Author: John Williams, M.D., Ph.D., 2009

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M1 - GI Sequence

Colon and Review

John Williams, M.D., Ph.D.

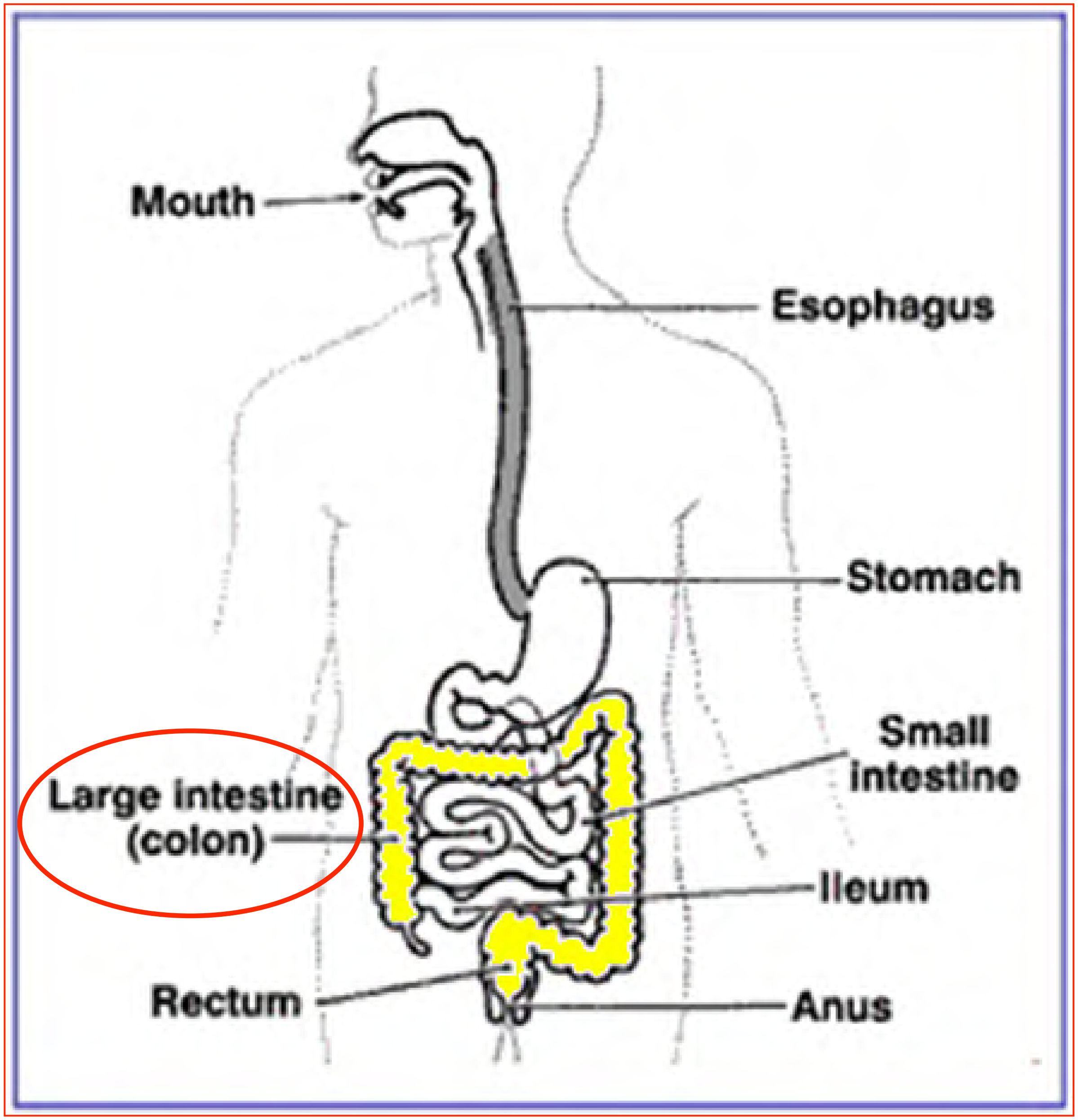
Winter, 2009

University of Michigan
Medical School

THE HUMAN COLON

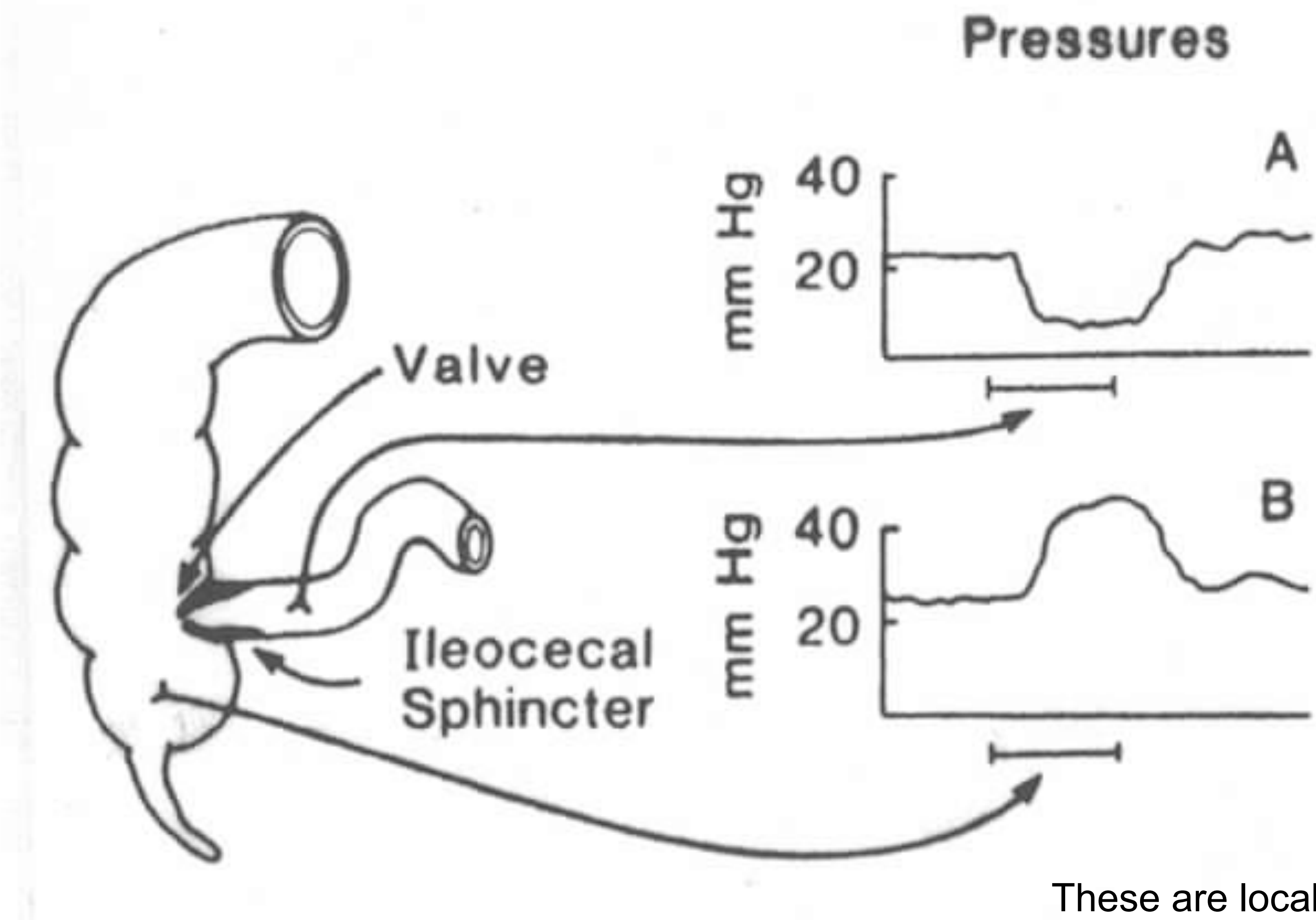
Functions

1. Storage
2. Absorption of salt and water
3. Digestion and Absorption



PD-GOV National Digestive Diseases Information Clearinghouse

Response of the Ileocecal Sphincter to distension of the Ileum or Cecum



These are local reflexes
in the myenteric plexus

 Fig 7-30 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

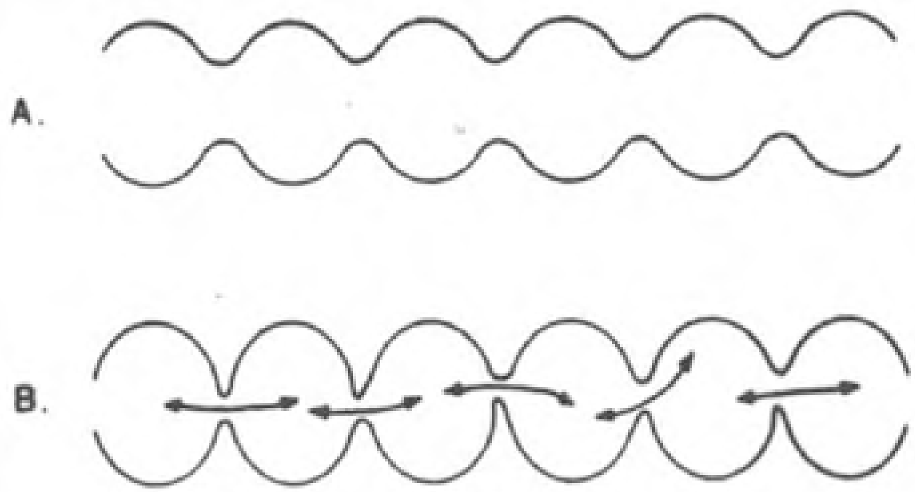
Colonic Motility

1. Slow wave frequency variable but highest in transverse colon and the rectum (11/min)

2. Contractions increase after feeding

3. Mass Peristalsis after a meal termed the “Gastro-Colic reflex

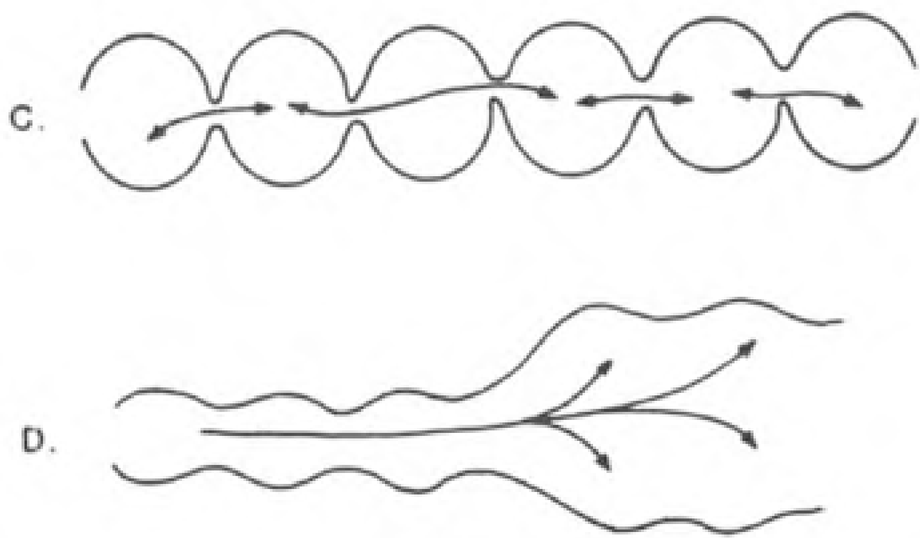
The Process of Haustral Shuttling and Propulsion



