Diverticular Disease

National Digestive Diseases Information Clearinghouse

National Institute of Diabetes and Digestive and Kidney Diseases

What is diverticular disease?

Diverticular disease is a condition that occurs when a person has problems from small pouches, or sacs, that have formed and pushed outward through weak spots in the colon wall. Each pouch is called a diverticulum. Multiple pouches are called diverticula.

The colon is part of the large intestine. The large intestine absorbs water from stool and changes it from a liquid to a solid form. Diverticula are most common in the lower part of the colon, called the sigmoid colon.

The problems that occur with diverticular disease include diverticulitis and diverticular bleeding. Diverticulitis occurs when the diverticula become inflamed, or irritated and swollen, and infected. Diverticular bleeding occurs when a small blood vessel within the wall of a diverticulum bursts.

Diverticular disease is a condition that occurs when a person has problems from small pouches, or sacs, that have formed and pushed outward through weak spots in the colon wall.

What is diverticulosis?

When a person has diverticula that do not cause diverticulitis or diverticular bleeding, the condition is called diverticulosis. Most people with diverticulosis do not have symptoms. Some people with diverticulosis have constipation or diarrhea. People may also have chronic

- cramping or pain in the lower abdomen—the area between the chest and hips
- bloating

Other conditions, such as irritable bowel syndrome and stomach ulcers, cause similar problems, so these symptoms do not always mean a person has diverticulosis. People with these symptoms should see their health care provider.

What causes diverticulosis and diverticular disease?

Scientists are not certain what causes diverticulosis and diverticular disease. For more than 50 years, the most widely accepted theory was that a low-fiber diet led to diverticulosis and diverticular disease. Diverticulosis and diverticular disease were first noticed in the United States in the early 1900s, around the time processed foods were introduced into the American diet. Consumption of processed foods greatly reduced Americans' fiber intake. Diverticulosis and diverticular disease are common in Western and industrialized countries—particularly the United States, England, and Australia—where low-fiber diets are common. The condition is rare in Asia and Africa, where most people eat high-fiber diets.[1] Two large studies also indicate that a low-fiber diet may increase the chance of developing diverticular disease.[2]

However, a recent study found that a low-fiber diet was not associated with diverticulosis and that a high-fiber diet and more frequent bowel movements may be linked to an increased rather than decreased chance of diverticula.[3]

Other studies have focused on the role of decreased levels of the neurotransmitter serotonin in causing decreased relaxation and increased spasms of the colon muscle. A neurotransmitter is a chemical that helps brain cells communicate with nerve cells. However, more studies are needed in this area.

Studies have also found links between diverticular disease and obesity, lack of exercise, smoking, and certain medications including nonsteroidal anti-inflammatory drugs, such as aspirin, and steroids.[3]

Scientists agree that with diverticulitis, inflammation may begin when bacteria or stool get caught in a diverticulum. In the colon, inflammation also may be caused by a decrease in healthy bacteria and an increase in disease-causing bacteria. This change in the bacteria may permit chronic inflammation to develop in the colon.

What is fiber?

Fiber is a substance in foods that comes from plants. Fiber helps soften stool so it moves smoothly through the colon and is easier to pass. Soluble fiber dissolves in water and is found in beans, fruit, and oat products. Insoluble fiber does not dissolve in water and is found in whole-grain products and vegetables. Both kinds of fiber help prevent constipation.

Constipation is a condition in which an adult has fewer than three bowel movements a week or has bowel movements with stools that are hard, dry, and small, making them painful or difficult to pass.

High-fiber foods also have many benefits in preventing and controlling chronic diseases, such as cardiovascular disease, obesity, diabetes, and cancer.[2]

Who gets diverticulosis and diverticular disease?

Diverticulosis becomes more common as people age, particularly in people older than age 50.[3] Some people with diverticulosis develop diverticulitis, and the number of cases is increasing. Although diverticular disease is generally thought to be a condition found in older adults, it is becoming more common in people younger than age 50, most of whom are male.[1]

What are the symptoms of diverticular disease?

