Computed Tomography (CT) Colonography

This procedure is reviewed by a physician with expertise in the area presented and is further reviewed by committees from the American College of Radiology (ACR) and the Radiological Society of North America (RSNA), comprising physicians with expertise in several radiologic areas.

What is CT Colonography?

CT scanning—sometimes called CAT scanning—is a noninvasive, painless medical test that helps physicians diagnose and treat medical conditions.

CT imaging uses special x-ray equipment to produce multiple images or pictures of the inside of the body and a computer to join them together in cross-sectional views of the area being studied. The images can then be examined on a computer monitor or printed.

CT scans of internal organs, bone, soft tissue and blood vessels provide greater clarity than conventional x-ray exams.

CT colonography uses CT scanning to obtain an interior view of the colon (the large intestine) that is ordinarily only seen with an endoscope inserted into the rectum.

What are some common uses of the procedure?

The major reason for performing CT colonography is to screen for polyps and other lesions in the large intestine. Polyps are benign growths that arise from the inner lining of the intestine. Some polyps may grow and turn into cancers.

The goal of screening with colonography is to find these growths in their early stages, so that they can be removed before cancer has had a chance to develop. Most physicians agree that everyone older than 50 years should be screened for polyps every seven to 10 years. Individuals at increased risk should be screened every five years. Risk factors for the disease include a history of polyps, a family history of colon cancer, or the presence of blood in the stool.

How should I prepare?

You should wear comfortable, loose-fitting clothing to your exam. You may be given a gown to wear during the procedure.

Metal objects including jewelry, eyeglasses, dentures and hairpins may affect the CT images and should be left at home or removed prior to your exam. You may also be asked to remove hearing aids and removable dental work.

Women should always inform their physician or technologist if there is any possibility that they are pregnant.

It is very important to clean out your bowel the night before your CT colonography examination so that the radiologist can clearly see any polyps that might be present. You will be asked to take either a set of pills or a cathartic liquid. Some common preparations are the Fleet Prep Kit 1 (phospho-soda and Bisacodyl) and NuLytely® or Go-Lytely® (Polyethylene glycol electrolyte solutions).

Be sure to inform your physician if you have heart, liver or kidney disease to be certain that the bowel prep will be safe. On the day before your exam, you should limit your food intake to clear liquids such as broth, tea or juice. You will be able to resume your usual diet immediately after the exam.

What does the equipment look like?

The CT scanner is typically a large machine with a hole, or tunnel, in the center. A moveable examination table slides into and out of this tunnel. In the center of the machine, the x-ray tube and electronic x-ray detectors are located opposite each other on a ring, called a gantry, which rotates around you. The computer that processes
How does the procedure work?

In many ways CT scanning works very much like other x-ray examinations. X-rays are a form of radiation—like light or radio waves—that can be directed at the body. Different body parts absorb the x-rays in varying degrees.

In a conventional x-ray exam, a small burst of radiation is aimed at and passes through the body, recording an image on photographic film or a special image recording plate. Bones appear white on the x-ray; soft tissue shows up in shades of gray and air appears black.

With CT scanning, numerous x-ray beams and a set of electronic x-ray detectors rotate around you, measuring the amount of radiation being absorbed throughout your body. At the same time, the examination table is moving through the scanner, so that the x-ray beam follows a spiral path. A special computer program processes this series of pictures, or slices of your body, to create two-dimensional cross-sectional images, which are then displayed on a monitor.

CT imaging is sometimes compared to looking into a loaf of bread by cutting the loaf into thin slices. When the image slices are reassembled by computer software, the result is a very detailed multidimensional view of the body’s interior.

Refinements in detector technology allow new CT scanners to obtain multiple slices in a single rotation. These scanners, called “multislice CT” or “multidetector CT,” allow thinner slices to be obtained in a shorter period of time, resulting in more detail and additional view capability.

Modern CT scanners are so fast that they can scan through large sections of the body in just a few seconds. Such speed is beneficial for all patients but especially children, the elderly and critically ill.

For CT colonography, the computer generates a detailed three-dimensional model of the abdomen and pelvis, which the radiologist uses to view the bowel in a way that simulates traveling down the colon. This is why it is often called a virtual colonoscopy.

