



LARGE INTESTINE

COLON MOTILITY

Color index

- Important
- Further explanation

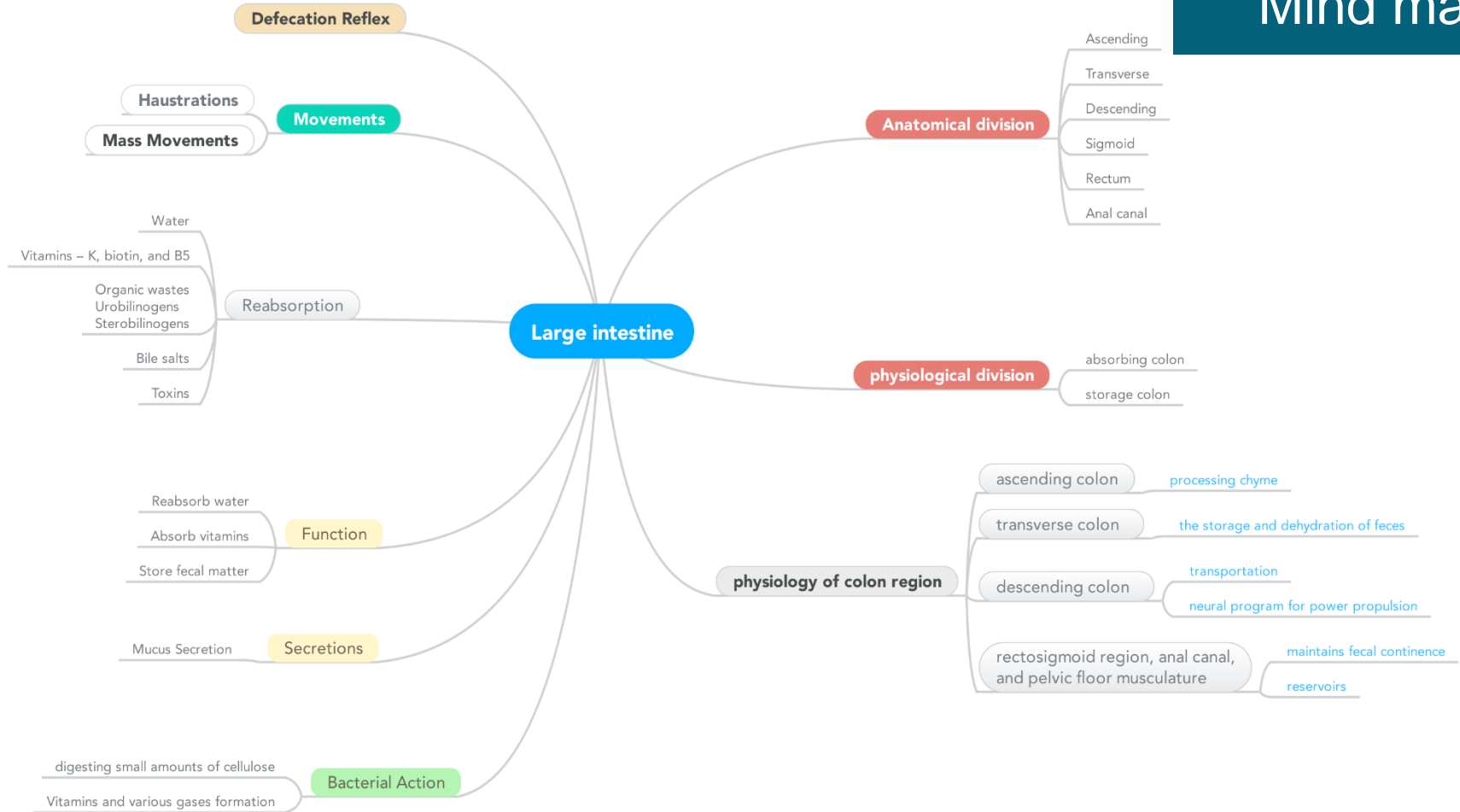


- Mind map.....3
- Colon Function.....4
- Physiology of Colon Regions.....6
- Absorption and Secretion.....8
- Types of motility.....9
- Innervation and motility.....11
- Defecation Reflex.....13
- Fecal Incontinence.....15



Please check out this link before viewing the file to know if there are any additions/changes or corrections. The same link will be used for all of our work [Physiology Edit](#)

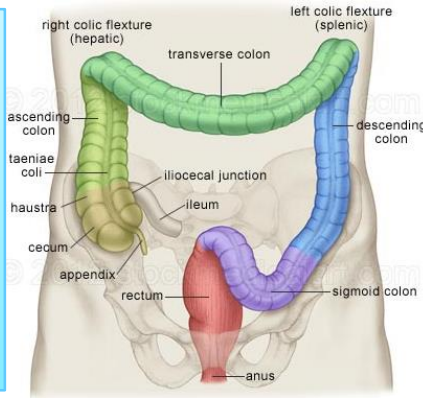
Mind map



COLON FUNCTIONS:

Colon consist of³ :

- Ascending
- Transverse
- Descending
- Sigmoid
- Rectum
- Anal canal



Functions of the Large Intestine:

1. Reabsorb water and compact material into feces.
2. Absorb vitamins produced by bacteria.
3. Store fecal matter prior to defecation.

