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For patients

Abdominal and Pelvic CT

Computed tomography (CT) of the abdomen and pelvis is a diagnostic imaging test. There are many indications for a CT of your abdomen and pelvis. Your doctor may ask for this test when looking for kidney stones, other causes of abdominal pain or nausea / vomiting (including appendicitis and diverticulitis), and assessing a wide variety of cancers involving organs in your abdomen or pelvis. CT scanning is fast, painless, noninvasive and accurate. In emergency cases, it can reveal internal injuries and bleeding quickly enough to help save lives.

Tell your doctor if there's a possibility you are pregnant. Discuss any recent illnesses, medical conditions, medications you're taking, and allergies. Your doctor may tell you not to eat or drink anything for a few hours before your exam. If you have a known allergy to contrast material, your doctor may prescribe medications to reduce the risk of an allergic reaction. Leave jewelry at home and wear loose, comfortable clothing. You may be asked to change into a hospital gown for the exam.

What is CT Scanning of the Abdomen and Pelvis?

Computed tomography, more commonly known as a CT or CAT scan, is a diagnostic medical imaging test. Like traditional x-rays, it produces multiple images or pictures of the inside of the body.

A CT scan generates images that can be reformatted in multiple planes. It can even generate three-dimensional images.

CT images of internal organs, bones, soft tissue, and blood vessels provide greater detail than traditional x-rays. This is especially true for soft tissues and blood vessels.

What are some common uses of the procedure?

Doctors typically use this procedure to help diagnose the cause of abdominal or pelvic pain. They also use it to diagnose diseases of the internal organs, small bowel and colon, such as:

- infections such as appendicitis (https://www.radiologyinfo.org/en/info/appendicitis) , diverticulitis (http://www.radiologyinfo.orgdiverticulitis) , pyelonephritis or infected fluid collections, also known as abscesses.
- inflammatory bowel disease such as ulcerative colitis or Crohn's disease (https://www.radiologyinfo.org/en/info/crohns-disease) .
- pancreatitis (http://www.radiologyinfo.orgpancreatitis) .
- looking for or following cancers of the liver, bowel, kidneys, pancreas, adrenal gland, uterus/ovaries and bladder as well as lymphoma (https://www.radiologyinfo.org/en/info/lymphoma) or melanoma. It is also commonly performed to look for spread of cancer into the abdomen/pelvis that form in other parts of the body such as lung cancer (http://www.radiologyinfo.orglung-cancer) or breast cancer (http://www.radiologyinfo.orgbreast-cancer) .
- kidney and bladder stones (https://www.radiologyinfo.org/en/info/stones-renal) .
- abdominal aortic aneurysms (AAA) (https://www.radiologyinfo.org/en/info/abdoaneurysm) .

- injuries to abdominal organs such as the spleen, liver, kidneys, or other internal organs in cases of trauma.

Doctors also use CT scanning of the abdomen/pelvis to:

- guide biopsies and other procedures such as abscess drainages and minimally invasive tumor treatments.
- plan for and assess the results of surgery, such as organ transplants.
- stage, plan and properly administer radiation treatments for tumors as well as monitor response to chemotherapy.

How should I prepare?

Wear comfortable, loose-fitting clothing to your exam. You may need to change into a gown for the procedure.

Metal objects, including jewelry, eyeglasses, dentures, and hairpins, may affect the CT images. Leave them at home or remove them prior to your exam. Some CT exams will require you to remove hearing aids and removable dental work. Women will need to remove bras containing metal underwire. You may need to remove any piercings, if possible.

Your doctor may instruct you to not eat or drink anything for a few hours before your exam if it will use intravenous (IV) contrast material. Tell your doctor about all medications you are taking and if you have any allergies. If you have a known allergy to contrast material, your doctor may prescribe medications (usually a steroid) to reduce the risk of an allergic reaction. To avoid unnecessary delays, contact your doctor well before the date of your exam.

If you have a history of diabetes, kidney disease, or high blood pressure and your CT scan is ordered with intravenous (IV) contrast, you may need to have a recent set of kidney labs (usually within the last 1-2 months) before your scan.

Women should always inform their physician and the CT technologist if there is any possibility that they may be pregnant. *See the CT Safety During Pregnancy (https://www.radiologyinfo.org/en/info/safety-ct-pregnancy) page for more information.*

What does the CT equipment look like?

