
بسم الله الرحمن الرحيم

GIT Large Intestine Motility Defecation Reflex

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Learning Objectives

- Recall the functions of colon.
- Describe the motility of Large Intestine.
- Explain the nervous and hormonal control of these movements
- Explain the steps involved in the Defecation Reflex

Functions of Colon

Functions of Colon

4 major functions

Reabsorption of water and

Minerals (Na, K)

Formation and temporary storage of feces

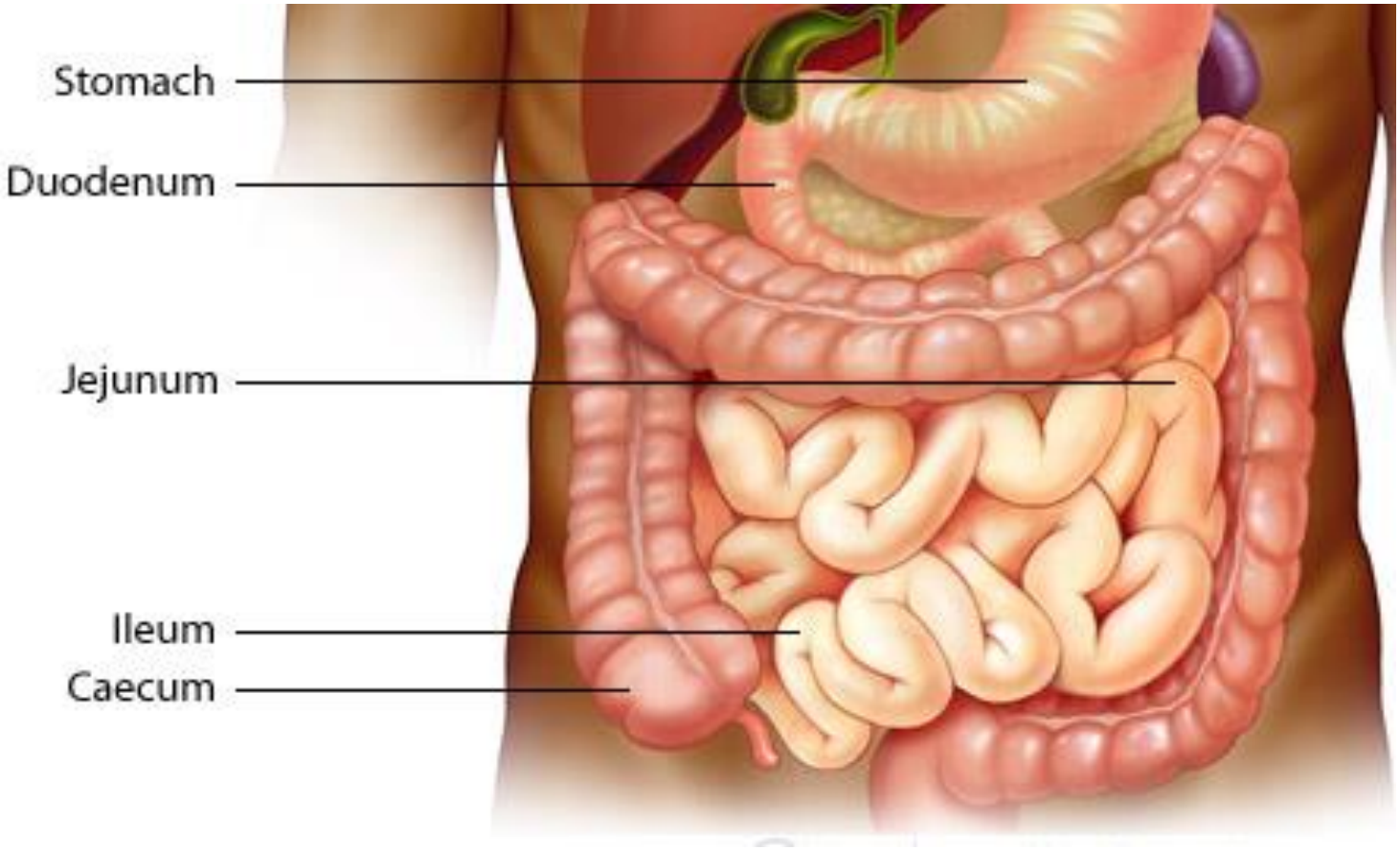
Maintaining a resident population of over 500 species of bacteria-Vit K

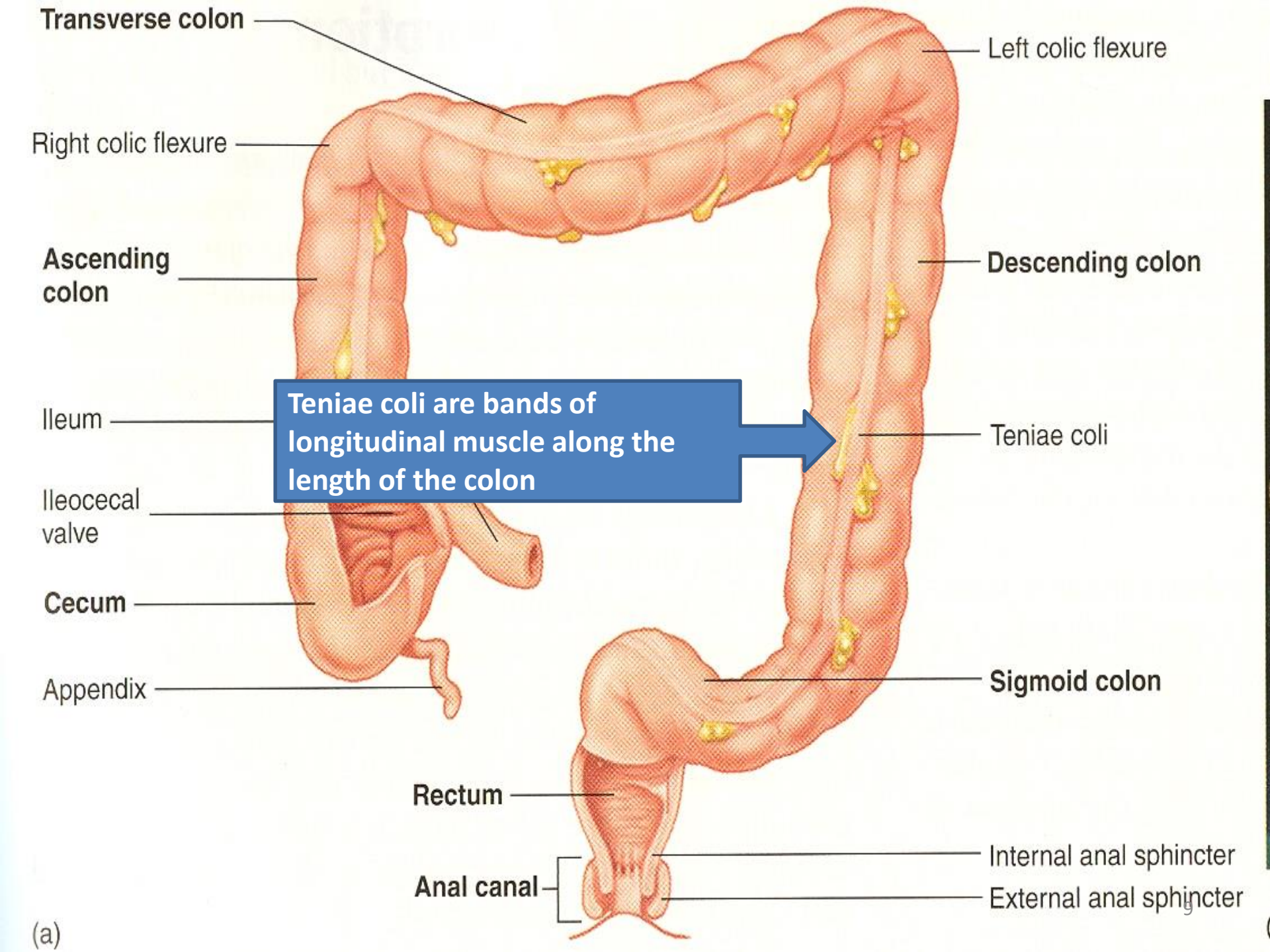
Bacterial fermentation of indigestible materials

Propulsion and Mixing of Food in the Alimentary Tract

- ✓Ingestion of food
- ✓Motor functions of Stomach
- ✓Movements of Small Intestine
- Movements of Colon

