

# Peptic Ulcer Disease and NSAIDs

National Digestive Diseases Information Clearinghouse



National Institute of  
Diabetes and Digestive  
and Kidney Diseases

## What is a peptic ulcer?

A peptic ulcer is a sore on the inner lining of the stomach or duodenum—the first part of the small intestine. Less commonly, a peptic ulcer may develop just above the stomach in the esophagus—the organ that connects the mouth to the stomach.

## What causes peptic ulcer disease?

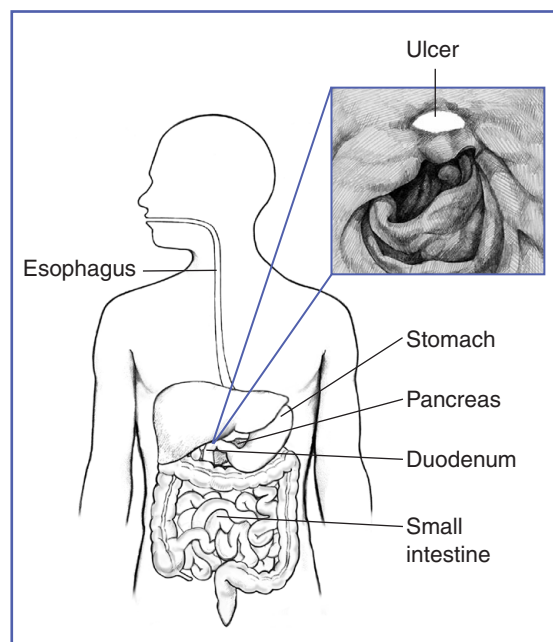
Causes of peptic ulcer disease include

- long-term use of nonsteroidal anti-inflammatory drugs (NSAIDs), such as aspirin and ibuprofen
- an infection with the bacteria *Helicobacter pylori* (*H. pylori*)
- rarely, cancerous or noncancerous tumors in the stomach, duodenum, or pancreas

## What are nonsteroidal anti-inflammatory drugs?

Nonsteroidal anti-inflammatory drugs reduce pain, fever, and inflammation, or swelling. A small, daily dose of one common NSAID—aspirin—can even help prevent heart attacks in some people.

In addition to aspirin and ibuprofen, another common over-the-counter NSAID is naproxen (Aleve). Acetaminophen (Tylenol) is not an NSAID. Some NSAIDs require a prescription.



A peptic ulcer is a sore on the inner lining of the stomach or duodenum.

## What are *H. pylori*?

*H. pylori* are spiral-shaped bacteria that can cause peptic ulcer disease by damaging the mucous coating that protects the lining of the stomach and duodenum. Once *H. pylori* damage the mucous coating, powerful stomach acid can get through to the sensitive lining. Together, the stomach acid and *H. pylori* irritate the lining of the stomach or duodenum and cause a peptic ulcer.

Read more in *Peptic Ulcer Disease and H. pylori* at [www.digestive.niddk.nih.gov](http://www.digestive.niddk.nih.gov).

## How do nonsteroidal anti-inflammatory drugs cause peptic ulcer disease?

To understand how NSAIDs cause peptic ulcer disease, it is important to understand how NSAIDs work. Everyone has two enzymes called COX-1 and COX-2. Enzymes are proteins in the body that control chemical reactions. COX-1 and COX-2 produce chemicals in the body's cells that promote pain, inflammation, and fever. NSAIDs work by blocking or reducing the amount of COX-1 and COX-2 the body makes.

However, COX-1 also produces another type of chemical that protects the stomach lining from stomach acid and helps control bleeding. When NSAIDs block or reduce the amount of COX-1 in the body, they also increase a person's chance of developing a peptic ulcer.

## Who is more likely to develop a peptic ulcer caused by nonsteroidal anti-inflammatory drugs?

People who regularly take NSAIDs—including those with chronic conditions such as arthritis—are more likely to develop a peptic ulcer than people who do not take them regularly. Even occasional users of NSAIDs—of any age—can develop a peptic ulcer. The chance of developing an NSAID-induced peptic ulcer increases with the following:

- dose of NSAIDs
- frequency of NSAID use
- use of multiple NSAIDs
- length of time taking NSAIDs
- age—peptic ulcer disease is more likely in those age 70 or older
- being female
- having a history of peptic ulcer disease
- smoking
- alcohol use
- having two or more medical conditions or diseases
- use of other medications, such as steroids and medications that increase bone mass

## What are the signs and symptoms of peptic ulcer disease?

A dull or burning pain in the stomach is the most common symptom of peptic ulcer disease. A person can feel this pain anywhere between the navel and the breastbone. The pain usually

