

Colorectal Cancer Screening

What is colorectal cancer screening?

Screening tests identify disease in individuals who don't show any signs or symptoms. The primary goal of cancer screening is to detect cancer at its earliest stage when treatment is still an option. However, the primary goal of colorectal cancer screening is to identify abnormal growths, known as polyps, well before they become cancerous. In order to be endorsed by the medical community, a screening program must meet a number of criteria (https://www.radiologyinfo.org/en/info/safety-hiw_05), including reducing the number of deaths from the given disease.



Many colorectal cancer screening options exist, including:

- Computed tomography colonography (CTC) (<http://www.radiologyinfo.org>), also called virtual colonoscopy, a test in which low-dose CT scanning produces pictures of the colon and rectum.
- Colonoscopy (<http://www.radiologyinfo.org>), a test that examines the rectum and entire colon using a long, lighted instrument called a colonoscope (<http://www.radiologyinfo.org>).
- Double-contrast barium enema (<http://www.radiologyinfo.org>), also called lower GI tract radiography (<https://www.radiologyinfo.org/en/info/lowergi>), a test in which the doctor introduces barium solution and air into the colon and takes a series of x-rays of the entire colon and rectum. A single-contrast barium enema (<http://www.radiologyinfo.org>) that produces images using x-ray and a barium solution without air is also available for select situations.
- Sigmoidoscopy (<http://www.radiologyinfo.org>), a test that examines the rectum and lower colon using a lighted instrument called a sigmoidoscope (<http://www.radiologyinfo.org>).

Screening examinations for detection only of colorectal cancer include:

- Fecal occult blood test (FOBT) (<http://www.radiologyinfo.org>) or fecal immunochemical test (<http://www.radiologyinfo.org>) that checks for hidden blood in fecal material (stool).
- Stool DNA test that checks for abnormal DNA or genetic material in mutated cells that are shed into the stool.

Who should consider colorectal cancer screening – and why?

About Colorectal Cancer

Colorectal cancer (<https://www.radiologyinfo.org/en/info/colocarcinoma>) forms in the colon (<http://www.radiologyinfo.org>) or rectum (<http://www.radiologyinfo.org>). They comprise the lower part of the body's digestive tract (<http://www.radiologyinfo.org>), a series of hollow organs joined in a long, twisting tube from the mouth to the anus. This digestive system (<http://www.radiologyinfo.org>) enables the body to break down and absorb food and eliminate waste.

Polyps (<http://www.radiologyinfo.org>) are abnormal growths that stick out from or lie flat along the inner wall of the colon or rectum. They are common in people over age 50. Most polyps are benign (<http://www.radiologyinfo.org>) (non-cancerous). However, most colorectal cancers develop in specific types of polyps known as adenomas (<http://www.radiologyinfo.org>).

Detecting and removing adenomas helps prevent colon cancer.

Colorectal cancer is a leading cause of cancer-related death in the United States. Improved tests that allow for both cancer prevention and early detection of cancer have led to a decrease in deaths. This is because they identify cancer when it can be more easily treated.

Screening Recommendations

The American Cancer Society (<https://onlinelibrary.wiley.com/doi/full/10.3322/caac.21457>) recommends that adults begin screening at age 45, preferably with a test that allows for both cancer prevention and detection.

The two most preferred tests that offer both cancer prevention and detection include:

- CT colonography (virtual colonoscopy), repeated every five years
- Colonoscopy, repeated every 10 years

Less preferred screening tests include:

- Double-contrast barium enema, repeated every five years
- Flexible sigmoidoscopy, repeated every five years

Tests that allow for cancer detection only include:

- Fecal occult blood test (gFOBT) or fecal immunochemical test (FIT), repeated every year
- Stool DNA test, repeated every three years

If your doctor finds blood, significant polyps, or other suspicious areas during any screening test other than colonoscopy, they will likely recommend a follow-up colonoscopy.

High Risk Individuals

Factors that put an individual at a higher risk for developing colorectal cancer include:

- age 60 or older
- African American or eastern European ancestry
- a personal history of:
 - colorectal cancer
 - cancer of the ovary, endometrium, or breast
 - inflammatory bowel disease (ulcerative colitis or Crohn's disease)
- a family history of:
 - colorectal cancer or polyps
 - a hereditary colorectal cancer syndrome such as familial adenomatous polyposis (FAP) or hereditary non-polyposis colon cancer (HNPCC)

Some of the above conditions increase your risk for developing colorectal cancer. Your doctor will tell you if you are at a high risk. If so, you should be screened more often and begin screening before age 45. Your doctor can advise you about when to begin screening, which tests to have, the benefits and risks of testing, and how often to be screened.

