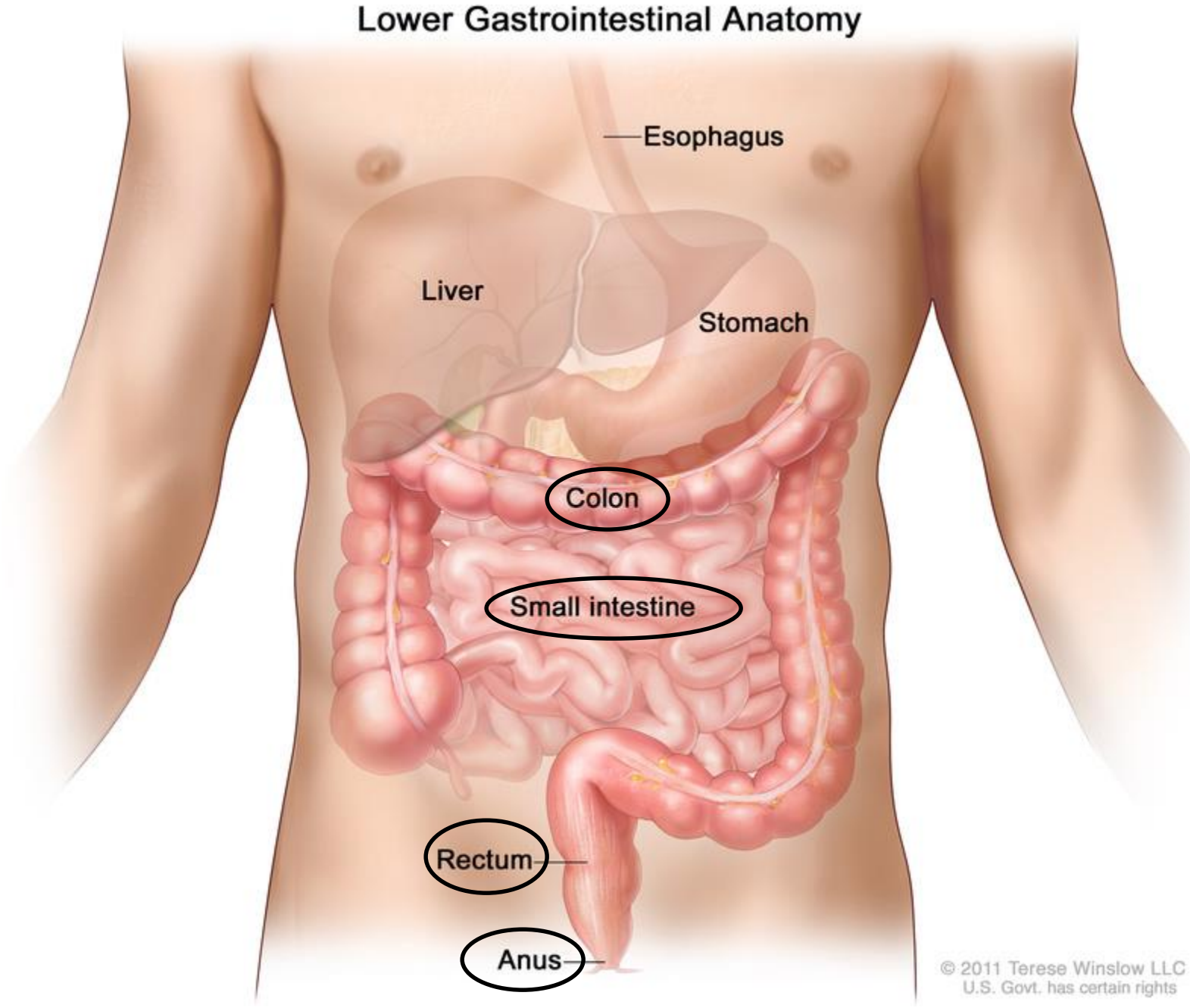
Chapter 18 : Nutrition for Patients with Disorders of the Lower GI Tract and Accessory Organs


Lower Gastrointestinal Anatomy
Esophagus
Liver
Stomach
Colon
Small intestine
Rectum
Anus
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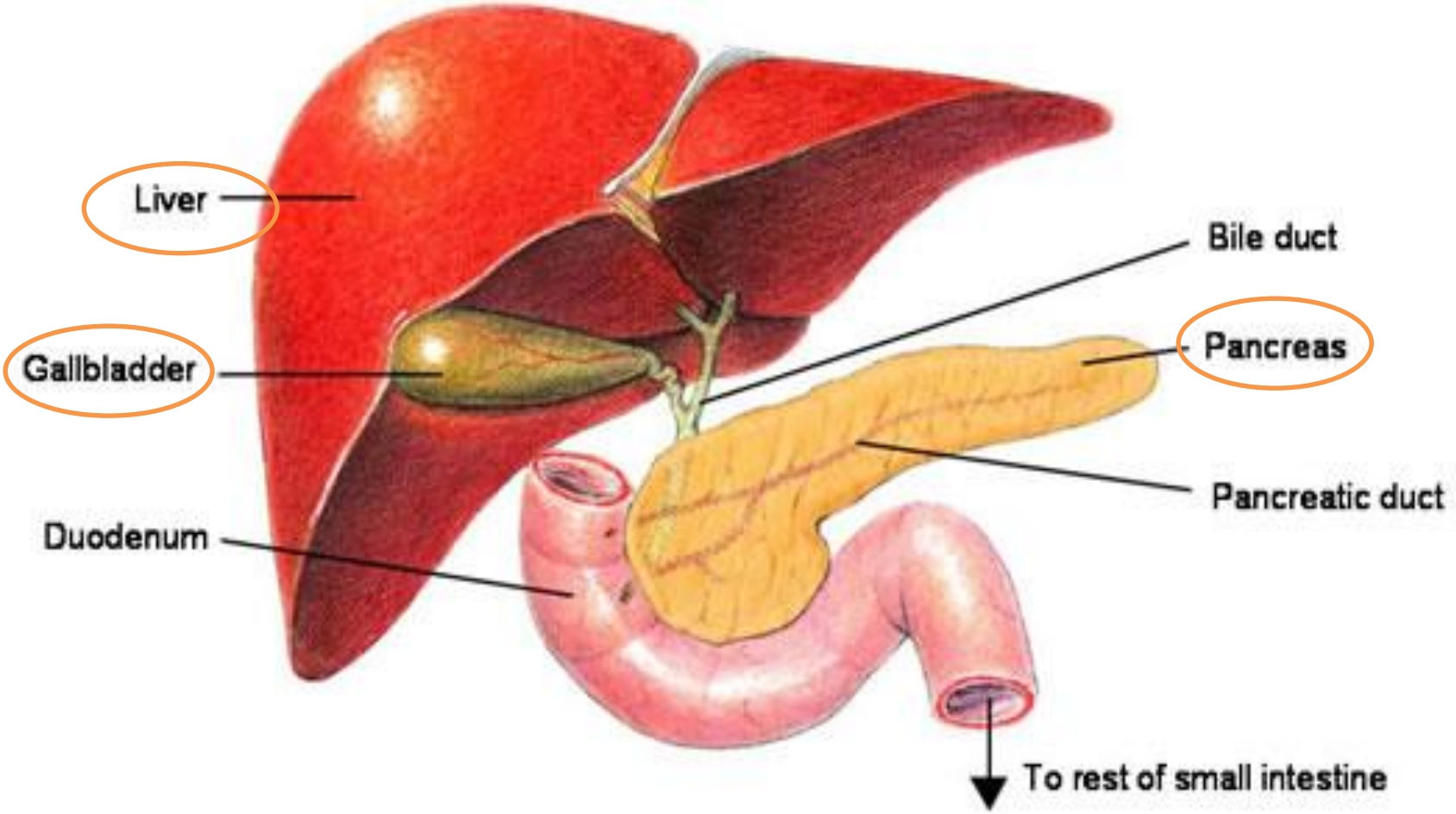
Accessory Organs