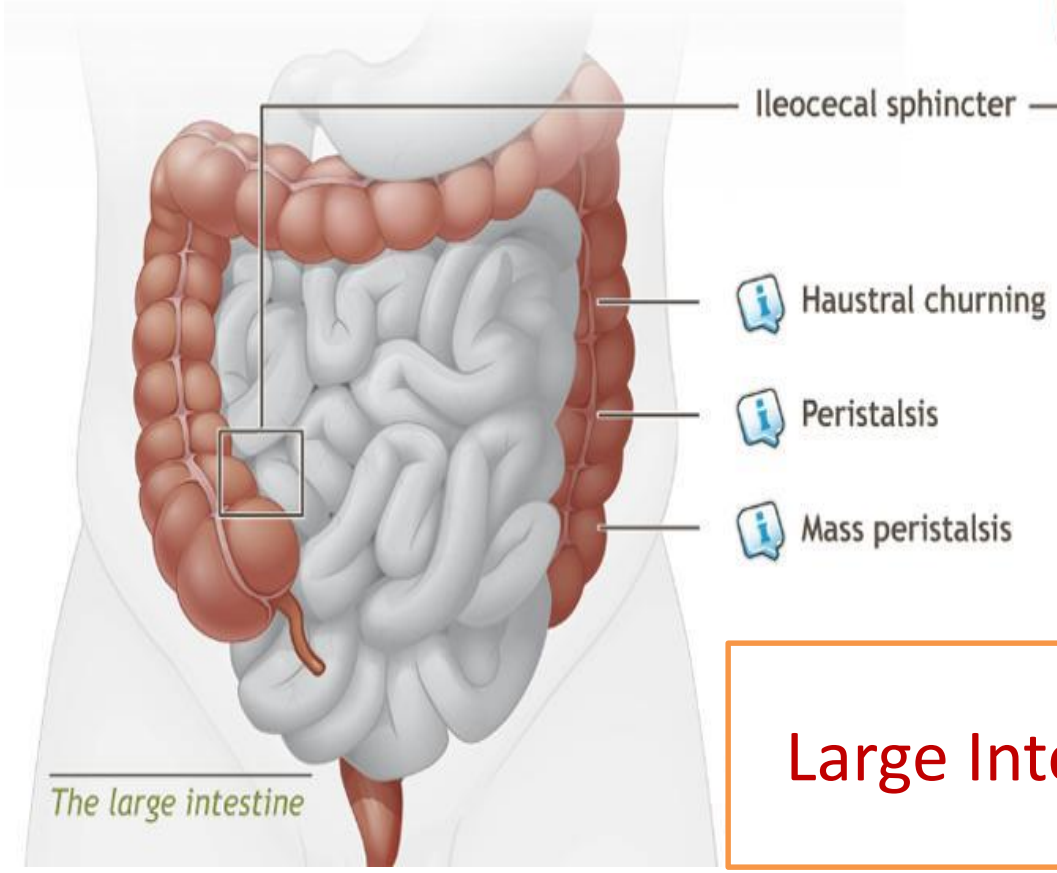
Large Intestine

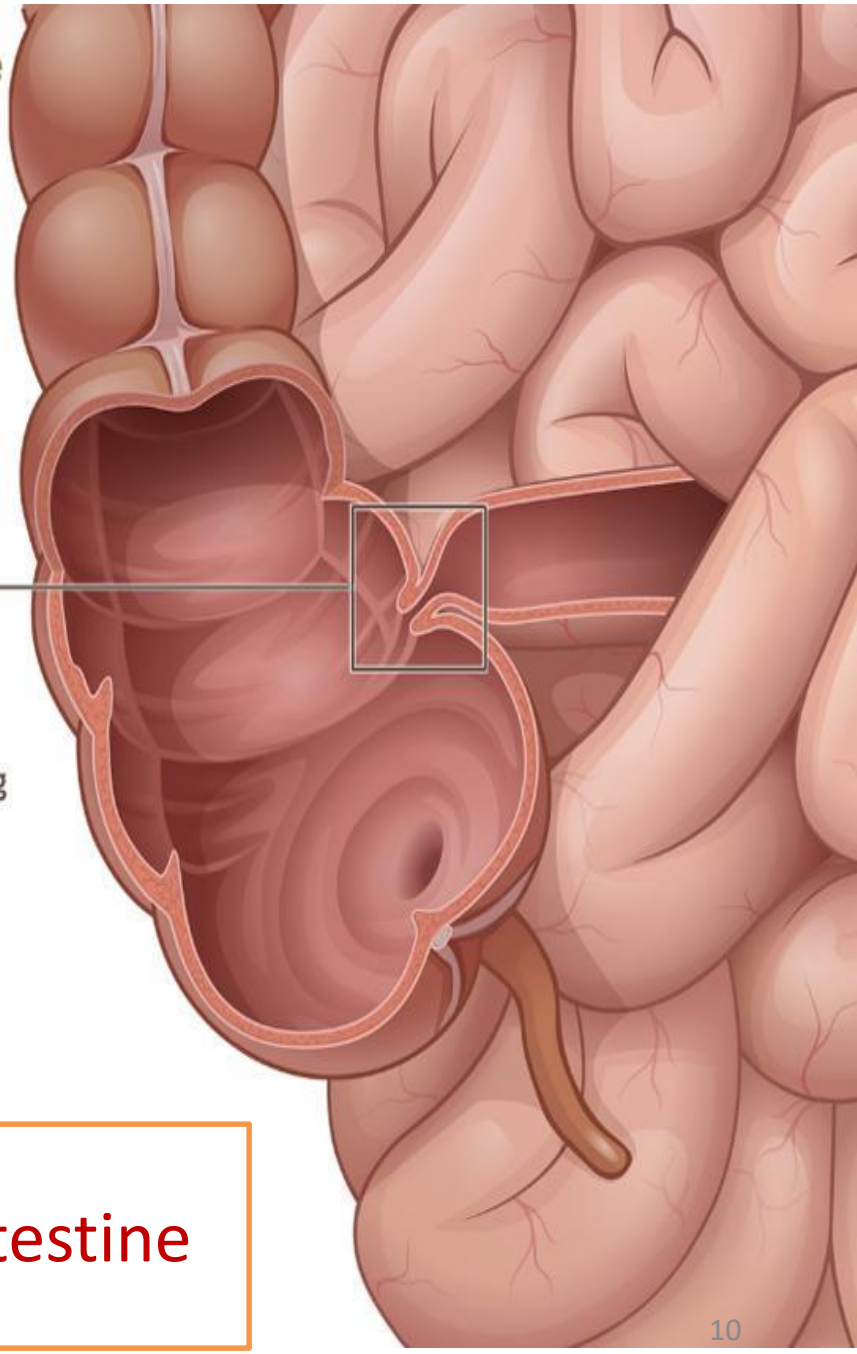



Transverse colon
Left colic flexure
Right colic flexure
Ascending colon
Descending colon
Teniae coli are bands of longitudinal muscle along the length of the colon
Ileum
Teniae coli
Ileocecal valve
Cecum
Appendix
Sigmoid colon
Rectum
Internal anal sphincter
Anal canal
External anal sphincter
(a)

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.





Large Intestine

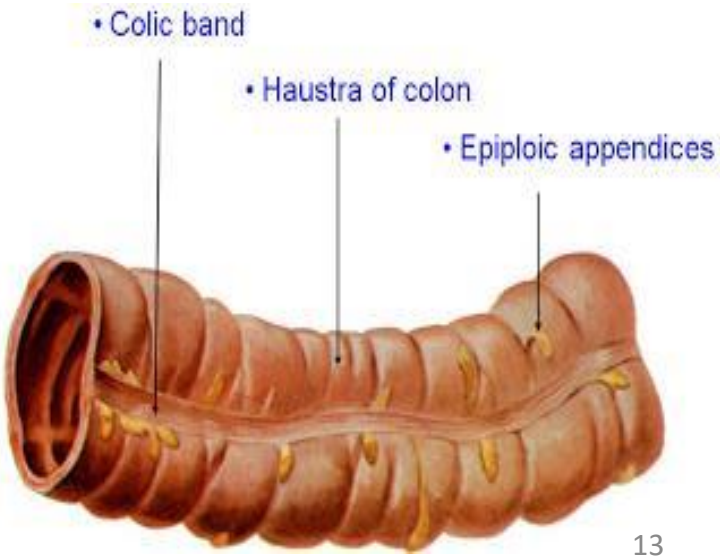
Movements of Colon

Types of Colonic Movements

- **Mixing movements-**
  Haustrations
- **Propulsive movements-**
  Mass movements