Other risk factors for colorectal cancer include smoking, drinking alcohol, and consuming a high-fat, low-fiber diet.

How is colorectal cancer screening performed?

CT colonography (CTC)

CT colonography (virtual colonoscopy) uses a CT scan to obtain images of the inside of the colon that otherwise can only be seen with the more invasive colonoscopy. The radiation dose for CT colonography is lower than a typical CT scan of your abdomen/pelvis.

During CT colonography, a small tube is inserted into the rectum to allow for inflation with carbon dioxide or air. Doctors prefer automated carbon dioxide because it provides better inflation and less discomfort. After your colon is filled with air CT images are obtained of your abdomen/pelvis. Most centers will take 2 sets of images. One when laying on your back and the other when laying on your side or on your belly (face down). A radiologist (<http://www.radiologyinfo.org>) examines your images and looks for polyps or masses. You will not need sedation for this exam. You will, however, still need to thoroughly cleanse your colon before the test like you would for a normal colonoscopy. The doctor may also ask you to drink oral contrast 1-2 days before the test. Contrast makes your stool look different than polyps.

CT scanning works very much like other x-ray exams. X-rays are a form of radiation—like light or radio waves—that can be directed through the part of the body under examination. Different body parts absorb the x-rays in varying degrees. Radiologists are doctors who specialize in medical imaging performance and interpretation. They recognize the importance of keeping the radiation dose to their patients as low as possible while still using the necessary amount to ensure they obtain a diagnostic quality image. *See the Radiation Dose page (<https://www.radiologyinfo.org/en/info/safety-xray>) for more information about x-rays. See the CT Colonography page (https://www.radiologyinfo.org/en/info/ct_colo) for more information about virtual colonoscopy.*

Colonoscopy

Colonoscopy uses a flexible tube with a tiny camera at the end called a colonoscope. During colonoscopy, the doctor inserts the colonoscope through the rectum and into the colon. The doctor inflates the colon with air. The camera at the end of the scope sends images to a video monitor. This allows the doctor to examine the inner walls of the intestines. If necessary, the doctor may remove polyps and tissue samples using tools inserted through the colonoscope. You must thoroughly cleanse your colon before this test. Most patients will get some form of sedation/anesthesia so they are asleep during the test.

Because this screening exam is more invasive and uses sedation, you will need time to recover. Plan to have someone drive you home.

Double-Contrast Barium Enema

A double-contrast barium enema is also called lower gastrointestinal (GI) tract radiography (<https://www.radiologyinfo.org/en/info/lowergi>). This x-ray exam fills the colon with barium liquid and air and looks at the entire colon and rectum.

For a double-contrast barium enema, the radiologist or technologist inserts a mixture of barium and water into the colon through a small tube placed into the rectum. They also inject air through the tube to help inflate the colon. This also helps the barium thoroughly coat the lining of the colon. Your doctor may also use a single-contrast version of the barium enema without air. The exam will take a series of x-ray images of the abdomen. Prior to this test, you must thoroughly cleanse your colon. This will allow the doctor to see the inner lining of the colon and rectum.

Sigmoidoscopy

Sigmoidoscopy uses a flexible tube with a tiny camera at the end called a sigmoidoscope. The doctor inserts the scope into the colon to capture images of the interior of the lower colon and rectum. Unlike colonoscopy, which examines the entire colon, sigmoidoscopy typically captures images of only the lower part of the colon known as the sigmoid colon.

During a sigmoidoscopy, the doctor inserts the scope through the rectum and into the lower colon. They will use air to help inflate the colon. The camera transmits video images onto a computer screen. This allows the doctor to examine the tissue lining of the sigmoid colon and rectum and, if necessary, to remove polyps and tissue samples. Prior to a sigmoidoscopy, you must thoroughly cleanse the lower colon.

If your sigmoidoscopy discovers abnormalities, your doctor may recommend that you have a full colonoscopy.