A. A qulescent segment of colon.

B. Haustral shuttling with no net movement of chyme.

Contractions increase after feeding

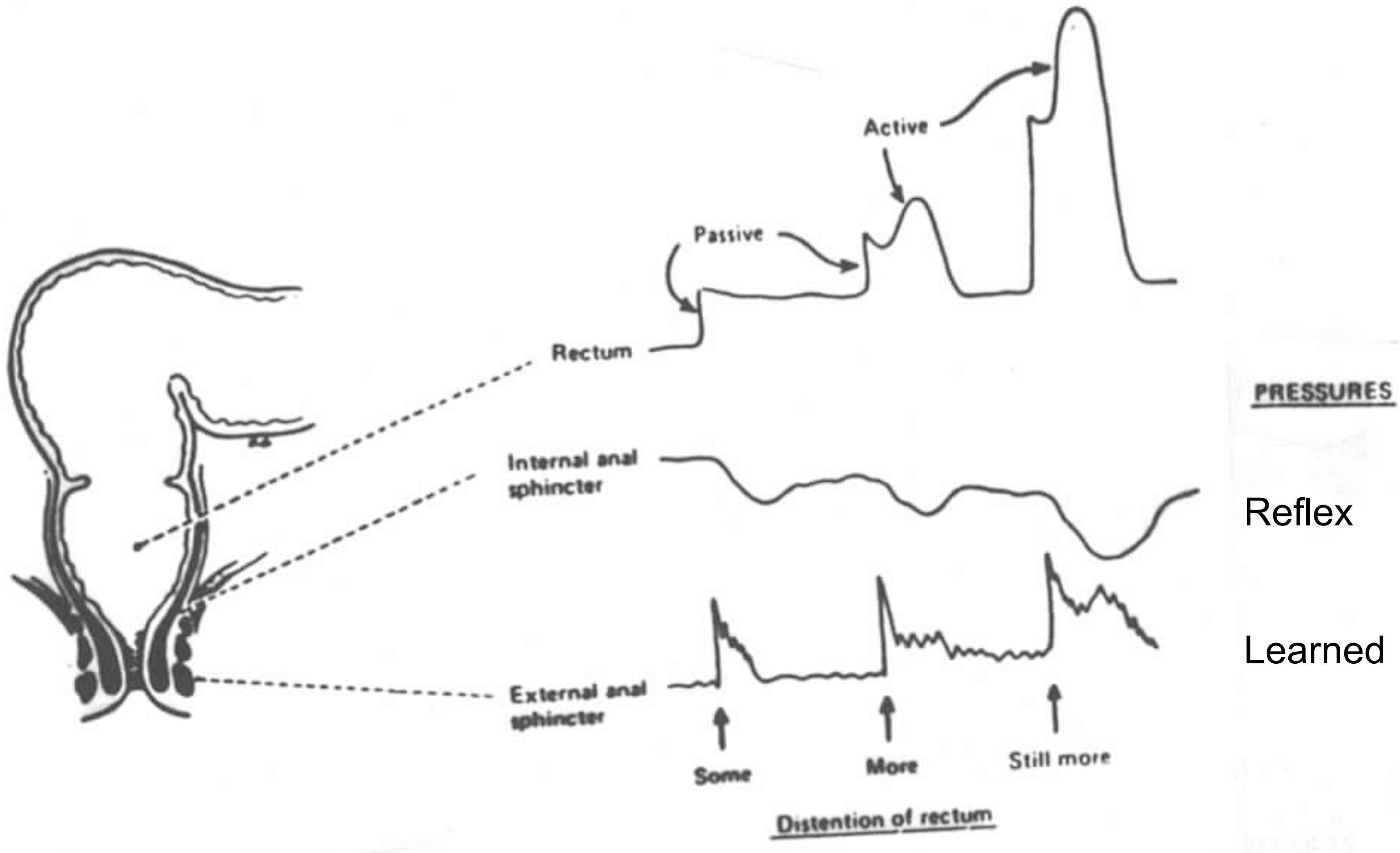


C. Haustral shuttling with propulsion of chyme from one haustrum to another.

D. Multihaustral propulsion with movement of chyme through several haustra.

 Fig. 8-6 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

Response of the Rectum and Anal Sphincters to Rectal Distension



PD-INEL Fig. 8-9 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

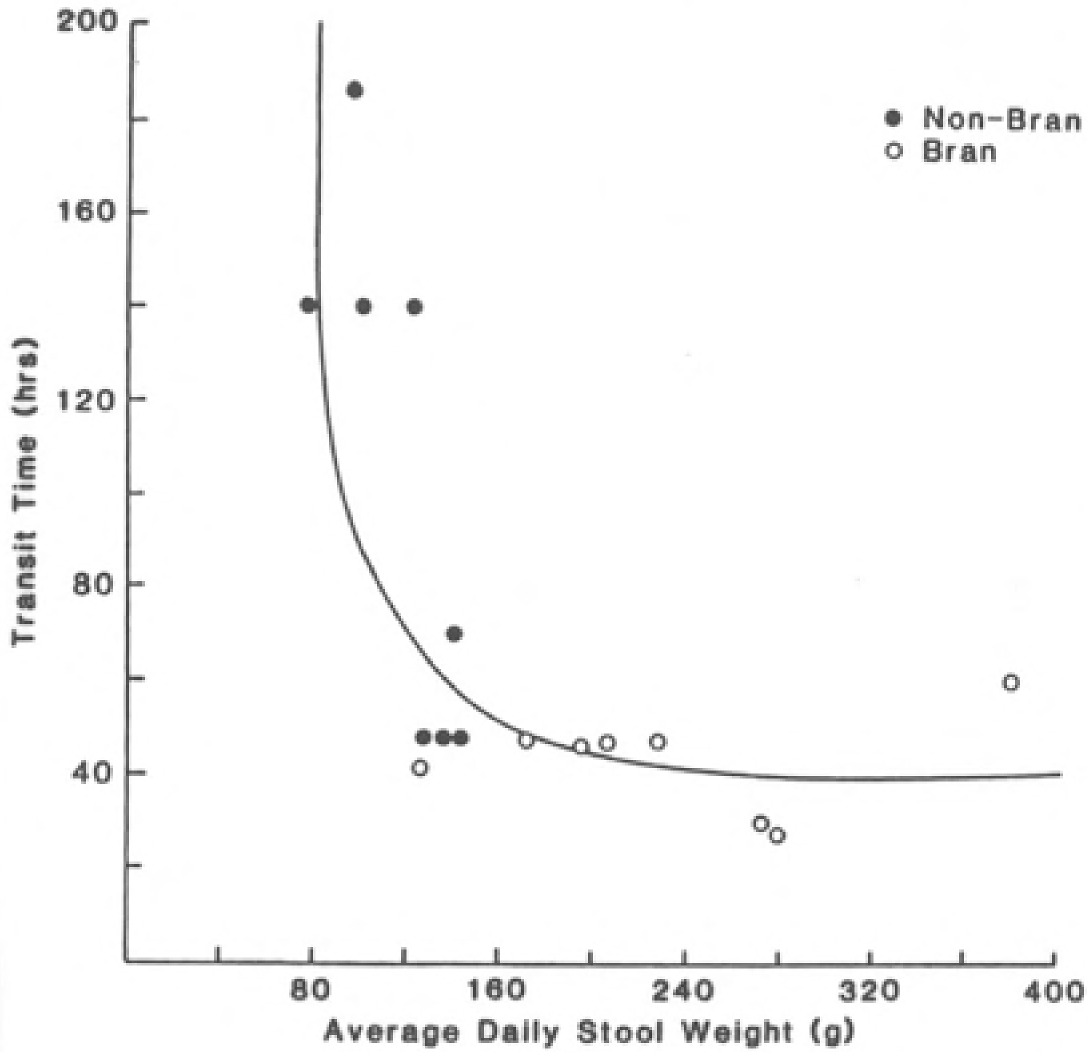
Hirschprungs Disease

