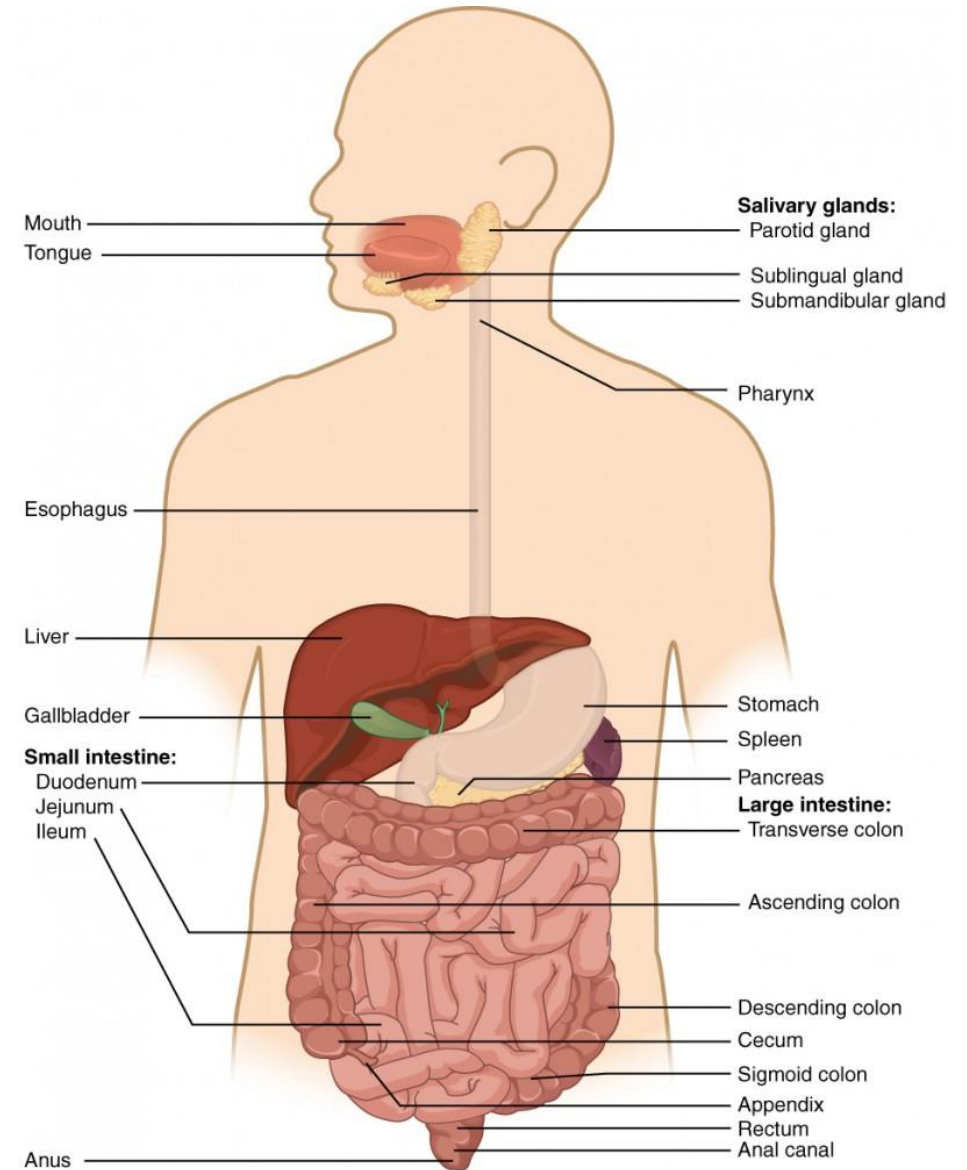


DIGESTIVE SYSTEM

DR/ HEBA M. KAREEM

Anatomy and Physiology

- The digestive system, also called the ***gastrointestinal (GI)*** system, consists of a digestive tube called the ***GI tract*** or ***alimentary canal***, and several accessory organs whose primary function is to break down food, prepare it for absorption, and eliminate waste. The GI tract, extending from the mouth to the anus.
- Food passing along the GI tract is mixed with digestive enzymes and broken down into nutrient molecules, which are absorbed in the bloodstream.
- Undigested waste materials not absorbed by the blood are then eliminated from the body through defecation. Included in the digestive system are the accessory organs of digestion: the liver, gallbladder, and pancreas.