- occurs when a person's stomach is empty—such as between meals or during the night
- lessens briefly after eating food or taking antacids
- lasts for minutes to hours
- comes and goes for several days, weeks, or months

Other, less common symptoms include

- bloating
- burping
- changes in appetite
- nausea
- vomiting
- weight loss

## Seek Immediate Care

A person who has any of the following symptoms should call a health care provider right away:

- difficulty breathing
- dizziness or feeling faint
- red blood in the stool or black stools
- red blood in vomit or vomit that looks like coffee grounds
- sharp, sudden, and severe stomach pain

These symptoms could be signs of peptic ulcer disease complications.

## What are the complications of peptic ulcer disease?

Complications of peptic ulcer disease include

- internal bleeding—when gastric acid or a peptic ulcer breaks a blood vessel
- obstruction—when a peptic ulcer blocks the path of food trying to leave the stomach
- perforation—when a peptic ulcer grows deeper and breaks completely through the stomach or duodenal wall
- peritonitis—when infection or inflammation develops in the peritoneum, or lining of the abdominal cavity

## How is peptic ulcer disease diagnosed?

A health care provider diagnoses peptic ulcer disease based on

- a medical history
- a physical exam
- lab tests
- upper gastrointestinal (GI) endoscopy
- upper GI series
- computerized tomography (CT) scan

## Medical History

Taking a medical history may help a health care provider determine the cause of peptic ulcer disease. If a patient has peptic ulcer disease symptoms, the health care provider will ask about the patient's use of over-the-counter and prescription NSAIDs.

## Physical Exam

A physical exam may help the health care provider diagnose the cause of peptic ulcer disease. During a physical exam, a health care provider usually

- checks for abdominal bloating
- listens to sounds within the abdomen using a stethoscope
- taps on the abdomen checking for tenderness or pain

## Lab Tests

The health care provider will look to see if *H. pylori* are present using one of three simple tests:

- blood test
- urea breath test
- stool test

The breath test and stool test more accurately detect *H. pylori* than the blood test, so some health care providers prefer to use one of these two tests. Testing is important because health care providers treat *H. pylori*-induced peptic ulcer disease differently from peptic ulcer disease caused by NSAIDs.

Read more in *Peptic Ulcer Disease and H. pylori* at [www.digestive.niddk.nih.gov](http://www.digestive.niddk.nih.gov).

**Blood test.** A blood test involves drawing a sample of a patient's blood at a health care provider's office or a commercial facility and sending the sample to a lab for analysis. The blood test can show the presence of *H. pylori*.

**Urea breath test.** For a breath test, the patient swallows a special liquid that contains urea—a waste product the body produces as it breaks down protein. If *H. pylori* are present, the bacteria will convert the urea into carbon dioxide. A nurse or technician will take samples of a patient's breath at a health care provider's office or a commercial facility and send the samples to a lab to measure the level of carbon dioxide.

**Stool test.** A stool test is the analysis of a sample of stool. The health care provider will give the patient a container to take home for catching and storing the stool. The patient returns the sample to the health care provider or a commercial facility, and it is sent to a lab for analysis. Stool tests can show the presence of *H. pylori*.

## Upper Gastrointestinal Endoscopy

Upper GI endoscopy is a procedure that uses an endoscope—a small, flexible camera with a light—to see the upper GI tract. A health care provider performs the test at a hospital or an outpatient center. The health care provider carefully feeds the endoscope down the patient's esophagus and into the stomach and duodenum. The small camera built into the endoscope transmits a video image to a monitor, allowing close examination of the GI lining. A health care provider may give a patient a liquid anesthetic to gargle or may spray anesthetic on the back of the patient's throat before inserting the endoscope. A health care provider will place an intravenous (IV) needle in a vein in the arm to administer sedation. Sedatives help patients stay relaxed and comfortable. The test may show signs of inflammation or erosions in the stomach lining.

The health care provider can pass tiny tools through the endoscope to

- take photos of the peptic ulcer.
- obtain a biopsy of the lining of the stomach or small intestine. A biopsy is a procedure that involves taking a small piece of tissue for examination with a microscope by a pathologist—a health care provider who specializes in examining tissues to diagnose diseases. The patient will not feel the biopsy. The test can show the presence of *H. pylori*.
- inject medications that help the blood clot.
- stop any bleeding with an electrical probe or special medications.

Read more in *Upper GI Endoscopy* at [www.digestive.niddk.nih.gov](http://www.digestive.niddk.nih.gov).