1: considered a part of parasympathetic in large intestine .

2: resembling a rope in being long, strong, and fibrous

3: anatomical division.

Secretions of the Large Intestine:

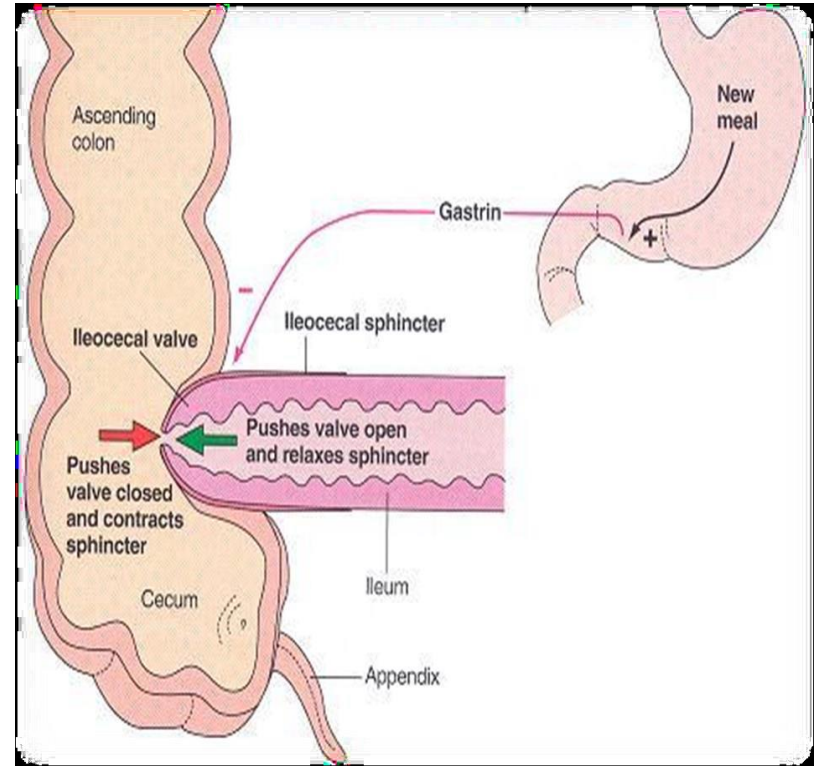
➤ Mucus Secretion.

- The mucosa of the large intestine has **many crypts of Lieberkühn**.
- **Absence of villi.**
- The epithelial cells contain **almost no enzymes**.
- Presence of **goblet cells that secrete mucus** (provides an adherent medium for holding fecal matter together).
- **Stimulation of the pelvic nerves¹ from the spinal cord can cause:**
 - marked increase in mucus secretion.
 - This occurs along with increase in peristaltic motility of the colon.
- During extreme parasympathetic stimulation, **so much mucus can be secreted** into the large intestine that the person has a bowel movement of ropy² mucus as often as every 30 minutes; this mucus often **contains little or no fecal material**.

ILEOCECAL VALVE

- It prevents backflow of contents from colon into small intestine.
- It remains closed and open only when an intestinal peristaltic wave reaches it.

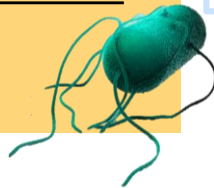
Relaxed By:	Contracted By:
Gastrin, <u>CCK</u> , <u>B</u> <u>adrenergic</u>	Distension of the cecum, <u>Secretin</u> , <u>Ach</u> , <u>alpha</u> <u>adrenergic</u>



PHYSIOLOGY OF COLON REGIONS:

Bacterial Action in the Colon:

- Colon **bacilli bacteria** are capable of digesting small amounts of **cellulose**.
- Vitamin K, vitamin B12, thiamine, and various gases can be formed by bacteria.
- The bacteria-formed vitamin K is especially important because the amount of this vitamin in the daily ingested foods is normally insufficient to maintain adequate blood coagulation.



The physiology of different colon regions:

(1st part)

ascending colon

- The ascending colon is specialized for **processing chyme delivered from the terminal ileum**
- When radiolabeled chyme is instilled (put gradually) into cecum, half of the instilled volume empties from ascending colon in 87 min.
- This period is short in comparison with the transverse colon
- The ascending colon is **not** the primary site of **storage, mixing and removal of water.** *

CONT.