Mouth

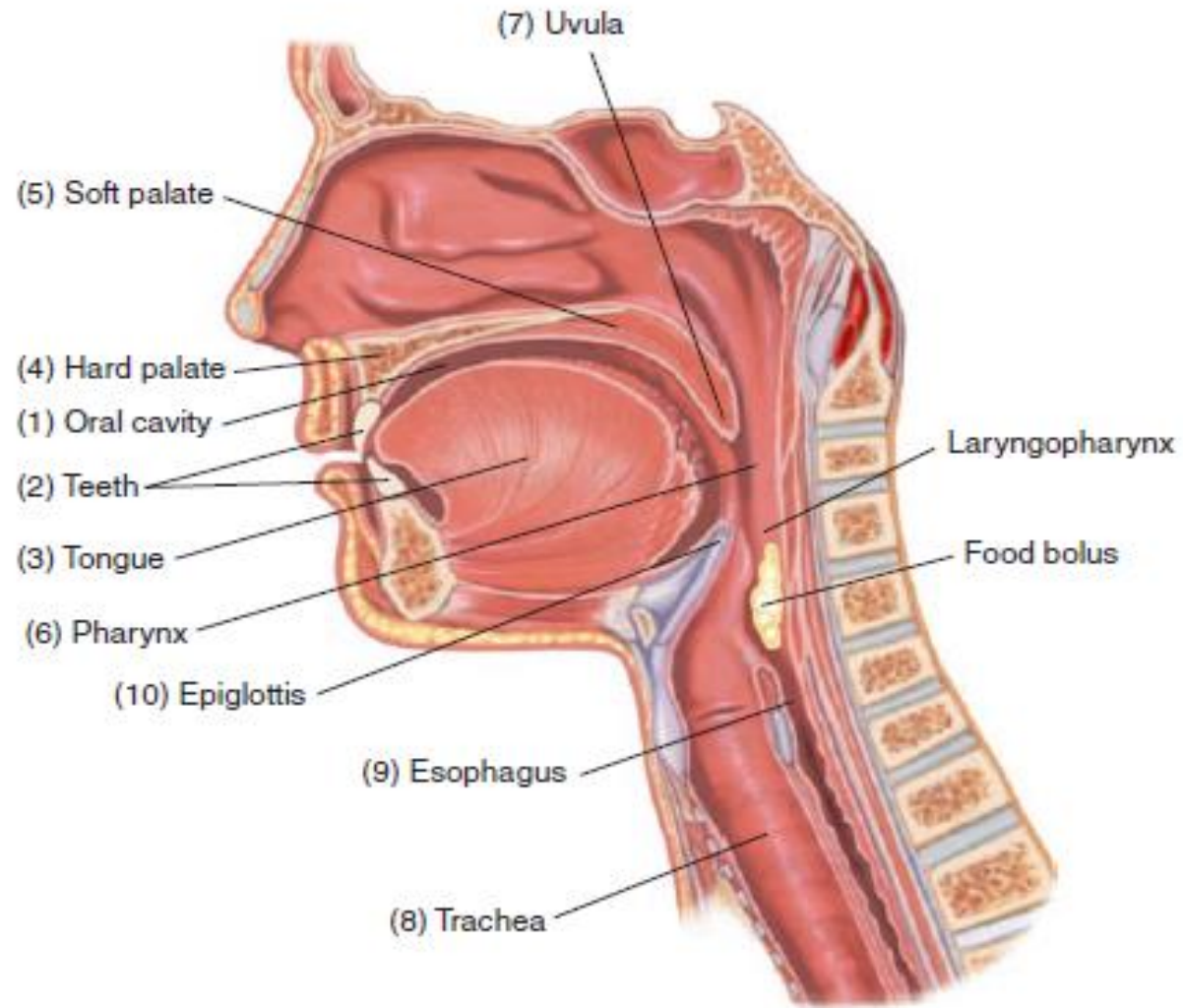


Figure 6-1. Sagittal view of the head showing oral, nasal, and pharyngeal components of the digestive system.

Anatomy and Physiology Key Terms

This section introduces important terms, along with their definitions and pronunciations. Word analyses for selected terms are also provided.

Term	Definition
bilirubin bĭl-ĭ-ROO-bĭn	Orange-colored or yellowish pigment in bile <i>Bilirubin is formed principally by the breakdown of hemoglobin in red blood cells after termination of their normal lifespan.</i>
bolus BŌ-lŭs	Mass of masticated food ready to be swallowed
exocrine ĔKS-ŏ-krĭn <i>exo-</i> : outside, outward <i>-crine</i> : secrete	Denotes a gland that secretes its products through excretory ducts to the surface of an organ or tissue or into a vessel
sphincter SFĬNGK-tĕr	Circular band of muscle fibers that constricts a passage or closes a natural opening of the body <i>An example of a sphincter is the lower esophageal (cardiac) sphincter that constricts once food has passed into the stomach.</i>

