

# Al-Mustaqbal University College



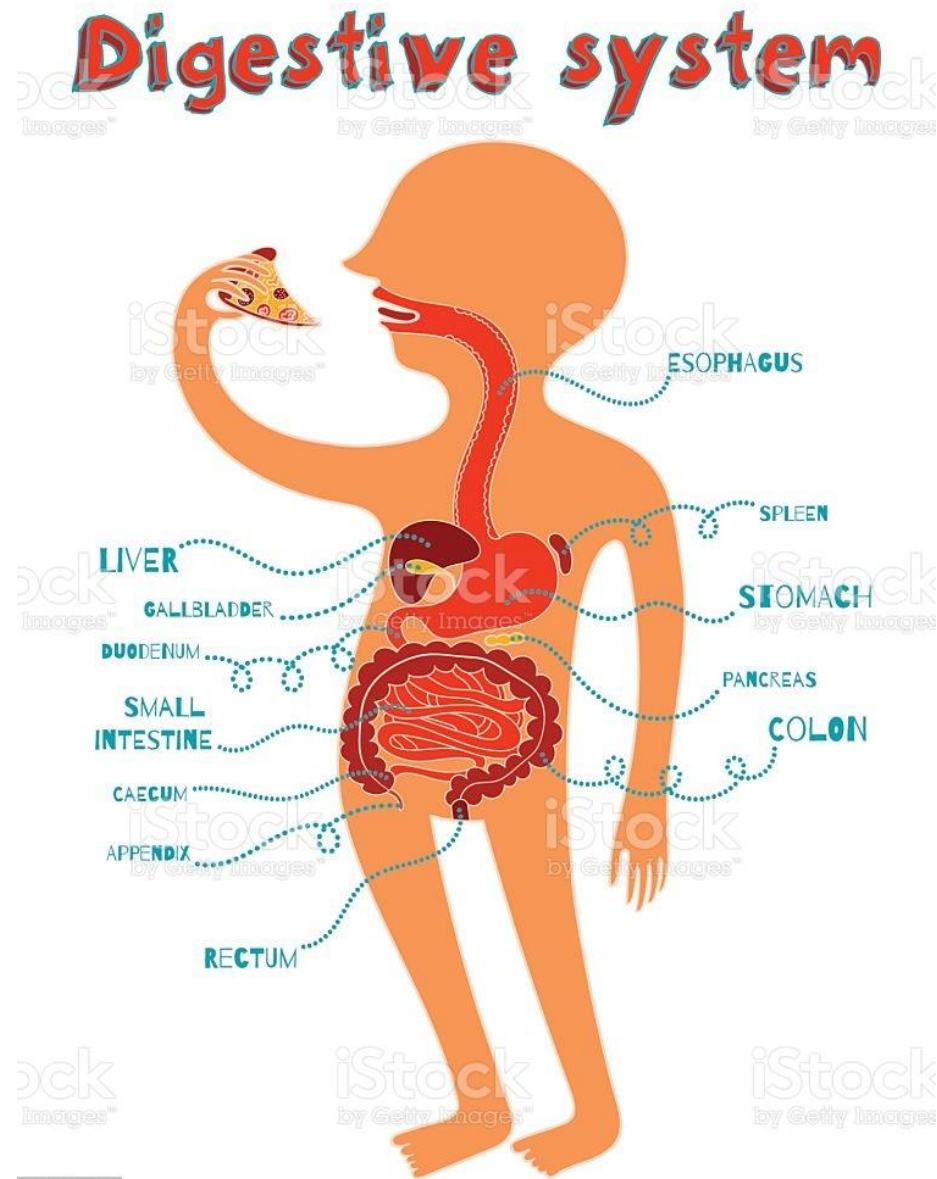
**Pathophysiology 3<sup>rd</sup> stage**

**Disorders of GI and Hepatobiliary  
System Part 1**

**Dr. Hasanain Owadh**

# The Gastrointestinal System

The gastrointestinal (GI) tract extends from the mouth to the anus. The function of the GI tract is to allow for food ingestion, propulsion, and digestion, and for the absorption of nutrients necessary for our bodies to live and grow.