1. Myenteric plexus in colon normally exerts a net inhibitory influence

2. When neurons are absent in rectum the aganglionic Segment is contracted resulting in a large distended Colon

3. Treatment is to surgically remove the segment

The Effect of Dietary Fiber on Colonic Transit Time and Stool Weight



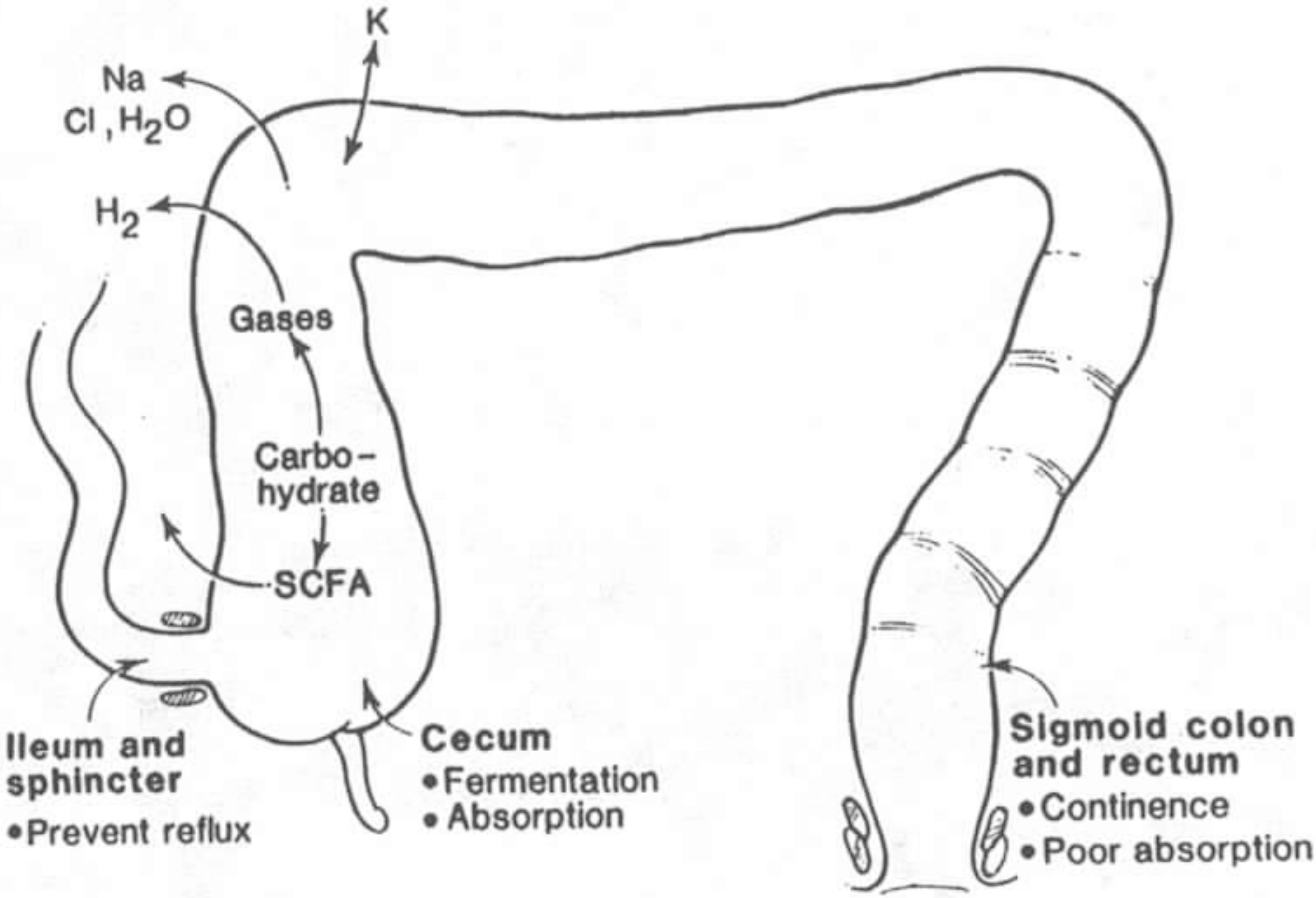
PD-INEL Fig. 8-8 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

Composition of Gastrointestinal Gas	Stomach (%)	Intestine (%)	Flatus (%)
Nitrogen	79	64	61.2
Carbon dioxide	4	14	8.1
Hydrogen	0	19	19.8
Methane	0	8.8	7.3
Oxygen	17	0.7	3.6