Lower GI Disorders

- ALTERED BOWEL ELIMINATION :
  - Constipation , Diarrhea
- Malabsorption conditions :
  - Lactose intolerance , Inflammatory Bowel Disease, celiac disease , short bowel syndrome
- CONDITIONS OF THE LARGE INTESTINE:
  - Irritable Bowel Syndrome, Diverticular Disease, Ileostomies and Colostomies
- DISORDERS OF THE ACCESSORY GI ORGANS:
  - Liver disease, liver transplantation , Pancreatitis, Gallbladder Disease

Constipation

- It can occur due to :
  1. psychogenic factors
  2. lack of activity
  3. chronic laxative use
  4. inadequate intake of fluid and fiber
  5. bowel abnormalities (e.g., tumors, hernias, strictures)
  6. Certain medications, such as iron supplements, and morphine, cause constipation

Constipation : Nutrition Therapy

- Treated by treating the underlying cause.
- increasing **fiber** and **fluid** intake effectively relieves and prevents constipation
- insoluble fiber (wheat bran and fruit and vegetable skins) → increases stool bulk and **stimulates peristalsis.**
- Soluble fiber, such as psyllium and inulin → absorbs water to produce softer, bulkier stools that are more easily passed.

Constipation : Nutrition Therapy

- The adequate intake (AI) set for fiber is :
  - 25 g/day for women
  - 38 g/day for men

- fiber intake should be gradually increased to avoid symptoms of intolerance such as gas, cramping, and diarrhea.

- Without adequate fluid, a high-fiber diet can lead to more constipation, abdominal pain, bloating, and gas

Diarrhea

- More than three bowel movements a day of large amounts of liquid or semiliquid stool

- A shortened transit time :
  - decreases the time available for **water**, **sodium**, and **potassium** to be absorbed through the colon

Diarrhea

- The result is ;
  - more water and electrolytes in the stools
  - the potential for dehydration
  - Hyponatremia
  - Hypokalemia
  - acid–base imbalance
  - metabolic acidosis.

1. Osmotic diarrhea

- increase in particles in the intestine, which draws water in to dilute the high concentration.

1. Osmotic diarrhea

- The causes of osmotic diarrhea include:
  - maldigestion of nutrients (e.g., lactose intolerance)
  - excessive intake of sorbitol or fructose
  - dumping syndrome
  - tube feedings
  - some laxatives

2. Secretory diarrhea

- excessive secretion of fluid and electrolytes into the intestines.
- Causes :
  - Bacterial, viral, protozoan, and other infection
  - some medications
  - some GI disorders, such as Crohn's disease and celiac disease.

Diarrhea : Nutrition Therapy

The primary nutritional concern with diarrhea is **maintaining or restoring fluid and electrolyte balance.**

Diarrhea : Nutrition Therapy

- **Mild diarrhea** lasting 24 to 48 hours :
  - usually requires no nutrition intervention other than:
  - encouraging a liberal fluid intake to replace losses.
  - High potassium foods are encouraged such as???

Diarrhea : Nutrition Therapy

- More serious cases:
  - –commercial (e.g., Pedialyte, Rehydralyte) or homemade oral rehydration solutions or IV therapy is used to replace fluid and electrolytes.

Low fiber diet

General Guidelines to Achieve a Low-Fiber Diet

- Use refined breads and cereals that provide 0–1 g fiber/serving, such as white bread and rolls, white pasta, white rice, low-fiber cereals
- Eat only vegetables that do not have skins or seeds and are well-cooked
- Choose canned or cooked fruit and fruit juices without pulp (except prune juice); ripe bananas, citrus sections without membranes
- Eat plain desserts made without nuts or coconut, such as plain cakes, puddings (rice, bread, plain), cookies, and ice cream
- Avoid foods high in fiber
  - Whole-grain breads and cereals
  - Most raw vegetables, vegetables with seeds, gassy vegetables
  - Fresh fruit with skins or seeds, dried fruits, prune juice
  - Dried peas and beans
  - Anything containing nuts, seeds, or coconut; popcorn

MALABSORPTION DISORDERS

- occurs secondary to nutrient maldigestion

- or from alterations to the absorptive surface of the intestinal mucosa.