Movements of Colon

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



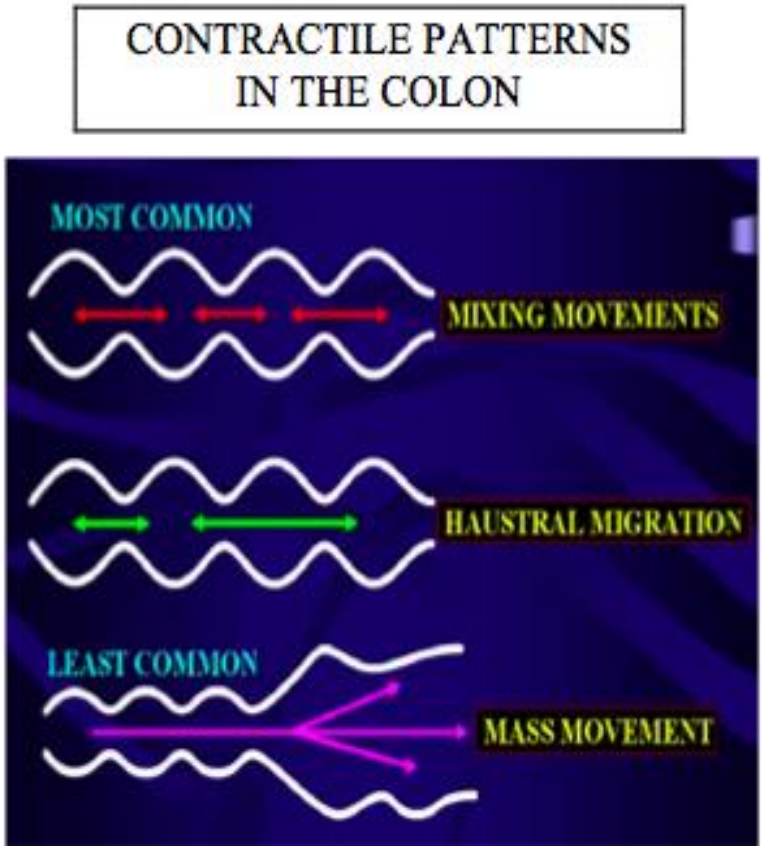
Mixing Movements
Haustrations

Large Circular Constrictions

Circular muscle + longitudinal muscle

Unstimulated Areas Bulge

→Haustrations < 2 minutes



Mixing Movements
Haustrations

- Each haustration **peaks in intensity about 30s** and disappears in next 60s

- **minor forward propulsion** of content

- Feces is dug into and rolled over

- **8-15 h** - **chyme from ileocecal valve** through the colon

- **80-200** ml feces expelled daily

- Semifluid chyme → semisolid state

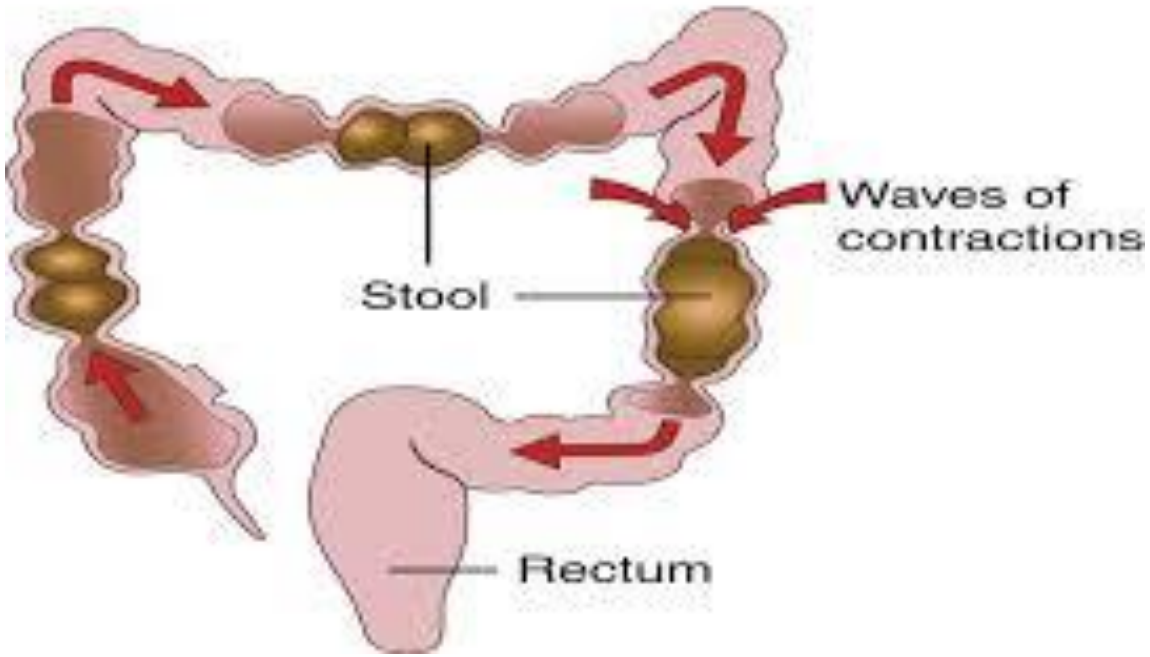
Propulsive Movements
Mass Movements

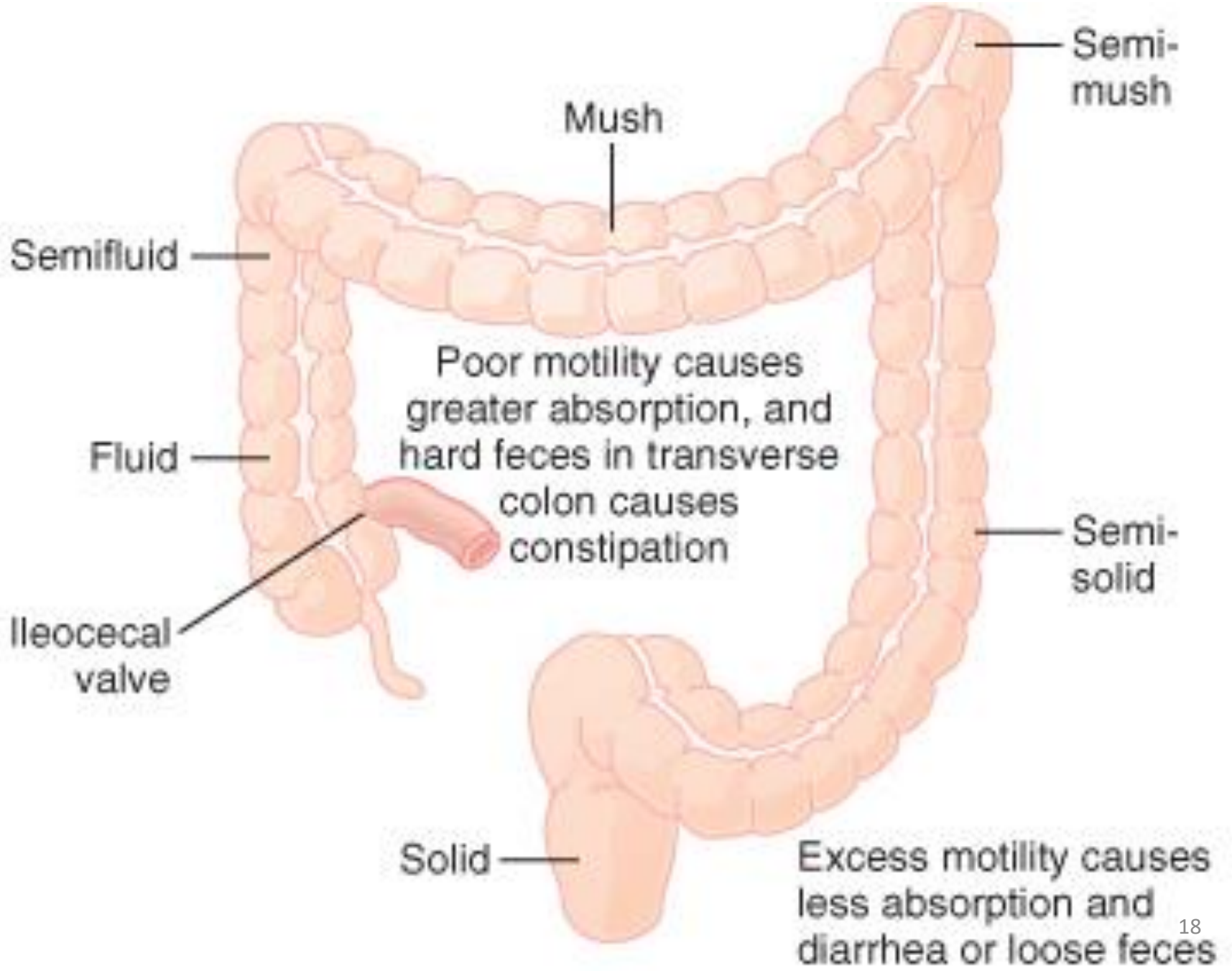
- From Caecum to Sigmoid
- Lasts for 30s and then relaxes for 2-3min

A constrictive ring forms followed by loss of haustrations 20cm or more distal to it propelling feces

- **Mass movements persist for 10-30 min**
- **1-3 times/day**
- Especially for about 15 minutes during the 1st hour after breakfast

Mass movements in the colon




Semi-
mush
Mush
Semifluid
Poor motility causes
greater absorption, and
hard feces in transverse
colon causes
constipation
Fluid
Semi-
solid
Ileocecal
valve
Solid
Excess motility causes
less absorption and
diarrhea or loose feces


I'm a victim of a cyber attack!
I'm a victim of a fiber attack!
CARTOONSTOCK .com
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Sequence of Events in Mass Movements

1. **Stimulus:**
   Distension/irritation in colon
2. **Constrictive ring**
   (usually in Transverse colon)
3. **Distal colon loses Haustrations**
   20 or more cm
4. **Distal colon contracts as a unit**
   fecal material pushed down
   Duration: 10-30 minutes
5. **Relaxation/desire to defecate**
   (if pushed into rectum)
6. **Recur perhaps half a day later**

Propulsive Movements (Mass Movements)

- **Facilitation of initiation of mass movements**
  - Gastrocolic Reflex
  - Duodenocolic Reflex
  - Controlled by Autonomic nerves
  - Irritation
    - Ulcerative colitis

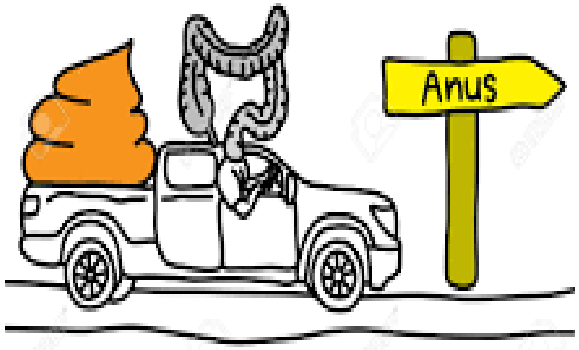
Secretions of Large Intestine

Mucus secretion

- Crypts of lieberkuhn
- No villi
- No enzymes
- Moderate amount of **bicarbonate ions**

