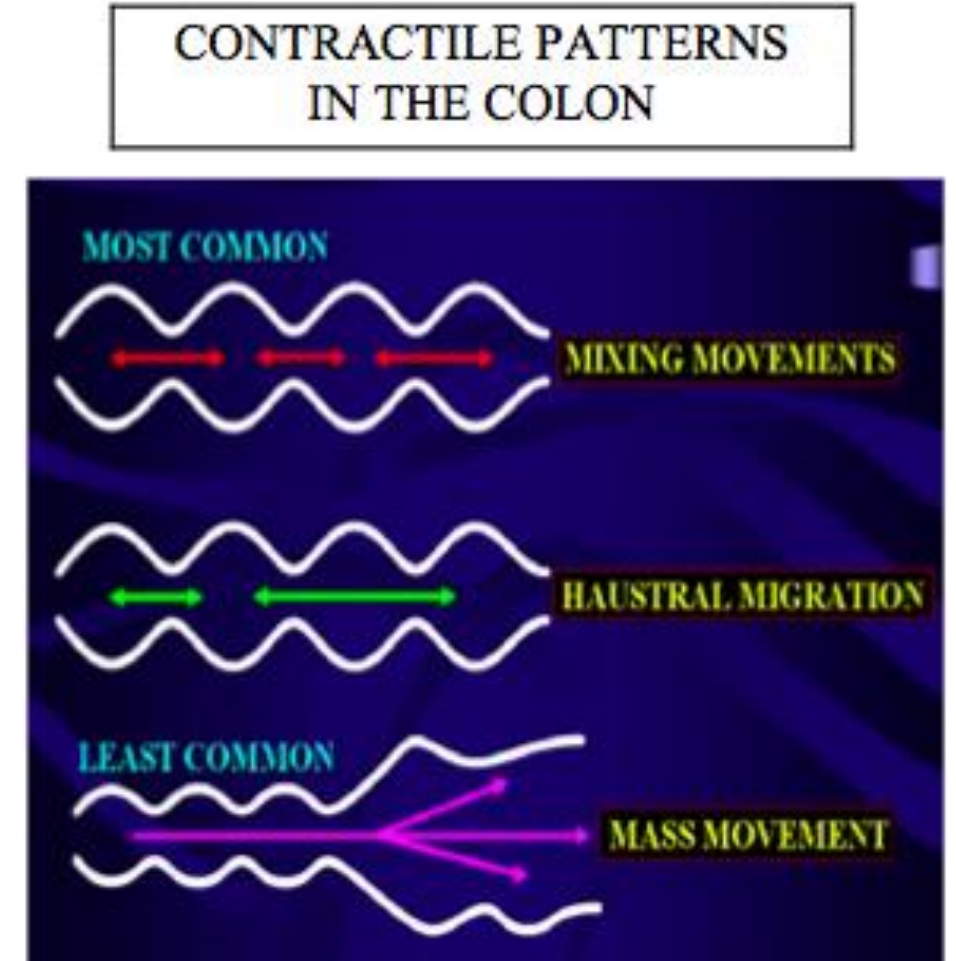
Mixing Movements: Haustrations

- Large circular constrictions
- Circular muscle + longitudinal muscle
- Unstimulated areas bulge → Haustrations < 2 minutes



Propulsive Movements Mass Movements

- Last for few minutes and then relaxes
- Persists for 10-30 min
- 1-3 times/day
- Especially for about 15 minutes during the 1st hour after breakfast



- **Mixing Movements—“Haustrations.”**
- large circular constrictions occur in the large intestine. At each of these constrictions, about 2.5 centimeters of the circular muscle contract, sometimes constricting the lumen of the colon almost to occlusion.
- At the same time, the longitudinal muscle of the colon, which is aggregated into three longitudinal strips called the *teniae coli*, contracts.
- These combined contractions of the circular and longitudinal strips of muscle cause the unstimulated portion of the large intestine to bulge outward into baglike sacs called *haustrations*.

- Each haustration usually reaches peak intensity in about 30 seconds and then disappears during the next 60 seconds.
- They also at times move slowly toward the anus during contraction, especially in the cecum and ascending colon, and thereby provide a minor amount of forward propulsion of the colonic contents.
- After another few minutes, new haustral contractions occur in other areas nearby.
- Therefore, the fecal material in the large intestine is slowly *dug into and rolled over* in much the same manner that one spades the earth.
- In this way, all the fecal material is gradually exposed to the mucosal surface of the large intestine, and fluid and dissolved substances are progressively absorbed until only 80 to 200 milliliters of feces are expelled each day.

Propulsive Movements—“Mass Movements.”

- Much of the propulsion in the cecum and ascending colon results from the slow but persistent haustral contractions, requiring as many as 8 to 15 hours to move the chyme from the ileocecal valve through the colon, while the chyme itself becomes fecal in quality, a semisolid slush instead of semifluid.
- From the cecum to the sigmoid, *mass movements* can, for many minutes at a time, take over the propulsive role. These movements usually occur only one to three times each day,
- in many people especially for about 15 minutes during the first hour after eating breakfast.

Trying to stay awake in class



That's all Folks!