Lactose Intolerance

- Lactase : the enzyme that splits lactose into its component simple sugars glucose and galactose

- when the levels of lactase is absent or deficient

Lactose Intolerance

- particles of undigested lactose increase the osmolality of intestinal contents
  - which may lead to osmotic diarrhea

- Lactose is fermented in the colon, which produces bloating, cramping, and flatulence

1. Primary lactose intolerance

- occurs in people who simply do not secrete adequate Lactase

- may be asymptomatic :
  - when they consume doses less than 4 to 12 g of lactose (e.g., **1⁄3 to 1 cup of milk**)
  - or when lactose is consumed **as part of a meal**

2. Secondary lactose intolerance

- Secondary to GI disorders that alter the integrity and function of intestinal villi cells, where lactase is secreted.

- Or secondary to malnutrition because the rapidly growing intestinal cells that produce lactase are reduced in number and function.

2. Secondary lactose intolerance

- Tends to be **more severe** than primary lactose intolerance and symptoms occur more quickly after eating lactose.

Lactose Intolerance :Nutrition Therapy

- lactose-free diet is **NOT** realistic.
  - Because lactose is used as an ingredient in many foods and drugs

Reduce lactose to the maximum amount tolerated by the individual

Low lactose diet

- Choose nondairy sources of calcium to ensure an adequate intake, such as:
  - canned salmon with bones
  - calcium-fortified tofu
  - Fortified orange juice, and soy milk
  - Shellfish
  - “greens” such as turnip, collard, and kale
  - dried peas and beans; broccoli; almonds

Lactose-free milk and nondairy foods

- Lactose-free milk
- Almond, rice, or soy milk
- Soy yogurt, soy cheese
- Soy sour cream

Low-lactose dairy foods

- Aged cheese, such as cheddar, Swiss, and parmesan
- Cream cheese
- Ricotta cheese
- Cottage cheese
- Yogurt

Possible hidden sources of lactose

- Bread
- Baked goods
- Breakfast cereals
- Instant potatoes and soups
- Margarine
- Lunch meats
- Salad dressings
- Mixes for pancakes, biscuits, and cookies
- Powdered meal-replacement supplements

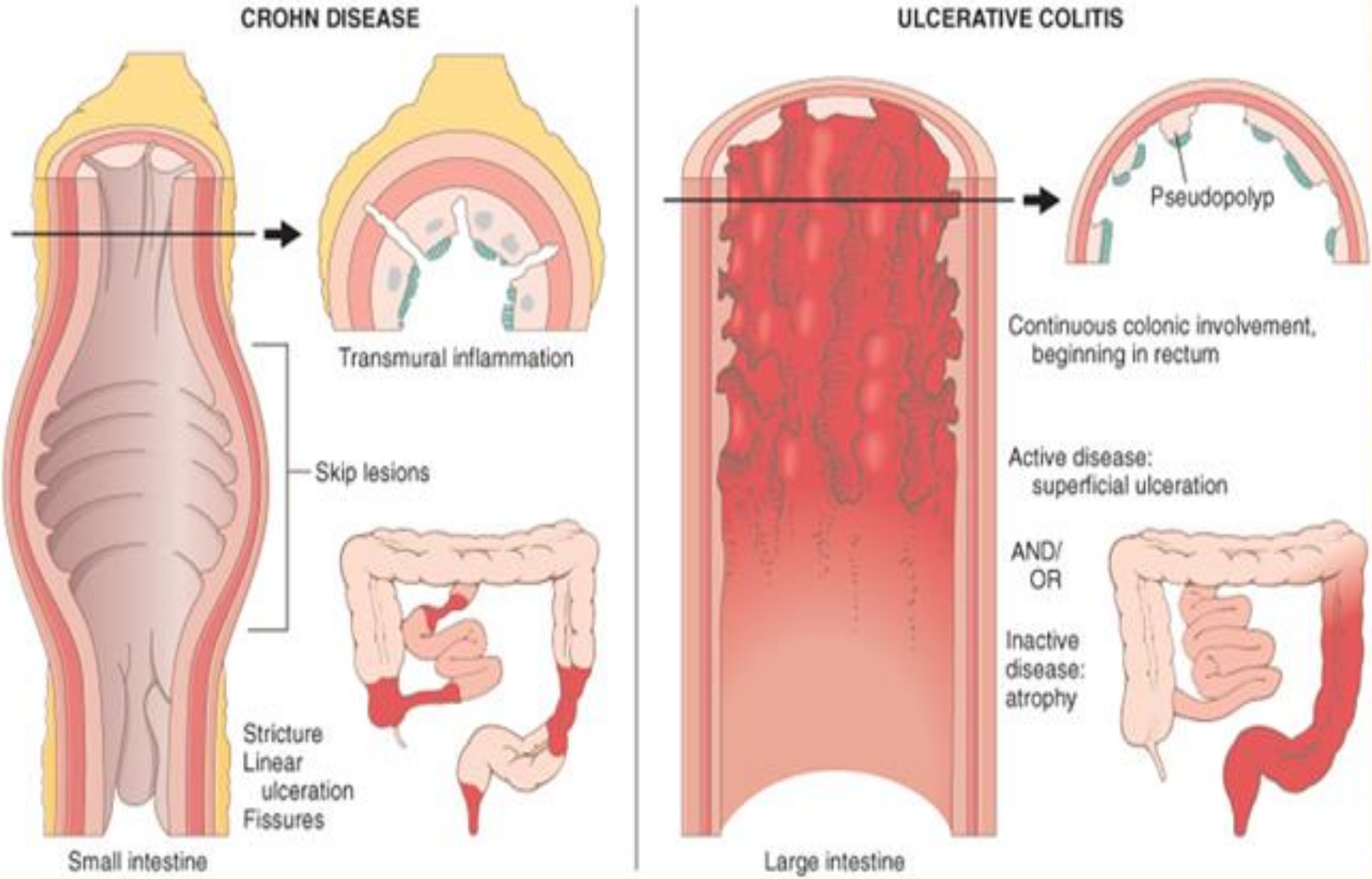
Inflammatory Bowel Disease

- Refers to two chronic inflammatory GI diseases:
  - Crohn's disease
  - ulcerative colitis