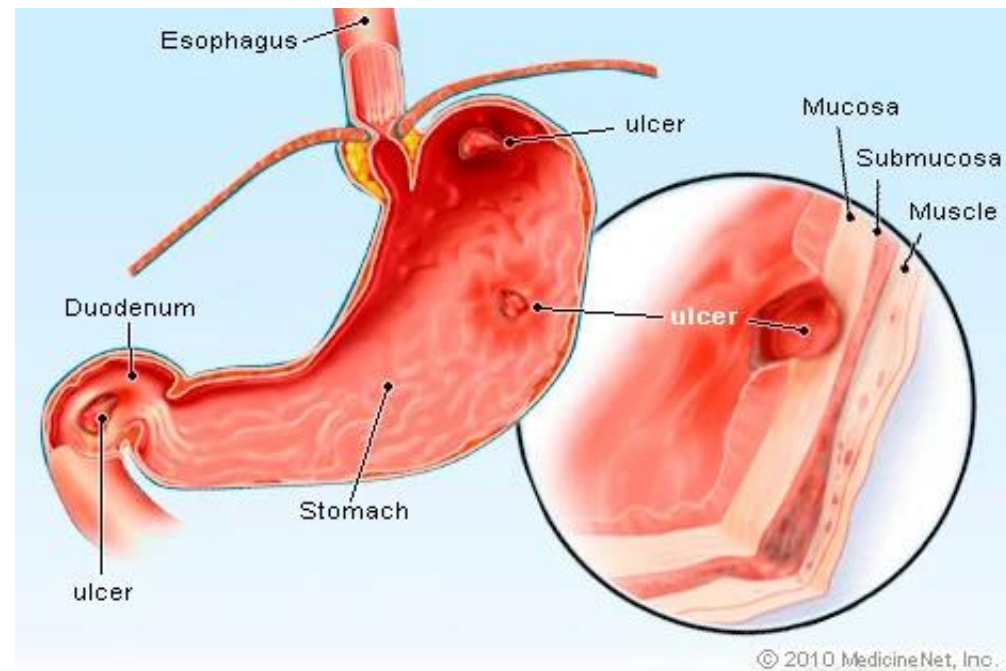
# I- Peptic Ulcer

The term peptic ulcer refers to an erosion of the mucosal layer anywhere in the GI tract; however, it usually refers to erosions in the stomach or duodenum. Gastric ulcer refers only to an ulcer in the stomach.

## Causes of Peptic Ulcer

There are two main causes of ulcers:

- (1) too little mucus production or
- (2) too much acid being produced in the stomach or delivered to the intestine.



## 1- Decreased Mucus Production as a Cause of Ulcer

Ulcers most commonly develop when the mucosal cells of the gut do not produce adequate mucus to protect against acid digestion.

2- Decreased mucus production in the duodenum also can occur as a result of inhibition of mucus-producing glands, called Brunner's glands, located there.

Their activity is inhibited by sympathetic stimulation.

Sympathetic stimulation is increased by chronic stress, thus making a connection between chronic stress and ulcer development.



**3- The main cause** of decreased mucus production is related to infection with the bacterium *H. pylori*.

*H. pylori* colonizes the mucus-secreting cells of the stomach and duodenum, reducing their ability to produce mucus.

**4- The use of various drugs**, especially non-steroidal anti-inflammatory drugs (NSAIDs).

These drugs contribute to ulcer development by inhibiting protective prostaglandins both systemically and in the gut wall.

## Excess Acid as a Cause of Ulcer

Acid production in the stomach is necessary for activation of stomach digestive enzymes.

Hydrochloric acid (HCl) is produced by the parietal cells in response to certain **foods, drugs, hormones** (including **gastrin**), **histamine**, and **parasympathetic stimulation**.

**Zollinger-Ellison syndrome**, a disease characterized by tumors of the gastrin-secreting endocrine cells.

Foods and drugs such as caffeine and alcohol stimulate the parietal cells to produce acid.

## Increased Delivery of Acid as a Cause of Duodenal Ulcer

Too rapid movement of stomach contents into the duodenum can overwhelm the protective mucus layer there.

This occurs with irritation of the stomach by certain foods or microorganisms, as well as by excess gastrin secretion or abnormal distention.

Also in the condition called dumping syndrome. **Dumping syndrome** happens when the ability of the stomach to hold and slowly release chyme into the duodenum is compromised.

One cause of dumping syndrome is surgical removal of a large part of the stomach.

## Clinical Manifestations

- **Burning abdominal pain** (dyspepsia) often occurs at night.
- Pain that occurs when the stomach is empty (for example, at night) often signifies a **duodenal ulcer**. This is **most common**.
- Pain that occurs immediately after or during eating suggests a **gastric ulcer**. Occasionally, the pain may be referred to the back or shoulder as well.
  
- The occurrence of pain often comes and goes; it sometimes occurs daily for several weeks and then disappears altogether until the next exacerbation.
  
- **Weight loss is common with gastric ulcers. Weight gain may occur with duodenal ulcers because eating relieves the discomfort.**