The physiology of different colon regions: (2st parts)

transverse colon

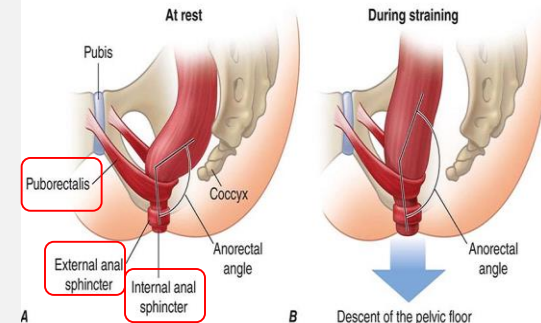
- The transverse colon is specialized **for the storage and dehydration** of feces.
- The labeled material is retained for about 24 hrs.
- The transverse colon is **the primary site** for the removal of **water** and electrolytes and the storage of feces.

descending colon

- The descending colon is a **conduit** between the transverse and sigmoid colon. "**transportation**"
- Labeled feces begin to accumulate in the sigmoid colon about 24 hours after the label is instilled in the cecum
- This region has **the neural program for power propulsion** that is involved **in defecation reflex**.

rectosigmoid region, anal canal, and pelvic floor musculature

- The physiology of the rectosigmoid region, anal canal, and pelvic floor musculature **maintains fecal continence** (the ability to voluntarily control urinary and fecal discharge).
- **The sigmoid and rectum** are **reservoirs** with a capacity of up to **500mL¹**.
- **The puborectalis muscle and external anal sphincter** **comprise a functional unit that maintain continence** .
- Fibers of **puborectalis** **join behind the anorectum** and **pass around it** to form a **U-shaped sling** (physiological valve)*



1: 25% of 500ml in sigmoid can trigger defecation.

ABSORPTION AND SECRETION:

Chyme absorption and Formation of Feces:

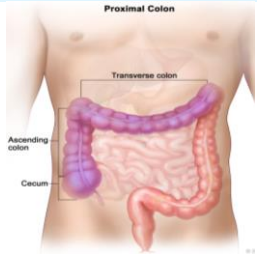
(physiological division)

absorbing colon

Most of the absorption in the large intestine occurs in **the proximal one half** of the colon giving this portion the name absorbing colon

storage colon

the distal colon functions principally **for feces storage** until a propitious time for feces excretion and is therefore called the storage colon



Absorption and Secretion of Electrolytes and Water:

- The large intestine can absorb a maximum of 5 to 8 liters of fluid and electrolytes each day.
- The mucosa, like that of the small intestine, has a high capability for **active absorption** of **sodium, Cl** and **water**.
- It secretes ***bicarbonate ions and Potassium***.

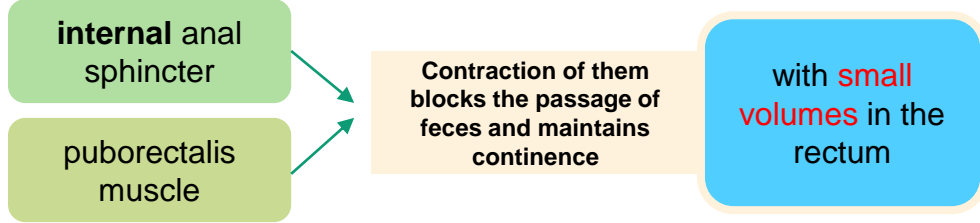
Reabsorption in the large intestine includes:

- **Water, Sodium and Chlor.**
- **Vitamins – K, biotin, and B5**
- **Organic wastes – Urobilinogens and Sterobilinogens**
- **Bile salts**
- **Toxins**
- **Ammonia (By Catalyzing Urea by Urease).**

INNERVATIONS & MOTILITY:

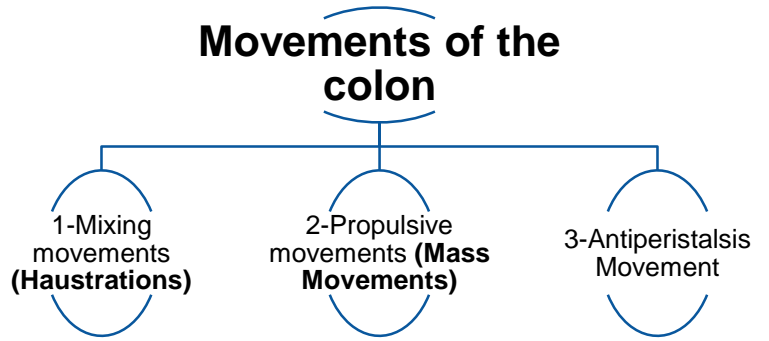
Sensory innervation and continence:

- MR+ENS** **Mechanoreceptors in the rectum** detect distention and supply the ENS.
- SS+CNS** **The anal canal in the region of the skin** is innervated by somatosensory nerves that transmit signals to **CNS**.
- SS+CNS** This region has **sensory receptors of pain, temperature and touch**.