People with diverticulitis may have many symptoms, the most common of which is pain in the lower left side of the abdomen. The pain is usually severe and comes on suddenly, though it can also be mild and then worsen over several days. The intensity of the pain can fluctuate. Diverticulitis may also cause

- fevers and chills
- nausea or vomiting
- a change in bowel habits—constipation or diarrhea
- diverticular bleeding

In most cases, people with diverticular bleeding suddenly have a large amount of red or maroon-colored blood in their stool. Diverticular bleeding may also cause

- weakness
- dizziness or light-headedness
- abdominal cramping

How are diverticulosis and diverticular disease diagnosed?

Diverticulosis

Health care providers often find diverticulosis during a routine x ray or a colonoscopy, a test used to look inside the rectum and entire colon to screen for colon cancer or polyps or to evaluate the source of rectal bleeding.

Diverticular Disease

Based on symptoms and severity of illness, a person may be evaluated and diagnosed by a primary care physician, an emergency department physician, a surgeon, or a gastroenterologist—a doctor who specializes in digestive diseases.

The health care provider will ask about the person's health, symptoms, bowel habits, diet, and medications, and will perform a physical exam, which may include a rectal exam. A rectal exam is performed in the health care provider's office; anesthesia is not needed. To perform the exam, the health care provider asks the person to bend over a table or lie on one side while holding the knees close to the chest. The health care provider slides a gloved, lubricated finger into the rectum. The exam is used to check for pain, bleeding, or a blockage in the intestine.

The health care provider may schedule one or more of the following tests:

- **Blood test.** A blood test involves drawing a person's blood at a health care provider's office, a commercial facility, or a hospital and sending the sample to a lab for analysis. The blood test can show the presence of inflammation or anemia—a condition in which red blood cells are fewer or smaller than normal, which prevents the body's cells from getting enough oxygen.
- **Computerized tomography (CT) scan.** A CT scan of the colon is the most common test used to diagnose diverticular disease. CT scans use a combination of x rays and computer technology to create three-dimensional (3–D) images. For a CT scan, the person may be given a solution to drink and an injection of a special dye, called contrast medium. CT scans require the person to lie on a table that slides into a tunnel-shaped device where the x rays are taken. The procedure is performed in an outpatient center or a hospital by an x-ray technician, and the images are interpreted by a radiologist—a doctor who specializes in medical imaging. Anesthesia is not needed. CT scans can detect diverticulosis and confirm the diagnosis of diverticulitis.
- **Lower gastrointestinal (GI) series.** A lower GI series is an x-ray exam that is used to look at the large intestine. The test is performed at a hospital or an outpatient center by an x-ray technician, and the images are interpreted by a radiologist. Anesthesia is not needed. The health care provider may provide written bowel prep instructions to follow at home before the test. The person may be asked to follow a clear liquid diet for 1 to 3 days before the procedure. A laxative or enema may be used before the test. A laxative is medication that loosens stool and increases bowel movements. An enema involves flushing water or laxative into the rectum using a special squirt bottle. These medications cause diarrhea, so the person should stay close to a bathroom during the bowel prep.

  For the test, the person will lie on a table while the radiologist inserts a flexible tube into the person's anus. The colon is filled with barium, making signs of diverticular disease show up more clearly on x rays.

  For several days, traces of barium in the large intestine can cause stools to be white or light colored. Enemas and repeated bowel movements may cause anal soreness. A health care provider will provide specific instructions about eating and drinking after the test.
- **Colonoscopy.** The test is performed at a hospital or an outpatient center by a gastroenterologist. Before the test, the person's health care provider will provide written bowel prep instructions to follow at home. The person may need to follow a clear liquid diet for 1 to 3 days before the test. The person may also need to take laxatives and enemas the evening before the test.

