DIGESTIVE SYSTEM

What is the digestive system?

Your digestive system is a group of organs that work together to digest and absorb nutrients from the food you eat. Digestion is a complicated process, and conditions and disorders can disrupt that process. Knowing how your digestive system works may help you keep it healthy and know when it may be time to get medical care.

Function

What does the digestive system do?

It breaks down and absorbs nutrients from the food and liquids you consume. Your digestive system also takes care of food waste — the stuff that's left over after you digest food. Your digestive system turns food waste into poop (stool).

What are the parts of the digestive system?

The main parts of your digestive system are your gastrointestinal (GI) tract and your biliary tract:

- Your GI tract is a series of hollow organs that connect to digest and move food through your body. It includes your mouth, esophagus, stomach, small intestine and large intestine.
- Your biliary tract makes and releases fluids that help digestion. It includes your bile ducts, gallbladder, liver and pancreas.

The gastrointestinal tract

Your GI tract is a long tube that runs from your mouth to your anus. If you could stretch it out, it would measure 30 feet (9 meters). It's shorter in your body because your intestines — the longest parts of the tract — coil up in your lower abdomen (belly) under your stomach. Your GI tract parts are your:

- **Mouth**: This is where digestion begins.
- **Esophagus**: This is a tube in the center of your chest, behind your windpipe (trachea) and in front of your spine.
- **Stomach**: Your stomach sits in your upper abdomen on the left side of your body.
- **Small intestine**: This 22-foot-long muscular tube is the longest part of your gastrointestinal tract. It coils up in your lower abdomen and curves around your pancreas.
- **Large intestine**: The last step in the digestive process, the large intestine includes your colon, rectum and anus.

The digestive system is made up of the gastrointestinal tract—also called the GI tract or digestive tract—and the liver, pancreas, and gallbladder. The GI tract is a series of hollow organs joined in a long, twisting tube from the mouth to the anus. The hollow

organs that make up the GI tract are the mouth, esophagus, stomach, small intestine, large intestine, and anus. The liver, pancreas, and gallbladder are the solid organs of the digestive system.

The small intestine has three parts. The first part is called the duodenum. The jejunum is in the middle and the ileum is at the end. The large intestine includes the appendix, cecum, colon, and rectum. The appendix is a finger-shaped pouch attached to the cecum. The cecum is the first part of the large intestine. The colon is next. The rectum is the end of the large intestine.