## Diagnostic Tools

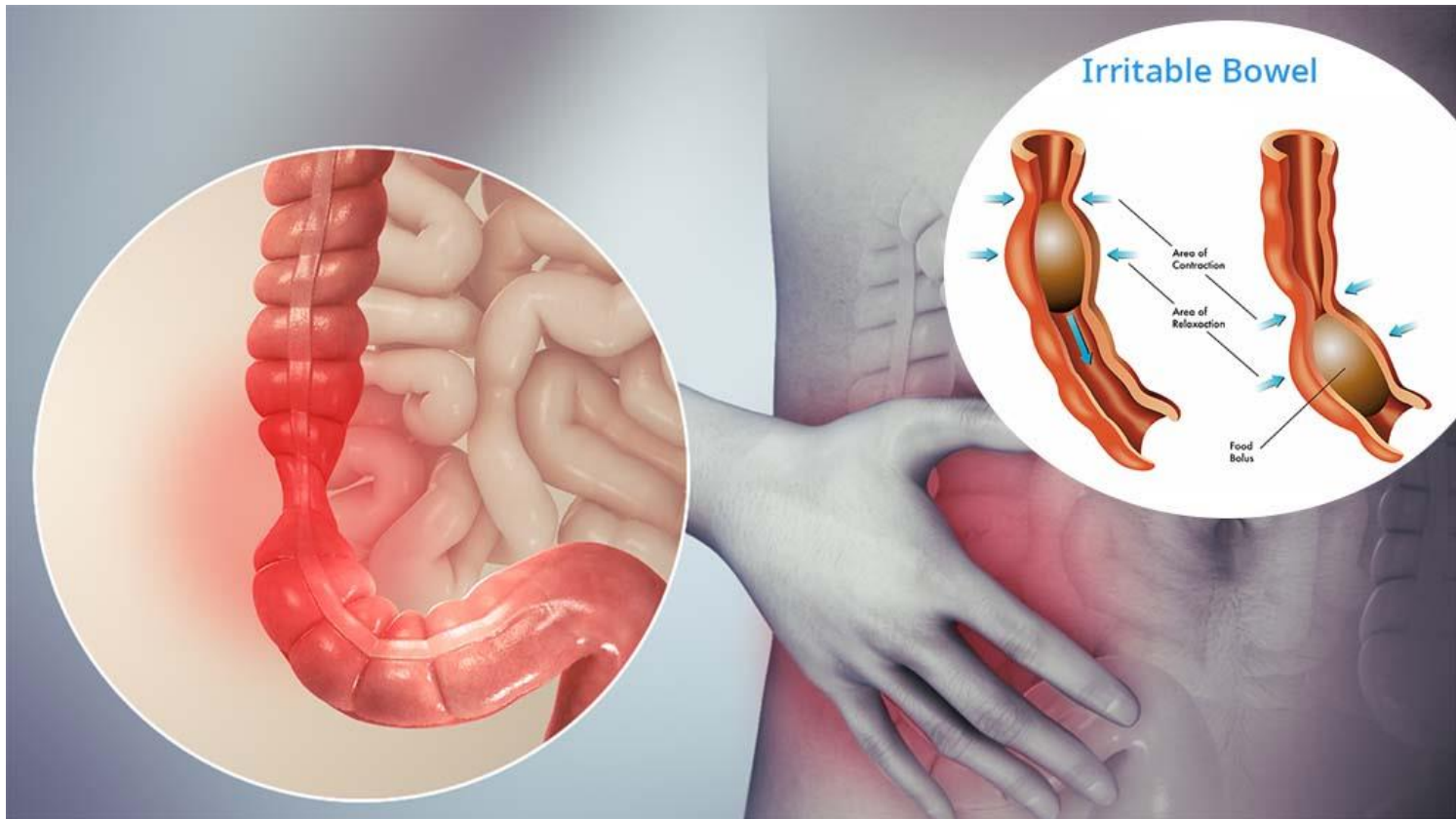
- Ulcers are diagnosed primarily by history and endoscopy.
- H. pylori infection may be diagnosed by endoscope biopsy, blood tests or stool test for antibody and by breath tests that measure metabolic waste production by the microbe.

## Complications

- (perforated ulcer), it may be infected and painful.
- Obstruction of the lumen of the GI tract.
- Hemorrhage (May cause shock).

## II- Irritable Bowel Syndrome

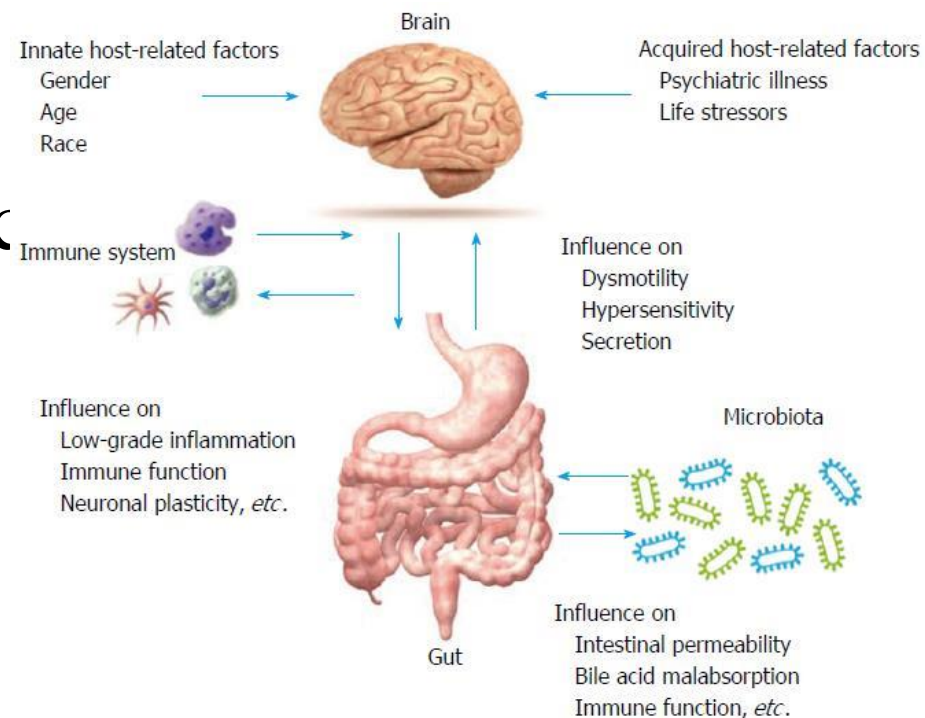
Irritable bowel syndrome (IBS) currently is a symptom-based disease characterized by recurrent abdominal pain with altered bowel habits.



Individuals with symptoms of IBS also are more likely to have anxiety, depression, and reduced quality of life.

The pathophysiology of IBS is unknown and there are no specific biomarkers for the disease.

altered gut microflora,  
gut immune responses,  
gut neuroendocrine cell function,  
the brain-gut axis,  
genetic  
susceptibility,  
and epigenetic factors.