Pronunciation Help

Long Sound
Short Sound

ā—rate
ă—alone

ē—rebirth
ĕ—ever

ī—isle
ĭ—it

ō—over
ŏ—not

ū—unite
ÿ—cut

Stomach

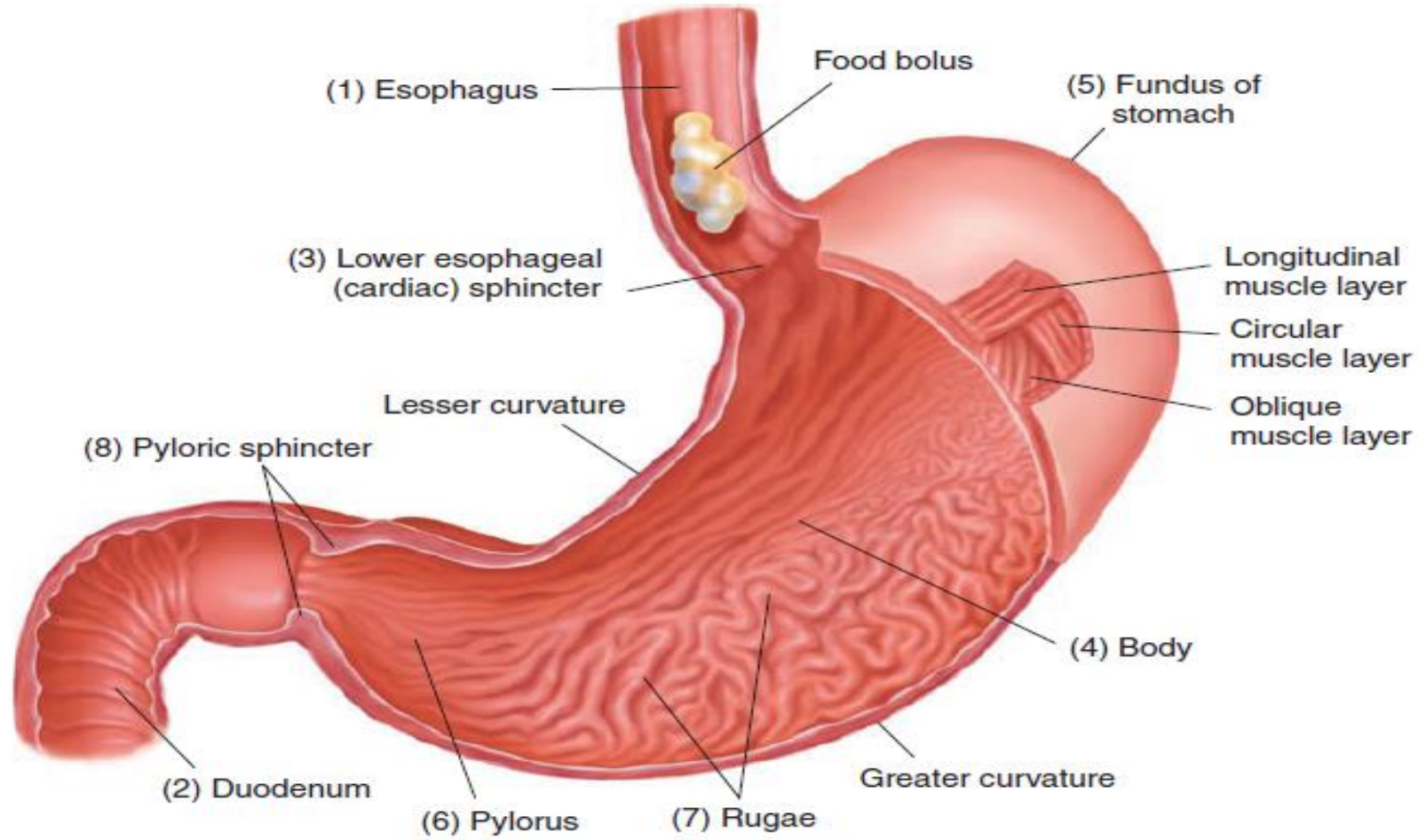


Figure 6-2. Anterior view of the stomach showing muscle layers and rugae of the mucosa.

Accessory Organs of Digestion

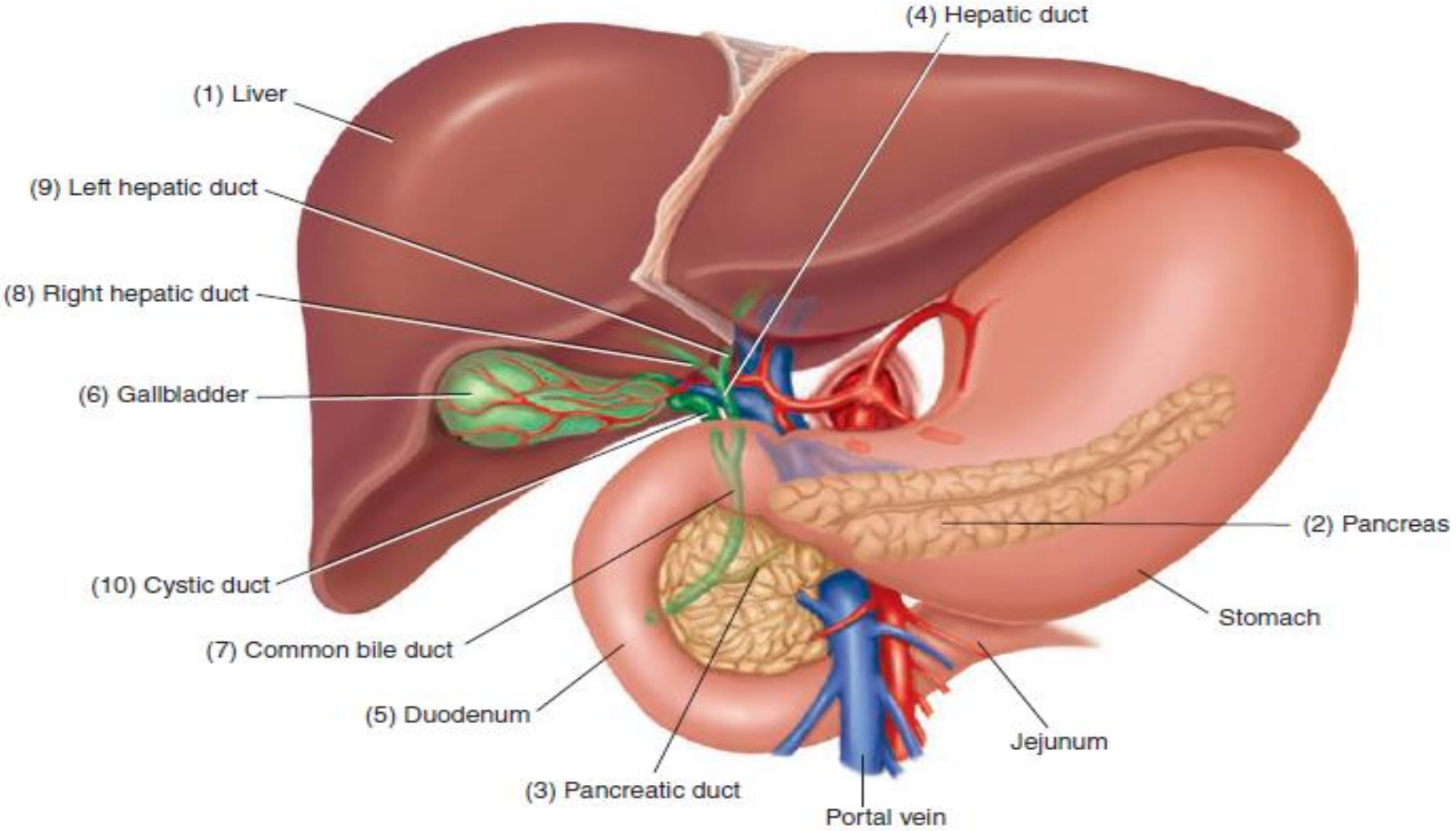


Figure 6-4. Liver, gallbladder, pancreas, and duodenum with associated ducts and blood vessels.

Medical Word Elements

This section introduces combining forms, suffixes, and prefixes related to the digestive system. Word analyses are also provided.