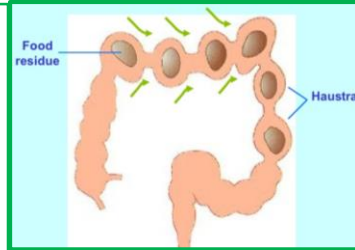
Motility in the Large Intestine:

- **The proximal half** of the colon is concerned with absorption and the **distal half** with storage.
- The transit of small labeled markers through the large intestine occurs in **36-48 hrs**.



TYPES OF MOVEMENTS:

1-Mixing movements (Haustrations)



- **Ring-like contractions** (about 2.5 cm) of the circular muscle divide the colon into pockets³ called **haustra**.

- The contracting segment and receiving segment on either side remain in their respective state for longer periods.

- In addition, there is uniform repetition of the haustra along the colon.

- **Net forward propulsion** occurs when **sequential¹ migration of haustra occurs along the length of the bowel**.

At: Ascending + 1st part of transverse

2-Propulsive movements (Mass Movements)

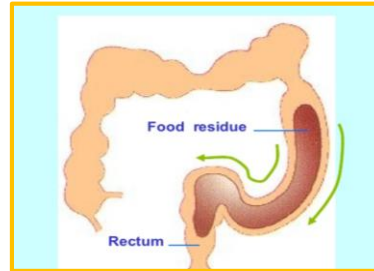
- The motor events in the **transverse and descending colon**.

- May be **triggered by the increased delivery** of ileal chyme into ascending colon following a meal (**gastrocolic reflex²**).

- Irritants, e.g., castor oil, threatening agents such as parasites and enterotoxins can **initiate mass movement**.

- **Start at the middle of transverse colon** and is preceded by relaxation of the circular muscle and the downstream disappearance of haustral contractions.

At: Descending + rest part of transverse

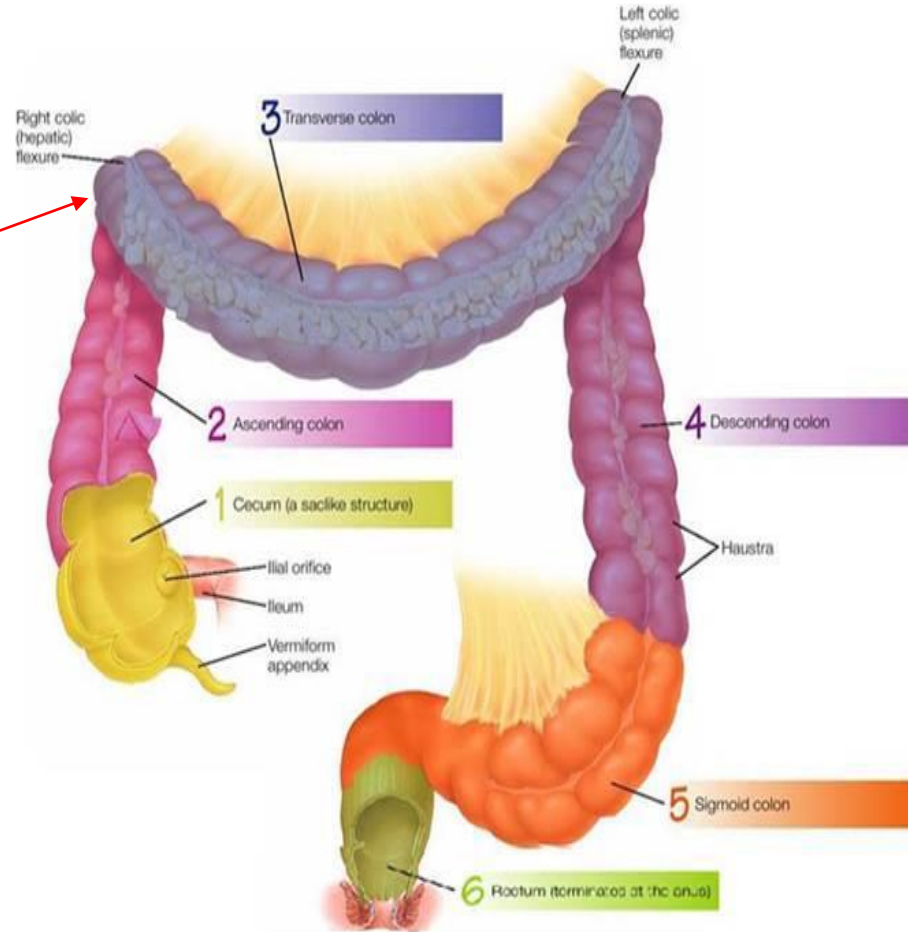


1. following in a logical order or sequence. 3: pocket haustra means two fingers contraction in between them space which called pocket.
2. an increase in motility of the **colon** in response to stretch in the **stomach** and byproducts of digestion in the **small intestine**.