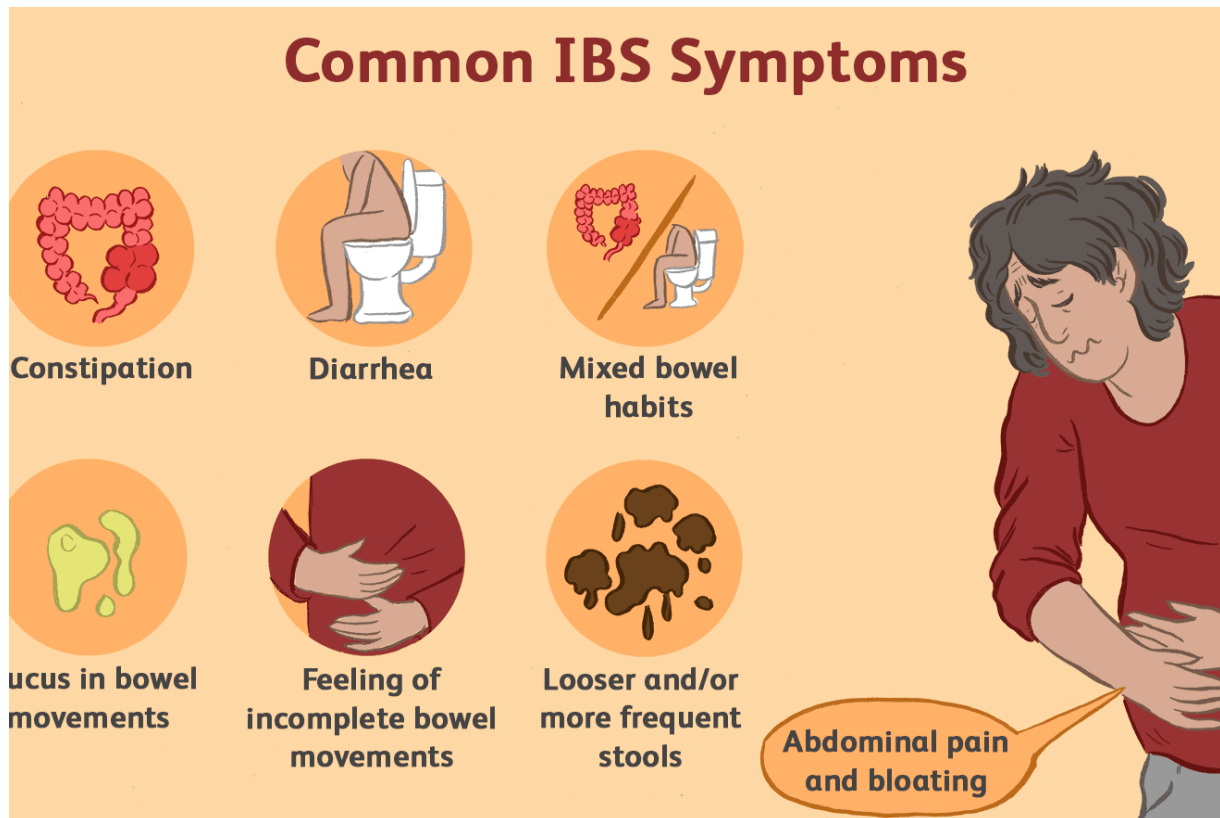
## **Clinical manifestations**

lower abdominal pain or discomfort and bloating.

Women report more abdominal pain and constipation and men report more diarrhea.

IBS can be grouped as **diarrhea**-predominant, **constipation**-predominant, or alternating diarrhea/constipation.

Symptoms including gas, bloating, and nausea are usually relieved with defecation and do not interfere with sleep.



# Diagnostic Criteria for Irritable Bowel Syndrome (IBS)

Recurrent abdominal pain or discomfort at least 3 days/month in the last 3 months associated with two or more of the following:

Improvement with defecation.

Onset associated with a change in frequency of stool.

Onset associated with a change in form (appearance) of stool.

Onset of symptoms more than 6 months before diagnosis.



### **III- Diarrhea**

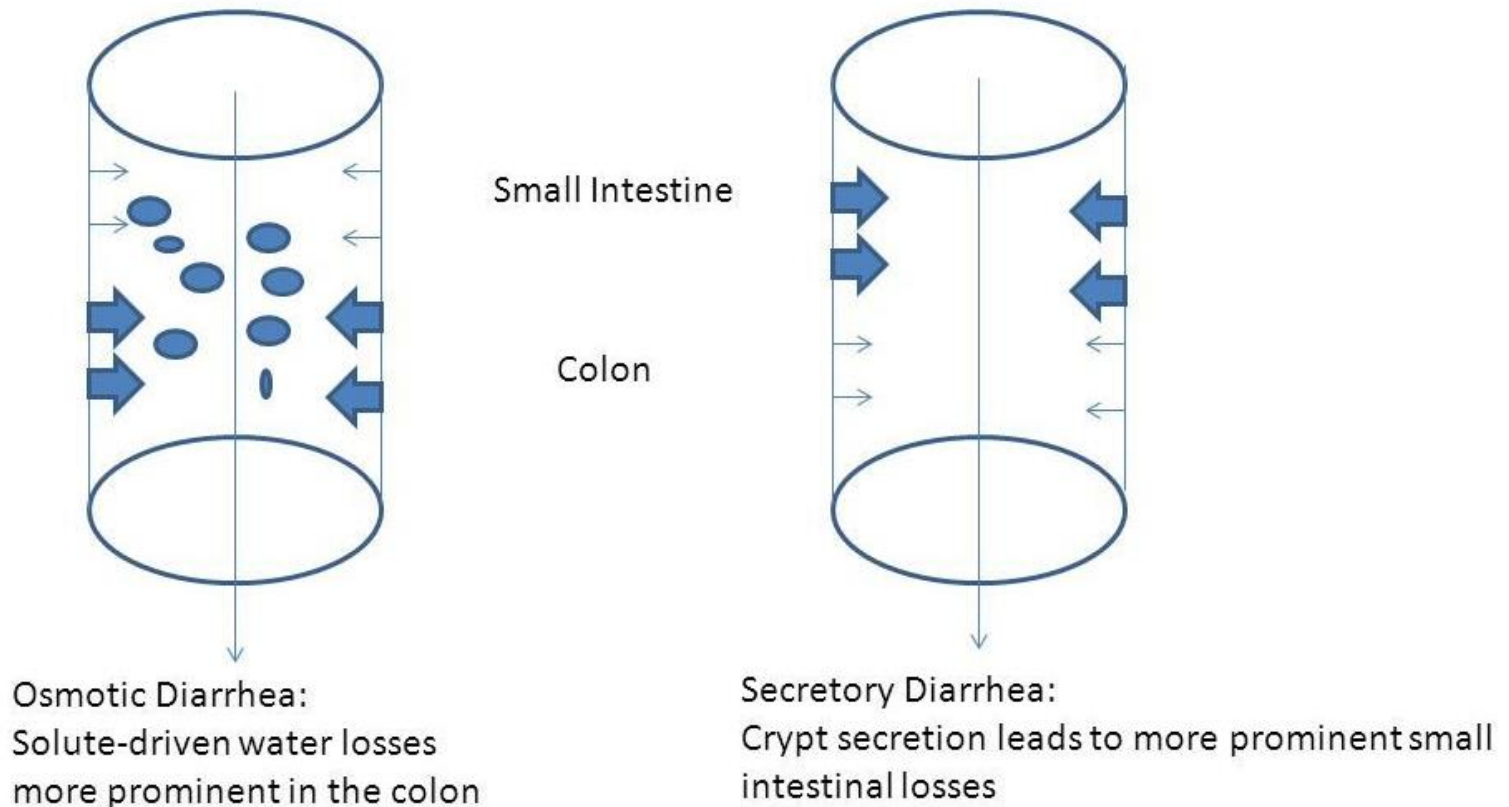
Diarrhea is an increase in fluidity and frequency of stools.