Element	Meaning	Word Analysis
<i>Combining Forms</i>		
Mouth		
or/o	mouth	or/al (OR-ăl): pertaining to the mouth <i>-al</i> : pertaining to
stomat/o		stomat/itis (stō-mă-TĪ-tīs): inflammation of the mouth <i>-itis</i> : inflammation
gloss/o	tongue	gloss/ectomy (glōs-ĔK-tō-mē): removal of all or part of the tongue <i>-ectomy</i> : excision, removal
lingu/o		lingu/al (LĪNG-gwăl): pertaining to the tongue <i>-al</i> : pertaining to
bucc/o	cheek	bucc/al (BŪK-ăl): pertaining to the cheek <i>-al</i> : pertaining to

cheil/o	lip	cheil/o/plasty (KĪ-lō-plās-tē): surgical repair of a defective lip <i>-plasty</i> : surgical repair
labi/o		labi/al (LĀ-bē-ăl): pertaining to the lips, particularly the lips of the mouth <i>-al</i> : pertaining to
dent/o	teeth	dent/ist (DĒN-tĭst): specialist who diagnoses and treats diseases and disorders of teeth <i>-ist</i> : specialist
odont/o		orth/odont/ist (or-thō-DŌN-tĭst): dentist who specializes in correcting and preventing irregularities of abnormally positioned or aligned teeth <i>orth</i> : straight <i>-ist</i> : specialist
gingiv/o	gum(s)	gingiv/ectomy (jĭn-jĭ-VĔK-tō-mē): excision of diseased gingival tissue <i>-ectomy</i> : excision, removal <i>Gingivectomy is performed as a surgical treatment for periodontal disease.</i>
sial/o	saliva, salivary gland	sial/o/lith (sĭ-ĀL-ō-lĭth): calculus formed in a salivary gland or duct <i>-lith</i> : stone, calculus

**Esophagus,
Pharynx, and
Stomach**

esophag/o

esophagus

esophag/o/scope (ē-SŎF-ă-gō-skōp): instrument used to examine the esophagus
-scope: instrument for examining

pharyng/o

pharynx
(throat)

pharyng/o/tonsill/itis (fă-rīng-gō-tōn-sĭ-LĪ-tĭs): inflammation of the pharynx and tonsils
tonsill: tonsils
-itis: inflammation

Medical Word Elements—cont'd

Element	Meaning	Word Analysis
gastr/o	stomach	gastr/algia (gās-TRĀL-jē-ă): pain in the stomach; also called <i>stomachache</i> <i>-algia</i> : pain
pylor/o	pylorus	pylor/o/spasm (pī-LOR-ō-spāzm): involuntary contraction of the pyloric sphincter of the stomach, as in pyloric stenosis <i>-spasm</i> : involuntary contraction, twitching
Small Intestine		
duoden/o	duodenum (first part of small intestine)	duoden/o/scopy (dū-ōd-ě-NŌS-kō-pē): visual examination of the duodenum <i>-scopy</i> : visual examination
enter/o	intestine (usually small intestine)	enter/o/pathy (ěn-tēr-ŌP-ă-thē): disease of the intestine <i>-pathy</i> : disease

jejun/o	jejunum (second part of small intestine)	jejun/o/rrhaphy (jě-joo-NOR-ă-fē): suture of the jejunum <i>-rrhaphy</i> : suture
ile/o	ileum (third part of small intestine)	ile/o/stomy (il-ē-ŎS-tō-mē): creation of an opening between the ileum and the abdominal wall <i>-stomy*</i> : forming an opening (mouth) <i>An ileostomy creates an opening on the surface of the abdomen to allow feces to be discharged into a bag worn on the abdomen.</i>
Large Intestine		
append/o	appendix	append/ectomy (ăp-ĕn-DĚK-tō-mē): excision of the appendix <i>-ectomy</i> : excision, removal <i>Appendectomy is performed to remove a diseased appendix in danger of rupturing.</i>
appendic/o		appendic/itis (ă-pĕn-dĭ-SĪ-tĭs): inflammation of the appendix <i>-itis</i> : inflammation
col/o	colon	col/o/stomy (kō-LŎS-tō-mē): creation of an opening between the colon and the abdominal wall

Medical Word Elements—cont'd

Element	Meaning	Word Analysis
Terminal End of Large Intestine		
rect/o	rectum	rect/o/cele (RĔK-tō-sēl): herniation or protrusion of the rectum; also called <i>proctocele</i> <i>-cele</i> : hernia, swelling
proct/o	anus, rectum	proct/o/logist (prōk-TŌL-ō-jĭst): physician who specializes in treating disorders of the colon, rectum, and anus <i>-logist</i> : specialist in the study of
an/o	anus	peri/an/al (pĕr-ē-Ā-nāl): pertaining to the area around the anus <i>peri-</i> : around <i>-al</i> : pertaining to

Accessory Organs of Digestion

hepat/o

liver

hepat/o/megaly (hĕp-ă-tō-MĒG-ă-lē): enlargement of the liver
-megaly: enlargement

pancreat/o

pancreas

pancreat/o/lysis (păn-krē-ă-TŎL-ĭ-sĭs): destruction of the pancreas by pancreatic enzymes
-lysis: separation; destruction; loosening

cholangi/o

bile vessel

cholangi/ole (kō-LĂN-jē-ōl): small terminal portion of the bile duct
-ole: small, minute

chol/e**

bile, gall

chol/e/lith (KŌ-lē-lĭth): gallstone
-lith: calculus, stone
Gallstones are solid masses composed of bile and cholesterol that form in the gallbladder and common bile duct.

cholecyst/o

gallbladder

cholecyst/ectomy (kō-lē-sĭs-TĚK-tō-mē): removal of the gallbladder
-ectomy: excision, removal
Cholecystectomy is performed by laparoscopic or open surgery.

choledoch/o	bile duct	choledoch/o/plasty (kō-LĒD-ō-kō-plās-tē): surgical repair of the common bile duct <i>-plasty</i> : surgical repair
Suffixes		
-emesis	vomit	hyper/emesis (hī-pĕr-ĔM-ĕ-sĭs): excessive vomiting <i>hyper-</i> : excessive, above normal
-iasis	abnormal condition (produced by something specified)	chol/e/lith/iasis (kō-lē-lĭ-THĪ-ă-sĭs): presence or formation of gallstones in the gallbladder or common bile duct <i>chol/e</i> : bile, gall <i>lith</i> : stone, calculus <i>When gallstones form in the common bile duct, the condition is called choledocholithiasis</i>

*The *e* in *chol/e* is an exception to the rule of using the connecting vowel *o*.