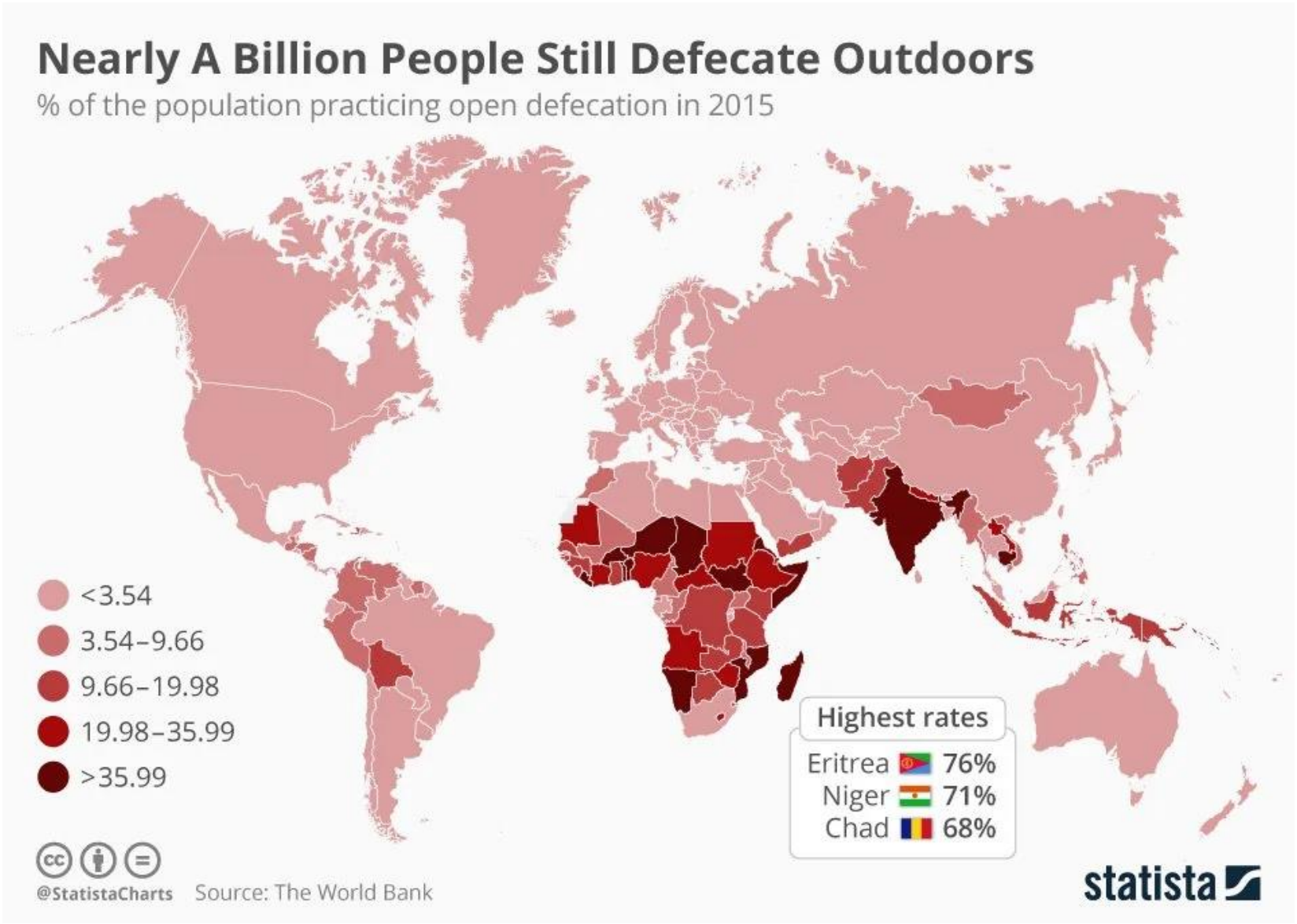
Function of Mucus

1. Protection
2. Adherent medium for holding fecal material
3. Protection from bacterial activity (taking place inside feces)
4. Barrier to acids formed in feces (mucus + bicarbonate)

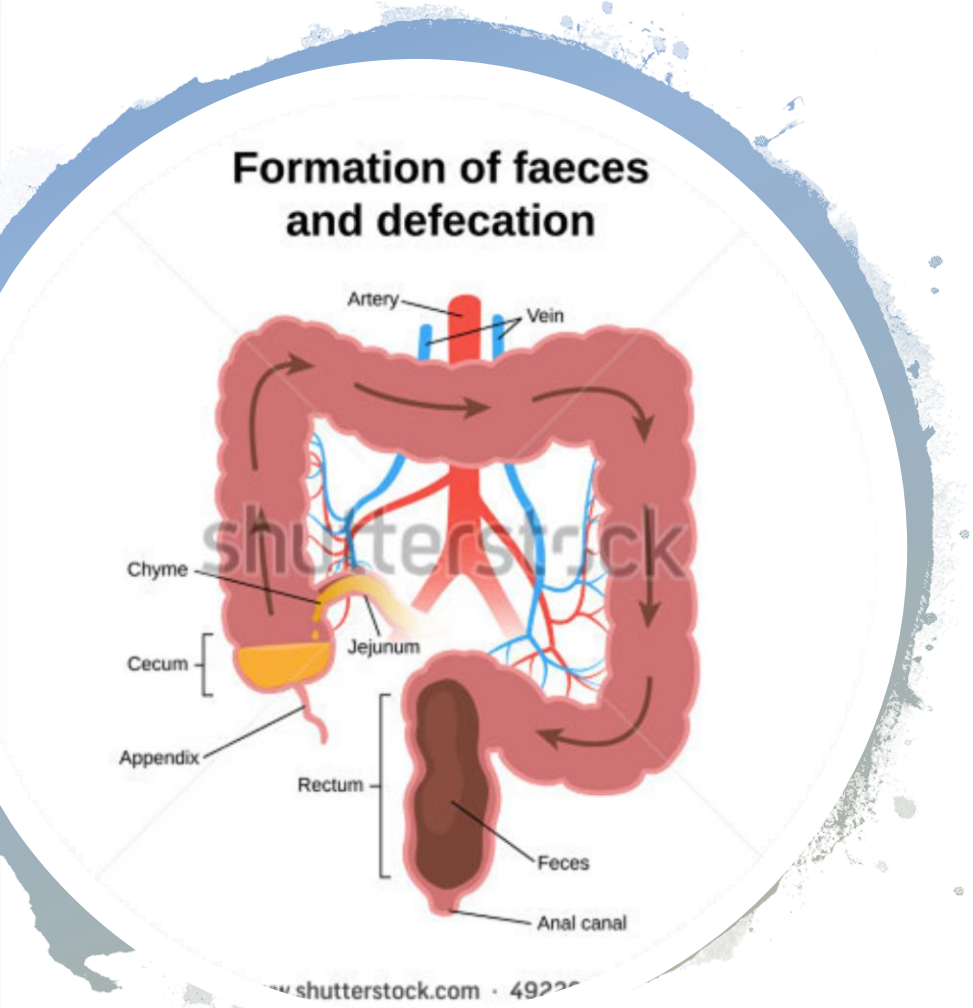


Large intestine "colon"

Defecation Reflex


Nearly A Billion People Still Defecate Outdoors
% of the population practicing open defecation in 2015
<3.54
3.54–9.66
9.66–19.98
19.98–35.99
>35.99
Highest rates
Eritrea 76%
Niger 71%
Chad 68%
@StatistaCharts
Source: The World Bank
statista


SOMETIMES I FEEL THAT I HAVE THE WORST JOB IN THE WORLD!
YA...RIGHT!