It may be large or small volume and may or may not contain blood.

1. Osmotic diarrhea. A nonabsorbable substance in the intestine draws excess water into the intestine and increases stool weight and volume, producing large-volume diarrhea.

## 2. Secretory diarrhea. Excessive mucosal secretion of fluid and electrolytes produces large-volume diarrhea.

### Mechanisms of Diarrhea: Osmotic versus Secretory



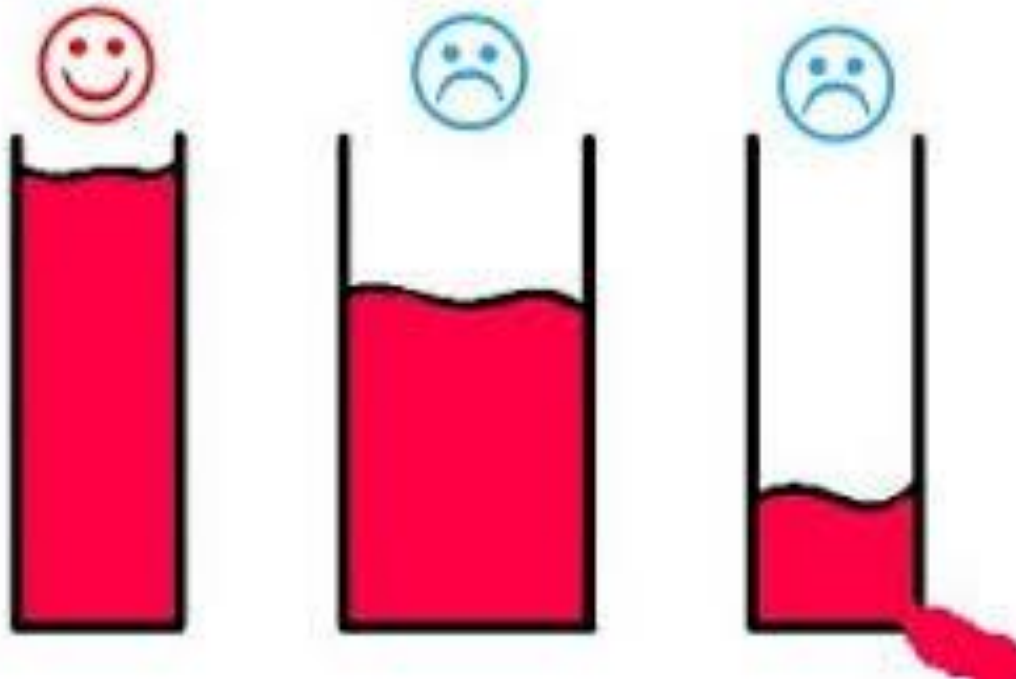


Irritation of the intestines by a pathogen affects the mucosal layer, leading to increased secretory products, including mucus.