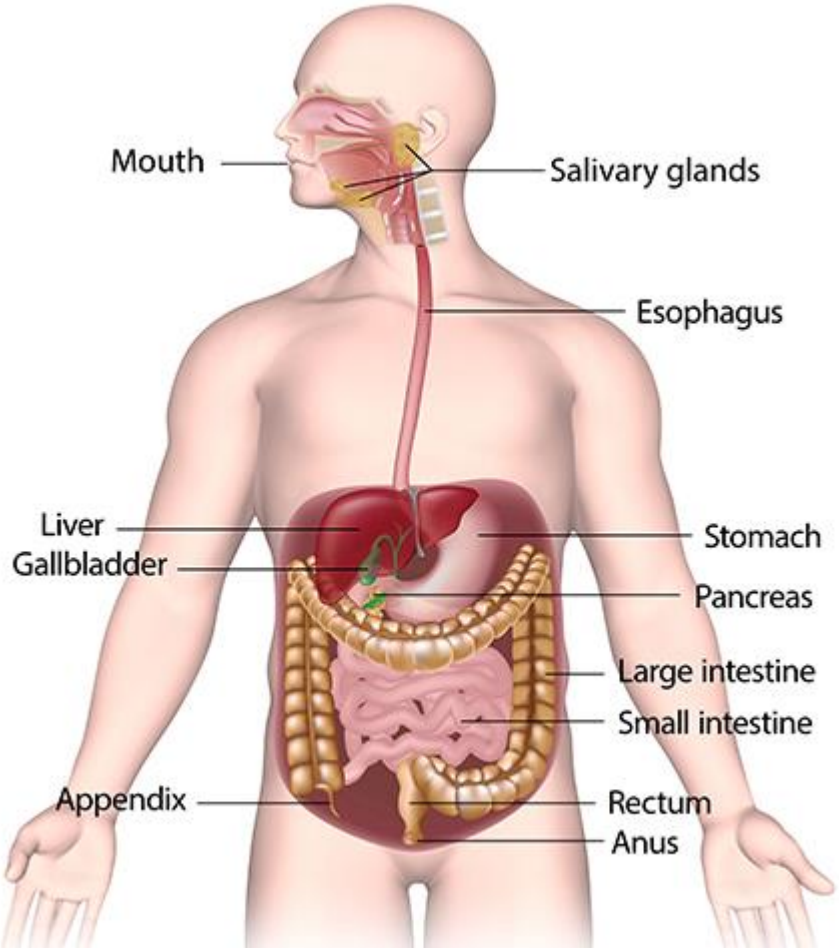

Fig: The Digestive System

Bacteria in your GI tract, also called gut flora or microbiome, help with digestion. Parts of your nervous and circulatory *NIH external link* systems also help. Working together, nerves, hormones, bacteria, blood, and the organs of your digestive system digest the foods and liquids you eat or drink each day.

Why is digestion important?

Digestion is important because your body needs nutrients from food and drink to work properly and stay healthy. Proteins, fats, carbohydrates, vitamins *NIH external link*, minerals *NIH external link*, and water are nutrients. Your digestive system breaks

nutrients into parts small enough for your body to absorb and use for energy, growth, and cell repair.

- Proteins break into amino acids
- Fats break into fatty acids and glycerol
- Carbohydrates break into simple sugars

Your digestive system breaks nutrients into parts that are small enough for your body to absorb.

How does my digestive system work?

Each part of your digestive system helps to move food and liquid through your GI tract, break food and liquid into smaller parts, or both. Once foods are broken into small enough parts, your body can absorb and move the nutrients to where they are needed. Your large intestine absorbs water, and the waste products of digestion become stool. Nerves and hormones help control the digestive process.

The digestive process

Organ	Movement	Digestive Juices Added	Food Particles Broken Down
Mouth	Chewing	Saliva	Starches, a type of carbohydrate
Esophagus	Peristalsis	None	None
Stomach	Upper muscle in stomach relaxes to let food enter, and lower muscle mixes food with digestive juice	Stomach acid and digestive enzymes	Proteins
Small intestine	Peristalsis	Small intestine digestive juice	Starches, proteins, and carbohydrates
Pancreas	None	Pancreatic juice	Carbohydrates, fats, and proteins
Liver	None	Bile	Fats
Large intestine	Peristalsis	None	Bacteria in the large intestine can also break down food.

The 6 Basic Digestive Processes

1. **Ingestion** – taking food or drink into the mouth or oral cavity.

2. **Propulsion** – movement through alimentary canal. This includes movement of tongue and cheeks and involves contraction of the muscles of swallowing, in addition

to the peristaltic movement generated by the muscular layers of the tract and the cavities created by the canal.

3. **Mechanical Digestion** – the Physical breakdown of food (chewing, churning), mechanical processing and moistening of foods. This is most often required prior to chemical digestion.

4. **Chemical Digestion** – the Enzymatic breakdown of food (from complex to simple building blocks) by the use of enzymes made by the body. This involves the breaking of chemical bonds.

5. **Absorption** – the transportation of digested products from lumen of G.I. tract across an epithelial lining and into the blood and lymph vessels, which are considered to be inside the body.

6. **Defecation** – the Elimination of indigestible material and waste products from body (feces).

How does food move through my GI tract?

Food moves through your GI tract by a process called peristalsis. The large, hollow organs of your GI tract contain a layer of muscle that enables their walls to move. The movement pushes food and liquid through your GI tract and mixes the contents within each organ. The muscle behind the food contracts and squeezes the food forward, while the muscle in front of the food relaxes to allow the food to move.

The digestive process starts when you put food in your mouth.

Mouth. Food starts to move through your GI tract when you eat. When you swallow, your tongue pushes the food into your throat. A small flap of tissue, called the epiglottis, folds over your windpipe to prevent choking and the food passes into your esophagus.