## Upper Gastrointestinal Series

Upper GI series is an x-ray exam that provides a look at the shape of the upper GI tract to help diagnose peptic ulcer disease. An x-ray technician performs this test at a hospital or an outpatient center, and a radiologist—a health care provider who specializes in medical imaging—interprets the images. This test does not require anesthesia. A patient should not eat or drink before the procedure, as directed by his or her health care provider. Patients should ask their health care provider about how to prepare for an upper GI series.

During the procedure, the patient will stand or sit in front of an x-ray machine and drink barium, a chalky liquid that coats the esophagus, stomach, and small intestine so the radiologist and health care provider can see the shape of these organs more clearly on the x rays.

A patient may experience bloating and nausea for a short time after the test. For several days afterward, barium liquid in the GI tract causes white or light-colored stools. A health care provider will give the patient specific instructions about eating and drinking after the test.

Read more in *Upper GI Series* at [www.digestive.niddk.nih.gov](http://www.digestive.niddk.nih.gov).

## Computerized Tomography Scan

Computerized tomography scans use a combination of x rays and computer technology to create images. For a CT scan, a nurse or technician may give the patient a solution to drink and an injection of a special dye, called contrast medium. CT scans require the patient to lie on a table that slides into a tunnel-shaped device that takes the x rays. An x-ray technician performs the procedure in an outpatient center or a hospital, and a radiologist interprets the images. The patient does not need anesthesia. CT scans can help diagnose a perforated peptic ulcer.

## How is peptic ulcer disease treated?

How a health care provider treats peptic ulcer disease will depend on its cause. In the case of NSAID-induced peptic ulcer disease, the absence or presence of *H. pylori* also determines the treatment strategy.

## NSAID-induced Peptic Ulcer Disease without *H. pylori* Present

If NSAIDs are the cause of a patient's peptic ulcer and *H. pylori* are not present, the health care provider prescribes medication to reduce stomach acid. Medications that reduce stomach acid can help relieve pain and promote healing. They include

- proton pump inhibitors (PPIs), which suppress acid production by halting the mechanism that pumps acid into the stomach. While PPIs cannot kill *H. pylori*, they do help fight the *H. pylori* infection. PPIs include
  - omeprazole (Prilosec, Zegerid)
  - lansoprazole (Prevacid)
  - pantoprazole (Protonix)
  - rabeprazole (Aciphex)
  - esomeprazole (Nexium)
  - dexlansoprazole (Dexilant)
- histamine receptor blockers, which work by blocking histamine, a substance that stimulates acid production. Histamine receptor blockers include
  - cimetidine (Tagamet)
  - ranitidine (Zantac)
  - famotidine (Pepcid)
  - nizatidine (Axid)

## NSAID-induced Peptic Ulcer Disease with *H. pylori* Present

When *H. pylori* are present, a health care provider will treat an NSAID-induced peptic ulcer with PPIs or histamine receptor blockers and other medications, including

- antibiotics
- bismuth subsalicylate
- antacids

**Antibiotics.** A health care provider will prescribe antibiotics to kill *H. pylori*. Antibiotic regimens may differ throughout the world because some strains of *H. pylori* have become resistant to certain antibiotics over time—meaning that an antibiotic that once destroyed a particular strain of bacteria is no longer effective against that strain.

Although antibiotics can cure most *H. pylori*-induced peptic ulcers, eliminating the bacteria can be difficult. People should take all doses of their antibiotics exactly as their health care provider prescribes, even when the pain from a peptic ulcer is gone.

**Bismuth subsalicylate.** Medications containing bismuth subsalicylate, such as Pepto Bismol, coat a peptic ulcer and protect it from stomach acid. Although bismuth subsalicylate may kill *H. pylori*, health care providers use it with—not in place of—antibiotics in some treatment regimens.

**Antacids.** Although an antacid may make the pain from a peptic ulcer go away temporarily, it will not kill *H. pylori*. Patients receiving treatment for an *H. pylori*-induced peptic ulcer should check with their health care provider before taking antacids. Some of the antibiotics that health care providers use to kill *H. pylori* may not work as well if patients combine them with an antacid.

In addition, health care providers may use one of three standard therapies to treat *H. pylori*-induced peptic ulcer disease:

- **Triple therapy.** The patient takes the antibiotic clarithromycin, a PPI, and either metronidazole or the penicillinlike antibiotic amoxicillin for 7 to 14 days.