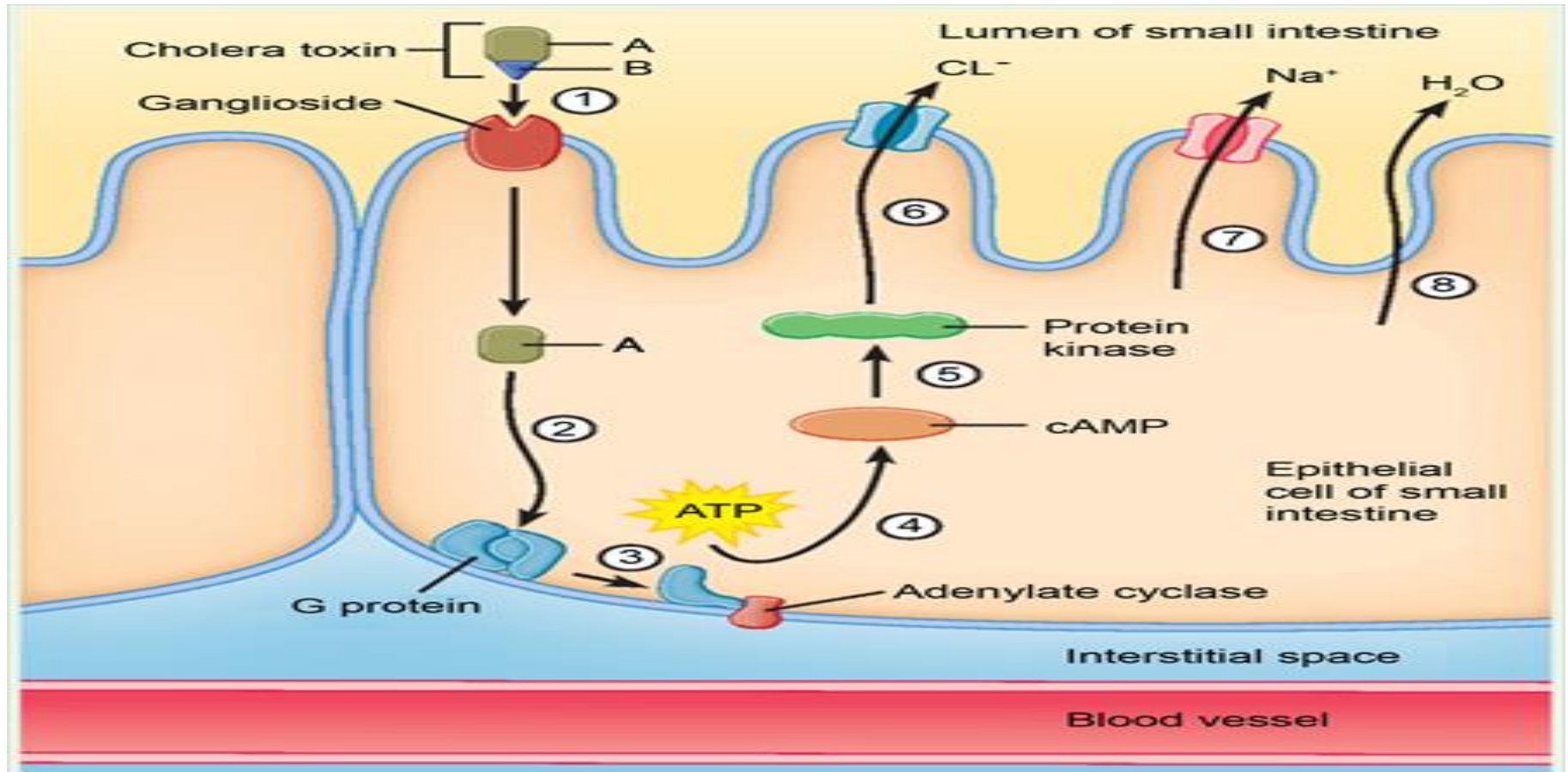
Microbial irritation also affects the muscular layer, leading to increased motility.

Increased motility causes large amounts of water and electrolytes to be lost in the stool because the time available for their reabsorption in the colon is reduced.

An individual who has severe diarrhea can die from hypovolemic shock and electrolyte irregularities.



Cholera toxin stimulates motility and directly causes secretion of water and electrolytes into the large intestine, contributing to the devastating loss of these important plasma constituents.



Infection with *Escherichia coli* O157, found in undercooked ground beef, causes a severe bloody diarrhea.

Large-volume diarrhea can also be caused by psychological factors, such as fear or some types of stress, mediated through parasympathetic stimulation of the gut.

Small-volume diarrhea is characterized by frequent loss of small amounts of stool.

Causes of this type of diarrhea include **ulcerative colitis** and **Crohn's disease**.

## **Clinical manifestations**

Diarrhea can be acute or chronic depending on its cause. Systemic effects of prolonged diarrhea are: Dehydration, Electrolyte imbalance (hyponatremia, hypokalemia), and weight loss.

Manifestations of acute bacterial or viral infection include fever, with or without vomiting or cramping pain.

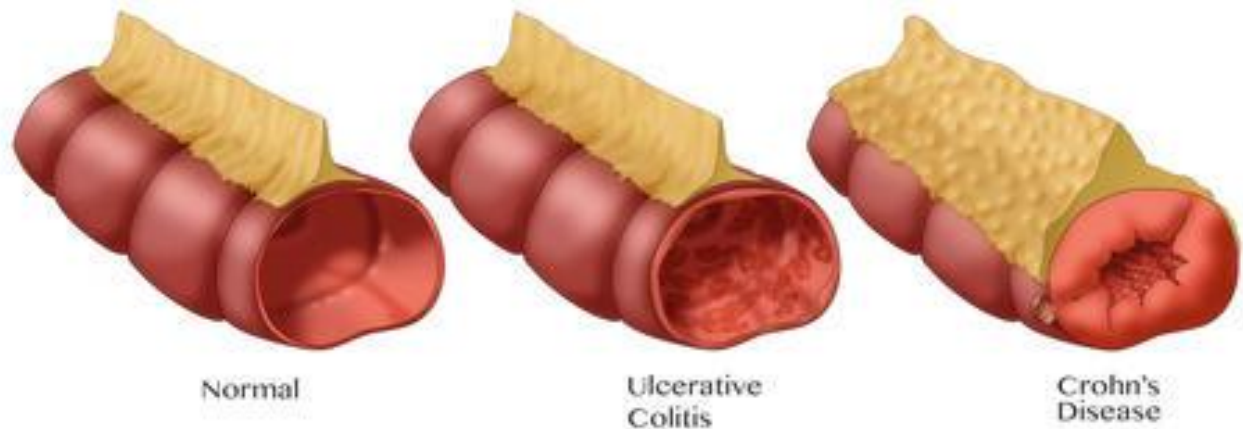
Most infectious diarrhea usually lasts less than 2 weeks.