Defecation

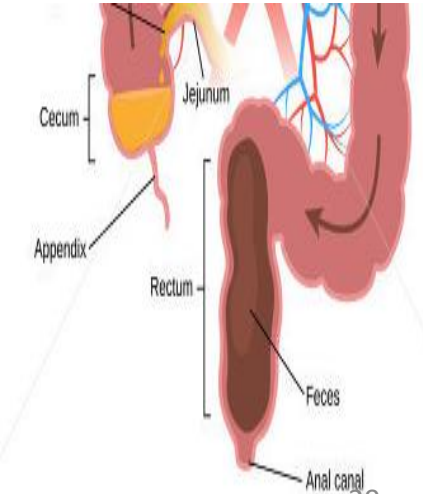
- Expulsion of feces from the anus and rectum

- Also known as bowel movement

Defecation

- **Rectum is empty most of the time**
  - Weak functional sphincter at juncture between sigmoid colon & rectum
  - Sharp angulation → resistance to filling

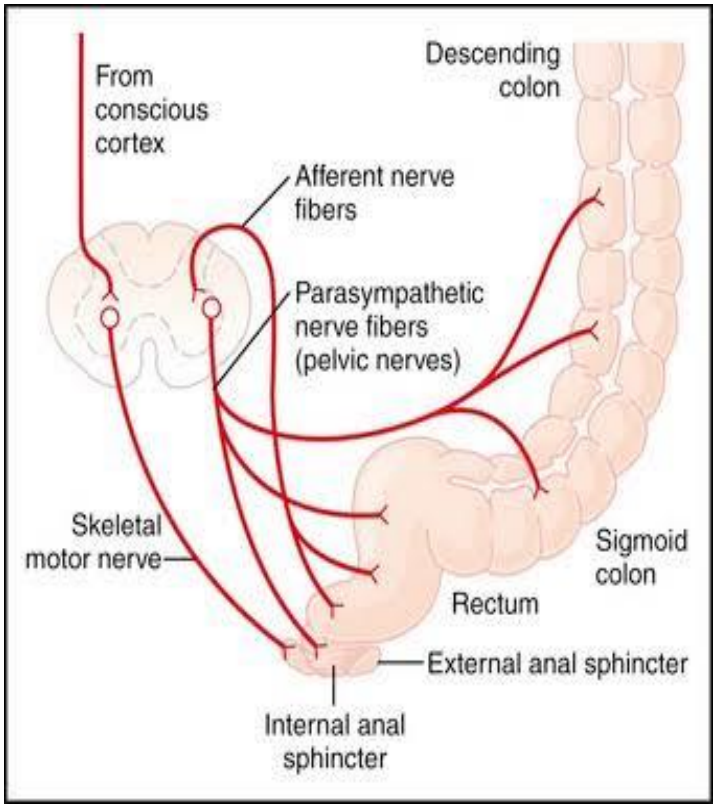
- **Feces into rectum → Defecation reflex**
  - Pressure rises from 20-25cm of H_2O
  - Desire for Defecation
  - Reflex contraction of rectum
  - Reflex relaxation of **anal sphincters**



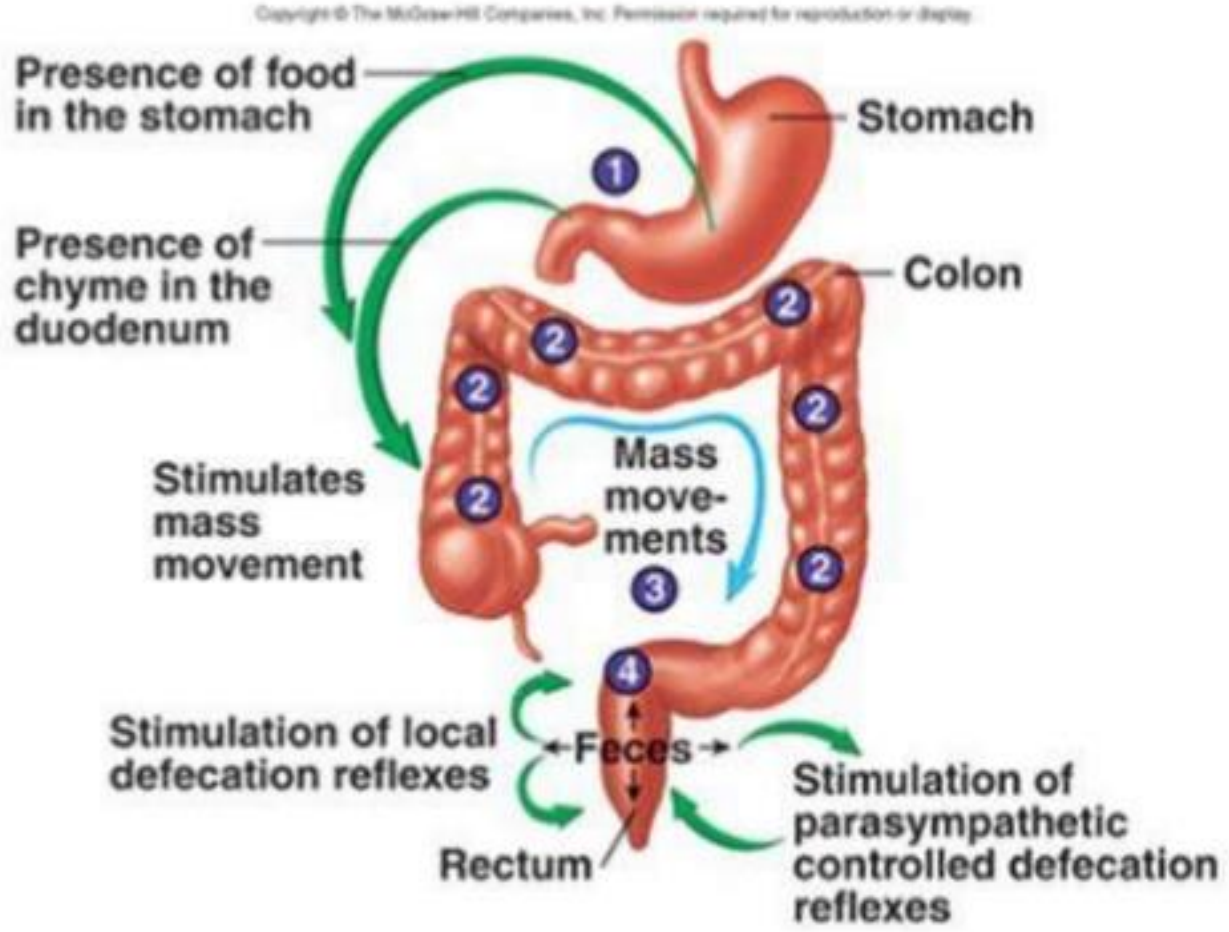
Defecation Reflexes

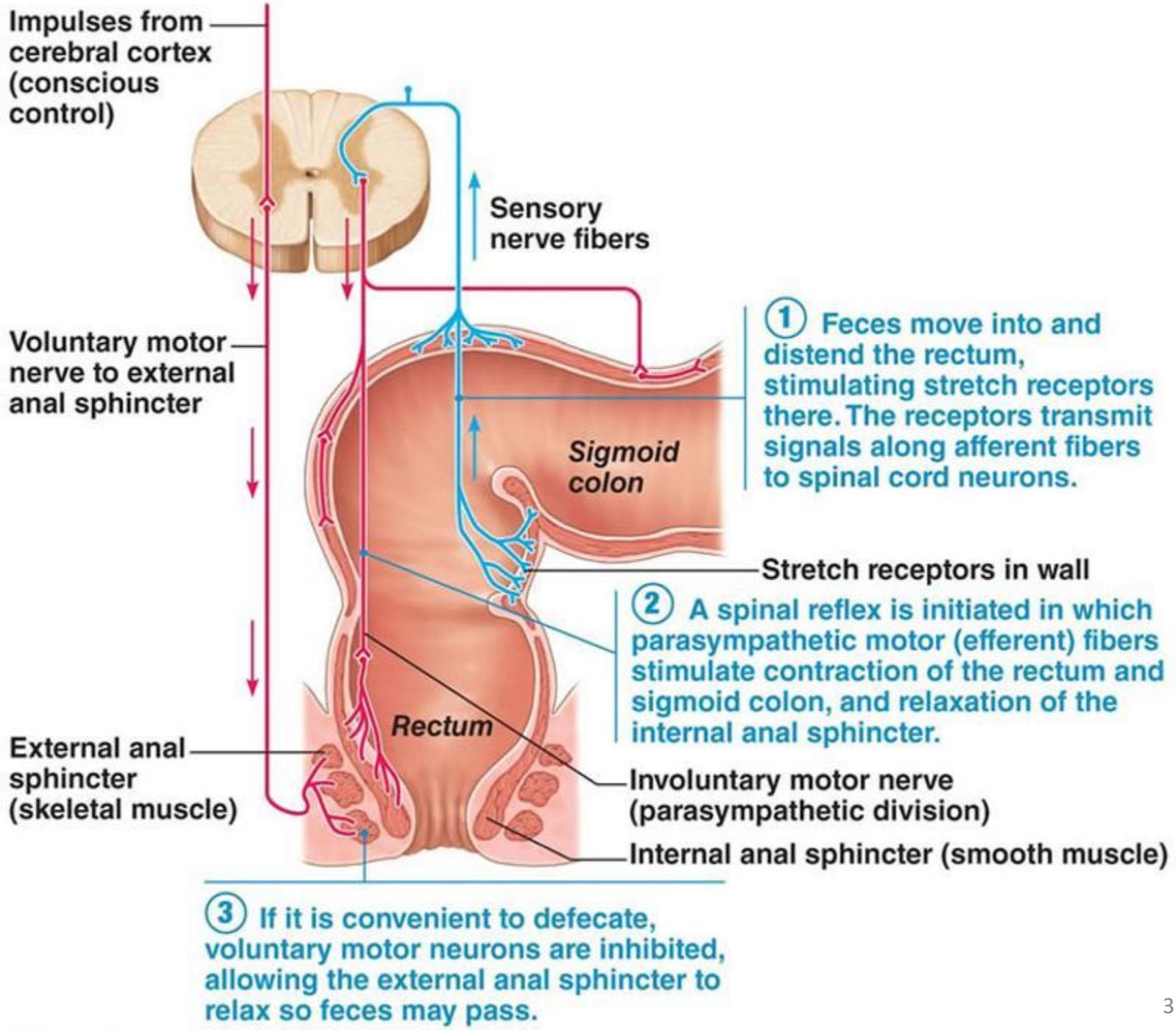
- **Intrinsic Reflex -** by local Enteric nervous system – weak action