- **Quadruple therapy.** The patient takes a PPI, bismuth subsalicylate, and the antibiotics tetracycline and metronidazole for 14 days. Health care providers use quadruple therapy to treat patients in one of several situations, including if the patient
  - cannot take amoxicillin because of a penicillin allergy
  - has undergone treatment before with a macrolide antibiotic, such as clarithromycin
  - is still infected with *H. pylori* because triple therapy failed to kill the bacteria
- **Sequential therapy.** The patient takes a PPI and amoxicillin for 5 days, followed by a PPI, clarithromycin, and tinidazole for another 5 days.

Triple therapy, quadruple therapy, and sequential therapy may cause nausea and other side effects, including

- a darkened tongue
- altered taste
- darkened stools
- diarrhea
- headaches
- temporary reddening of the skin when drinking alcohol
- vaginal yeast infections

Patients should discuss any bothersome side effects with their health care provider, who may prescribe other medications.

At least 4 weeks after a patient's treatment ends, his or her health care provider will perform a breath or stool test again to be sure the treatment has cured the *H. pylori* infection. Blood tests are not useful after treatment because a person's blood can test positive for *H. pylori* even after treatment has eliminated the bacteria.

If the infection is still present, a peptic ulcer could return or, rarely, stomach cancer could develop. Thus, some people need to take more than one round of medications to kill the *H. pylori* bacteria. Quadruple therapy is one of several treatments that health care providers use after an initial treatment has failed—a strategy called “rescue” or “salvage” therapy. In the second round of treatment, the health care provider may prescribe different antibiotics than those that he or she prescribed in the first round.

## What if nonsteroidal anti-inflammatory drugs are still needed?

People who take NSAIDs for other conditions—such as arthritis—should consult with their health care provider to weigh the benefits and risks of using NSAIDs, even when NSAIDs have caused an ulcer. People who have an ulcer and have stopped taking an NSAID at their health care provider's request may want to resume using it once they feel better. In such cases, a health care provider can help a person determine how he or she can continue using an NSAID safely.

People should tell their health care provider about all prescription and over-the-counter medications they take. The health care provider can then decide if the person may safely use NSAIDs or if the person should switch to a different medication. In either case, the health care provider may prescribe a PPI or histamine receptor blocker to protect the lining of the person's stomach and duodenum.

People who need the benefits of NSAIDs can reduce the chance of a peptic ulcer returning by

- taking the NSAID with a meal
- using the lowest effective dose possible
- quitting smoking
- avoiding or limiting alcohol

Peptic ulcer disease can return, even when people have been careful to reduce their risk.

## Eating, Diet, and Nutrition

Researchers have not found that eating, diet, and nutrition play a role in causing or preventing peptic ulcer disease.

In the past, people believed that drinking milk helped a peptic ulcer heal. Health care providers now know that while milk may make a peptic ulcer feel better briefly, it also increases stomach acid, which can make a peptic ulcer worse. People should talk with their health care provider about drinking milk while a peptic ulcer is healing.

Stress and spicy food are not causes of peptic ulcer disease; however, they can make symptoms worse. Drinking alcohol and smoking can also worsen a peptic ulcer and prevent healing.

## Points to Remember

- A peptic ulcer is a sore on the inner lining of the stomach or duodenum—the first part of the small intestine.
- Causes of peptic ulcer disease include
  - long-term use of nonsteroidal anti-inflammatory drugs (NSAIDs), such as aspirin and ibuprofen
  - an infection with the bacteria *Helicobacter pylori* (*H. pylori*)
  - rarely, cancerous or noncancerous tumors in the stomach, duodenum, or pancreas
- A dull or burning pain in the stomach is the most common symptom of peptic ulcer disease. A person can feel this pain anywhere between the navel and the breastbone.
- How a health care provider treats peptic ulcer disease will depend on its cause.
- Stress and spicy food are not causes of peptic ulcer disease; however, they can make symptoms worse. Drinking alcohol and smoking can also worsen a peptic ulcer and prevent healing.

## Hope through Research

The National Institute of Diabetes and Digestive and Kidney Diseases' (NIDDK's) Division of Digestive Diseases and Nutrition conducts and supports basic and clinical research into many digestive disorders.

Clinical trials are research studies involving people. Clinical trials look at safe and effective new ways to prevent, detect, or treat disease. Researchers also use clinical trials to look at other aspects of care, such as improving the quality of life for people with chronic illnesses. To learn more about clinical trials, why they matter, and how to participate, visit the NIH Clinical Research Trials and You website at [www.nih.gov/health/clinicaltrials](http://www.nih.gov/health/clinicaltrials). For information about current studies, visit [www.ClinicalTrials.gov](http://www.ClinicalTrials.gov).

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