## IV- Crohn's Disease

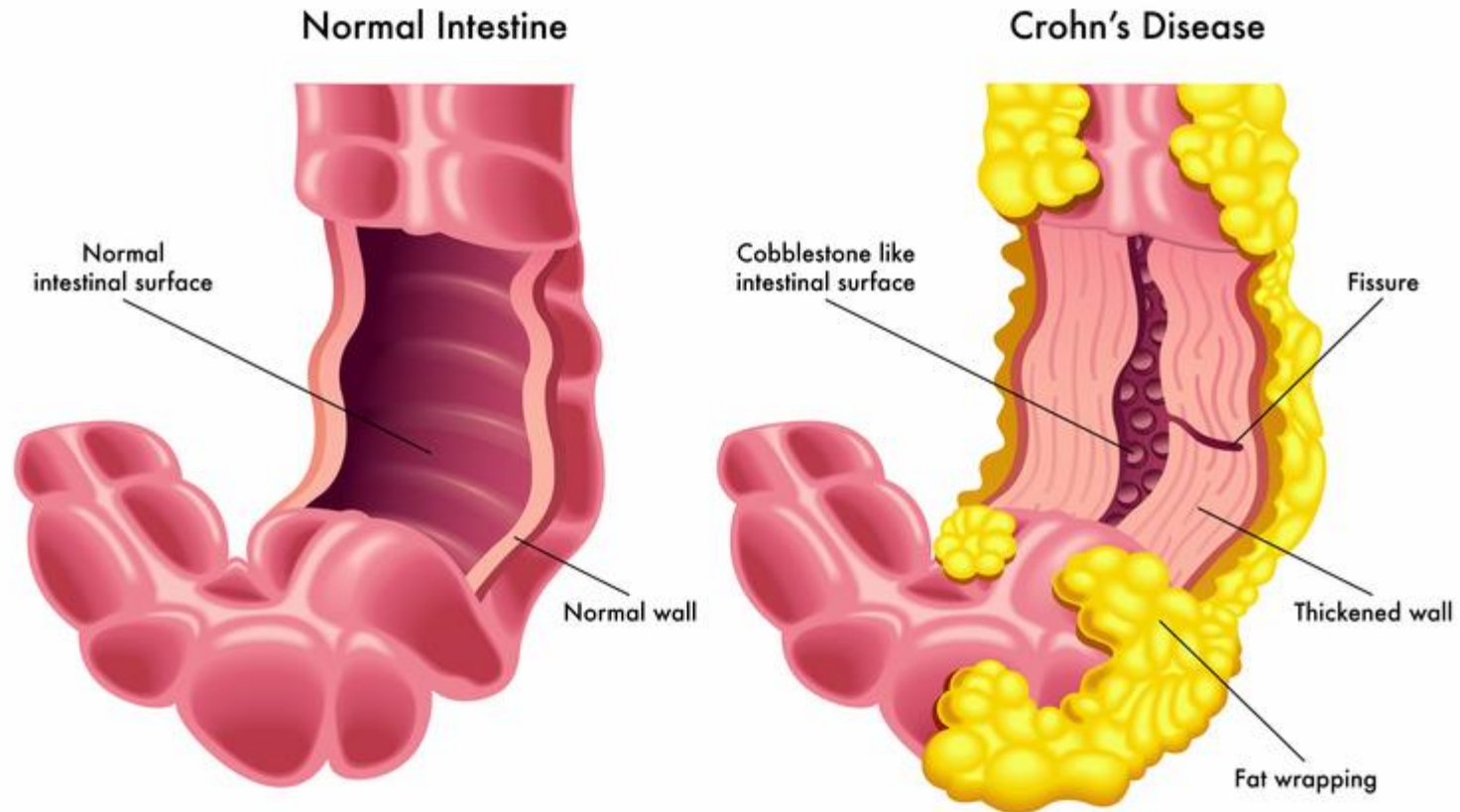
Crohn's disease is a chronic inflammatory disease of the bowel characterized by inflammation of all layers of the GI tract.

It especially affects the submucosal layer and the small and large intestines.

The inflammation of Crohn's occurs as sharply outlined granulomatous lesions that appear in skip pattern scattered throughout the affected area of the gut.



Interspersed between areas of inflammation is normal gut tissue. With chronic inflammation, fibrosis and scarring occur and make the bowel stiff and inflexible that interfere with the absorption of nutrients.



## Clinical Manifestations

- Intermittent, usually non-bloody diarrhea.
- Colicky pain.
- Weight loss.
- Malabsorption.
- Fluid and electrolyte imbalances may result.
- Malaise.
- Low-grade fevers.

## Diagnostic Tools

- Colonoscopy reveals irregular, scarred bowel.

