

NSAIDs and Peptic Ulcers

National Digestive Diseases Information Clearinghouse



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What is a peptic ulcer?

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

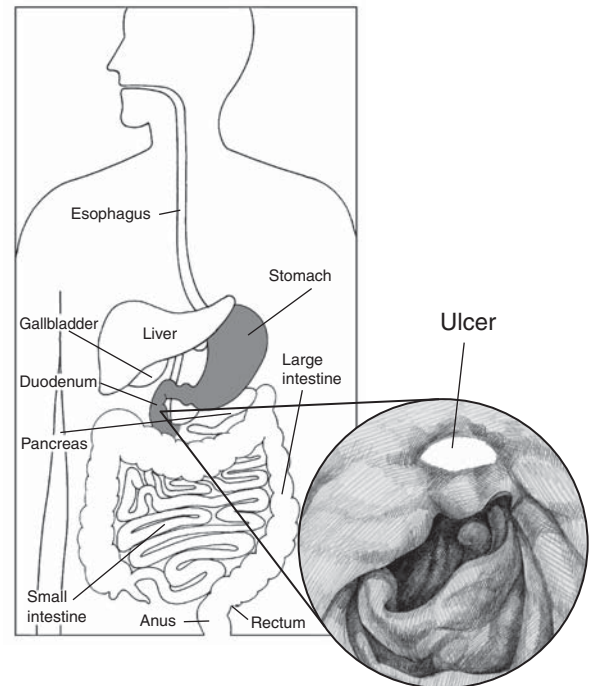
A peptic ulcer in the stomach is called a gastric ulcer. One that occurs in the duodenum is called a duodenal ulcer. People can have both gastric and duodenal ulcers at the same time. They also can develop peptic ulcers more than once in their lifetime.

Peptic ulcers are common. Each year in the United States, about half a million people develop a peptic ulcer.¹

What causes peptic ulcers?

A bacterium called *Helicobacter pylori* (*H. pylori*) is a major cause of peptic ulcers. *H. pylori*-induced ulcers often occur in the duodenum. Nonsteroidal anti-inflammatory drugs (NSAIDs), such as aspirin and ibuprofen, are another common cause. Ulcers caused by NSAID use frequently appear in the stomach. Rarely, cancerous or noncancerous tumors in the stomach, duodenum, or pancreas cause ulcers.

Peptic ulcers are not caused by stress or eating spicy food, but both can make ulcer symptoms worse. Smoking and drinking alcohol also can worsen ulcers and prevent healing.



NSAIDs can cause peptic ulcers—sores on the lining of the stomach or duodenum.

What is *H. pylori*?

H. pylori is a type of bacteria—a germ that may cause infection. *H. pylori* infection is common, particularly in developing countries, and usually begins in childhood. Symptoms usually don't occur until adulthood, although most people never develop symptoms. *H. pylori* bacteria are found in roughly half of people who develop peptic ulcers.¹

¹Ramakrishnan K, Salinas RC. Peptic ulcer disease. *American Family Physician*. 2007;76(7):1005–1012.

What are NSAIDs?

NSAIDs are medicines that reduce pain, fever, and inflammation. A small, daily dose of one common NSAID—aspirin—can even help prevent heart attacks in some people.

In addition to aspirin and ibuprofen, other common over-the-counter NSAIDs include naproxen and ketoprofen. Acetaminophen is not an NSAID. Some NSAIDs require a doctor's prescription.

NSAIDs offer many benefits. However, people who regularly take these medicines—such as those with chronic conditions like arthritis—are five times more likely to develop peptic ulcers than people who do not take them.² Even occasional users of NSAIDs—of any age—can develop a peptic ulcer. But the risk of developing an NSAID-induced peptic ulcer increases with

- dose and frequency of NSAIDs
- use of multiple NSAIDs
- length of time taking NSAIDs
- age—more likely in those age 60 or older
- gender—more common in women than men
- a history of peptic ulcers
- smoking
- alcohol use
- use of corticosteroids, such as prednisone

²Huang J-Q, Sridhar S, Hunt RH. Role of *Helicobacter pylori* infection and non-steroidal anti-inflammatory drugs in peptic ulcer disease: a meta-analysis. *Lancet*. 2002;359:14–22.