In most cases, light anesthesia, and possibly pain medication, helps people relax for the test. The person will lie on a table while the gastroenterologist inserts a flexible tube into the anus. A small camera on the tube sends a video image of the intestinal lining to a computer screen. The test can show diverticulosis and diverticular disease.

Cramping or bloating may occur during the first hour after the test. Driving is not permitted for 24 hours after the test to allow the anesthesia time to wear off. Before the appointment, people should make plans for a ride home. Full recovery is expected by the next day, and people should be able to go back to their normal diet.

How are diverticulosis and diverticular disease treated?

A health care provider may treat the symptoms of diverticulosis with a high-fiber diet or fiber supplements, medications, and possibly probiotics. Treatment for diverticular disease varies, depending on whether a person has diverticulitis or diverticular bleeding.

Diverticulosis

High-fiber diet. Studies have shown that a high-fiber diet can help prevent diverticular disease in people who already have diverticulosis.[2] A health care provider may recommend a slow increase in dietary fiber to minimize gas and abdominal discomfort. For more information about fiber-rich foods, see "Eating, Diet, and Nutrition."

Fiber supplements. A health care provider may recommend taking a fiber product such as methylcellulose (Citrucel) or psyllium (Metamucil) one to three times a day. These products are available as powders, pills, or wafers and provide 0.5 to 3.5 grams of fiber per dose. Fiber products should be taken with at least 8 ounces of water.

Medications. A number of studies suggest the medication mesalazine (Asacol), given either continuously or in cycles, may be effective at reducing abdominal pain and GI symptoms of diverticulosis. Research has also shown that combining mesalazine with the antibiotic rifaximin (Xifaxan) can be significantly more effective than using rifaximin alone to improve a person's symptoms and maintain periods of remission, which means being free of symptoms.[4]

Probiotics. Although more research is needed, probiotics may help treat the symptoms of diverticulosis, prevent the onset of diverticulitis, and reduce the chance of recurrent symptoms. Probiotics are live bacteria, like those normally found in the GI tract. Probiotics can be found in dietary supplements—in capsules, tablets, and powders—and in some foods, such as yogurt.

To help ensure coordinated and safe care, people should discuss their use of complementary and alternative medical practices, including their use of dietary supplements and probiotics, with their health care provider. Read more at *www.nccam.nih.gov/health/probiotics.*

Tips for talking with health care providers are available at *www.nccam.nih.gov/timetotalk.*

Diverticular Bleeding

Diverticular bleeding is rare. Bleeding can be severe; however, it may stop by itself and not require treatment. A person who has bleeding from the rectum—even a small amount—should see a health care provider right away.

To treat the bleeding, a colonoscopy may be performed to identify the location of and stop the bleeding. A CT scan or angiogram also may be used to identify the site of the bleeding. A traditional angiogram is a special kind of x ray in which a thin, flexible tube called a catheter is threaded through a large artery, often from the groin, to the area of bleeding. Contrast medium is injected through the catheter so the artery shows up more clearly on the x ray. The procedure is performed in a hospital or an outpatient center by an x-ray technician, and the images are interpreted by a radiologist. Anesthesia is not needed, though a sedative may be given to lessen anxiety during the procedure.

If the bleeding does not stop, abdominal surgery with a colon resection may be necessary. In a colon resection, the surgeon removes the affected part of the colon and joins the remaining ends of the colon together; general anesthesia is used. A blood transfusion may be needed if the person has lost a significant amount of blood.

Diverticulitis

Diverticulitis with mild symptoms and no complications usually requires a person to rest, take oral antibiotics, and be on a liquid diet for a period of time. If symptoms ease after a few days, the health care provider will recommend gradually adding solid foods back into the diet.

Severe cases of diverticulitis with acute pain and complications will likely require a hospital stay. Most cases of severe diverticulitis are treated with intravenous (IV) antibiotics and a few days without food or drink to help the colon rest. If the period without food or drink is longer, the person may be given parenteral nutrition—a method of providing an IV liquid food mixture through a special tube in the chest. The mixture contains proteins, carbohydrates, fats, vitamins, and minerals.