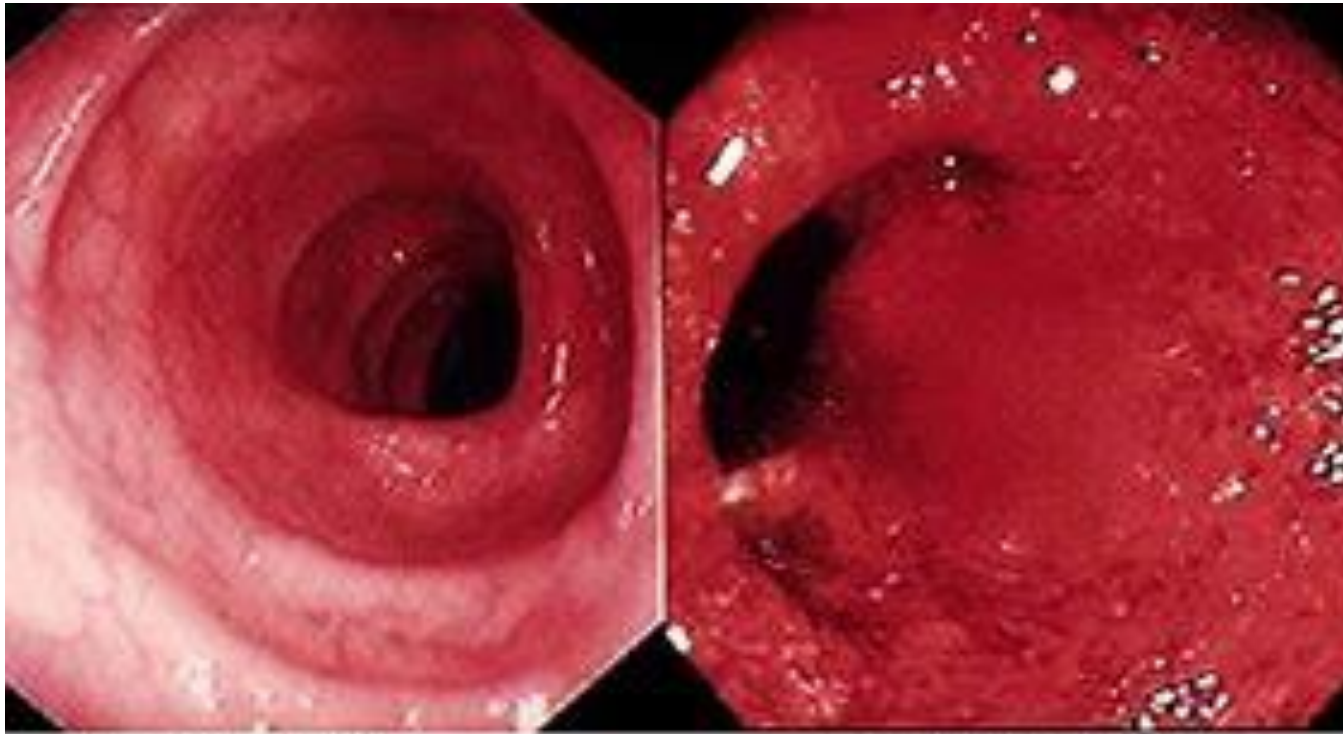


## Complications

- Toxic megacolon.
- Obstruction of the intestine.
- arthritis, skin lesions, and various blood disorders, including autoimmune anemia, hypercoagulability and depression.
- Children afflicted with Crohn's disease may experience growth retardation, resulting from malabsorption as well as from the anti-inflammatory drugs used to treat the disease.

## V- Ulcerative Colitis

Ulcerative colitis (UC) is a chronic inflammatory disease that causes ulceration of the colonic mucosa, most commonly in the rectum and sigmoid colon.



Healthy Colon

Ulcerative Colon

## Clinical manifestations

**Mild UC** involves less mucosa, so that the frequency of bowel movements, bleeding, and pain is minimal.

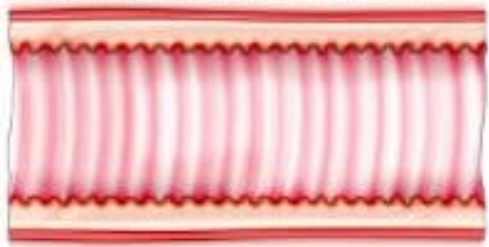
Severe forms may involve the entire colon and are characterized by **abdominal pain, fever, elevated pulse rate, frequent diarrhea** (10 to 20 stools/day), **urgency, obviously bloody stools, and continuous, crampy pain.**

Dehydration, weight loss, anemia, and fever result from fluid loss, bleeding, and inflammation.

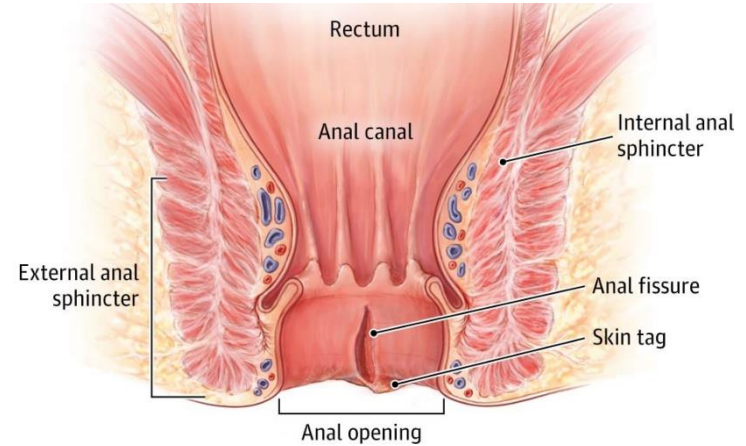
# Complications

**Complications** include: anal fissures, hemorrhoids, and perirectal abscess.

Normal Intestine



Intestine with Stricture



Edema, strictures, or fibrosis can obstruct the colon.

Extraintestinal manifestations like cutaneous lesions and polyarthritis.

**Thank  
you**