The CT scanner is typically a large, donut-shaped machine with a short tunnel in the center. You will lie on a narrow table that slides in and out of this short tunnel. Even patients who suffer from claustrophobia can tolerate a CT scan without any issues as it will not feel like a tight closed space. Rotating around you, the x-ray tube and electronic x-ray detectors are located opposite each other in a ring, called a gantry. Most CT scans are very quick, only taking a few minutes inside the machine. The computer workstation that processes the imaging information is in a separate control room. This is where the technologist operates the scanner and monitors your exam in direct visual contact. The technologist will be able to hear and talk to you using a speaker and microphone.

How does the procedure work?

In many ways, a CT scan works like other x-ray exams. Different body parts absorb x-rays in different amounts. This difference allows the doctor to distinguish body parts from one another on an x-ray or CT image.

A conventional x-ray exam directs a small amount of radiation through the body part under examination. A special electronic image recording plate captures the image. Bones appear white on the x-ray. Soft tissue, such as the heart or liver, shows up in shades of gray. Air appears black.

With CT scanning, several x-ray beams and electronic x-ray detectors rotate around you. These measure the amount of radiation being absorbed throughout your body. Sometimes, the exam table will move during the scan. A special computer program processes this large volume of data to create two-dimensional cross-sectional images of your body. The system displays the images on a computer monitor. CT imaging is sometimes compared to looking into a loaf of bread by cutting the loaf into thin slices. When the computer software reassembles the image slices, the result is a very detailed multidimensional view of the body's

interior.

Nearly all CT scanners can obtain multiple slices in a single rotation. These multi-slice (multidetector) CT scanners obtain thinner slices in less time. This results in more detail.

Modern CT scanners can image large sections of the body in just a few seconds, and even faster in small children. Such speed is beneficial for all patients. Speed is especially beneficial for children, the elderly, and critically ill – anyone who finds it difficult to stay still, even for the brief time necessary to obtain images.
For children, the radiologist will adjust the CT scanner technique to their size and the area of interest to reduce the radiation dose.

Some CT exams use an intravenous contrast material and oral contrast material (which you will be asked to drink in the radiology department) to enhance visibility in the body area under examination.

How is the procedure performed?

The technologist begins by positioning you on the CT exam table, usually lying flat on your back. They may use straps and pillows to help you maintain the correct position and remain still during the exam.

Many scanners are fast enough to scan children without sedation. In special cases, children who cannot hold still may need sedation. Motion may cause blurring of the images and degrade image quality the same way that it affects photographs.

The exam may use contrast material, depending on the type of exam. If so, it may be injected through an intravenous line (IV), given as a drink or, rarely, administered by enema into your bowel.

Next, the table will move quickly through the scanner to determine the correct starting position for the scans. Then, the table will move slowly through the machine for the actual CT scan. Depending on the type of CT scan, the machine may make several passes. For most CT scans you will be asked to lie on your back. For some scans, you may be asked to lie on your belly (this is commonly done for scans designed to look for kidney stones).

The technologist may ask you to hold your breath during the scanning. Any motion, including breathing and body movements, can lead to artifacts on the images. This loss of image quality can resemble the blurring seen on a photograph taken of a moving object. It is very important to hold your breath and stay still when you are instructed to do so.

When the exam is complete, the technologist will ask you to wait until they verify that the images are of high enough quality for accurate interpretation by the radiologist.

The CT exam usually takes just a few minutes. However, if you need to drink oral contrast, the imaging center will ask you to arrive one to two hours prior to your scan time. Some radiology centers may give you the oral contrast ahead of time so you can drink it at home prior to arriving.

What will I experience during and after the procedure?

CT exams are generally painless, fast, and easy.

Though the scan is painless, you may have some discomfort from remaining still for several minutes or from placement of an IV. If you have a hard time staying still, are very nervous, anxious, or in pain, you may find a CT exam stressful *(see the Scanxiety (http://www.radiologyinfo.orgScanxiety) page for more information).* The technologist or nurse, under the direction of a doctor, may offer you some medication to help you tolerate the CT exam.

If the exam uses intravenous (IV) iodinated contrast material, the radiology center will likely ask if you have any kidney problems or medical conditions that can cause kidney problems (such as diabetes and high blood pressure).

The doctor may administer contrast material intravenously (by vein), so you will feel a pin prick when the nurse inserts the needle into your vein. You may feel warm or flushed as the contrast is injected. You also may have a metallic taste in your mouth. This will pass and is completely normal. These are only side effects of the contrast injection, and they go away quickly.

If you swallow oral contrast material, you may find the taste mildly unpleasant. However, most patients can easily tolerate it. It is normal to have loose stools after drinking the oral contrast for 1-2 days.