What are the complications of diverticulitis and how are they treated?

Diverticulitis can attack suddenly and cause complications, such as

- an abscess—a painful, swollen, pus-filled area just outside the colon wall—caused by infection
- a perforation—a small tear or hole in the diverticula
- peritonitis—inflammation of tissues inside the abdomen from pus and stool that leak through a perforation

- a fistula—an abnormal passage, or tunnel, between two organs, or between an organ and the outside of the body
- intestinal obstruction—partial or total blockage of movement of food or stool through the intestines

These complications need to be treated to prevent them from getting worse and causing serious illness. In some cases, surgery may be needed.

Abscess, perforation, and peritonitis. Antibiotic treatment of diverticulitis usually prevents or treats an abscess. If the abscess is large or does not clear up with antibiotics, it may need to be drained. After giving the person numbing medication, a radiologist inserts a needle through the skin to the abscess and then drains the fluid through a catheter. The procedure is usually guided by an abdominal ultrasound or a CT scan. Ultrasound uses a device, called a transducer, that bounces safe, painless sound waves off organs to create an image of their structure.

A person with a perforation usually needs surgery to repair the tear or hole. Sometimes, a person needs surgery to remove a small part of the intestine if the perforation cannot be repaired.

A person with peritonitis may be extremely ill, with nausea, vomiting, fever, and severe abdominal tenderness. This condition requires immediate surgery to clean the abdominal cavity and possibly a colon resection at a later date after a course of antibiotics. A blood transfusion may be needed if the person has lost a significant amount of blood. Without prompt treatment, peritonitis can be fatal.

Fistula. Diverticulitis-related infection may lead to one or more fistulas. Fistulas usually form between the colon and the bladder, small intestine, or skin. The most common type of fistula occurs between the colon and the bladder. Fistulas can be corrected with a colon resection and removal of the fistula.

Intestinal obstruction. Diverticulitis-related inflammation or scarring caused by past inflammation may lead to intestinal obstruction. If the intestine is completely blocked, emergency surgery is necessary, with possible colon resection. Partial blockage is not an emergency, so the surgery or other procedures to correct it can be scheduled.

When urgent surgery with colon resection is necessary for diverticulitis, two procedures may be needed because it is not safe to rejoin the colon right away. During the colon resection, the surgeon performs a temporary colostomy, creating an opening, or stoma, in the abdomen. The end of the colon is connected to the opening to allow normal eating while healing occurs. Stool is collected in a pouch attached to the stoma on the abdominal wall. In the second surgery, several months later, the surgeon rejoins the ends of the colon and closes the stoma.

Eating, Diet, and Nutrition

The *Dietary Guidelines for Americans, 2010,* recommends a dietary fiber intake of 14 grams per 1,000 calories consumed. For instance, for a 2,000-calorie diet, the fiber recommendation is 28 grams per day. The amount of fiber in a food is listed on the food's nutrition facts label. Some of the best sources of fiber include fruits; vegetables, particularly starchy ones; and whole grains. A health care provider or dietitian can help a person learn how to add more high-fiber foods into the diet.

Fiber-rich Foods

Beans, cereals, and breads	**Amount of fiber**
1/2 cup of navy beans	9.5 grams
1/2 cup of kidney beans	8.2 grams
1/2 cup of black beans	7.5 grams
Whole-grain cereal, cold	
1/2 cup of All-Bran	9.6 grams
3/4 cup of Total	2.4 grams
3/4 cup of Post Bran Flakes	5.3 grams
1 packet of whole-grain cereal, hot (oatmeal, Wheatena)	3.0 grams
1 whole-wheat English muffin	4.4 grams
Fruits	
1 medium apple, with skin	3.3 grams
1 medium pear, with skin	4.3 grams
1/2 cup of raspberries	4.0 grams
1/2 cup of stewed prunes	3.8 grams
Vegetables	
1/2 cup of winter squash	2.9 grams
1 medium sweet potato, with skin	4.8 grams
1/2 cup of green peas	4.4 grams
1 medium potato, with skin	3.8 grams
1/2 cup of mixed vegetables	4.0 grams
1 cup of cauliflower	2.5 grams
1/2 cup of spinach	3.5 grams
1/2 cup of turnip greens	2.5 grams