CONT.

3-Antiperistalsis

- It starts at the junction of **ascending and transverse colon** and traveling **towards the cecum**.
- It mixes contents and help water absorption.



**** (Gastrocolic & duodenocolic reflexes): increase the colon movement by filling the Stomach or duodenum.**

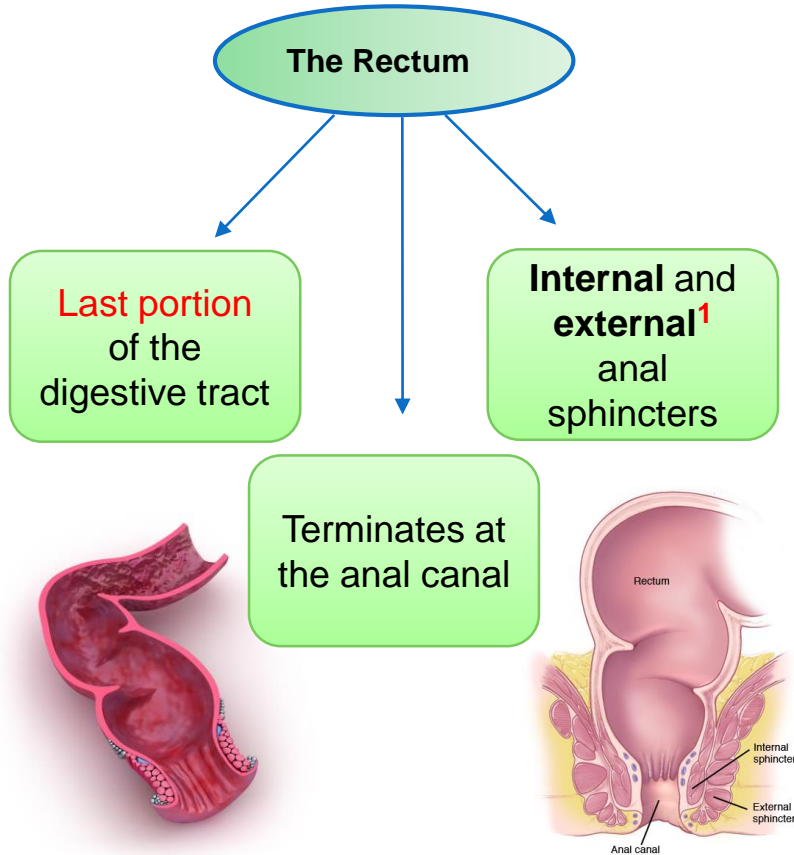
CONTROL OF COLONIC MOTILITY

The intramural plexuses directly control the contractile behavior of the colon.

Stimulatory	Inhibitory
<u>acetylcholine & substance P</u> as neurotransmitter	<u>VIP & NO</u> onto colonic smooth muscle cells

-
- The extrinsic autonomic nerves to the colon **modulate** the control of the colonic motility by the enteric nervous system.
 - Parasympathetic nervous system **increase** the motility of colon: (Vagus nerve supplies ascending colon and proximal 2/3 of transverse colon) and (Pelvic splanchnic nerves supply distal 1/3 part of transverse colon and the remainder of large intestine)

RECTUM & DEF. REFLEX:



Defecation Reflex:

1

Distension of the rectum.

2

Stimulation of the stretch receptors in the rectum.

3

- A. **Short reflex:** Stimulation of **myenteric plexus** in sigmoid colon and rectum.
- B. **Long reflex:** stimulation of **parasympathetic² motor neurons** in sacral spinal cord.
- C. stimulation of **somatic motor** neurons.