Medical Word Elements—cont'd		
Element	Meaning	Word Analysis
-megaly	enlargement	<p>hepat/o/megaly (hĕp-ă-tō-MĔG-ă-lē): enlargement of the liver <i>hepat/o:</i> liver</p> <p><i>Hepatomegaly may be caused by hepatitis or infection, fatty infiltration (as in alcoholism), biliary obstruction, or malignancy.</i></p>
-orexia	appetite	<p>an/orexia (ăn-ō-RĔK-sē-ă): loss of appetite <i>an-:</i> without, not</p> <p><i>Anorexia can result from various conditions, such as adverse effects of drugs or various physical or psychological causes.</i></p>
-pepsia	digestion	<p>dys/pepsia (dĭs-PĔP-sē-ă): epigastric discomfort felt after eating; also called <i>indigestion</i> <i>dys-:</i> bad; painful; difficult</p>
-phagia	swallowing, eating	<p>aer/o/phagia (ĕr-ō-FĀ-jē-ă): swallowing air <i>aer/o:</i> air</p>
-prandial	meal	<p>post/prandial (pōst-PRĀN-dē-ăl): following a meal <i>post-:</i> after, behind</p>

-rrhea	discharge, flow	steat/o/rrhea (stē-ă-tō-RĒ-ă): excessive amount of fat discharged in fecal matter <i>-rrhea</i> : discharge, flow
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Prefixes

dia-	through, across	dia/rrhea (dī-ă-RĒ-ă): abnormally frequent discharge or flow of fluid fecal matter from the bowel <i>-rrhea</i> : discharge, flow
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peri-	around	peri/sigmoid/itis (pēr-ĭ-sĭg-moy-DĪ-tĭs): inflammation of peritoneal tissue around the sigmoid colon <i>peri-</i> : around <i>-itis</i> : inflammation
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sub-	under, below	sub/lingu/al (sŭb-LĪNG-gwăł): pertaining to the area under the tongue <i>lingu</i> : tongue <i>-al</i> : pertaining to
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anorexia

ăn-ō-REĬK-sē-ă

an-: without, not*-orexia*: appetite

Lack or loss of appetite, resulting in the inability to eat

Anorexia should not be confused with anorexia nervosa, which is a complex psychogenic eating disorder characterized by an all-consuming desire to remain thin. Anorexia nervosa and a similar eating disorder called bulimia nervosa are discussed in Chapter 14.

appendicitis

ă-pĕn-dĭ-SĪ-tĭs

appendic: appendix*-itis*: inflammation

Inflammation of the appendix, usually due to obstruction or infection

If left undiagnosed, appendicitis rapidly leads to perforation and peritonitis. Treatment is appendectomy within 24 to 48 hours of the first symptoms because delay usually results in rupture and peritonitis as fecal matter is released into the peritoneal cavity. (See Figure 6–7.)



A. Diseased appendix

ascites

ă-SĪ-tēz

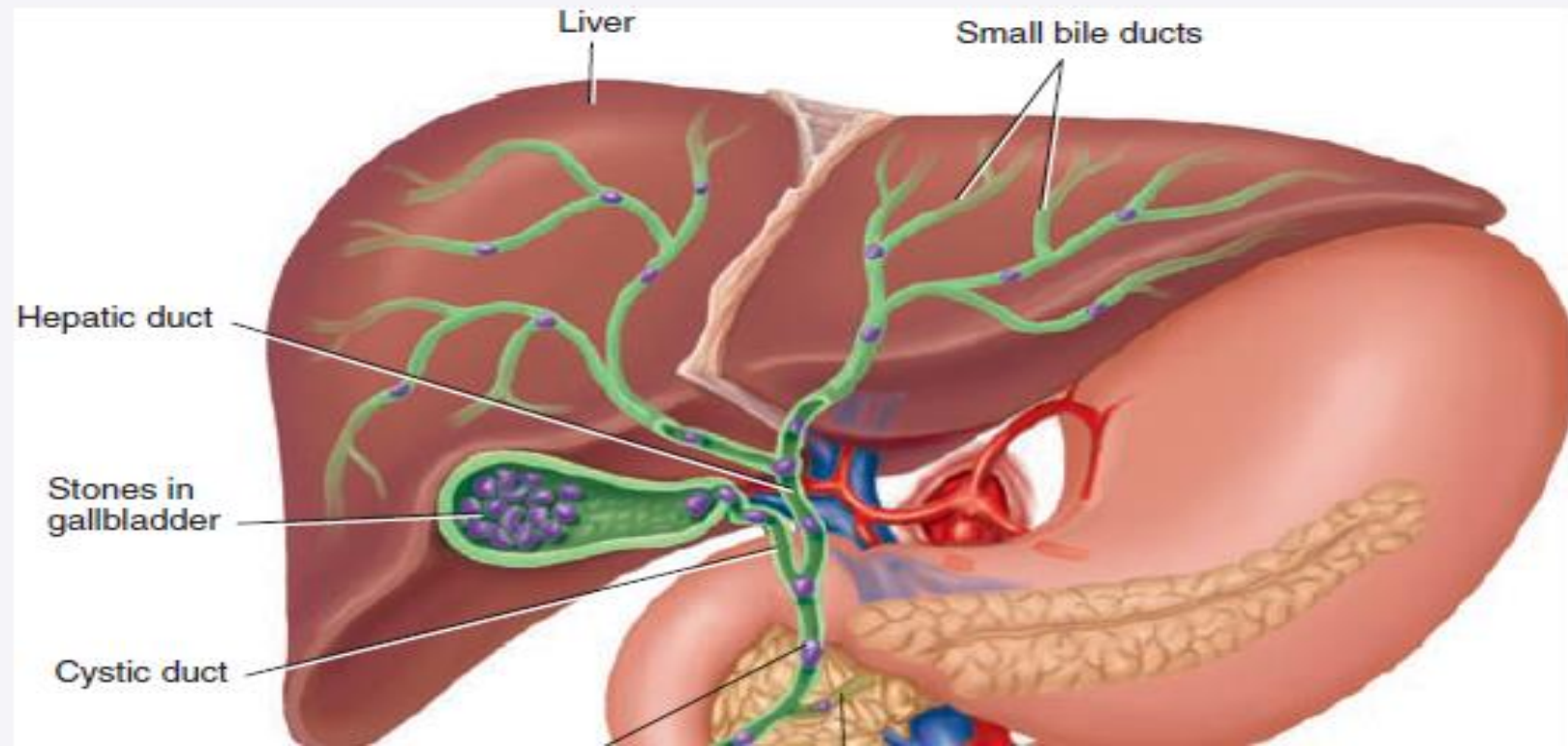
Abnormal accumulation of fluid in the abdomen