- **Parasympathetic Defection reflex** – effective defecation

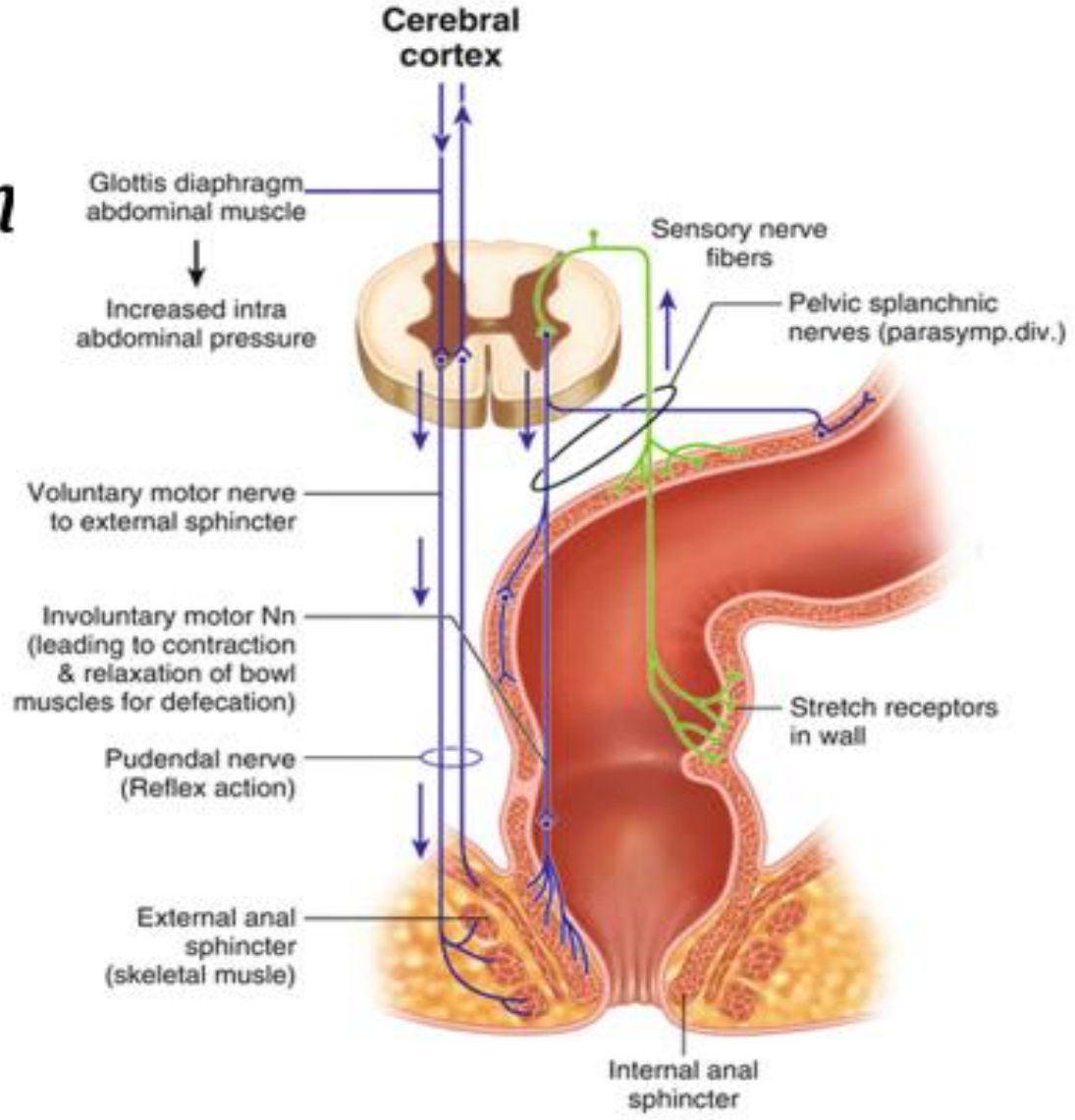


DEFECATION – INTEGRATED REFLEXES

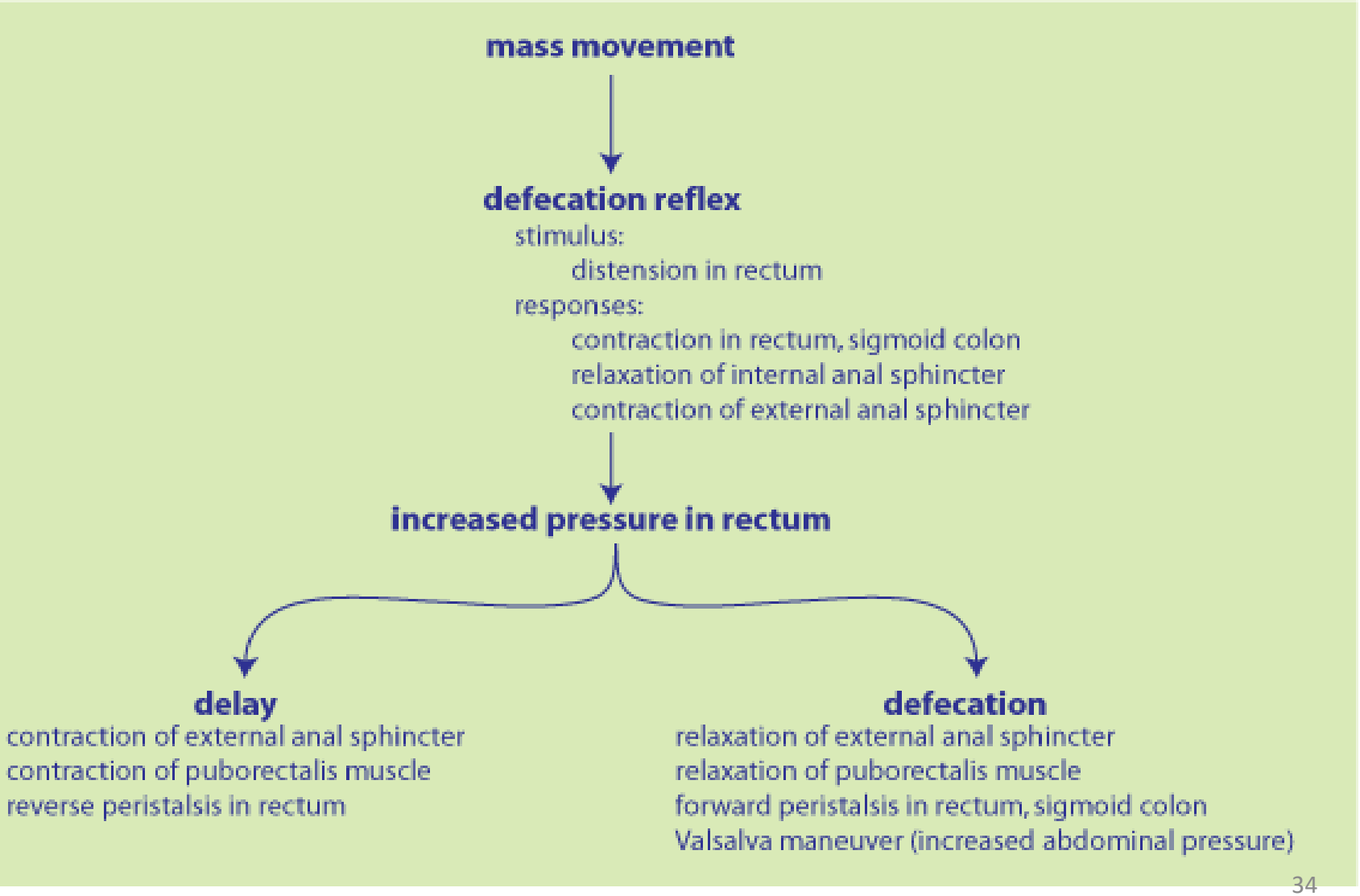


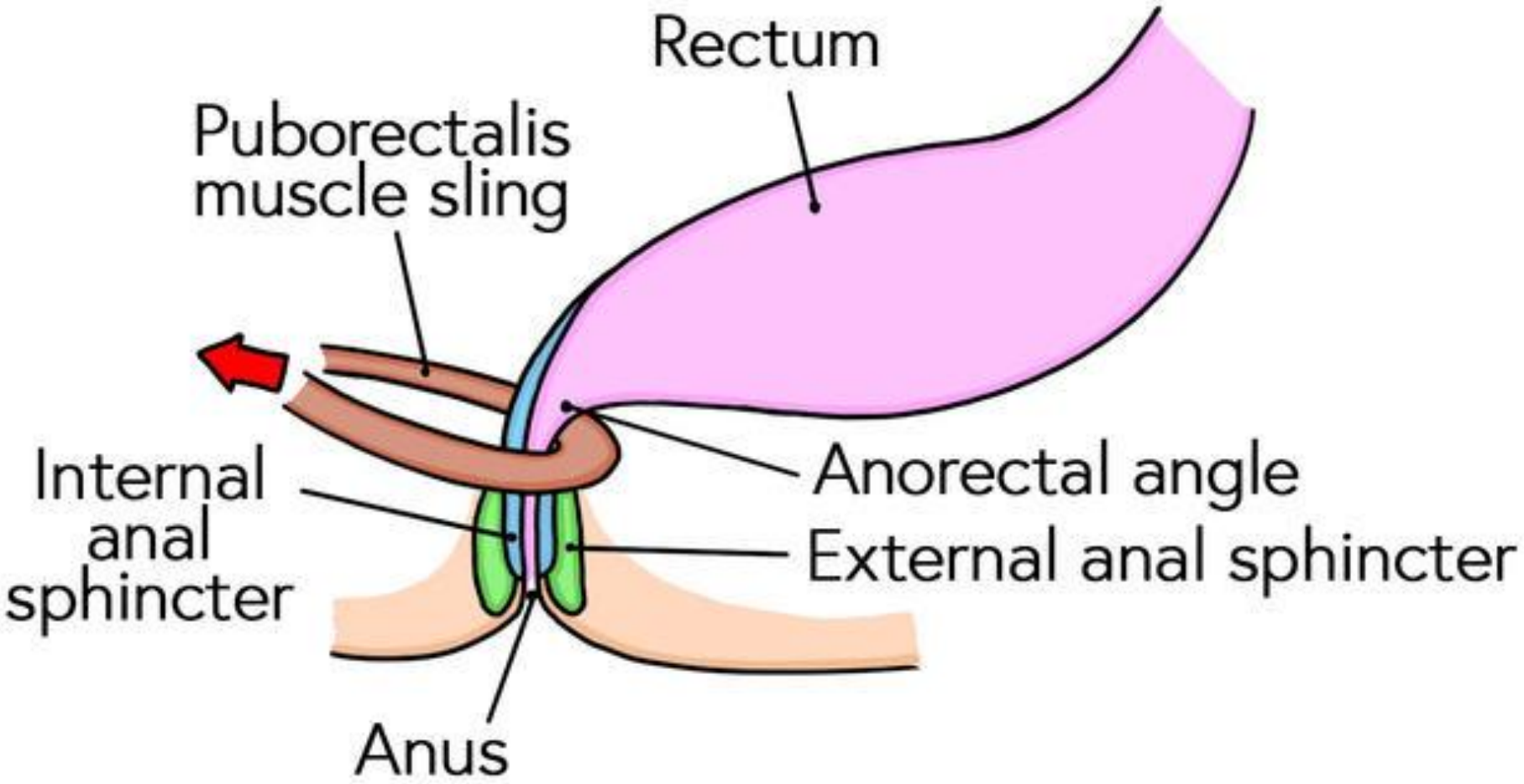


Mechanism of Defecation