Swallowed air *Bacterially Produced*

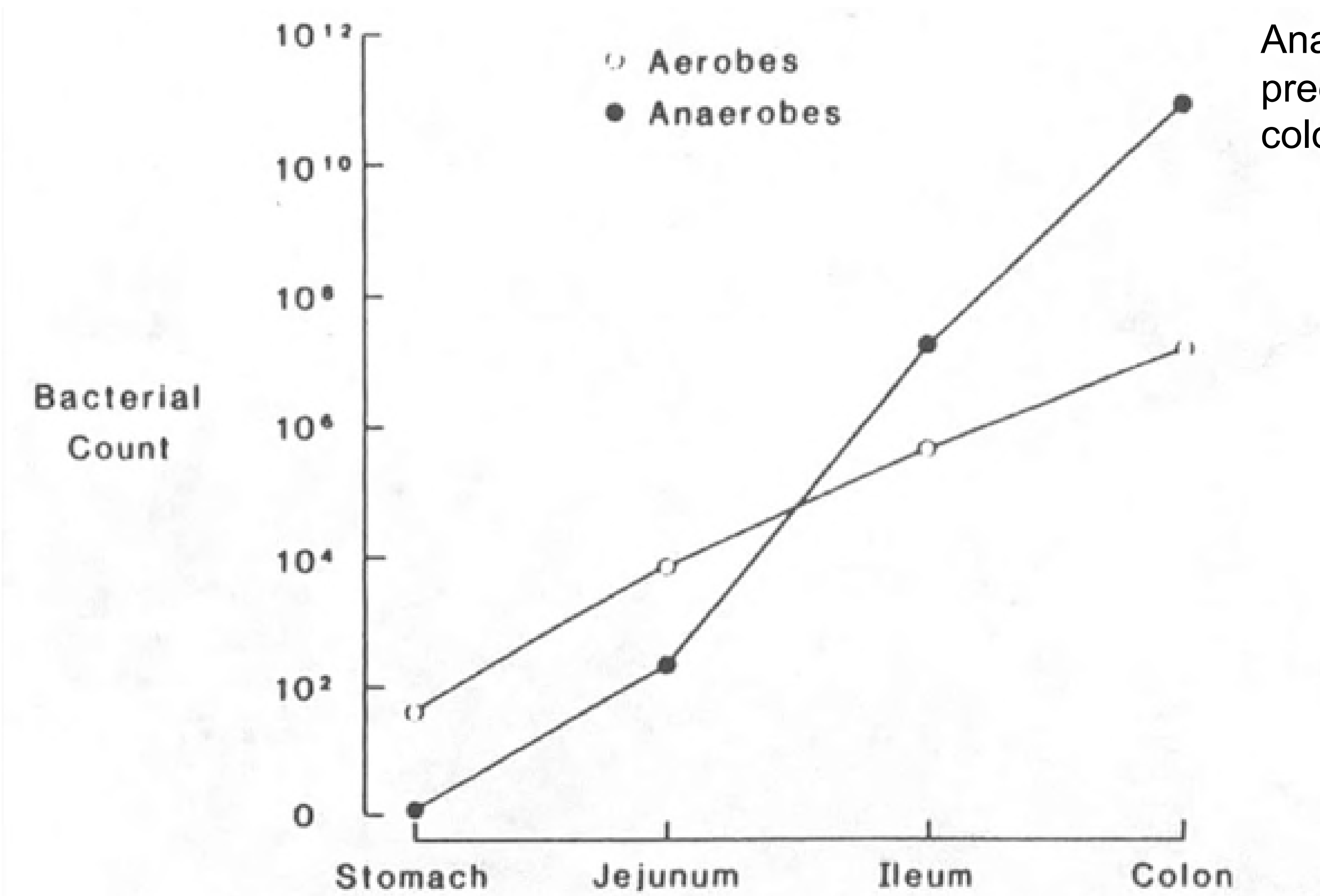
Normally about 1 to 1½ liters per day of flatus

Role of the Cecum in Fermentation and Absorbtion



 Levitt, MD, Bond, JH, Levitt, DG. "Gastrointestinal gas". *In* Johnson, L. *Physiology of the Gastrointestinal Tract*, Vol. 2. Raven Press, New York, NY; 1981.

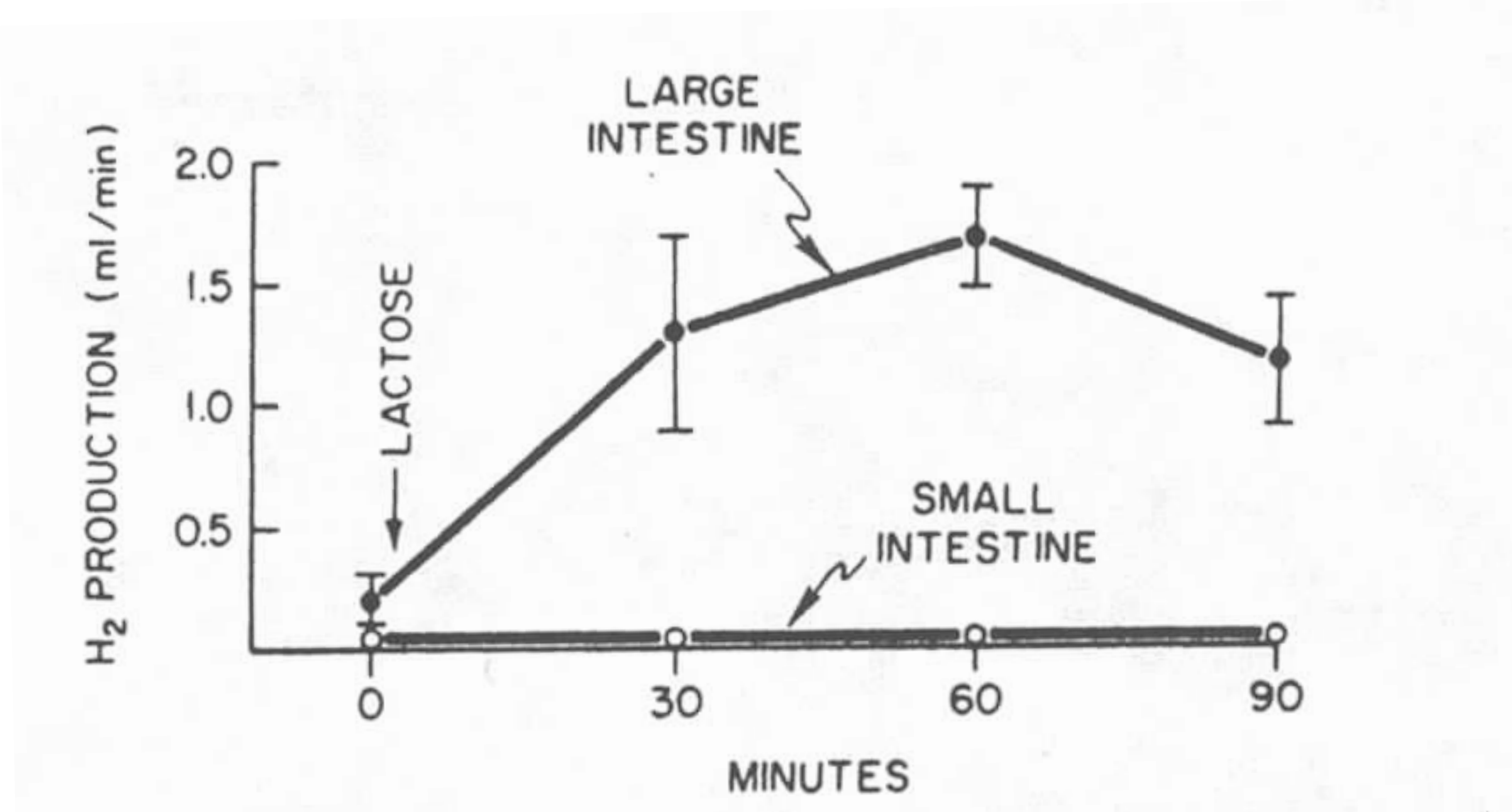
Magnitude of the Bacterial Population in the Gut