Ascites is most commonly associated with cirrhosis of the liver, especially when caused by alcoholism. Failure of the liver to produce albumin (a protein that regulates the amount of fluid in the circulatory system), combined with portal hypertension forces fluid to pass from the circulatory system and accumulate in the peritoneum.

(continued)

Diagnostic, Symptomatic, and Related Terms—cont'd

Term	Definition
borborygmus bōr-bō-RĪG-mūs	Rumbling or gurgling noises that are audible at a distance and caused by passage of gas through the liquid contents of the intestine
cachexia kā-KĒKS-ē-ă	Physical wasting that includes loss of weight and muscle mass; commonly associated with AIDS and cancer.
cholelithiasis kō-lē-lī-THĪ-ă-sīs <i>chol/e</i> : bile, gall <i>lith</i> : stone, calculus <i>-iasis</i> : abnormal condition (produced by something specified)	Presence or formation of gallstones in the gallbladder or common bile duct <i>Cholelithiasis may or may not produce symptoms. (See Figure 6–8.)</i>



cirrhosis
sĭr-RŌ-sĭs

Scarring and dysfunction of the liver cause by chronic liver disease

Cirrhosis is most commonly caused by chronic alcoholism. It may also be caused by toxins, infectious agents, metabolic diseases, and circulatory disorders. In this disorder, functional hepatic cells are replaced by nonfunctioning fibrous tissue that impairs the flow of blood and lymph within the liver, resulting in hepatic insufficiency.

colic
KŌL-ĭk

Spasm in any hollow or tubular soft organ especially in the colon, accompanied by pain

Crohn disease
KRŌN

Chronic inflammation, usually of the ileum, but possibly affecting any portion of the intestinal tract; also called *regional enteritis*

Crohn disease is a chronic disease distinguished from closely related bowel disorders by its inflammatory pattern. It may cause fever, cramping, diarrhea, and weight loss.

deglutition
dē-gloo-TĪSH-ŭn

Act of swallowing

Diagnostic, Symptomatic, and Related Terms—cont'd

Term	Definition
dysentery DĪS-ĕn-tĕr-ĕ	Inflammation of the intestine, especially the colon, that may be caused by ingesting water or food containing chemical irritants, bacteria, protozoa, or parasites, which results in bloody diarrhea <i>Dysentery is common in underdeveloped countries and in times of disaster when sanitary living conditions, clean food, and safe water are not available.</i>
dyspepsia dĭs-PĒP-sĕ-ă <i>dys-</i> : bad; painful; difficult <i>-pepsia</i> : digestion	Epigastric discomfort felt after eating; also called <i>indigestion</i>
dysphagia dĭs-FĀ-jĕ-ă <i>dys-</i> : bad; painful; difficult <i>-phagia</i> : swallowing, eating	Inability or difficulty in swallowing; also called <i>aphagia</i>
eructation ĕ-rŭk-TĀ-shŭn	Producing gas from the stomach, usually with a characteristic sound; also called <i>belching</i>
fecalith FĒ-kă-lĭth	Fecal concretion
flatus FLĀ-tŭs	Gas in the GI tract; expelling of air from a body orifice, especially the anus

gastroesophageal reflux disease
(GERD)

gās-trō-ě-s-ōf-ǎ-JĔ-ǎl RĔ-flūks

gastr/o: stomach

esophag: esophagus

-eal: pertaining to

Backflow of gastric contents into the esophagus due to a malfunction of the sphincter muscle at the inferior portion of the esophagus

GERD may occur whenever pressure in the stomach is greater than that in the esophagus and may be associated with heartburn, esophagitis, hiatal hernia, or chest pain.

halitosis

hǎl-ĭ-TŌ-sĭs

Offensive, or “bad,” breath

hematemesis

hēm-ăt-ĔM-ě-sĭs

hemat: blood

-emesis: vomiting

Vomiting of blood from bleeding in the stomach or esophagus

Hematemesis can be caused by an esophageal ulcer, esophageal varices (dilation of veins), or a gastric ulcer. Treatment requires correction of the underlying cause.

irritable bowel syndrome (IBS)

Symptom complex marked by abdominal pain and altered bowel function (typically constipation, diarrhea, or alternating constipation and diarrhea) for which no organic cause can be determined; also called *spastic colon*

Contributing or aggravating factors of IBS include anxiety and stress.

malabsorption syndrome

mǎl-ǎb-SORP-shŭn SĪN-drŏm

Symptom complex of the small intestine characterized by the impaired passage of nutrients, minerals, or fluids through intestinal villi into the blood or lymph

Malabsorption syndrome may be associated with or due to a number of diseases, including those affecting the intestinal mucosa. It may also be due to surgery, such as gastric resection and ileal bypass, or antibiotic therapy.