How is the procedure performed?

The technologist begins by positioning you on the CT examination table, usually lying flat on your back or possibly on your side or on your stomach. Straps and pillows may be used to help you maintain the correct position and to hold still during the exam.

A very small, flexible tube will be passed two inches into your rectum to allow air to be gently pumped into the colon using a hand-held squeeze bulb. Sometimes an electronic pump is used to deliver carbon dioxide gas into the colon. In either case, you will be able to control the amount of air or gas passing into the colon. The purpose of the gas is to distend the colon a little to eliminate any folds or wrinkles that might obscure polyps from the physician’s view.

Next, the table will move through the scanner. Patients are asked to hold their breath for about 15 seconds before turning over and lying on their back for a second pass is made through the scanner. In some centers the sequence of positions may be the opposite: facing upward first and then facing down. Once the scan is done, the tube is removed.

The entire examination is usually completed within 15 minutes.

What will I experience during and after the procedure?

The vast majority of patients who have CT colonography report a feeling of fullness when the colon is inflated during the exam, as if they need to pass gas. Significant pain is uncommon, occurring in fewer than 5 percent of patients. A muscle-relaxing drug may be injected intravenously to lessen discomfort, but this is seldom necessary. After the tube is inserted, your privacy will be respected. The scanning procedure itself causes no pain or other symptoms.

When you enter the CT scanner, special lights may be used to ensure that you are properly positioned. With modern CT scanners, you will hear only slight buzzing, clicking and whirring sounds as the CT scanner revolves around you during the imaging process.
You will be alone in the exam room during the CT scan, however, the technologist will be able to see, hear and speak with you at all times.

After a CT exam, you can return to your normal activities.

Who interprets the results and how do I get them?

A radiologist, a physician specifically trained to supervise and interpret radiology examinations, will analyze the images and send a signed report to your primary care or referring physician, who will share the results with you.

What are the benefits vs. risks?

Benefits

- This new minimally invasive test provides three-dimensional images that can depict many polyps and other lesions as clearly as when they are directly seen by optical colonoscopy.
- CT colonography has a markedly lower the risk of perforating the colon that conventional colonoscopy. Most of those examined do not have polyps, and can be spared having to undergo a full colonoscopy.
- CT colonography is a less invasive option for patients who do not wish to have colonoscopy, which involves inserting a flexible tube into the colon to view the bowel wall.
- CT colonography is an excellent alternative for patients who have clinical factors that increase the risk of complications from colonoscopy, such as treatment with a blood thinner or a severe breathing problem.
- Elderly patients, especially those who are frail or ill, will tolerate CT colonography better than conventional colonoscopy.
- CT colonography can be helpful when colonoscopy cannot be completed because the bowel is narrowed or obstructed for any reason, such as by a large tumor.
- If conventional colonoscopy cannot reach the full length of the colon—which occurs up to 10 percent of the time—CT colonography can be performed on the same day because the colon has already been cleansed.
- CT colonography provides clearer and more detailed images than does a conventional barium enema x-ray examination.
- In 5 percent of patients, CT colonography shows abnormalities outside the colon, which would be otherwise missed, because colonoscopy only looks at the interior surfaces.
- CT colonography is tolerated well. Sedation and pain-relievers are not needed, so there is no recovery period.
- CT colonography is less costly than colonoscopy.
- No radiation remains in a patient’s body after a CT examination.
- X-rays used in CT scans usually have no side effects.

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 2,000 patients.
- There is always a slight chance of cancer from radiation. However, the benefit of an accurate diagnosis far outweighs the risk.
- The effective radiation dose from this procedure is about 5 mSv, which is about the same as the average person receives from background radiation in 20 months.
- Women should always inform their physician or x-ray technologist if there is any possibility that they are pregnant.
- CT scanning is, in general, not recommended for pregnant women because of potential risk to the baby.

What are the limitations of CT Colonography?

A person who is very obese may not fit into the opening of a conventional CT unit.

CT colonography is strictly a diagnostic procedure. If any significant polyps are found, they will have to be removed by conventional colonoscopy.

Many insurance companies do not cover CT colonography as a screening test for colonic polyps, but they may cover the cost if a patient has symptoms related to the colon.