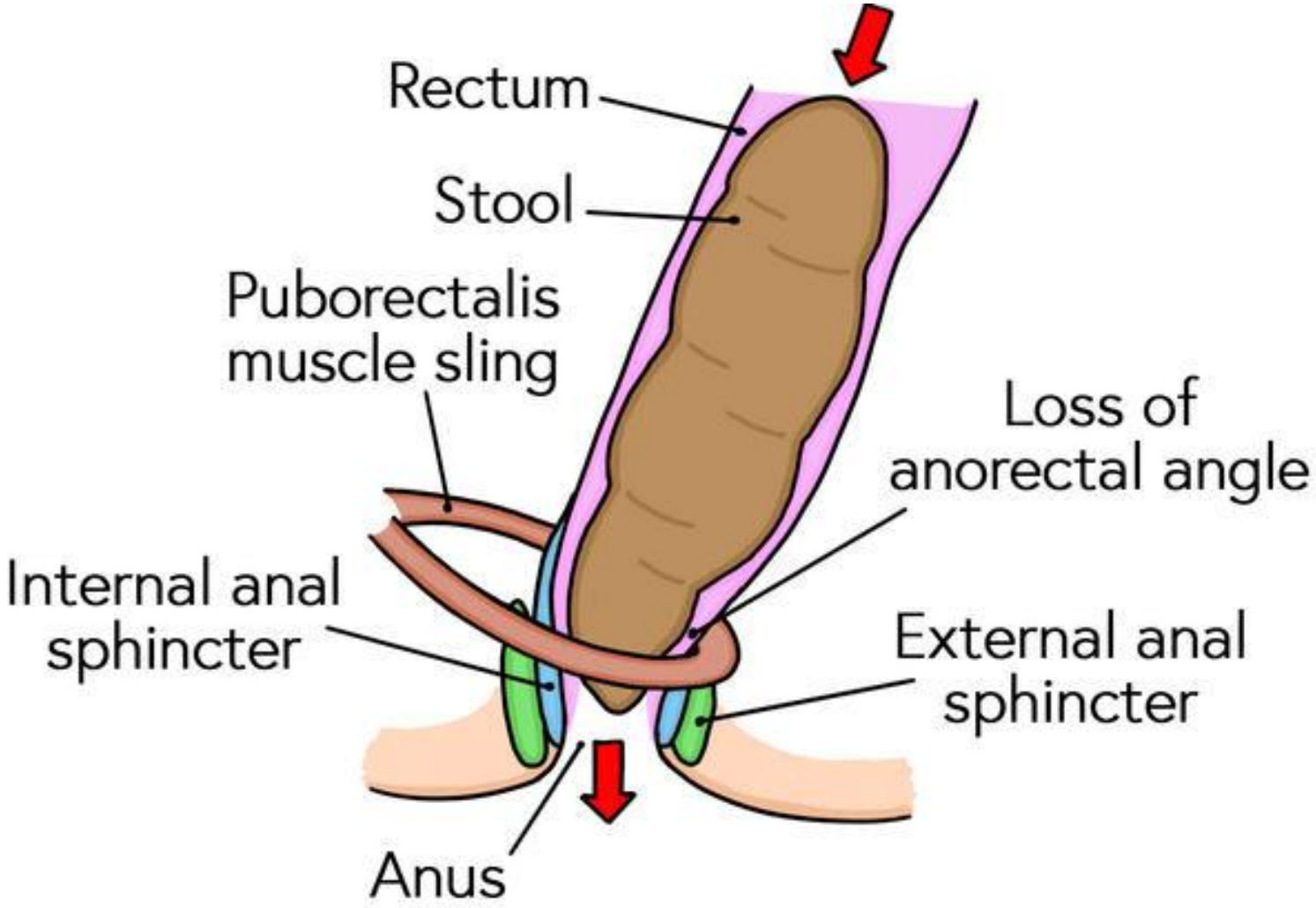


Increase in intraabdominal pressure by voluntary abdominal muscle contraction, Gastrocolic and Duodenocolic reflex

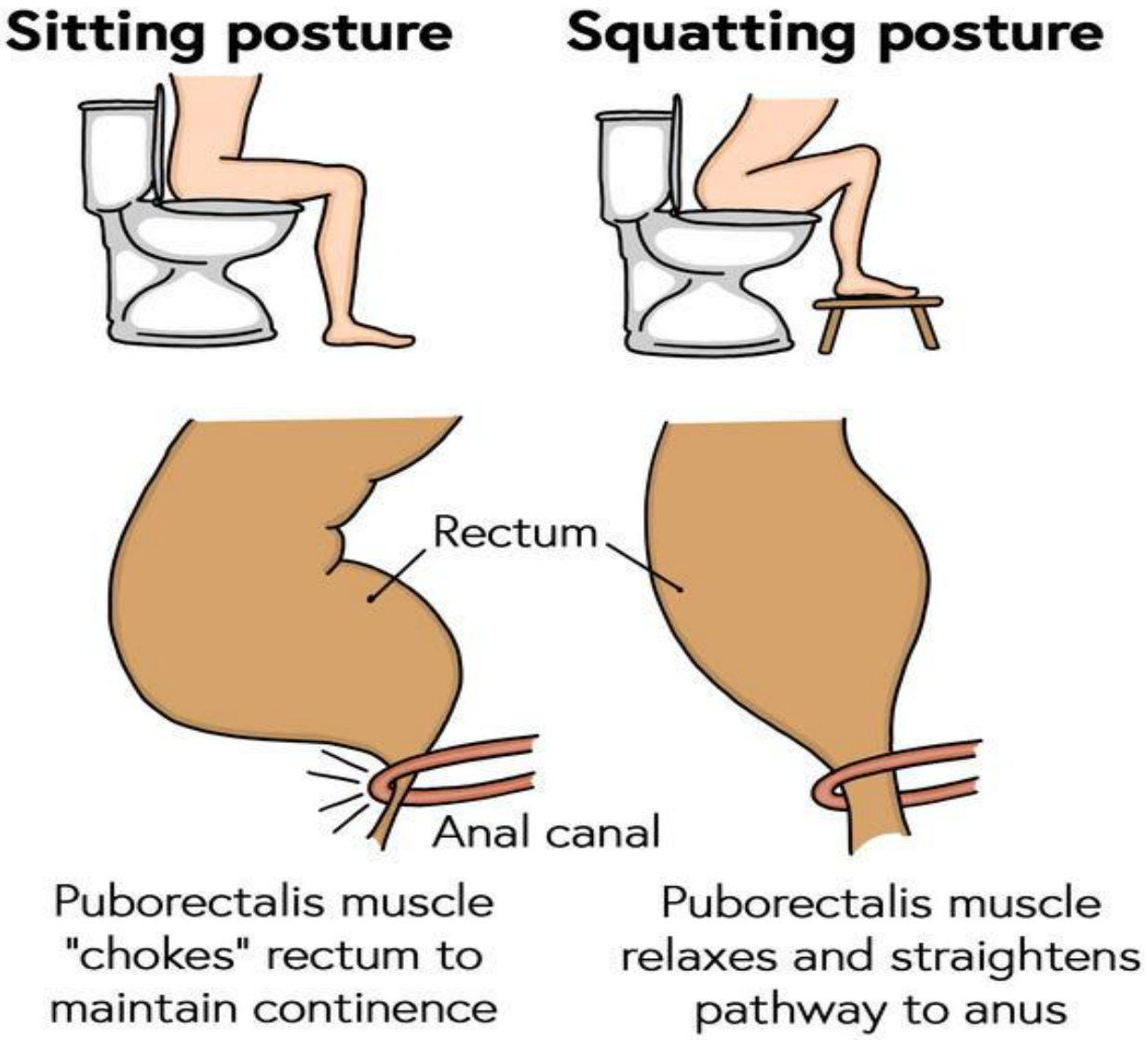




Anal sphincter mechanism when the rectum is empty.