(continued)

Diagnostic, Symptomatic, and Related Terms—cont'd

Term	Definition
melena MĚL-ě-nă	Passage of dark-colored, tarry stools, due to the presence of blood altered by intestinal juices
obesity ō-BĚ-sĭ-tē	Excessive accumulation of fat that exceeds the body's skeletal and physical standards, usually an increase of 20 percent or more above ideal body weight. <i>Obesity may be due to excessive intake of food (exogenous) or metabolic or endocrine abnormalities (endogenous).</i>
morbid obesity ō-BĚ-sĭ-tē	Body mass index (BMI) of 40 or greater, which is generally 100 or more pounds over ideal body weight. <i>Morbid obesity is a disease with serious psychological, social, and medical ramifications and one that threatens necessary body functions such as respiration.</i>
obstipation ōb-stĭ-PĀ-shŭn	Severe constipation; may be caused by an intestinal obstruction
oral leukoplakia OR-ăl loo-kō-PLĀ-kē-ă <i>leuk/o</i> : white <i>-plakia</i> : plaque	Formation of white spots or patches on the mucous membrane of the tongue, lips, or cheek caused primarily by irritation <i>Oral leukoplakia is a precancerous condition usually associated with pipe or cigarette smoking or ill-fitting dentures.</i>
peristalsis pěr-ĭ-STĀL-sĭs	Progressive, wavelike movement that occurs involuntarily in hollow tubes of the body, especially the GI tract

pyloric stenosis

pī-LOR-ik stě-NŌ-sīs

pylor: pylorus

-ic: pertaining to

sten: narrowing, stricture

-osis: abnormal condition; increase
(used primarily with blood cells)

Stricture or narrowing of the pyloric sphincter (circular muscle of the pylorus) at the outlet of the stomach, causing an obstruction that blocks the flow of food into the small intestine

The muscle fibers of the outlet are cut, without severing the mucosa, to widen the opening. After surgery in adults, a stomach tube remains in place and observation is maintained for signs of hemorrhage or blockage of the tube.

regurgitation

rē-gŭr-jĭ-TĀ-shŭn

Backward flowing, as in the return of solids or fluids to the mouth from the stomach

steatorrhea

stē-ă-tō-RĒ-ă

steat/o: fat

-rrhea: discharge, flow

Passage of fat in large amounts in the feces due to failure to digest and absorb it

Steatorrhea may occur in pancreatic disease when pancreatic enzymes are not sufficient. It also occurs in malabsorption syndrome.

Diagnostic and Therapeutic Procedures

This section introduces procedures used to diagnose and treat digestive system disorders. Descriptions are provided as well as pronunciations and word analyses for selected terms.

Procedure	Description
Diagnostic Procedures	
Endoscopic	
endoscopy ĕn-DŌS-kō-pē <i>endo-</i> : in, within <i>-scopy</i> : visual examination	Visual examination of a cavity or canal using a flexible fiberoptic instrument called an <i>endoscope</i> <i>The organ, cavity, or canal being examined dictates the name of the endoscopic procedure. (See Figure 4-6.) A camera and video recorder are commonly used during the procedure to provide a permanent record.</i>
upper GI	Endoscopy of the esophagus (esophagoscopy), stomach (gastroscopy), and duodenum (duodenoscopy) <i>Endoscopy of the upper GI tract is performed to identify tumors, esophagitis, gastroesophageal varices, peptic ulcers, and the source of upper GI bleeding. It is also used to confirm the presence and extent of varices in the lower esophagus and stomach in patients with liver disease.</i>
lower GI	Endoscopy of the colon (colonoscopy), sigmoid colon (sigmoidoscopy), and rectum and anal canal (proctoscopy) (See Figure 6-9.) <i>Endoscopy of the lower GI tract is used to identify pathological conditions in the colon. It may also be used to remove polyps. When polyps are discovered in the colon, they are retrieved and tested for cancer.</i>