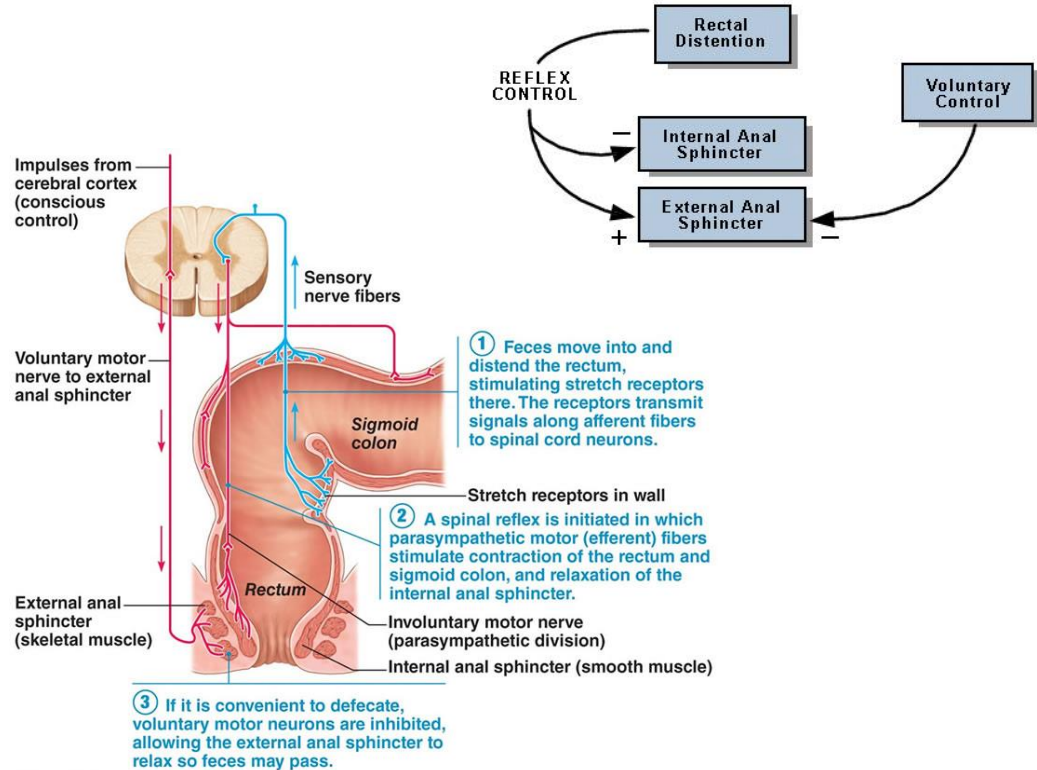
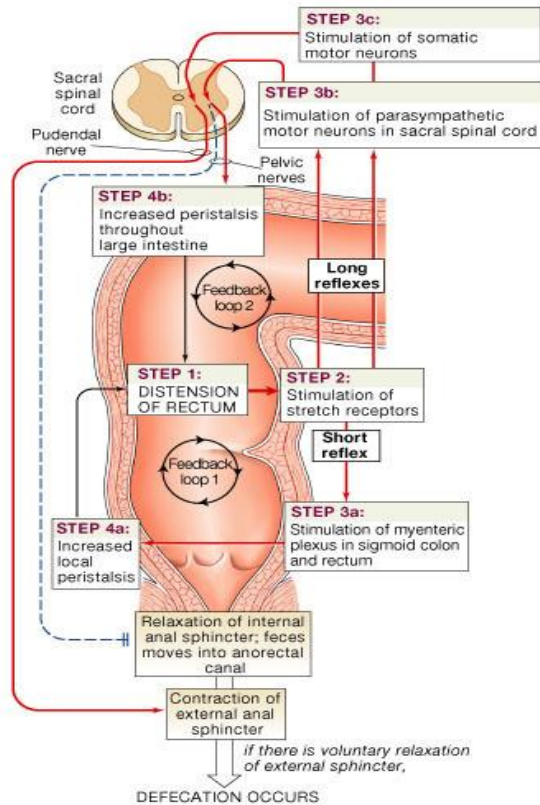
4

- A. Increased local **peristalsis**.
- B. **Relaxation** of **internal** anal sphincter and **contraction** of **external** anal sphincter.

2: for increasing peristaltic movement.

1: **external sphincter** is important in **voluntary continence** specially **at high volume in sigmoid**.

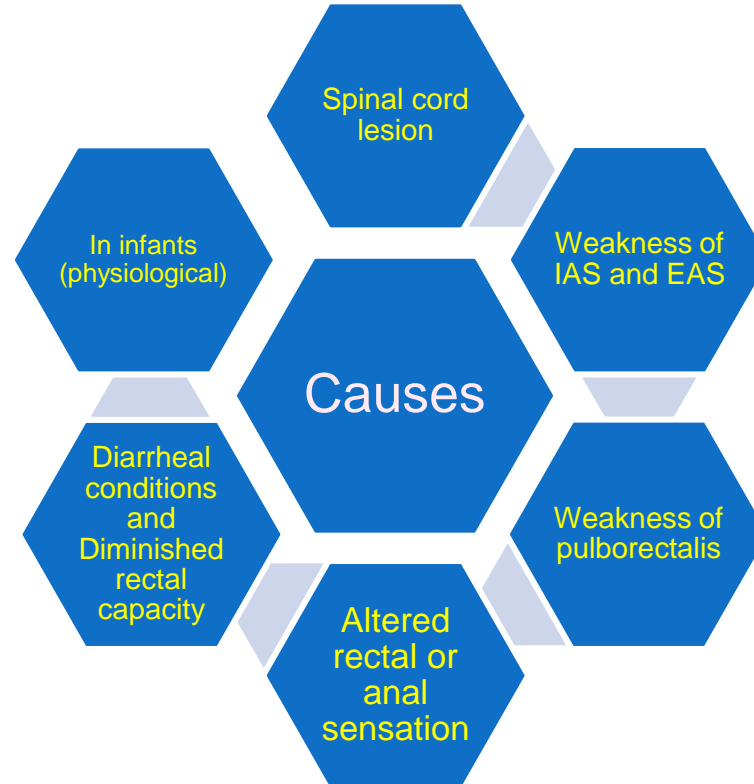
ADDITIONAL SLIDE DEFECATION REFELX :