Anaerobes predominate in colon

 Fig. 8-4 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

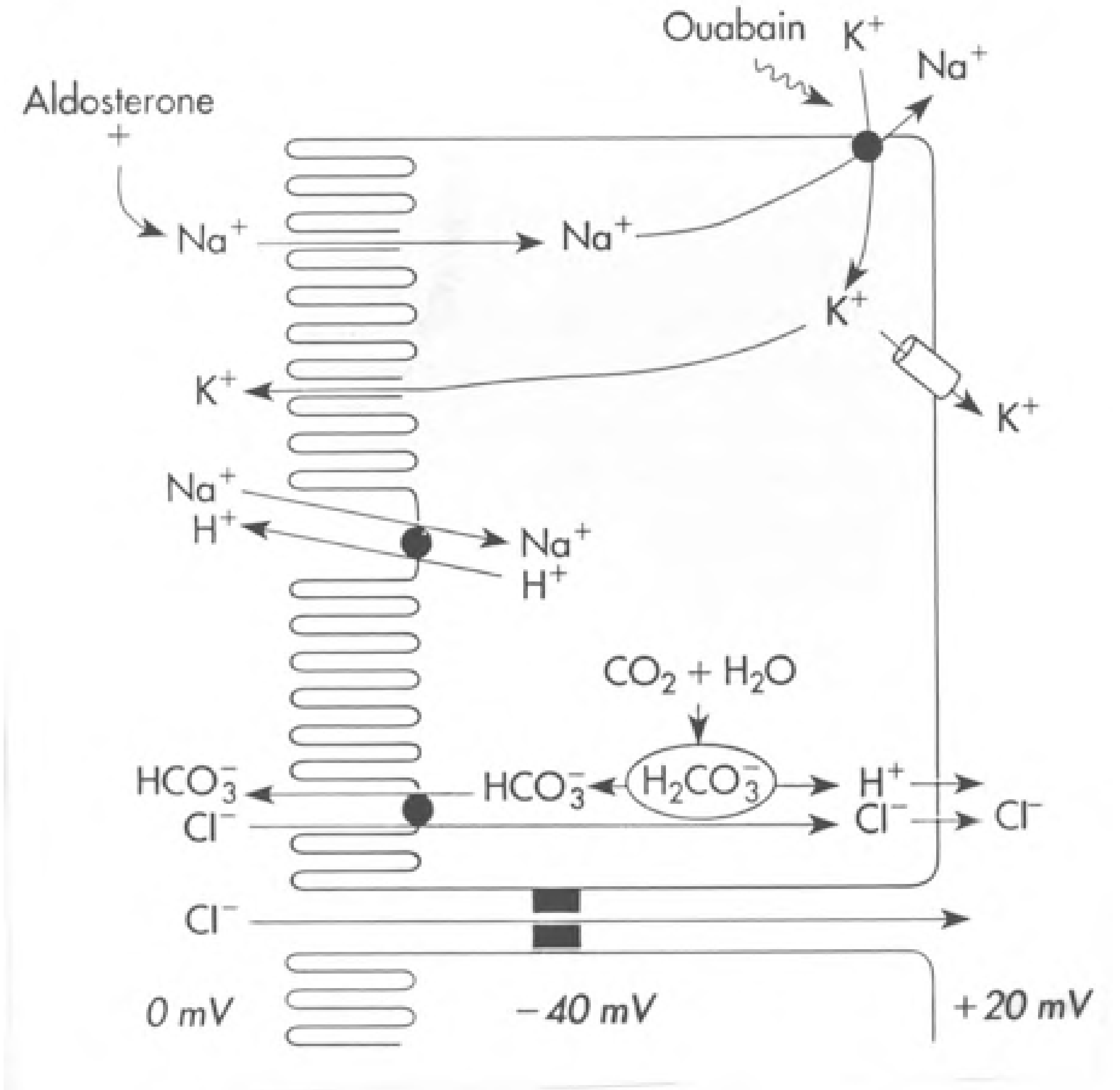
Hydrogen gas production in the small intestine and colon in response to lactose



PD-INEL Levitt, MD, Bond, JH, Levitt, DG. “Gastrointestinal gas”. *In* Johnson, L. *Physiology of the Gastrointestinal Tract*, Vol. 2. Raven Press, New York, NY; 1981.

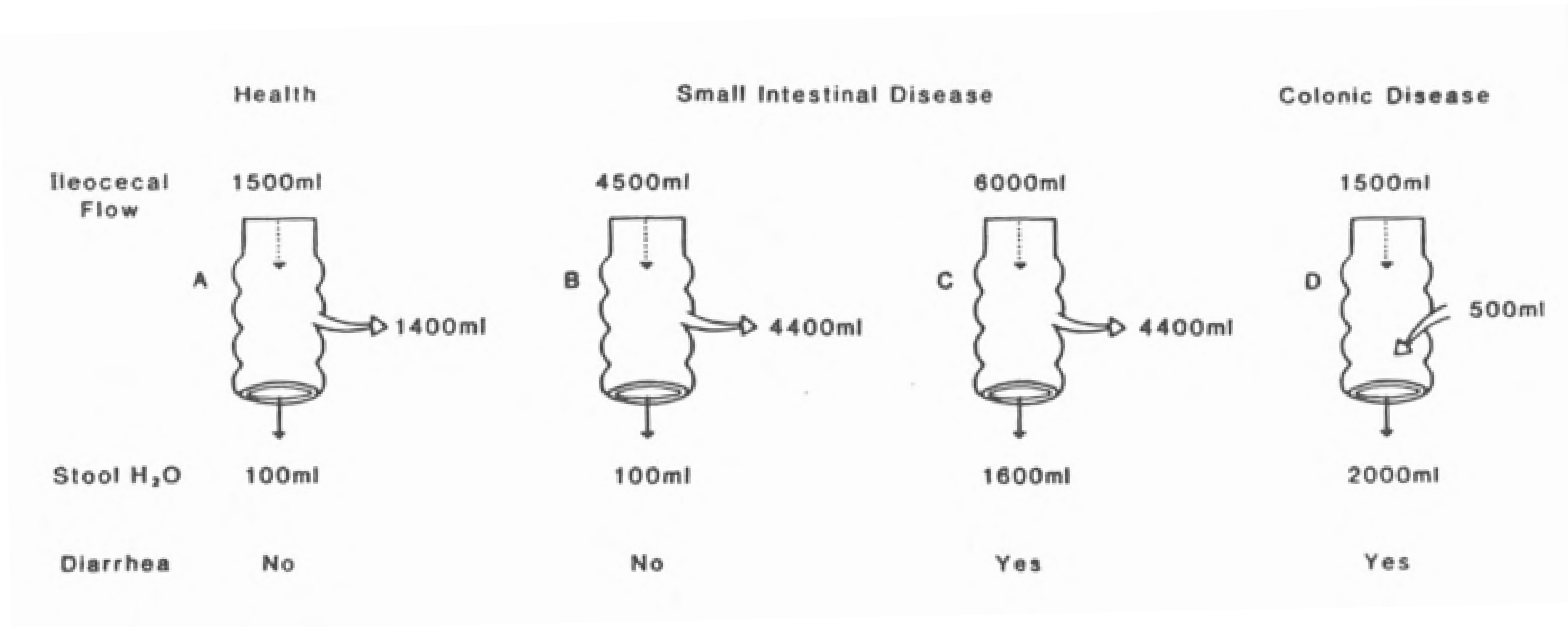
Ingestion of certain foods such as beans rich in indigestible carbohydrates leads to massive increase in hydrogen content and increased flatus

Ion Transport Pathways in the Human Colon



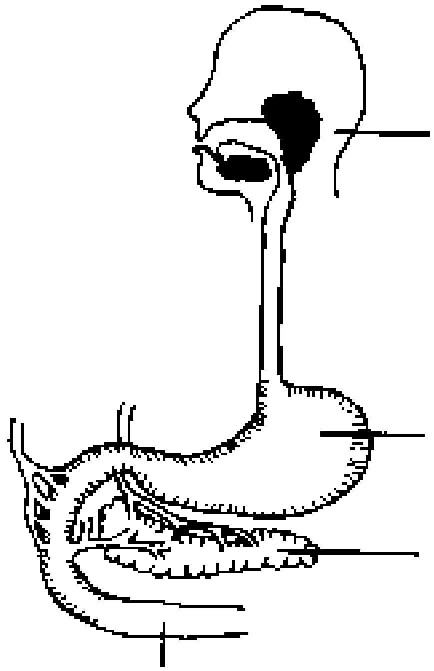
PD-INEL Fig. 12-3 Johnson, L. *Gastrointestinal Physiology*, 7th ed. Mosby Elsevier, Philadelphia, PA; 2007: 130.

Relationship Between Ileocecal Flow, Colonic Water Absorption and Stool Water in Health and in Various Disease States



PD-INEL Fig. 8-2 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985. Modified (see additional source information).