Table 18.3

Comparison Between Crohn's Disease and Ulcerative Colitis

	Crohn's Disease	Ulcerative Colitis
Area affected	Can occur anywhere along the GI tract but most commonly occurs in the ileum and colon	Confined to the rectum and colon
Disease pattern	Inflammation is discontinuous, with normal tissue between patches of inflamed tissue All layers of the bowel are affected	Inflammation is continuous, beginning at rectum and usually extending into the colon Affects only the mucosal layer
Main symptoms	Diarrhea, abdominal pain, weight loss	Diarrhea, abdominal pain, rectal bleeding Weight loss, fever, and weakness are common when most of the colon is involved
Complications	Fistulas, abscesses Stricture of the ileum Bowel perforation Bowel obstructions may occur from scar tissue formation Toxic megacolon Increased risk of intestinal cancer	Tissue erosion and ulceration Toxic megacolon Greatly increased risk of cancer
Nutritional complications	Impaired bile acid reabsorption may cause malabsorption of fat, fat-soluble vitamins, calcium, magnesium, and zinc Malnutrition may occur from nutrient malabsorption, decreased intake, or intestinal resections Anemia related to blood loss or malabsorption Vitamin B_{12} deficiency related to B_{12} malabsorption from the ileum due to inflammation	Anemia related to blood loss Dehydration and electrolyte imbalances related to diarrhea Protein depletion from losses through inflamed tissue
Medical treatment	Antidiarrheals, immunosuppressants, immunomodulators, biologic therapies, and antiinflammatory agents	Antidiarrheals, immunosuppressants, and antiinflammatory agents
Surgical intervention	Most common procedure is ileostomy; disease often recurs in the remaining intestine	Most common procedure is total colectomy; surgery prevents recurrence


CROHN DISEASE
Transmural inflammation
Skip lesions
Stricture
Linear ulceration
Fissures
Small intestine
ULCERATIVE COLITIS
Pseudopolyp
Continuous colonic involvement, beginning in rectum
Active disease: superficial ulceration
AND/ OR
Inactive disease: atrophy
Large intestine

IBD : Nutrition Therapy

- Depends on the presence and severity of symptoms

- Diet restrictions are kept to a minimum to encourage an adequate intake
- the diet is liberalized during periods of remission

IBD : Nutrition Therapy

- **correct deficiencies** by providing nutrients in a form the patient can tolerate

- **hydrolyzed enteral feeding,** possibly one fortified with **glutamine**

- nonessential amino acid that **maintains the integrity of the intestinal mucosa** and helps prevent pathogenic bacteria from crossing the intestinal barrier into the bloodstream, thereby reducing the risk of GI-derived septicemia

- TPN

IBD : Nutrition Therapy

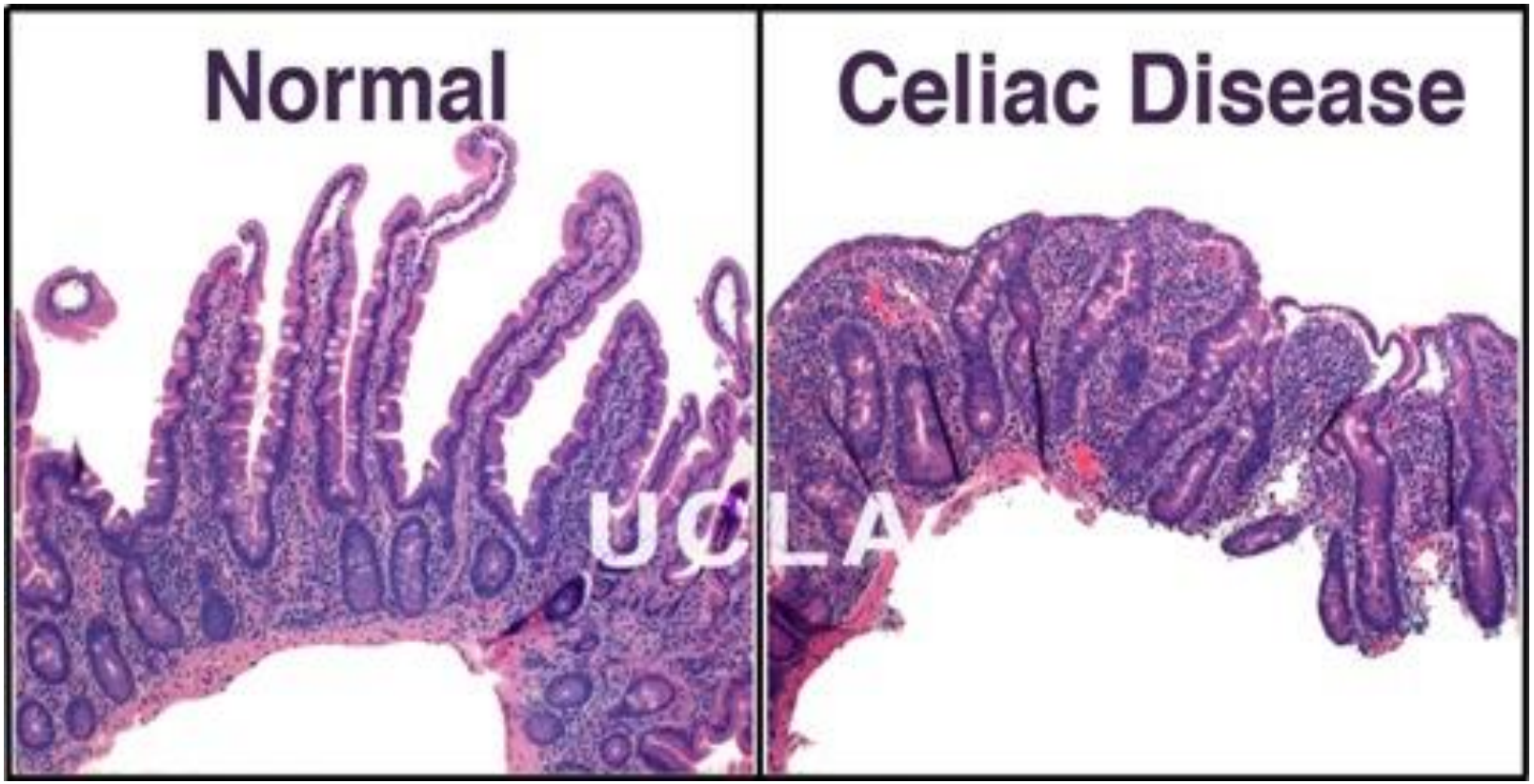
- For patients consuming an oral diet:
  - low fiber one is recommended to minimize bowel Stimulation
  - Lactose is avoided if lactose intolerance is suspected.