When you enter the CT scanner, you may see special light lines projected onto your body. These lines help ensure that you are in the correct position on the exam table. With modern CT scanners, you may hear slight buzzing, clicking and whirring sounds. These occur as the CT scanner's internal parts, not usually visible to you, revolve around you during the imaging process.

You will be alone in the exam room during the CT scan, unless there are special circumstances. For example, sometimes a parent wearing a lead shield may stay in the room with their child. However, the technologist will always be able to see, hear and speak with you through a built-in intercom system.

If you had an IV placed the CT technologist will remove it after your scan and cover it with a band aid or small dressing. You can return to your normal activities immediately.

Who interprets the results and how do I get them?

A radiologist (https://www.radiologyinfo.org/en/info/article-your-radiologist) , a doctor specially trained to supervise and interpret radiology exams, will analyze the images. The radiologist will send an official report to the doctor who ordered the exam.

You may need a follow-up exam. If so, your doctor will explain why. Sometimes a follow-up exam further evaluates a potential issue with more views or a special imaging technique. It may also see if there has been any change in an issue over time. Follow-up exams are often the best way to see if treatment is working or if a problem needs attention.

What are the benefits vs. risks?

Benefits

- Viewing a CT scan, an experienced radiologist can diagnose many causes of abdominal pain or injury from trauma with very high accuracy. This allows for faster treatment and often eliminates the need for additional, more invasive diagnostic procedures.
- When pain is caused by infection and inflammation, the speed, ease and accuracy of a CT exam can reduce the risk of serious complications. Such complications may include those caused by a burst appendix or an infected fluid collection and the subsequent spread of infection.
- CT scanning is painless, noninvasive, and accurate.
- A major advantage of CT is its ability to image bone, soft tissue, and blood vessels all at the same time.
- Unlike conventional x-rays, CT scanning provides very detailed images of many types of tissue as well as the lungs, bones, and blood vessels.
- CT exams are fast and simple. In emergency cases, they can reveal internal injuries and bleeding quickly enough to help save lives.
- CT has been shown to be a cost-effective imaging tool for a wide range of clinical problems.
- CT is less sensitive to patient movement than MRI. While many patients have a hard time completing an MRI (because they take longer and can be more claustrophobic), most patients can tolerate a CT scan easily.
- Unlike MRI, an implanted medical device or metal of any kind in your body will not prevent you from having a CT scan.
- CT imaging provides real-time imaging, making it a good tool for guiding needle biopsies and needle aspirations. This is particularly true of procedures involving the lungs, abdomen, pelvis, and bones.
- A diagnosis via CT scan may eliminate the need for exploratory surgery and surgical biopsy.

- No radiation remains in a patient's body after a CT exam.
- The x-rays used for CT scanning should have no immediate side effects.

Risks

- There is always a slight chance of cancer from excessive exposure to radiation. However, the benefit of an accurate diagnosis far outweighs the risk involved with CT scanning.
- The radiation dose for this procedure varies. *See the Radiation Dose (https://www.radiologyinfo.org/en/info/safety-xray) page for more information.*
- Women should always tell their doctor and x-ray or CT technologist if there is any chance they are pregnant. *See the Radiation Safety (https://www.radiologyinfo.org/en/info/safety-radiation) page for more information about pregnancy and x-rays.*
- The risk of serious allergic reaction to contrast materials that contain iodine is extremely rare, and radiology departments are well-equipped to deal with reactions.
- Doctors do not generally recommend abdomen and pelvis CT scanning for pregnant women unless medically necessary to avoid any radiation exposure to the baby. In general, there is no need to stop breast feeding after a CT scan.
- Because children are more sensitive to radiation, they should have a CT exam only if it is essential for making a diagnosis. They should not have repeated CT exams unless absolutely necessary. CT scans in children should always be done with low-dose technique.
- Radiology departments tailor the radiation dose for CT scans, especially when scanning children. This helps ensure that the benefits of the scan far outweigh any possible risks from exposure to diagnostic radiation.

What are the limitations of Abdominal and Pelvic CT?

A person who is very large may not fit into the opening of a conventional CT scanner. Or, they may be over the weight limit—usually 450 pounds—for the moving table.

CT scanning of the abdomen may not see gallstones well. Ultrasound is the best test for this.

Doctors prefer alternate imaging techniques such as plain films, gastrointestinal (GI) contrast exams and ultrasound for evaluating acute abdominal conditions in babies, such as vomiting or blood in stool.

For some conditions, including but not limited to some liver, kidney, pancreatic, uterine, or ovarian abnormalities, evaluation and diagnosis with MRI may be preferable to CT scanning.

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