© 2013 Pearson Education, Inc.

FECAL INCONTINENCE لا إراديا

The spinal reflex of defecation operates without interference from higher centers.



If the surrounding circumstances are suitable

1) Defecation reflex will be allowed. Stretch of the rectal wall is **signaled to SC by pelvic nerve**. Efferent pelvic impulses cause reflex **contraction of the rectum and relaxation of IAS**.

2) This is followed by **reduction in tonic impulses to EAS**, so it relaxes and feces leave the rectum assisted by voluntary straining and **contraction of pelvic floor muscle**

If situation is not suitable for defecation

The reflex is **inhibited by the cerebral cortex**. Tonic contraction of EAS is voluntary maintained which leads to **accommodation of the rectum to distension and return of tonic contraction of the IAS**.

Repeated inhibition of defecation reflex is a major cause of constipation

Anal Canal

Internal canal sphincter:

- Involuntary control
- Smooth muscle
- Contracted at normal condition

External canal sphincter:

- Voluntary control
- Striated muscle
- Relaxed at normal condition

With activation of defecation reflex, the internal anal sphincter get relaxed by the effect of ENS, so if you don't want to defecate → the external anal sphincter get contracted voluntary to stop defecation :->

Control of colonic motility

The intramural plexuses directly control the contractile behavior of the colon.

The extrinsic autonomic nerves to the colon **modulate** the control of the colonic motility by the enteric nervous system

Stimulatory enteric motor neurons use **acetylcholine & substance P** as neurotransmitters.

Inhibitory enteric motor neurons release **VIP & NO** onto colonic smooth muscle cells.

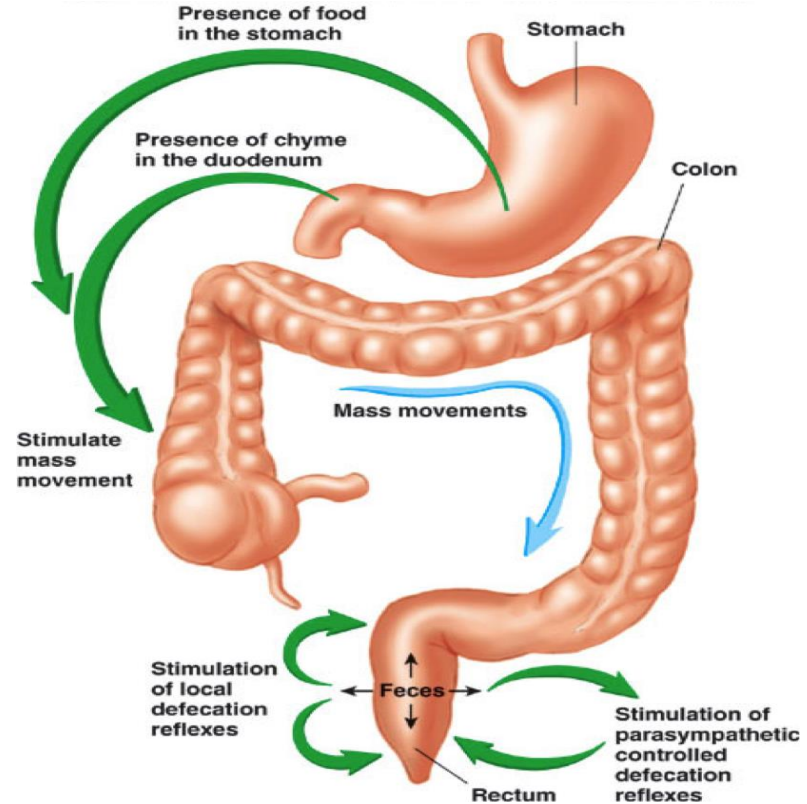
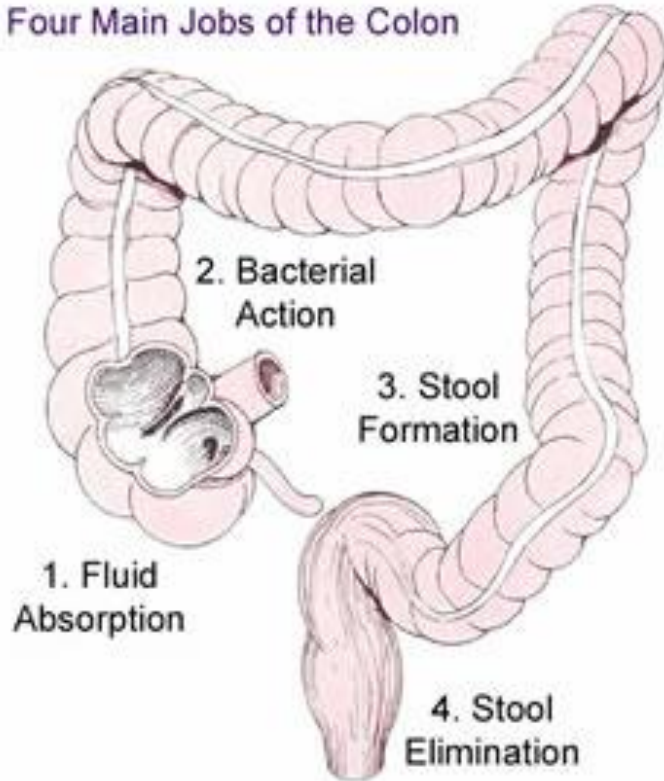
Summary