Celiac Disease

- A genetic autoimmune disorder characterized by:
  - **chronic inflammation** of the proximal small intestine mucosa
- related to:
  - permanent intolerance to certain proteins found in wheat, barley, and rye

Celiac Disease

- People at risk for celiac disease :
  - have a first-degree relative with celiac disease
  - with Down syndrome
  - with an autoimmune disease


Normal
Celiac Disease
UCLA

Celiac Disease

- **Malabsorption** of carbohydrates, protein, fat, vitamins, and minerals may occur

- resulting in diarrhea, flatulence, weight loss, vitamin and mineral deficiencies (e.g., folate, calcium, and fat-soluble vitamins), iron deficiency anemia, and loss of bone

Celiac Disease

- **Untreated** celiac disease is associated with:

  – an increased incidence of small bowel cancers and lymphoma

Celiac Disease : Nutrition Therapy

Completely and permanently eliminate **gluten** from the diet

- A gluten-free diet (Box 18.5) allows the villi to return toward normal, usually within a few weeks

GLUTEN-FREE DIET

- Gluten, a protein fraction found in wheat, rye, and barley, is eliminated. Oats are also eliminated due to the high risk of gluten contamination. All products made from these grains or their flours are eliminated
- Many foods are naturally gluten free: milk, butter, cheese; fresh, frozen, and canned fruits and vegetables; fresh meat, fish, poultry, eggs; dried peas and beans; nuts; corn; and rice

Allowed Grains and Related Foods

Almond flour
Amaranth
Arrowroot
Buckwheat
Cassava
Channa flour (a type of chickpea)
Corn
Cornstarch
Flax seed
Indian rice grass
Job's tears
Legumes
Millet
Nuts
Oats (uncontaminated)
Potatoes
Potato flour
Quinoa
Rice (all plain forms)
Sago
Seeds
Soy
Sorghum
Tapioca
Taro flour
Teff
White rice flour
Wild rice
Yucca

Grains to Eliminate

Wheat
- Wheat flours, such as bromated flour, durum flour, enriched flour, graham flour, phosphated flour, plain flour, self-rising flour, semolina, white flour
- Wheat starch, wheat bran, wheat germ, cracked wheat, hydrolyzed wheat protein, farina
- Einkorn, emmer, spelt, kamut

Barley
Rye
Triticale (a cross between wheat and rye)
Bouillon cubes

Questionable Foods (may contain wheat, barely, or rye)

Brown rice syrup
Chips/potato chips
Candy
Cold cuts, hot dogs, salami, sausage
Communion wafer
French fries
Gravy
Imitation fish
Matzo
Rice mixes
Sauces
Seasoned tortilla chips
Self-basting turkey
Soups
Soy sauce
Vegetables in sauce

Short Bowel Syndrome

- occurs when the bowel is surgically shortened
  - the remaining bowel is unable to absorb adequate levels of nutrients to meet the individual's needs.

- Crohn's disease, traumatic abdominal injuries, malignant tumors are the most common reasons for extensive intestinal resections that result in SBS.

SBS: **Nutrition Therapy**

- In the early months after bowel surgery, TPN is the major source of nutrition and hydration until the remaining bowel adapts.

- Then the amount of TPN is gradually decreased
- Consuming intact nutrients promotes bowel adaptation because they stimulate blood flow to the intestine and the secretion of pancreatic enzymes and bile acids

CONDITIONS OF THE LARGE INTESTINE

Irritable Bowel Syndrome

- The most frequently diagnosed digestive disorder

- Symptoms include:
  - lower abdominal pain
  - Constipation
  - Diarrhea
  - alternating periods of constipation and diarrhea
  - bloating
  - mucus in the stools

- IBS doesn't cause permanent damage to the colon, doesn't cause inflammation or changes in bowel tissue or increase risk of colorectal cancer

IBS: Nutrition Therapy

- Pharmacologic treatment :
  - Antidiarrheals, antispasmodics, and antidepressants

- Complementary therapies include :
  - Cognitive behavior therapy
  - Hypnosis
  - dietary inventions
    - avoiding caffeine
    - moderating fat intake
    - **elimination diet** to identify potential food intolerances or allergies

IBS: Nutrition Therapy

- **Probiotics** such as yogurt may improve IBS symptoms by <u>altering intestinal flora</u>

FOODS TO CONSIDER ELIMINATING ON A TRIAL BASIS TO TEST FOR SYMPTOMATIC IMPROVEMENT IN IBS	
Milk and dairy foods containing lactose	Shellfish
Wheat and other sources of gluten	Soybeans
High-fructose corn syrup	Beef
Sorbitol	Pork
Eggs	Lamb
Nuts	