Esophagus. Once you begin swallowing, the process becomes automatic. Your brain signals the muscles of the esophagus and peristalsis begins.

Lower esophageal sphincter. When food reaches the end of your esophagus, a ringlike muscle—called the lower esophageal sphincter —relaxes and lets food pass into your stomach. This sphincter usually stays closed to keep what's in your stomach from flowing back into your esophagus.

Stomach. After food enters your stomach, the stomach muscles mix the food and liquid with digestive juices. The stomach slowly empties its contents, called chyme, into your small intestine.

Small intestine. The muscles of the small intestine mix food with digestive juices from the pancreas, liver, and intestine, and push the mixture forward for further digestion. The walls of the small intestine absorb water and the digested nutrients into your bloodstream. As peristalsis continues, the waste products of the digestive process move into the large intestine.

Large intestine. Waste products from the digestive process include undigested parts of food, fluid, and older cells from the lining of your GI tract. The large intestine absorbs water and changes the waste from liquid into stool. Peristalsis helps move the stool into your rectum.

Rectum. The lower end of your large intestine, the rectum, stores stool until it pushes stool out of your anus during a bowel movement.

How does my digestive system break food into small parts my body can use?

As food moves through your GI tract, your digestive organs break the food into smaller parts using:

- motion, such as chewing, squeezing, and mixing
- digestive juices, such as stomach acid, bile, and enzymes

Mouth. The digestive process starts in your mouth when you chew. Your salivary glands make saliva, a digestive juice, which moistens food so it moves more easily through your esophagus into your stomach. Saliva also has an enzyme that begins to break down starches in your food.

Esophagus. After you swallow, peristalsis pushes the food down your esophagus into your stomach.

Stomach. Glands in your stomach lining make stomach acid and enzymes that break down food. Muscles of your stomach mix the food with these digestive juices.

Pancreas. Your pancreas makes a digestive juice that has enzymes that break down carbohydrates, fats, and proteins. The pancreas delivers the digestive juice to the small intestine through small tubes called ducts.

Liver. Your liver makes a digestive juice called bile that helps digest fats and some vitamins. Bile ducts carry bile from your liver to your gallbladder for storage, or to the small intestine for use.

Gallbladder. Your gallbladder stores bile between meals. When you eat, your gallbladder squeezes bile through the bile ducts into your small intestine.

Small intestine. Your small intestine makes digestive juice, which mixes with bile and pancreatic juice to complete the breakdown of proteins, carbohydrates, and fats. Bacteria in your small intestine make some of the enzymes you need to digest carbohydrates. Your small intestine moves water from your bloodstream into your GI tract to help break down food. Your small intestine also absorbs water with other nutrients.

Large intestine. In your large intestine, more water moves from your GI tract into your bloodstream. Bacteria in your large intestine help break down remaining nutrients and make vitamin K *NIH external link*. Waste products of digestion, including parts of food that are still too large, become stool.

What happens to the digested food?

The small intestine absorbs most of the nutrients in your food, and your circulatory system passes them on to other parts of your body to store or use. Special cells help absorbed nutrients cross the intestinal lining into your bloodstream. Your blood carries simple sugars, amino acids, glycerol, and some vitamins and salts to the liver. Your liver stores, processes, and delivers nutrients to the rest of your body when needed.

The lymph system, a network of vessels that carry white blood cells and a fluid called lymph throughout your body to fight infection, absorbs fatty acids and vitamins.

Your body uses sugars, amino acids, fatty acids, and glycerol to build substances you need for energy, growth, and cell repair.

How does my body control the digestive process?

Your hormones and nerves work together to help control the digestive process. Signals flow within your GI tract and back and forth from your GI tract to your brain.

Hormones

Cells lining your stomach and small intestine make and release hormones that control how your digestive system works. These hormones tell your body when to make digestive juices and send signals to your brain that you are hungry or full. Your pancreas also makes hormones that are important to digestion.

Nerves

You have nerves that connect your central nervous system—your brain and spinal cord—to your digestive system and control some digestive functions. For example, when you see or smell food, your brain sends a signal that causes your salivary glands to "make your mouth water" to prepare you to eat.