REVIEW



Amylase

Pepsin
Lipase

Amylase
Trypsin
Chymotrypsin
Carboxypeptidase
Elastase
Lipase - Colipase
Phospholipase A_2
Cholesterol esterase - nonspecific lipase

Disaccharides:
- Maltase
- Sucrase
- Lactase
- Isomaltase

Peptidases:
- Aminopeptidase
- Carboxypeptidase
- Dipeptidase
- Enterokinase

 Fig. 9-1 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

The Interdigestive Period

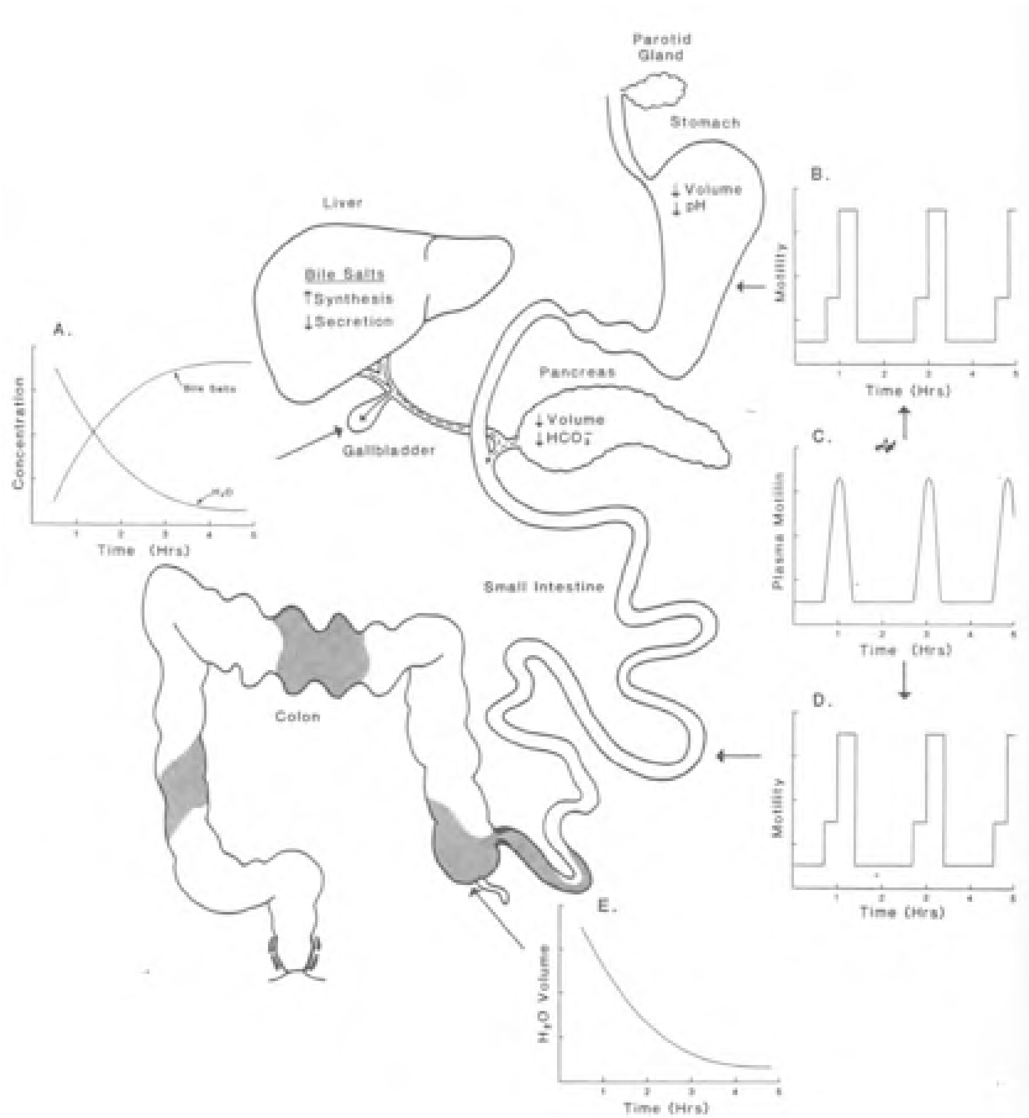


Fig. 9-2 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

The Cephalic Phase

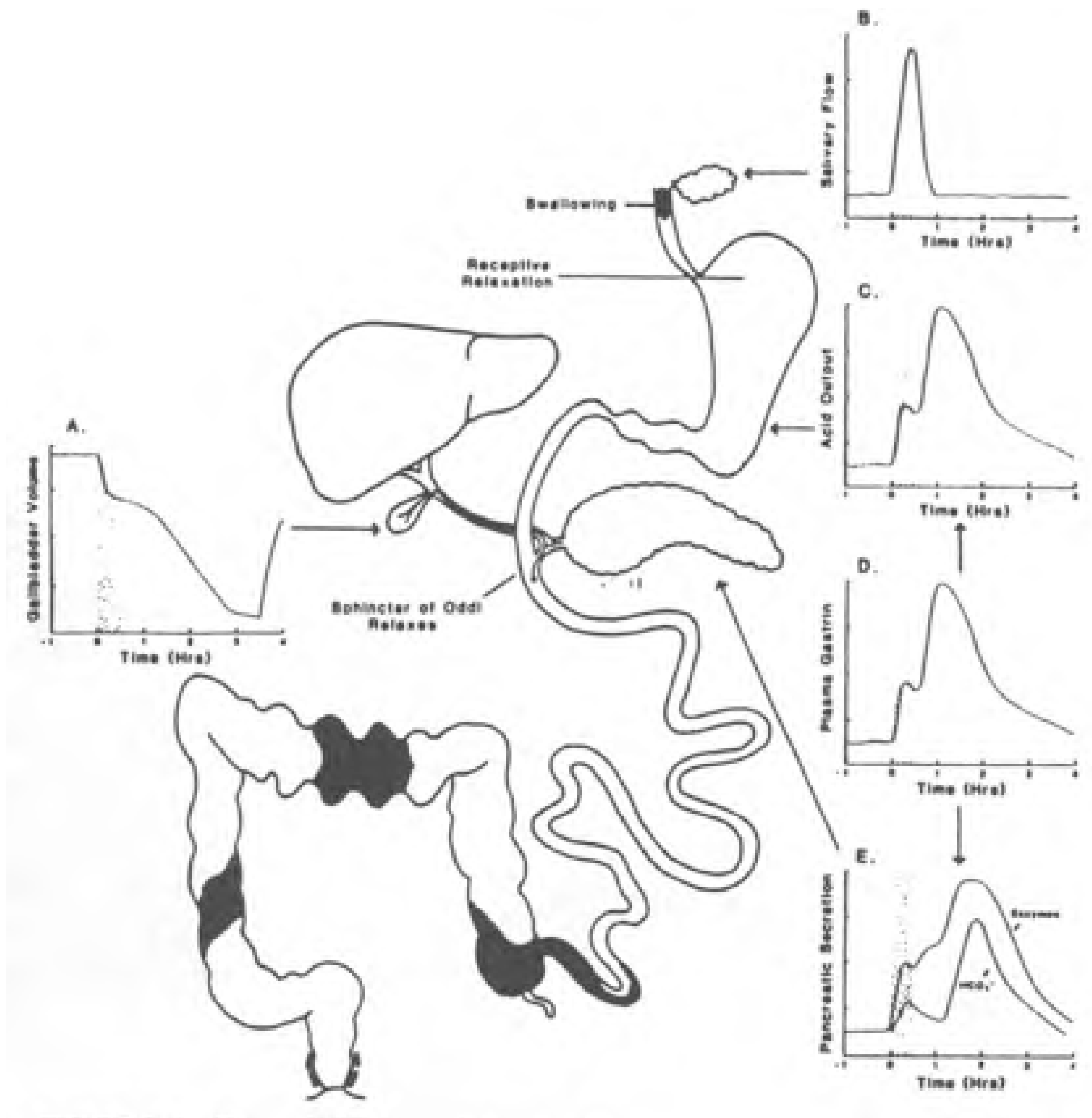


Fig 9-3 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

The Gastric Phase

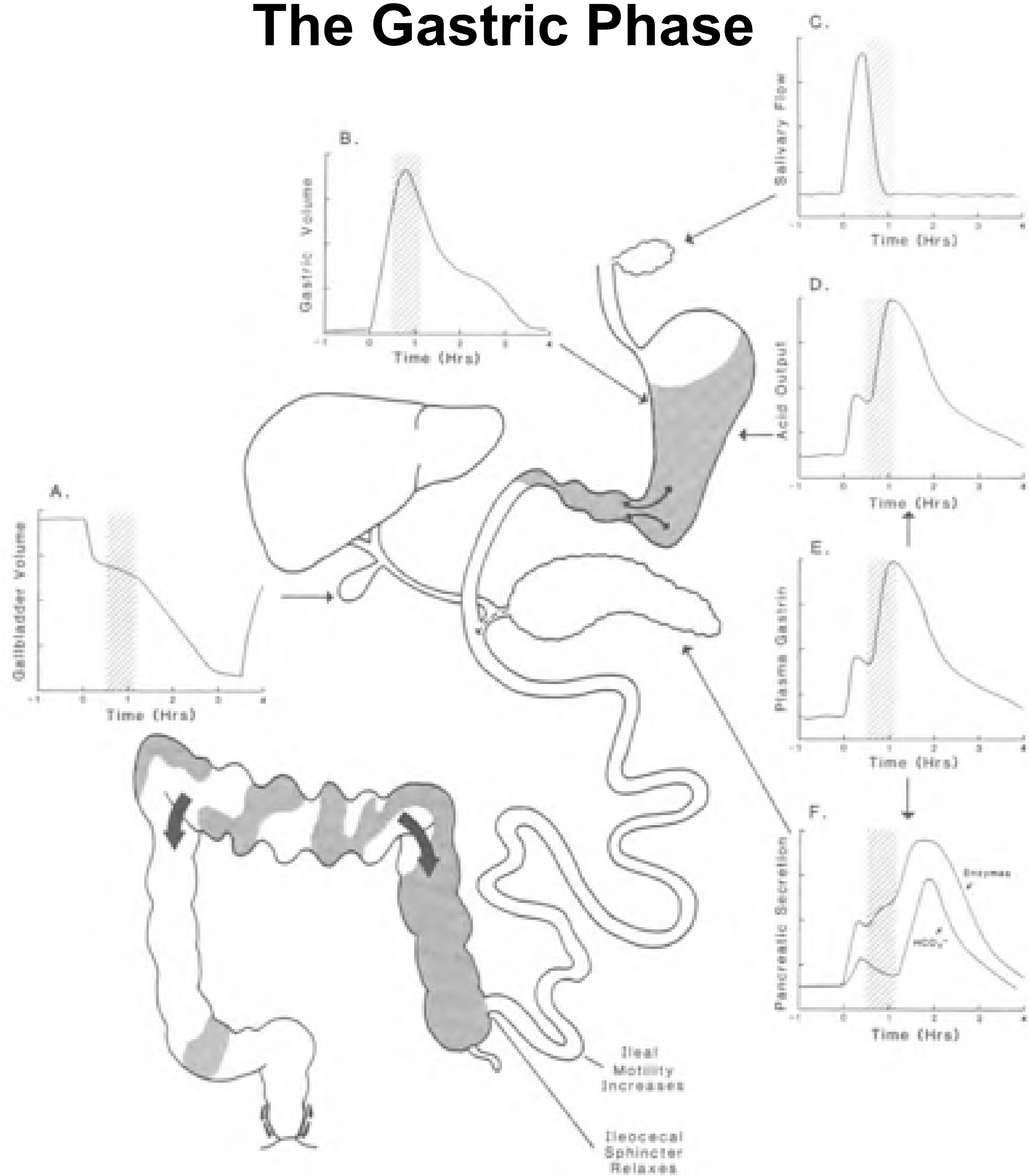


 Fig. 9-4 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

The Early Intestinal Phase

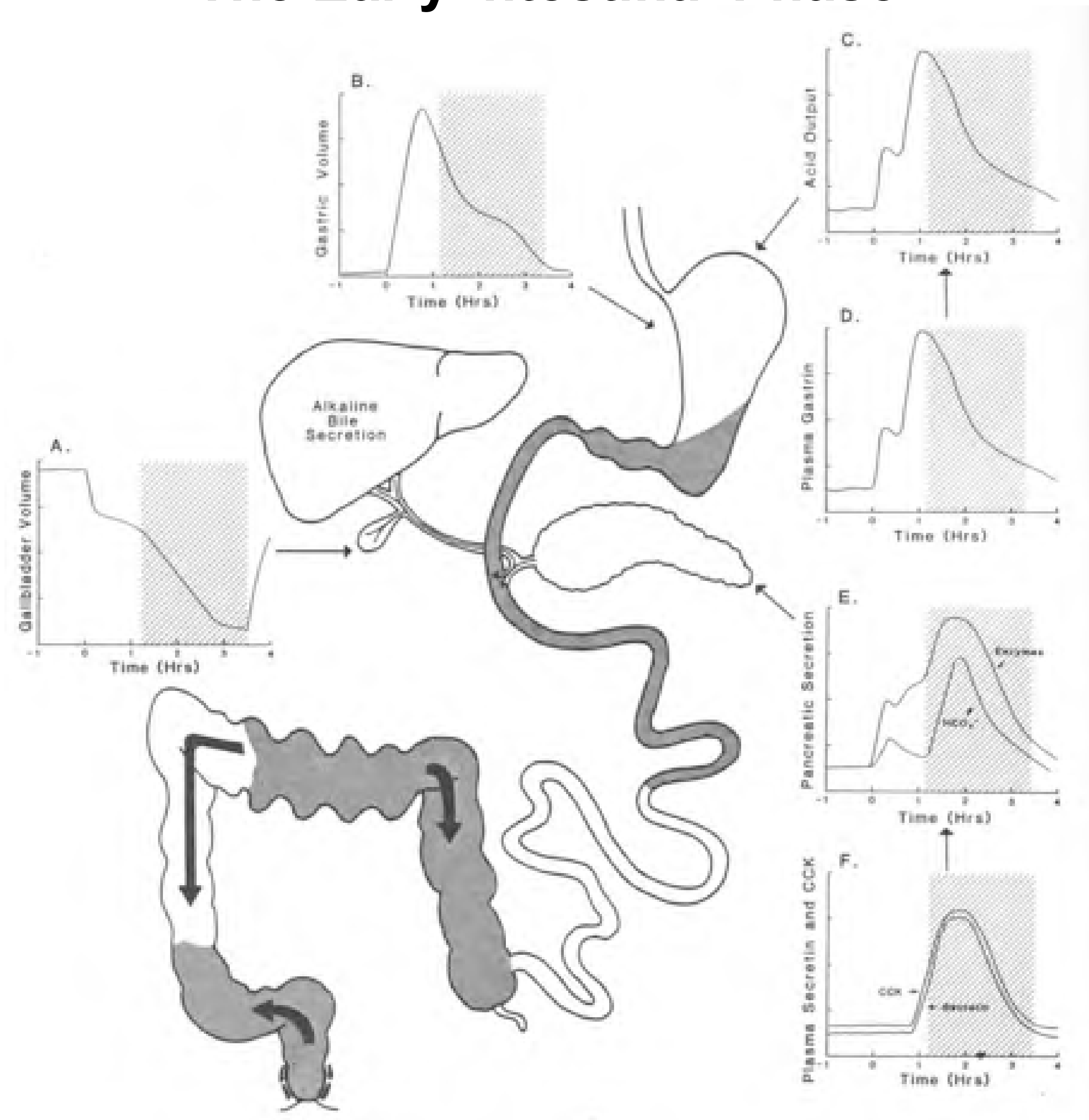


 Fig. 9-6 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

The Late Intestinal Phase

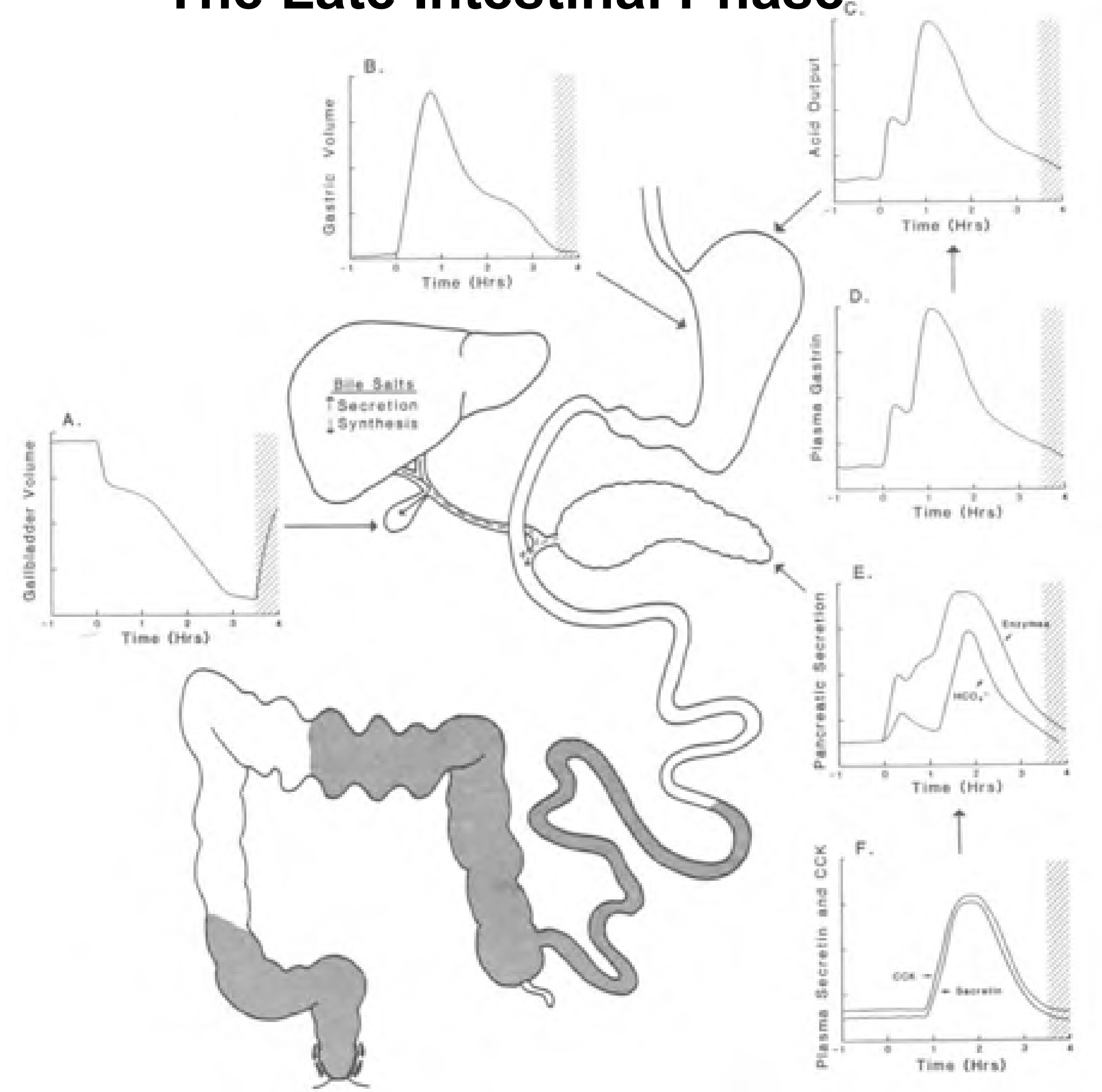


 Fig. 9-1 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