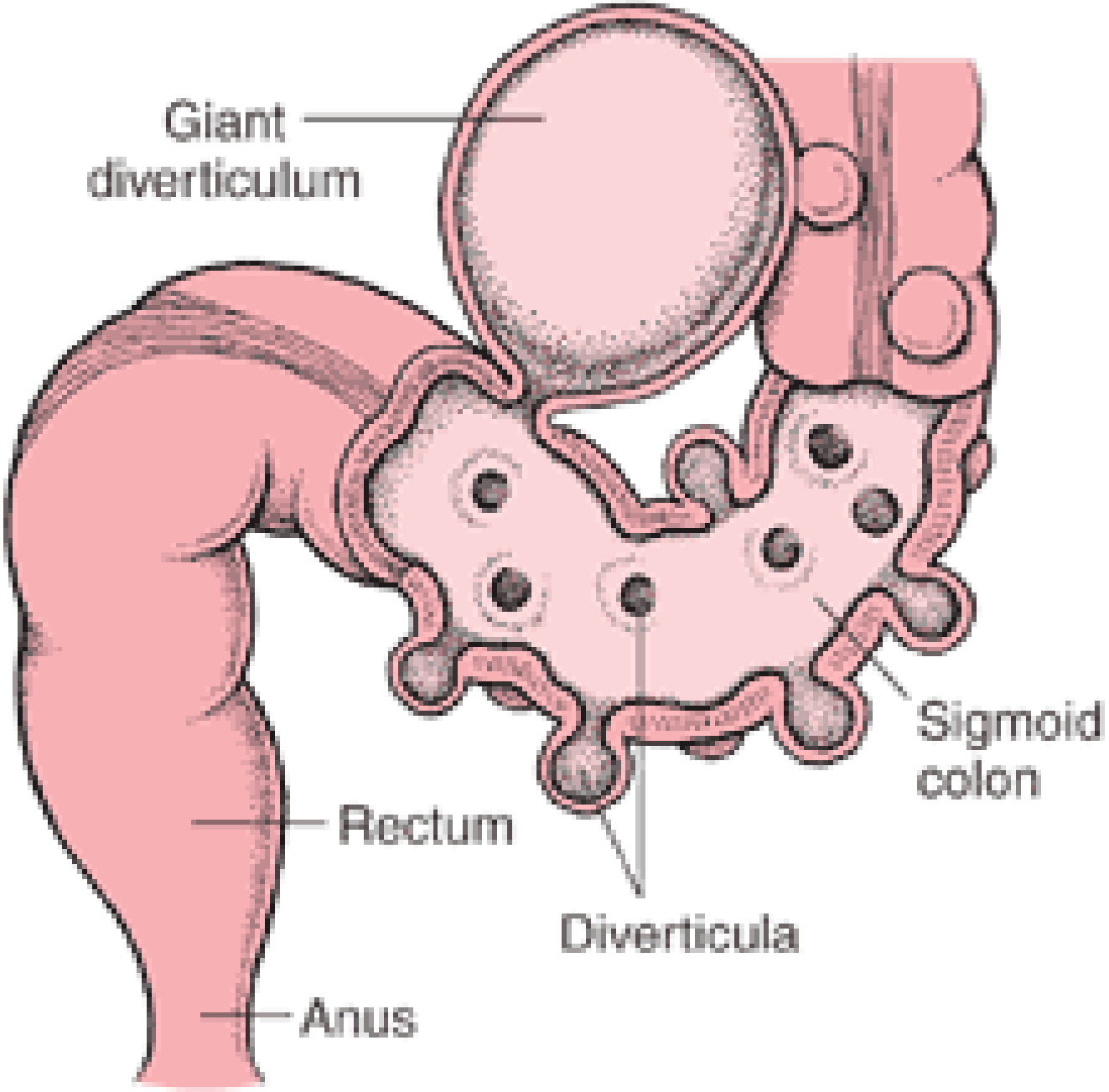
Diverticular Disease

- **Diverticula** are caused by increased pressure within the intestinal lumen
  - They are usually asymptomatic.

- **Diverticulitis** occurs when diverticula become inflamed
  - possibly from trapped stool or bacteria

Diverticular Disease

- Possible causes :
  - Chronic constipation
  - Obesity
  - low physical activity
  - Low fiber diet


Giant diverticulum
Sigmoid colon
Rectum
Diverticula
Anus


\DSqw4560-1nit
Room 1
1
AGE SEX 30/11/2009
10:06:01
COMMENT
Facility

Diverticular Disease

- Symptoms of diverticulitis include :
  - Cramping
  - alternating periods of diarrhea and constipation
  - Flatus
  - abdominal distention
  - low-grade fever

Diverticular Disease : Nutrition Therapy

- **A high fiber intake**
  - prevent and improve symptoms of **diverticulosis**
  - prevent **diverticulitis**

  by producing soft, bulky stools that are easily passed, resulting in decreased pressure within the colon and shortened transit time.

- Once the diverticula develop, a high-fiber diet cannot make them disappear

Diverticular Disease : Nutrition Therapy

- Avoid nuts, seeds, and popcorn because these can become trapped in diverticula and cause inflammation

- yet there is no scientific evidence to support this practice

Diverticular Disease : Nutrition Therapy

- During an acute phase of diverticulitis, patients are given nothing by mouth (NPO) until bleeding and diarrhea subside.

- Oral intake resumes with clear liquids and progresses to a low fiber diet until inflammation and bleeding are no longer a risk

DISORDERS OF THE ACCESSORY GI ORGANS

Liver Diseases

- After absorption, almost **all nutrients** are transported to the liver
- Where they are “processed” before being distributed to other tissues

Liver Diseases

- **Triglycerides, phospholipids, and cholesterol** are synthesized in the liver

- **Glucose** is synthesized and **glycogen** is formed, stored, and broken down as needed.

- **Vitamins and minerals** are metabolized, and many are stored in the liver.

- the liver is vital for detoxifying **drugs, alcohol**, ammonia, and other poisonous substances.

Hepatitis

- Inflammation of the liver

- Which maybe caused by :
  - viral infections
  - alcohol abuse
  - hepatotoxic chemicals such as chloroform and carbon Tetrachloride

- Early symptoms of **hepatitis** include:
  - anorexia, nausea and vomiting, fever, fatigue, headache, and weight loss