How do NSAIDs cause a peptic ulcer?

NSAIDs work by inhibiting two enzymes, substances that cause chemical changes in the body, called COX-1 and COX-2. Both enzymes produce prostaglandins—chemicals produced in the body's cells—that promote pain, inflammation, and fever.

However, unlike COX-2, COX-1 produces another type of prostaglandin that protects the stomach lining from stomach acid and helps control bleeding. By inhibiting COX-1, NSAIDs increase the risk of a peptic ulcer developing and bleeding.

What are the symptoms of a peptic ulcer?

Abdominal discomfort is the most common symptom of both gastric and duodenal ulcers. Felt anywhere between the navel and the breastbone, this discomfort usually

- is a dull or burning pain
- occurs when the stomach is empty—between meals or during the night
- may be briefly relieved by eating food, in the case of duodenal ulcers, or by taking antacids, in both types of peptic ulcers
- lasts for minutes to hours
- comes and goes for several days or weeks

Other symptoms of a peptic ulcer may include

- weight loss
- poor appetite
- bloating
- burping
- nausea
- vomiting

Some people experience only mild symptoms or none at all.

Emergency Symptoms

A person who has any of the following symptoms should call a doctor right away:

- sharp, sudden, persistent, and severe stomach pain
- bloody or black stools
- bloody vomit or vomit that looks like coffee grounds

These “alarm” symptoms could be signs of a serious problem, such as

- bleeding—when acid or the peptic ulcer breaks a blood vessel
- perforation—when the peptic ulcer burrows completely through the stomach or duodenal wall
- obstruction—when the peptic ulcer blocks the path of food trying to leave the stomach

How is a peptic ulcer diagnosed?

Noninvasive Techniques

If a patient has peptic ulcer symptoms, the doctor first asks about use of over-the-counter and prescription NSAIDs. Patients who are taking an NSAID are asked to stop, reduce the dose, or switch to another medication.

Then the doctor tests to see if *H. pylori* is present. Testing is important because people with an *H. pylori* infection require additional medicines than are given to people who have an NSAID-induced ulcer but no infection.

Doctors use one of three simple, noninvasive tests to detect *H. pylori* in a patient’s blood, breath, or stool. Because the breath test and stool test more accurately detect *H. pylori* than the blood test, some doctors prefer to use one of these two tests. Each test

described below is easily performed, often in an outpatient setting such as a doctor’s office or lab.

- **Blood test.** A blood sample is taken from the patient’s vein and tested for *H. pylori* antibodies. Antibodies are substances the body produces to fight invading harmful substances—called antigens—such as the *H. pylori* bacterium.
- **Urea breath test.** The patient swallows a capsule, liquid, or pudding that contains urea “labeled” with a special carbon atom. After a few minutes, the patient breathes into a container, exhaling carbon dioxide. If the special carbon atom is found in the exhaled breath, *H. pylori* is present, as this bacterium contains large amounts of urease, a chemical that breaks urea down into carbon dioxide and ammonia.
- **Stool antigen test.** The patient provides a stool sample, which is tested for *H. pylori* antigens.

Invasive Techniques

If a patient has any alarm symptoms, the doctor orders an endoscopy or upper gastrointestinal (GI) series. Many doctors also recommend these tests for patients who first experience peptic ulcer symptoms around age 50. Often performed as outpatient procedures in a hospital, both procedures are painless and allow the doctor to look inside the patient’s stomach and duodenum.

For an endoscopy, the patient is lightly sedated. The doctor passes an endoscope—a thin, lighted tube with a tiny camera on the end—into the patient’s mouth and down the throat to the stomach and duodenum. With this tool, the doctor can closely examine the lining of the esophagus, stomach, and duodenum.

The doctor can use the endoscope to take photos of ulcers or remove a tiny piece of tissue—no bigger than a match head—to view with a microscope. This procedure is called a biopsy. The biopsied tissue is examined to see if *H. pylori* is present.

If an ulcer is bleeding, the doctor can use the endoscope to inject medicines that help the blood clot or to guide a heat probe that burns tissue to stop bleeding—a process called cauterization.