You also have an enteric nervous system (ENS)—nerves within the walls of your GI tract. When food stretches the walls of your GI tract, the nerves of your ENS release many different substances that surined up or delay the movement of food and the production of digestive juices. The nerves send signals to control the actions of your gut muscles to contract and relax to push food through your intestines.

Clinical Trials

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) and other components of the National Institutes of Health (NIH) conduct and support research into many diseases and conditions.

The biliary tract

Your biliary tract is in your upper abdomen (belly). Organs in your biliary tract support digestion by delivering bile and enzymes that help your small intestine break down food. Your biliary tract includes your:

- **Bile ducts**: You have bile ducts inside and outside your liver. They connect to your gallbladder.
- **Gallbladder**: Your gallbladder is tucked below your liver on the right side of your body.
- **Liver**: An organ and a gland, your liver is on the right side of your body under your ribs.
- **Pancreas**: This organ is behind your stomach and in front of your spine on the right side of your body.

Conditions and Disorders

What are some common conditions and disorders that affect the digestive system?

Many different conditions and disorders can disrupt your digestive system. Some are acute, meaning they don't last for long. Others may be long-term or chronic illnesses. And some — like colon cancer, esophageal cancer or liver cancer — are serious diseases that can be life-threatening.

Examples include:

- **Acid reflux and GERD**: Stomach acid that flows into your esophagus causes indigestion and heartburn.
- **Celiac disease**: This is an autoimmune disorder that's triggered when you eat gluten, a type of protein.
- **Constipation**: Hard, dry poops from constipation are one of the most frequent gastrointestinal issues.
- **Diarrhea**: Loose, watery poop is one of the most common gut issues.
- **Diverticulosis** and **diverticulitis**: These conditions happen when little pouches (diverticula) develop in your colon.
- **Gastroenteritis (stomach flu)**: Stomach flu is a viral infection in your stomach and intestines.
- **Hemorrhoids**: Swollen veins inside of your rectum or outside of your anus can itch and hurt.
- **Inflammatory bowel disease (IBD)**: Crohn's disease and ulcerative colitis are two common inflammatory bowel diseases.
- **Stomach ulcers**: These are open sores in your stomach lining.

What are common symptoms of digestive system disorders?

Almost all common digestive system disorders can cause the following symptoms:

- Abdominal pain.
- Constipation.

- Diarrhea.
- Nausea and vomiting.

If you're like most people, you've had your share of occasional upset stomachs or loose poops that clear up within a few days. But any symptom that lasts for more than a few days, gets worse, or goes away and comes back is a reason to call a healthcare provider.

What are common tests to check the digestive system?

Healthcare providers may order one or more of the following tests to diagnose issues with your digestive system:

- **Biopsy**: Biopsies are procedures to get samples of tissue and fluid. Healthcare providers may order biopsies to diagnose digestive system issues like stomach ulcers or cancer.
- **Blood tests**: A healthcare provider may order tests like a complete blood count (CBC), basic metabolic panel (BMP) or a comprehensive metabolic panel (CMP) to diagnose issues with your digestive system.
- **Bowel function tests**: These include tests like anorectal manometry or defecography.
- **Endoscopy**: Providers do different types of endoscopies to examine the inside of your digestive system organs.
- **Gastrointestinal (GI) exams**: These exams involve X-rays that examine your GI tract**.**
- **Stool tests**: Medical pathologists look for germs or pathogens in your poop.

What are common treatments for these conditions and disorders?

Your digestive system is complicated because it contains many different organs. That's why there's no one treatment for conditions or disorders that can affect it. In general, healthcare providers recommend treatments like:

- **Lifestyle changes**: Changing what you eat, how you eat or even drinking more water may ease symptoms. For example, avoiding gluten is a treatment for celiac disease.
- **Medication**: Examples are corticosteroids to calm inflammation from Crohn's disease or proton pump inhibitors (PPIs) for excess stomach acid.
- **Surgery**: Providers may do surgery to repair damage or remove a cancerous tumor.