- The colon is divided into appendix ,cecum , ascending , transverse ,descending , sigmoid , rectum and finally anus.
- Tenia coli and haustra are characteristic to the colon.
- The mucous membrane of the colon lacks villi.
- Pelvic nerves (parasympathic) increase the mucus secretion
- Most of absorption occur in proximal half of the colon
- The distal colon function is storage
- About 0.5 L of water is absorbed daily from the colon.
- Na⁺ and Cl⁻ are absorbed
- K⁺ and HCO₃⁺ are secreted
- Vit. K, biotin, B5 and folic acid resulting from bacterial fermentation of CHO are absorbed.
- The ileocecal valve prevents backflow of contents from colon.
- Gastrin and CCK relaxes the ileocecal valve unlike the secretin.

Mixing movements (haustration)	Propulsive (mass) movement	antiperstalsis
predominant	Programmed for defecation	Give sufficient time for absorption
For absorption		
Cecum + ascending colon	Transverse + descending colon	In the orad direction

- Mass movement is mainly initiated by Gastrocolic and duodenocolic reflex.
- Defecation is a spinal reflex which is influenced by higher center that's why a person with spinal cord injury have fetal incontinence .

Four Main Jobs of the Colon



1-which one of the following is secreted in colon:

- A. Sodium.
- B. Water.
- C. Bicarbonate.
- D. Chlor.

2-Neurotransmitter that stimulate the motility of colon:

- A. VIP.
- B. GIP.
- C. NO.
- D. Substance P.

3-Iliocecal valve can contracted by:

- A. CCK.
- B. Gastrin.
- C. Secretin.
- D. B-Adrenergic.

4-what is can cause fecal incontinence:

- A. Diarrheal Condition.
- B. Obesity.
- C. Genetic.
- D. Powerful of EAS.

5- In Defecation Reflex, The Short Reflex Stimulate:

- A. Myenteric Plexus.
- B. Submucosal Plexus.
- C. Vagus.
- D. Pelvic Plexus.

6-Antiperistalsis Movement start at:

- A. Between Transverse and descending colons.
- B. Between Caecum and ascending colons.
- C. Between Ascending and transverse colons.
- D. Between Descending and sigmoid Colons.

7-the muscle that is U-Shaped:

- A. EAS.
- B. IAS.
- C. Puborectalis.
- D. Psoas Major.

8- Ring-like contractions (about 2.5 cm) of the circular muscle divide the colon into pockets:

- A. Propulsive Movement.
- B. Mixing contraction (Haustration).
- C. Antiperistalsis Movement.
- D. Rush Movement.

Q1: what are types of motility of colon:

Ans:

- 1-Mixing (Haustration).
- 2-Propulsive movement.
- 3-Antiperistalsis.

Q2: Two of substances that can reabsorbed by colon:

Ans: Water, Sodium, Chlor and Bile salt.

Q3: What are muscles that involved in Defecation?

Ans:

- 1-Puborectalis
- 2-Internal Anal Sphincter
- 3-External Anal Sphincter

Q4: Two of the Vitamins that can formed By Bacteria in Colon:

Ans: Vitamin K and Thiamine (B1).

Thanks for checking our work

Good Luck

Done by:
HAITHAM AIASIM
Omar AIRahbeeni



You don't need more time
, you just need to decide.