For an upper GI series, the patient drinks a white, chalky liquid called barium. The barium makes the esophagus, stomach, and duodenum and any ulcers show up clearly on an x ray. Sedation is not necessary for this procedure.

How is a peptic ulcer treated?

Peptic ulcers are treated based on their cause. In the case of NSAID-induced ulcers, the presence of *H. pylori* also determines the treatment strategy.

NSAID-induced Ulcers without *H. pylori* Present

If NSAIDs are the cause and *H. pylori* is not present, the doctor prescribes medicine to reduce stomach acid. Proton pump inhibitors (PPIs) and histamine receptor blockers (H2 blockers) are acid-reducing medicines that help relieve peptic ulcer pain after a few weeks and promote ulcer healing.

PPIs and H2 blockers work in different ways:

- PPIs suppress acid production by halting the mechanism that pumps acid into the stomach.
- H2 blockers work by blocking histamine, which stimulates acid secretion.

PPIs offer the added benefit of reducing the risk of serious complications—alarm symptoms—in people with ulcers caused by NSAIDs. Research shows that after 4 weeks of treatment, patients taking PPIs had earlier pain relief and better healing rates than those taking H2 blockers.

NSAID-induced Ulcers with *H. pylori* Present

In addition to treating an NSAID-induced ulcer with a PPI or an H2 blocker, antibiotics are prescribed if an *H. pylori* infection is present. Antibiotics destroy the *H. pylori* bacteria and cure the infection. Bismuth subsalicylate (Pepto-Bismol) also may be prescribed to protect the stomach lining from acid. Although bismuth subsalicylate may kill *H. pylori*, it is used with—not in place of—antibiotics in some treatment regimens.

Antibiotic regimens may differ throughout the world because some strains of *H. pylori* have become resistant to certain antibiotics—meaning that an antibiotic that once destroyed the bacterium is no longer effective. Doctors closely follow research on antibiotic treatments for *H. pylori* infection to know which treatment strategy will destroy which strain.

In the United States, clarithromycin-based triple therapy—triple therapy, for short—is the standard treatment for an *H. pylori* infection. The doctor prescribes the antibiotic clarithromycin, a PPI, and the antibiotics amoxicillin or metronidazole for 10 to 14 days. Because research shows higher cure rates with 14 days of treatment, some doctors now prescribe triple therapy for this longer period.

Bismuth quadruple therapy is another treatment strategy used in the United States. The patient takes a PPI, bismuth subsalicylate, and the antibiotics tetracycline and metronidazole for 10 to 14 days. Bismuth quadruple therapy is used to treat patients in one of several situations, including if the patient

- cannot take amoxicillin—a penicillin-like antibiotic—because of a penicillin allergy
- has been treated before with a macrolide antibiotic, such as clarithromycin
- is still infected with *H. pylori* because triple therapy failed to kill the bacteria

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

- stomach upset
- diarrhea
- headache
- a metallic taste
- a darkened tongue or stools
- flushing when drinking alcohol
- sensitivity to the sun

Patients should discuss any bothersome side effects with their doctor, who may prescribe other medicines to kill the bacteria and cure the ulcer.

Although antibiotics can cure 80 to 90 percent of *H. pylori* infections,³ eliminating *H. pylori* can be difficult. Patients must take all medicines exactly as prescribed, even when the peptic ulcer pain is gone.

At least 4 weeks after treatment, doctors test patients using a breath or stool test to be sure the *H. pylori* infection has been cured. Blood tests are not useful after treatment because a patient's blood can test positive for *H. pylori* even after the bacteria have been eliminated.

If infection is still present, ulcers could recur or, less commonly, stomach cancer could develop. Thus, some patients need to take more than one round of medicines to kill the *H. pylori* bacteria. Bismuth quadruple therapy is one of several treatments used after initial treatment has failed—a strategy called “rescue” or “salvage” therapy. In the second round of treatment, the doctor prescribes different antibiotics than those used in the first round. Amoxicillin, however, can be used again to treat *H. pylori* infection because *H. pylori* resistance to this antibiotic is rare.

Can *H. pylori* infection be prevented?