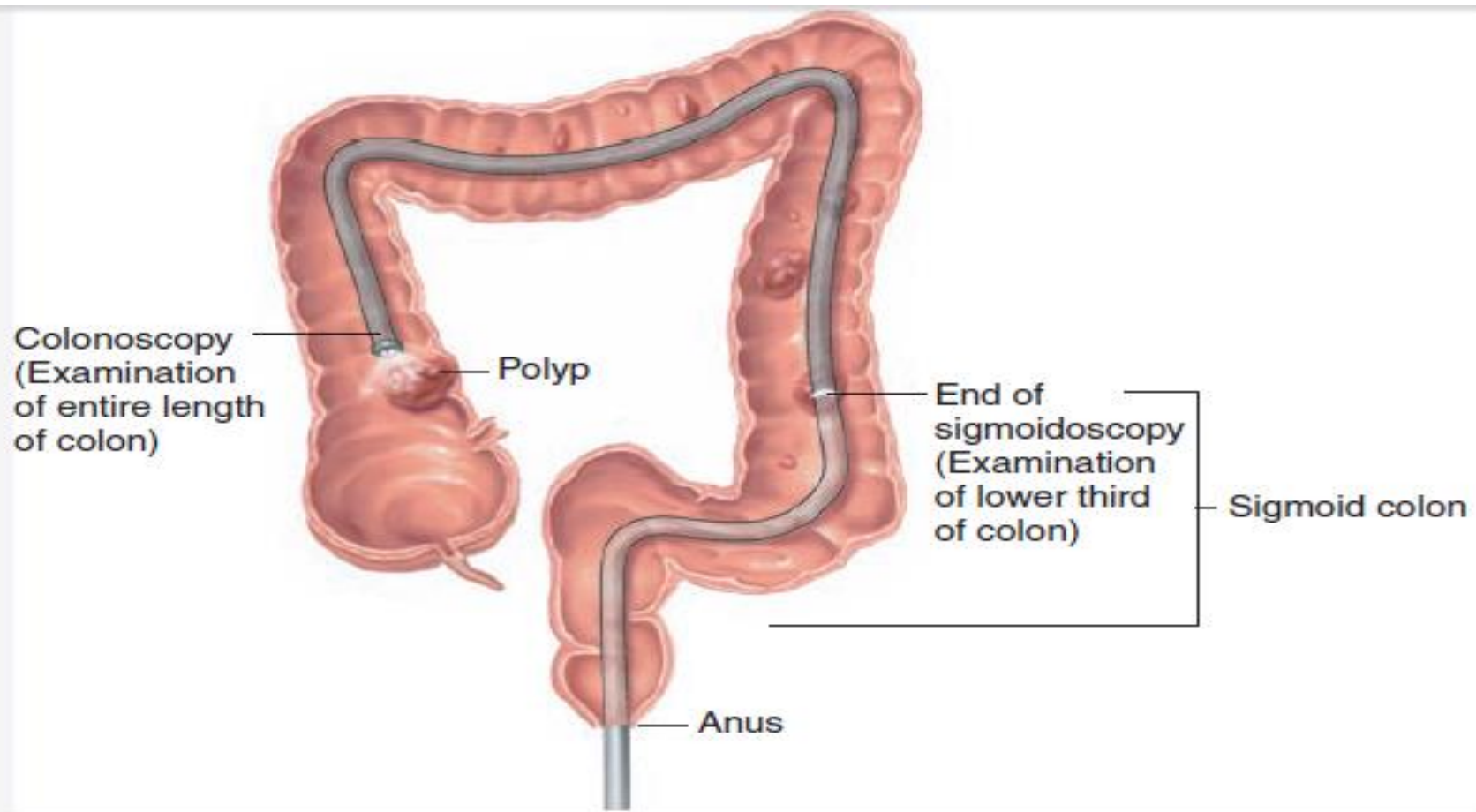


Figure 6-9. Colonoscopy and sigmoidoscopy.

Laboratory

hepatitis panel

hĕp-ă-TĪ-tĭs

hepat: liver

-itis: inflammation

Panel of blood tests that identify the specific virus—hepatitis A (HAV), hepatitis B (HBV), or hepatitis C (HCV)-causing hepatitis by testing serum using antibodies to each of these antigens

(continued)

Table 6-1

Drugs Used to Treat Digestive Disorders

This table lists common drug classifications used to treat digestive disorders, their therapeutic actions, and selected generic and trade names.

ملاحظة: أسماء الأدوية للاطلاع فقط

Classification	Therapeutic Action	Generic and Trade Names
antacids	<p>Counteract or neutralize acidity, usually in the stomach</p> <p><i>Antacids are used to treat and prevent heartburn and acid reflux.</i></p>	<p>calcium carbonate KĀL-sē-üm KĀR-bön-āt Mylanta, Rolaids, Tums</p>
antidiarrheals	<p>Control loose stools and relieve diarrhea by absorbing excess water in the bowel or slowing peristalsis in the intestinal tract</p>	<p>loperamide lō-PĒR-ă-mīd Imodium</p> <p>kaolin/pectin KĀ-ō-līn PĒK-tīn Donnagel-MB, Kapectolin</p>

(continued)

Table 6-1

Drugs Used to Treat Digestive Disorders—cont'd

Classification	Therapeutic Action	Generic and Trade Names
antiemetics	<p>Control nausea and vomiting by blocking nerve impulses to the vomiting center of the brain</p> <p><i>Some emetics act by hastening movement of food through the digestive tract.</i></p>	<p>ملاحظة: اسماء الادوية للاطلاع فقط</p> <p>prochlorperazine prō-klor-PĔR-ă-zēn Compazine, Compro</p> <p>trimethobenzamide trī-mēth-ō-BĔN-ză-mīd T-Gen, Tigan</p>
antispasmodics	<p>Decrease gastrointestinal (GI) spasms by slowing peristalsis and motility throughout the GI tract</p> <p><i>Antispasmodics are prescribed for irritable bowel syndrome (IBS), spastic colon, and diverticulitis.</i></p>	<p>glycopyrrolate glī-kō-PĪR-rō-lāt Robinul</p> <p>propantheline prō-PĀN-thě-lēn Pro-Banthine</p>
laxatives	<p>Treat constipation by increasing peristaltic activity in the large intestine or increasing water and electrolyte secretion into the bowel to induce defecation</p>	<p>senna, sennosides SĔN-ă, SĔN-ō-sīdz Senokot, Senolax</p> <p>psyllium SĪL-ē-ŭm Metamucil, Natural Fiber Supplement</p>

Abbreviations

This section introduces digestive-related abbreviations and their meanings.

Abbreviation	Meaning	Abbreviation	Meaning
<i>Common</i>			
ABC	aspiration biopsy cytology	EGD	esophagogastroduodenoscopy
alk phos	alkaline phosphatase	ERCP	endoscopic retrograde cholangiopancreatography
ALT	alanine aminotransferase	GB	gallbladder
AST	angiotensin sensitivity	GBS	gallbladder series (x-ray studies)
Ba	barium	GER	gastroesophageal reflux
BaE, BE	barium enema	GERD	gastroesophageal reflux disease
BM	bowel movement	GI	gastrointestinal
BMI	body mass index	HAV	hepatitis A virus
CF	cystic fibrosis	HBV	hepatitis B virus
CT	computed tomography	HCV	hepatitis C virus

Abbreviations—cont'd

Abbreviation	Meaning	Abbreviation	Meaning
HDV	hepatitis D virus	PTHC	percutaneous transhepatic cholangiography
HEV	hepatitis E virus	stat, STAT	immediately
IBS	irritable bowel syndrome	PMH	past medical history
LFT	liver function test	PUD	peptic ulcer disease
NG	nasogastric	RGB	Roux-en-Y gastric bypass
PE	physical examination; pulmonary embolism	R/O	rule out
<i>Medication time schedule</i>			
a.c.	before meals	qAM	every morning
b.i.d.	twice a day	q.d.	every day
hs	half strength	q.h.	every hour
h.s.	at bedtime	q.2h.	every 2 hours
NPO, n.p.o.	nothing by mouth	q.i.d.	four times a day
pc, p.c.	after meals	q.o.d.	every other day



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Thank you