Fecal Occult Blood Test

Your doctor can use lab tests to check the stool for tiny traces of blood. These may be a sign of polyps or cancer. These tests include:

- guaiac fecal occult blood test (gFOBT)
- immunochemical FOBT (iFOBT) or fecal immunochemical test (FIT)

The iFOBT is a newer fecal occult blood test.

These tests place small samples of stool on special cards for lab analysis.

Stool DNA Test

The stool DNA test checks for specific abnormal DNA or genetic material from cancer or polyp cells. Colorectal cancer cells often contain DNA abnormalities. These cells may shed into the stool, where tests may be able to identify them. The DNA test may be combined with a test that detects blood in the stool as well.

For this test, you will receive a kit with various containers. You will collect and send an entire stool sample to a laboratory for analysis. You must ship it within a day of collection, and it must arrive at the lab within 72 hours.

These tests primarily detect cancer (not polyps). They lack the preventive benefit of the other screening options, which are preferred by the American Cancer Society for use in patients who have no symptoms.

What are the benefits and risks of colorectal cancer screening?

CT Colonography (CTC)

Benefits

- This minimally invasive test provides images that can depict many polyps and other lesions as clearly as when they are directly seen by regular colonoscopy.
- CTC has a much lower risk of perforating the colon than regular colonoscopy. Most people who undergo CT colonography do not have polyps and can be spared from having a full colonoscopy.
- CTC is an excellent alternative for patients who wish to avoid sedation or have clinical factors that increase the risk of complications from colonoscopy. These complications could include treatment with a blood thinner or a severe breathing problem.
- Elderly patients, especially those who are frail or ill, will tolerate CTC better than conventional colonoscopy.
- CTC can be helpful when colonoscopy cannot be completed because the bowel is narrowed, very twisty or obstructed for any reason, such as by scarring or a mass.
- If conventional colonoscopy cannot reach the full length of the colon—which occurs up to 10 percent of the time—CTC can generally be performed on the same day because the colon has already been cleansed.
- CTC provides clearer and more detailed images than a barium enema x-ray exam.
- CTC can detect abnormalities outside of the colon, including early-stage malignancies and potentially dangerous conditions,

such as abdominal aortic aneurysms.

- Patients tolerate CTC well. CTC doesn't require sedation and pain relievers, so there is no recovery period. Patients can drive themselves home.
- CTC is less costly than colonoscopy.
- No radiation remains in a patient's body after a CT examination.
- X-rays used in standard CT scans have no immediate side effects. CTC is a specific type of low dose CT scan.

Risks

- There is a very small risk that inflating the colon with air could injure or perforate the bowel. This has been estimated to happen in fewer than one in 10,000 patients.
- Although unproven, there is a slight theoretical risk of developing a cancer secondary to radiation exposure much later in life. However, the benefit of an accurate diagnosis greatly outweighs any theoretical risk. These risks are more pronounced in children and individuals under the age of 50.
- If your CTC is positive, it will usually mean you have to undergo a regular colonoscopy as a biopsy and polyp removal cannot be done. A CTC will need to be read by a specialized radiologist who has undergone training and has experience reading these exams.
- Patients should always inform their physician and x-ray or CT technologist if there is any possibility that they are pregnant. *See the Radiation Safety page (<https://www.radiologyinfo.org/en/info/safety-radiation>) for more information about pregnancy and x-rays.*
- CT scanning is generally not recommended for pregnant women unless medically necessary because of potential risk to the baby.

Colonoscopy

Benefits

- This procedure allows the entire colon and rectum to be examined. It is still considered the best test for screening overall.
- Unlike CTC, the doctor can also remove polyps and remove a sample of abnormal tissue (biopsy) during this procedure. For people that end up having polyps this allows for both screening and diagnosis in one test.

Risks

- In most cases, some form of sedation (anesthesia) is necessary for this procedure.
- Although relatively uncommon, complications such as infection, bleeding, tearing or perforation of the colon, and cardiovascular complications may occur. Due to the invasiveness of this screening test, the risk is higher when compared to other screening tests.
- Colonoscopy tends to be more expensive compared to other screening tests,

Double-Contrast Barium Enema

Benefits

- This procedure allows the entire colon and rectum to be examined.
- Complications are rare.
- No sedation is required.