No one knows for sure how *H. pylori* spreads, so prevention is difficult. Researchers are trying to develop a vaccine to prevent—and even cure—*H. pylori* infection. To help prevent infection, doctors advise people to

- wash their hands with soap and water after using the bathroom and before eating
- eat food that has been washed well and cooked properly
- drink water from a clean, safe source

³Yuan Y, Padol IT, Hunt RH. Peptic ulcer today. *Nature Clinical Practice: Gastroenterology & Hepatology*. 2006;3(2):80–89.

Can antacids or milk help a peptic ulcer heal?

An antacid may make the ulcer pain go away temporarily, but it will not kill *H. pylori*. People being treated for *H. pylori* should check with their doctor before taking antacids. Some of the antibiotics used to kill *H. pylori* may not work as well if combined with an antacid.

People used to believe drinking milk helped peptic ulcers heal. But doctors know now that while milk may make an ulcer feel better briefly, it also increases stomach acid, which makes ulcers worse. Patients should talk with their doctor about drinking milk while an ulcer is healing.

What if NSAIDs are still needed?

Many people have come to rely on NSAIDs. Some take the smallest possible dose of aspirin once a day to keep their heart healthy. Others take NSAIDs throughout the day to reduce pain and inflammation. As with all medicines, NSAIDs offer many benefits, while also carrying some risks.

Doctors and patients work together to weigh the benefits and risks of using NSAIDs, even when NSAIDs have caused an ulcer. Patients who stop taking an NSAID at their doctor's request may want to resume use once they feel better. In other patients, the benefits of taking an NSAID outweigh the risks. In such cases, the doctor works with the patient to determine how an NSAID can be safely continued.

Whether deciding to resume or continue using NSAIDs, patients should tell their doctor about all prescription and nonprescription medicines they take. The doctor

then decides if the patient can safely use an NSAID that caused an ulcer or should switch to a different NSAID. In either case, the doctor prescribes a PPI or H2 blocker to protect the stomach and duodenal lining and promote healing.

People with a current or resolved NSAID-induced ulcer who need the benefits of NSAIDs can promote healing and reduce the risk of ulcer recurrence by

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

Peptic ulcers can return, however, even when patients have been careful to reduce their risk.

Points to Remember

- A peptic ulcer is a sore in the lining of the stomach or duodenum.
- Use of NSAIDs—such as aspirin and ibuprofen—is a leading cause of peptic ulcers. The bacterium *H. pylori* is another major cause.
- Neither stress nor spicy food causes peptic ulcers. Smoking or drinking alcohol, however, each can worsen ulcers and prevent their healing.
- The abdominal discomfort of peptic ulcers
 - feels like a dull or burning pain
 - occurs when the stomach is empty—between meals or during the night
 - may be briefly relieved by eating food, in the case of duodenal ulcers, or by taking antacids, in both types of peptic ulcers

- lasts for minutes to hours
- comes and goes for several days or weeks
- People with NSAID-induced ulcers may have to stop taking the NSAID, try a lower dose, or switch medicines.
- If NSAIDs are still needed, acid-reducing medicines are taken to protect the stomach and duodenal lining and promote healing.
- In many people who develop ulcers from NSAIDs, *H. pylori* bacteria are also present.
- If an *H. pylori* infection is present, antibiotics must be taken.
- Testing after treatment for an *H. pylori* infection is needed to be sure the bacteria are gone.
- To help prevent an *H. pylori* infection, people should
 - wash their hands after using the bathroom and before eating
 - eat properly prepared food
 - drink water from a clean, safe source
- To help prevent ulcers from NSAIDs, doctors may ask their patients to
 - take NSAIDs with a meal
 - use the lowest effective dose possible
 - take a PPI or H2 blocker

Hope through Research

Researchers are searching for ways to give people the benefits of NSAIDs without the GI risks. The range of research includes studies to

- compare the effectiveness of existing medicines used to prevent ulcer development and complications
- develop new medicines to prevent ulcer development and complications
- identify GI-friendly alternatives to NSAIDs
- improve understanding of how the duodenal lining can protect itself from stomach-acid injury

Participants in clinical trials can play a more active role in their own health care, gain access to new research treatments before they are widely available, and help others by contributing to medical research. For information about current studies, visit www.ClinicalTrials.gov.

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