Anal sphincter mechanism during defecation.



Correct Posture on the Toilet to Relax the Puborectalis Muscle and Straighten the way to Anus

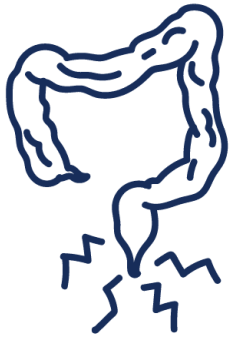
Large Gut Disorders

ulcerative colitis

irritable bowel syndrome

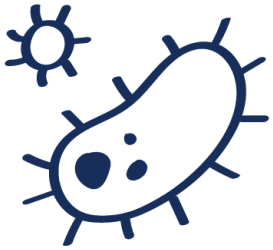
cystic fibrosis

crohn's disease



anal abscess or fistula

ostomy

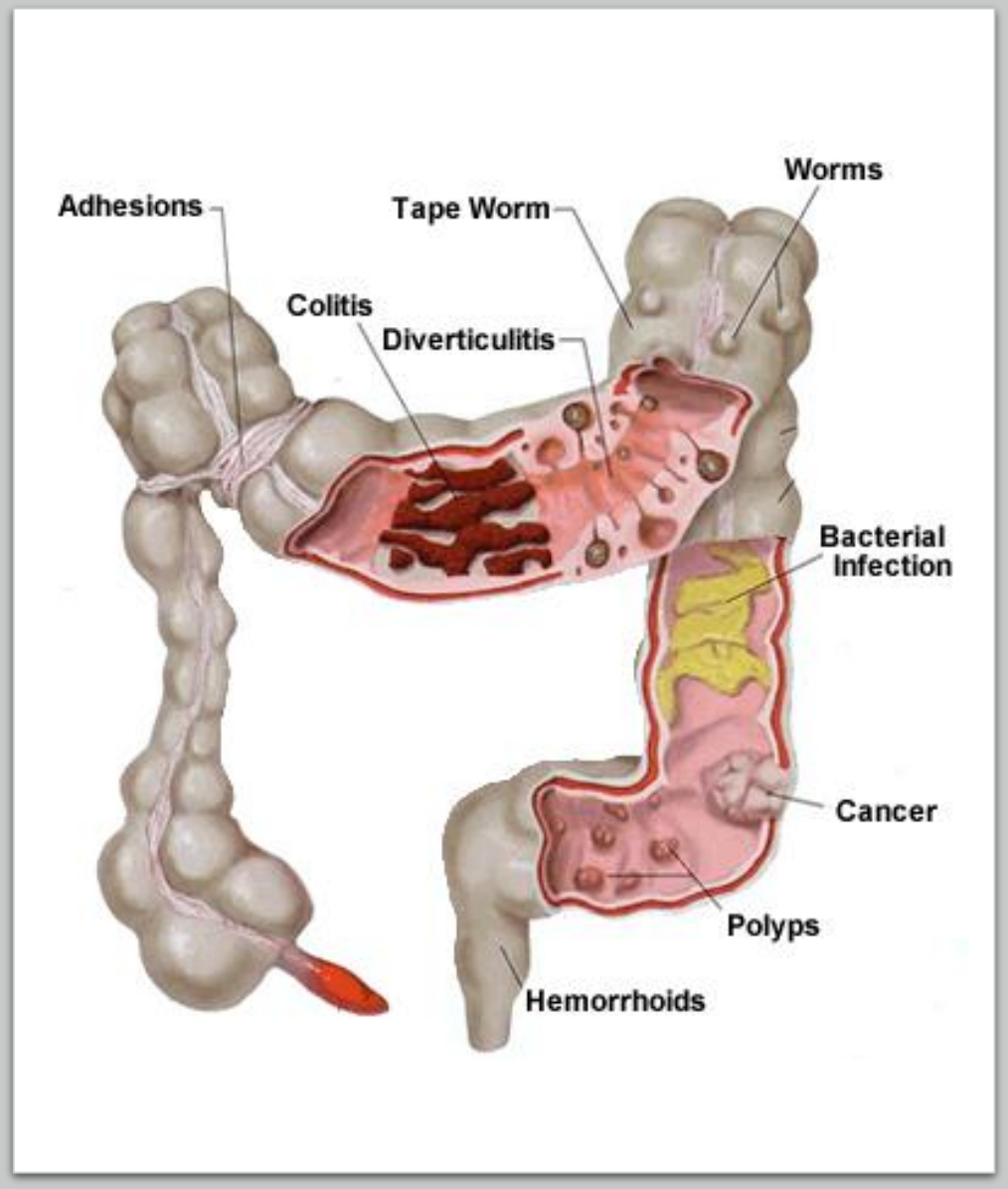


bacterial infections

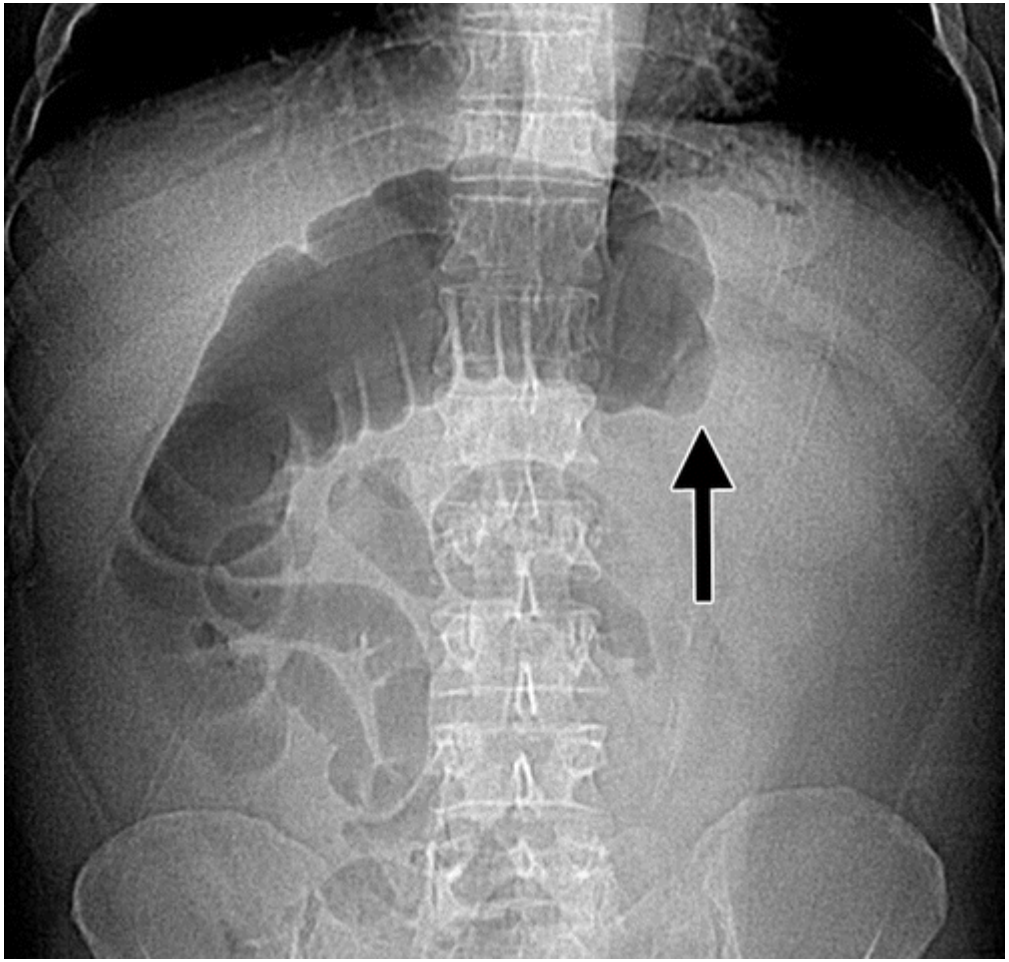
bowel obstruction

Ostomy

Diseases of Colon



Large Gut Obstruction



Defecation Reflex in Spinal Cord injuries

- **Injuries above Conus Medullaris**
  - Loss of voluntary control but defecation reflex maintained

- **Injuries at or below Conus Medullaris**
  - Loss of defecation reflex

Recommended Books

- Principles of Human Physiology
  -Lauralee Sherwood
- Guyton & Hall 13th Edition
- Ganong's review of Medical Physiology


Any Questions ?
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thank
you