Risks

- The barium enema may not detect some small polyps and cancers.
- A doctor cannot remove polyps or perform a biopsy during this procedure.
- False-positive results (<http://www.radiologyinfo.org>) can occur. False-positive results occur when a test appears to be abnormal, but no cancer is found.
- Abnormal findings require additional testing to determine whether cancer is present.

Sigmoidoscopy

Benefits

- The procedure is quick to perform.
- Complications are rare.
- For most patients, discomfort is minimal.
- The doctor may be able to remove polyps and perform a biopsy during this procedure.
- This test requires less extensive colon cleansing than colonoscopy.
- No sedation is necessary for this test.

Risks

- A sigmoidoscopy only examines the last third of the colon and, as a result, may miss some cancers and polyps.
- False-negative results (<http://www.radiologyinfo.org>) may occur. Test results that appear to be normal even when colorectal cancer is present are called false-negative results. A person who receives a false-negative test result may delay seeking medical care.
- Additional procedures, such as a colonoscopy, may be necessary if the test indicates an abnormality.

Fecal Occult Blood Test (FOBT)

Benefits

- You do not need to cleanse your colon.
- You can collect stool samples at home.
- The cost of this test is low compared with other colorectal cancer screening tests.

Risks

- The fecal occult blood test fails to detect most polyps and some cancers.
- Additional procedures, such as colonoscopy, may be needed if the test indicates an abnormality.
- Certain foods and medications need to be avoided prior to taking the test.
- False-positive results can occur. False-positive results occur when a test appears to be abnormal, but no cancer is found. Abnormal findings require additional testing to determine whether cancer is present. These tests have risks and may cause a patient anxiety.
- False-negative results can occur. Test results that appear to be normal even when colorectal cancer is present are called false-negative results. A person who receives a false-negative test result may delay seeking medical care.

Stool DNA Test

Benefits

- No cleansing of the colon is necessary.
- No dietary restriction.
- Stool sample can be collected at home.

Risks

- The stool DNA test fails to detect most polyps and a small percentage of cancers.
- Additional procedures, such as colonoscopy, may be needed if the test indicates an abnormality.
- False-positive results can occur. False-positive results occur when a test appears to be abnormal, but no cancer is found. Abnormal findings require additional testing to determine whether cancer is present. These tests have risks and may cause a patient anxiety.
- False-negative results can occur. Test results that appear to be normal even when colorectal cancer is present are called false-negative results. A person who receives a false-negative test result may delay seeking medical care.

What happens if something is detected on my screening exam?

If your doctor finds blood, significant polyps, or other suspicious areas during any screening test other than colonoscopy, they will likely recommend a follow-up colonoscopy. If colonoscopy finds an abnormality, the doctor may perform a biopsy or polypectomy (<http://www.radiologyinfo.org>) to determine whether cancer is present.

Colorectal cancer treatment

Treatment options for colorectal cancer depend on the stage of the disease—that is, how far it has spread or how deeply it is affecting the intestinal wall and other parts of your body nearby. Treatment is also different if the cancer is in the colon or rectum.

For more information, see the Colorectal Cancer Treatment (<https://www.radiologyinfo.org/en/info/colorect>) page.

Disclaimer

This information is copied from the RadiologyInfo Web site (<http://www.radiologyinfo.org>) which is dedicated to providing the highest quality information. To ensure that, each section is reviewed by a physician with expertise in the area presented. All information contained in the Web site is further reviewed by an ACR (American College of Radiology) - RSNA (Radiological Society of North America) committee, comprising physicians with expertise in several radiologic areas.

However, it is not possible to assure that this Web site contains complete, up-to-date information on any particular subject. Therefore, ACR and RSNA make no representations or warranties about the suitability of this information for use for any particular purpose. All information is provided "as is" without express or implied warranty.

Please visit the RadiologyInfo Web site at <http://www.radiologyinfo.org> to view or download the latest information.

Note: Images may be shown for illustrative purposes. Do not attempt to draw conclusions or make diagnoses by comparing these images to other medical images, particularly your own. Only qualified physicians should interpret images; the radiologist is the physician expert trained in medical imaging.

Copyright

This material is copyrighted by either the Radiological Society of North America (RSNA), 820 Jorie Boulevard, Oak Brook, IL 60523-2251 or the American College of Radiology (ACR), 1891 Preston White Drive, Reston, VA 20191-4397. Commercial reproduction or multiple distribution by any traditional or electronically based reproduction/publication method is prohibited.