Source: U.S. Department of Agriculture and U.S. Department of Health and Human Services, *Dietary Guidelines for Americans, 2010.*

Scientists now believe that people with diverticular disease do not need to eliminate certain foods from their diet. In the past, health care providers recommended that people with diverticular disease avoid nuts, popcorn, and sunflower, pumpkin, caraway, and sesame seeds because they thought food particles could enter, block, or irritate the diverticula. However, recent data suggest that these foods are not harmful.[5] The seeds in tomatoes, zucchini, cucumbers, strawberries, and raspberries, as well as poppy seeds, are also fine to eat. Nonetheless, people with diverticular disease may differ in the amounts and types of foods that worsen their symptoms.

Points to Remember

- Diverticular disease is a condition that occurs when a person has problems from small pouches, or sacs, that have formed and pushed outward through weak spots in the colon wall. The problems that occur with diverticular disease include diverticulitis and diverticular bleeding.
- When a person has diverticula that do not cause diverticulitis or diverticular bleeding, the condition is called diverticulosis.
- Scientists are not certain what causes diverticulosis and diverticular disease.
- Although diverticular disease is generally thought to be a condition found in older adults, it is becoming more common in people younger than age 50, most of whom are male.
- Health care providers often find diverticulosis during a routine x ray or a colonoscopy, a test used to look inside the rectum and entire colon to screen for colon cancer or polyps or to evaluate the source of rectal bleeding.
- To diagnose diverticular disease, a health care provider may schedule one or more of the following tests: blood test; computerized tomography (CT) scan; lower gastrointestinal (GI) series; colonoscopy.
- A health care provider may treat the symptoms of diverticulosis with a high-fiber diet or fiber supplements, medications, and possibly probiotics.
- Diverticular bleeding is rare. Bleeding can be severe; however, it may stop by itself and not require treatment. If the bleeding does not stop, abdominal surgery with a colon resection may be necessary.
- Diverticulitis with mild symptoms and no complications usually requires a person to rest, take oral antibiotics, and be on a liquid diet for a period of time.
- Diverticulitis can attack suddenly and cause complications, such as an abscess, a perforation, peritonitis, a fistula, or intestinal obstruction. These complications need to be treated to prevent them from getting worse and causing serious illness.

Hope through Research

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) supports basic and clinical research into GI diseases, including diverticular disease.

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.* For information about current studies, visit *www.ClinicalTrials.gov.*

References

1. Nguyen GC, Sam J, Anand N. Epidemiological trends and geographic variation in hospital admissions for diverticulitis in the United States. *World Journal of Gastroenterology.* 2011;17(12):1600–1605.

2. Strate LL. Diverticulosis and dietary fiber: rethinking the relationship. *Gastroenterology.* 2012;142(2):205–207.

3. Peery AF, Barrett PR, Park D, et al. A high-fiber diet does not protect against asymptomatic diverticulosis. *Gastroenterology.* 2012;142(2):266–272.

4. Tursi A, Joseph RE, Streck P. Expanding applications: the potential usage of 5-aminosalicylic acid in diverticular disease. *Digestive Diseases and Sciences.* 2011;56(11):3112–3121.

5. Strate LL, Liu YL, Syngal S, Aldoori WH, Giovannucci EL. Nut, corn, and popcorn consumption and the incidence of diverticular disease. *Journal of the American Medical Association.* 2008;300(8):907–914.

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