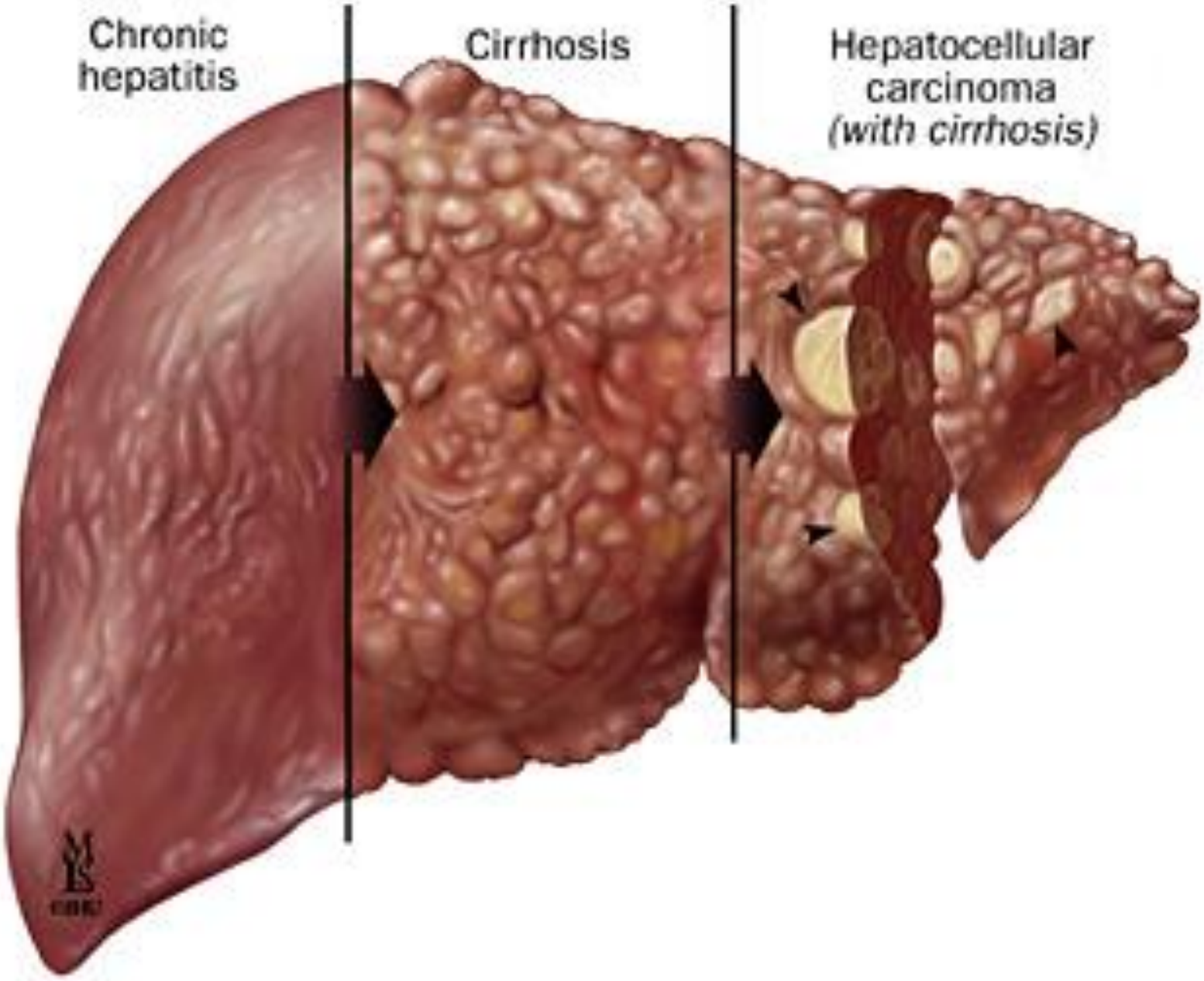
Cirrhosis

- Acute hepatitis → chronic hepatitis →
  - Liver cirrhosis , liver cancer, liver failure

- **Cirrhosis** : damaged liver cells are replaced by functionless scar tissue

- → impairing liver function and disrupting normal blood circulation through the liver

- Early symptoms include :
  - fever, anorexia, weight loss, and fatigue.
  - Glucose intolerance is common


Chronic hepatitis
Cirrhosis
Hepatocellular carcinoma (with cirrhosis)

Nutrition Therapy

- Generally, patients with acute hepatitis have difficulty consuming an adequate diet because of anorexia, early satiety, and fatigue.

- A balanced diet with between-meal feedings of commercial supplements may help ensure an adequate intake

Table 18.4

Nutrition Therapy Guidelines for Liver Disorders

Nutrient	Guideline	Rationale
Calories	20–70% above basal energy expenditure (BEE) based on the individual's status	Malnutrition, fever, infection, and weight loss influence calorie needs
Protein	0.8–1.2 g/kg	An adequate protein intake is vital to prevent body protein catabolism and worsening of nutritional status
Carbohydrates	No restriction unless diabetes is present	If hyperglycemia is a problem, carbohydrates should be mostly in the form of complex carbohydrates, and meal timings should be consistent
Fat	Limit if patient experiences steatorrhea MCT oil may be used for additional calories	Fat aggravates malabsorption in people with steatorrhea MCT oil is absorbed without undergoing digestion
Sodium	Limit to 2000 mg if the patient has ascites	Limiting sodium helps control fluid accumulation
Fluid	1200–1500 mL/day if serum sodium $<$128 mEq/L	To limit fluid accumulation
Supplements	As needed to correct for deficiencies	Supplements of B vitamins, vitamin C, and vitamin K may be needed to compensate for alterations in metabolism Zinc supplements may help to improve appetite Impaired liver function increases the risk of vitamin A toxicity, so excess amounts are avoided

Pancreatitis

- Inflammation of the pancreas causes digestive enzymes to be retained in the pancreas
- Digestive enzymes are converted to their active form
- so they literally begin to "**digest the pancreas**"

Pancreatitis

- Because the pancreas also produces insulin

- people with **pancreatitis** may also develop **hyperglycemia** → related to insufficient insulin secretion.

Pancreatitis

- Acute pancreatitis:
  - intermittent pain that is made worse by eating.
  - Steatorrhea occurs late in the disease
  - Gradual weight loss
  - Symptoms of diabetes, such as increased thirst and urination, may develop

Nutrition Therapy

- Acute pancreatitis is treated **by reducing pancreatic stimulation.**

- **In mild cases**, the patient is given pain medications, IV therapy, and NPO.

- when pain subsides, patients are given a clear liquid diet and advanced to a low-fat diet as tolerated.

Nutrition Therapy

- Small, frequent meals may be better tolerated initially

  – because they help to reduce the amount of pancreatic stimulation at each meal.

Moderate to severe pancreatitis

- The preferred route of delivering nutrition to patients with moderate to severe pancreatitis has shifted away from TPN to enteral nutrition

- Particularly jejunal feedings, offer the advantage of being well tolerated and less likely to cause septic and other complications

- And feeding into the jejunum does not stimulate pancreatic secretions

Chronic Pancreatitis

- A mildly low-fat diet (Box 18.9) that is high in protein is recommended.