The Interdigestive Period

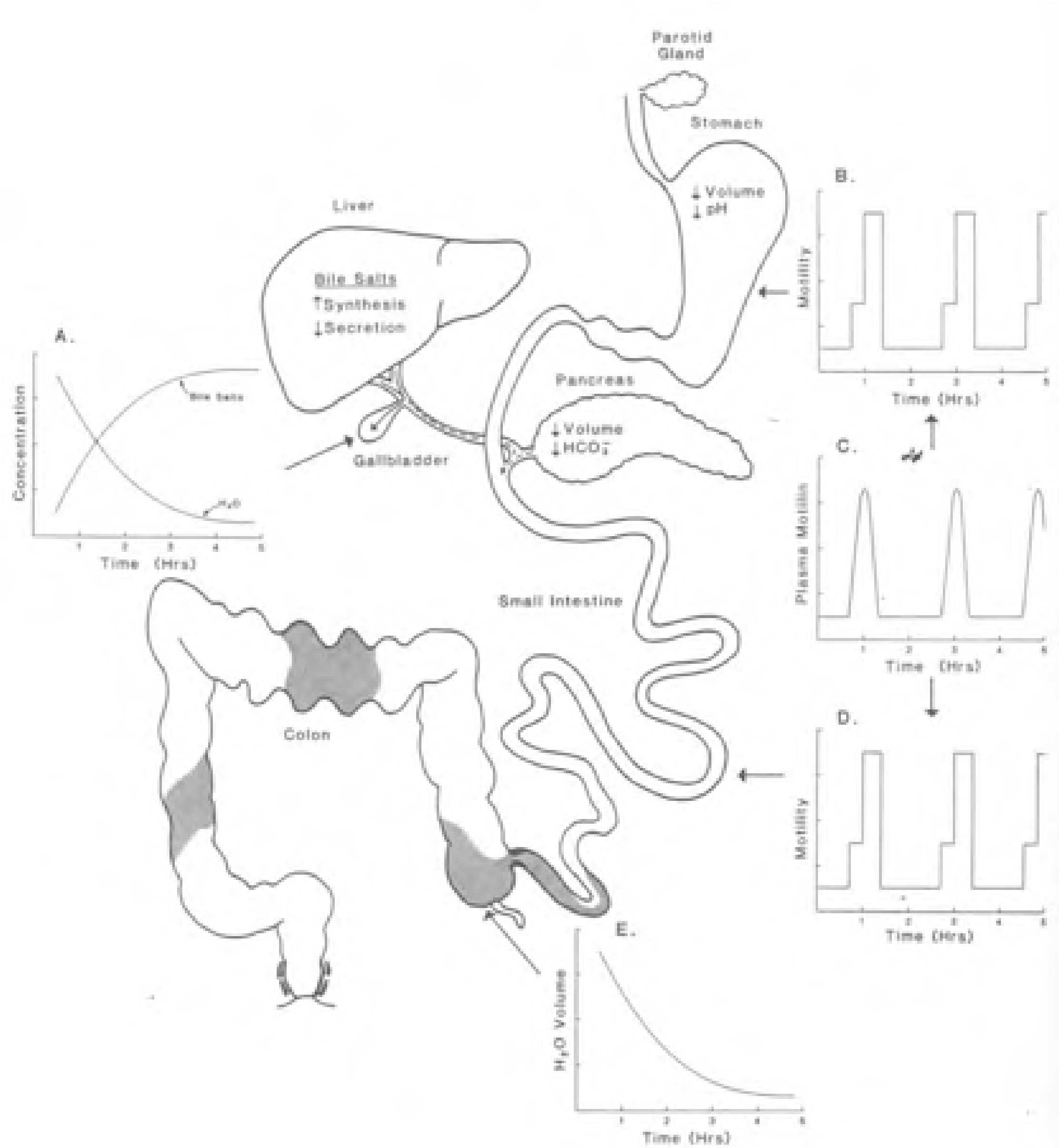


Fig. 9-2 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

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Slide 4 – National Digestive Diseases Information Clearinghouse, http://digestive.niddk.nih.gov/ddiseases/pubs/barretts/

Slide 5 – Fig. 7-30 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

Slide 7 – Fig. 8-6 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

Slide 8 – Fig. 8-9 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

Slide 10 – Fig. 8-8 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

Slide 11 – Source Undetermined

Slide 12 – Levitt, MD, Bond, JH, Levitt, DG. "Gastrointestinal gas". *In* Johnson, L. *Physiology of the Gastrointestinal Tract*, Vol. 2. Raven Press, New York, NY; 1981.

Slide 13 – Fig. 8-4 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

Slide 14 - Levitt, MD, Bond, JH, Levitt, DG. "Gastrointestinal gas". *In* Johnson, L. *Physiology of the Gastrointestinal Tract*, Vol. 2. Raven Press, New York, NY; 1981.

Slide 15 – Fig. 12-3 Johnson, L. *Gastrointestinal Physiology*, 7th ed. Mosby Elsevier, Philadelphia, PA; 2007: 130.

Slide 16 – Fig. 8-2 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985. Modified from Binder, HJ. "Absorption and secretion of water and electrolytes by small and large intestine". *In* Sleisenger, MH, Fordtran, JS. *Gastrointestinal Disease*: Pathophysiology, Diagnosis, Management. W.B. Saunders, Philadelphia,PA; 1983.

Slide 17 – Fig. 9-1 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

Slide 18 – Fig. 9-2 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

Slide 19 – Fig. 9-3 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

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Slide 21 – Fig. 9-6 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

Slide 22 – Fig. 9-1 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.

Slide 23 - Fig. 9-2 Granger, D, *et al. Clinical Gastrointestinal Physiology*. W.B. Saunders, Philadelphia, PA; 1985.