1. **Fat is restricted further for patients with steatorrhea.**

2. Patients whose insulin secretion is impaired may need a **diabetic diet** to help control hyperglycemia.

3. Taking **pancreatic enzyme replacement pills** at the beginning, end, and during each meal is crucial for maximum effectiveness.

LOW-FAT DIET

- Total fat is limited to reduce symptoms of steatorrhea and pain in patients who are intolerant to fat, such as for people with chronic pancreatitis, Crohn's disease, radiation enteritis, and short bowel syndrome

low fat diet

Guidelines to Achieve a Low-Fat Diet

- Eat nonfat or low-fat food to meet appropriate MyPyramid amounts
- Select only very lean meats, fish, and skinless poultry; egg whites; and low-fat egg substitutes
- Bake, broil, or boil foods instead of frying
- Use milk and dairy products that provide less than 1 g fat per serving and use low-fat cheese with 3 g or less of fat per serving.
- Enjoy all fruits and vegetables that are prepared without added fat except avocado and coconut
- Choose grain products that are prepared without added fat (e.g., avoid muffins, waffles, biscuits, pastries, other baked goods)
- Choose low-fat desserts: sherbet, fruit ices, gelatin, angel food cake, vanilla wafers, graham crackers, nonfat ice cream and frozen yogurt; fruit whips with gelatin
- Limit fats to less than 8 equivalents per day. Each of the following constitutes one serving (one "equivalent"):

1 tsp butter, margarine, shortening, oil, or mayonnaise

1 tbsp diet margarine, diet mayonnaise, or reduced-calorie cream salad dressing

1 strip crisp bacon

1 tbsp sesame, sunflower, or pumpkin seeds

2 tbsp sour cream, cream cheese, half-and-half, or coffee whitener

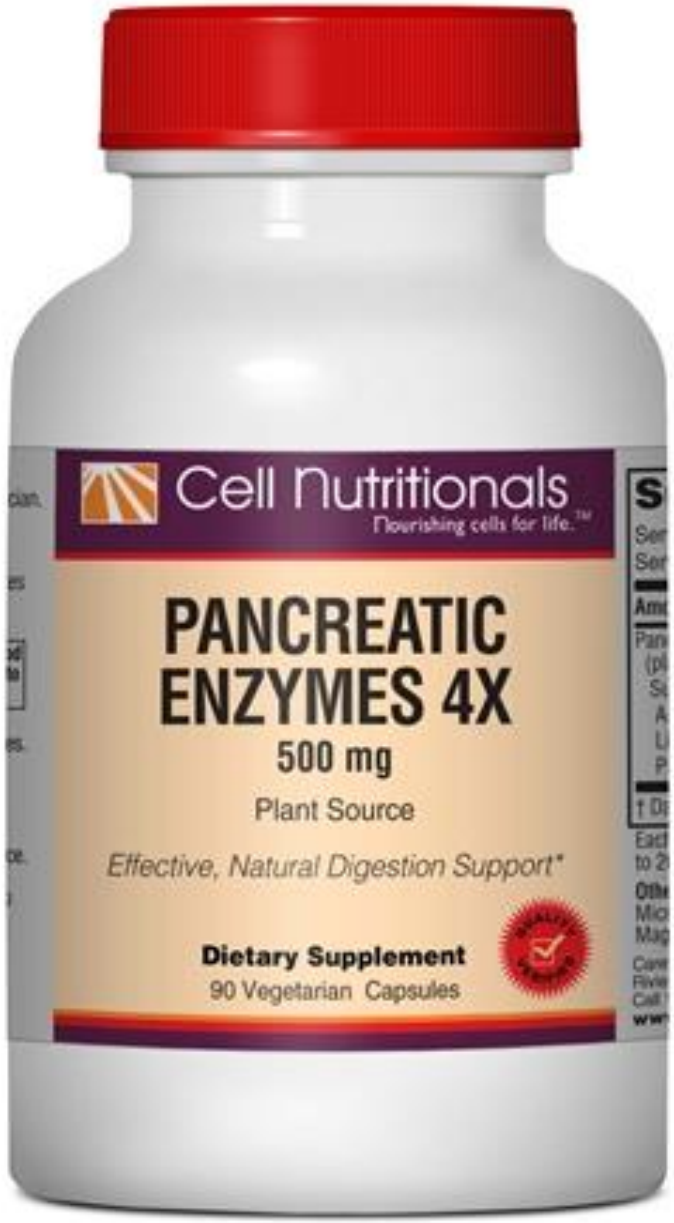
1 tbsp heavy cream
2 tsp regular creamy salad dressing

2 tsp peanut butter
2 tsp light cream

6 small nuts

8–10 olives

⅛ medium avocado



Supplement Facts

Serving Size 1 Capsule
Servings Per Container 90

Amount Per Serving		% Daily Value
Pancreatic Enzymes 4X (plant source)	500 mg	†
Supplying:		
Amylase	50,000 USP	†
Lipase	4,000 USP	†
Protease	50,000 USP	†

† Daily Value not established.

Each capsule contains enzymes equivalent in activity to 2000 mg pancreatin USP.

Other Ingredients: Hydroxypropyl Methylcellulose, Microcrystalline Cellulose, Silicon Dioxide, Vegetable Magnesium Stearate.

Suggested Use: For adults, take one (1) capsule with each meal, or as directed by your physician.

Gallbladder Disease

- The gallbladder's role in digestion is to store and release bile, which prepares fat for digestion

- **Cholelithiasis:**
  - Cholesterol crystals or pigment material will precipitate out into clumps known as **gallstones**.
  - Incomplete emptying of the gallbladder may also be involved in gallstone formation.

Gallbladder Disease

- No diet modifications are necessary for healthy people with asymptomatic gallstones.

- Patients with symptomatic gallstones may be told to limit their intake of fat based on the rationale that limiting fat intake reduces stimulation to the gallbladder and minimizes pain.

- Other practices, based more on popular belief than on scientific data, include **limiting spicy foods, high-fiber foods, and foods that cause gas.**

- Most patients do not experience problems after recovery from surgery.