Guide to
CT Scans

Iowa Radiology

Diagnostic & Preventative Imaging Center

515-226-9810 | *Clive* | *Downtown Des Moines*

Table of Contents

What is CT?

Computed tomography (commonly known as CT or CAT scan) is a valuable diagnostic tool that ranks among the top medical achievements of the last 40 years. While it uses X-rays, CT imaging is an improvement over traditional X-ray exams because it eliminates from the images overlapping structures in the body that can obscure the area of concern and make diagnosis difficult. During CT imaging, the X-ray tube rotates around the patient, capturing multiple images from different angles. A computer is then used to synthesize these images to create unobstructed views of the structures of interest.[1]

Why have a CT scan?

Many different types of symptoms and concerns can warrant a CT scan.

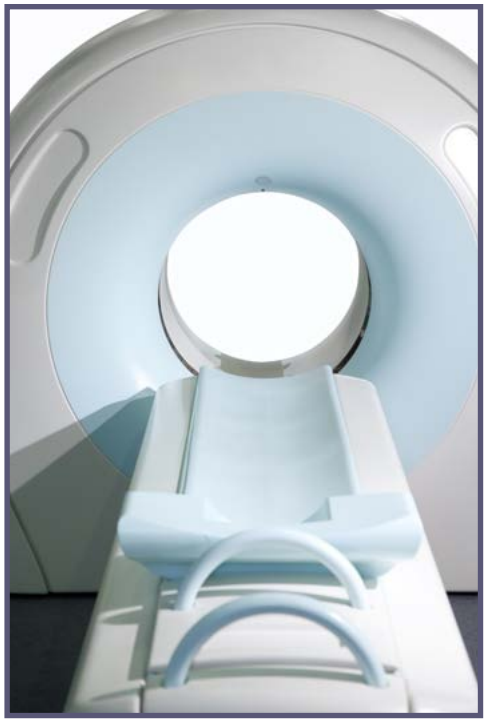
It allows doctors to derive detailed information in high-resolution images from a non-invasive procedure, sometimes eliminating the need for exploratory surgery or surgical biopsy. CT is particularly useful for examining skeletal structures and is capable of imaging bone, soft tissue, and blood vessels all at the same time. CT can aid in cancer staging as well as empower surgeons to determine the exact size and location of tumors before removal.

Although MRI can offer some of the same benefits, CT imaging has some distinct advantages over MRI in certain situations:

- CT is much faster than MRI. This makes it preferable in emergencies, especially when checking for internal injuries following an accident.
- The speed of CT imaging makes it an easier test for claustrophobic patients to endure.
- CT is less sensitive to movement than MRI, making it easier to obtain clear images.
- Unlike MRI, CT can be performed on patients with implanted medical devices.[2]

What are the risks of CT scanning?

The small risk involved in CT scanning stems primarily from the use of ionizing radiation and the contrast material that is sometimes necessary to produce the most informative images.



Ionizing Radiation

Because CT is an X-ray exam, it utilizes ionizing radiation, which is associated with an increased risk of developing cancer. Scientists were first able to establish the link between cancer and radiation dose by observing survivors of the nuclear blasts in Hiroshima and Nagasaki. However, we are exposed to small amounts of radiation every day from natural sources such as sunlight. In fact, it is currently estimated that the average person in the U.S. receives 3 millisieverts (mSv) of radiation annually through natural sources. That means that an abdominal CT scan that delivers 10 mSv of radiation is roughly equivalent to the dose you would receive by living an additional 3 1/3 years on the earth. [3] While some models predict this correlates with a 0.1% increased risk of developing cancer, [4] other models challenge this assumption and suggest the increased risk is lower or even nonexistent.[5] When a CT scan is recommended, any projected increased risk is outweighed by the value of the information obtainable from the scan, which can allow for diagnosis and treatment of much riskier and more immediate issues.

Contrast Material

The most common contrast materials used in CT scanning contain iodine. When iodine-containing contrast is injected, it often causes a warm flush and a metallic taste, which typically dissipate quickly and leave no lasting effects. After the procedure, patients are often advised to consume extra fluids to help flush the contrast from the kidneys.

Potential reactions to iodine-containing contrast range from mild to severe. Sensitive patients may experience sneezing, hives, itching, or nausea and vomiting after receiving iodine-containing contrast material. Be sure to tell your doctor if you have a known allergy to iodine. Severe allergic reactions may cause breathing difficulties, abnormal blood pressure, or arrhythmia.[6] Additionally, precautions must be taken when iodine-containing contrast is used in conjunction with some diabetes medications.

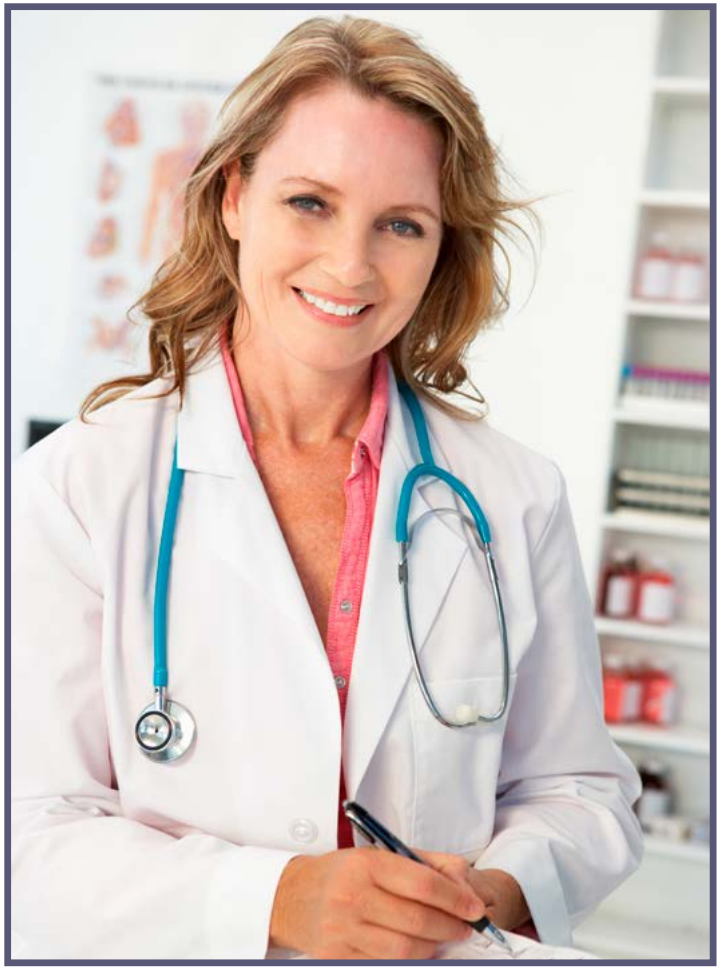
Minimizing Risk

To minimize risks involved with ionizing radiation, CT facilities and providers must follow approved safety protocols and undergo specified training. In recommending CT, practitioners are required to follow guidelines designed to ensure that CT technology is used sparingly and only when necessary to answer an important clinical question. Best radiologic practices demand that the radiation dose delivered in any exam be "as low as reasonably achievable" (commonly abbreviated as ALARA). In this interest, Iowa Radiology uses dose-reducing software to achieve the best quality images with the lowest possible radiation dose.

CT Colonography (Virtual Colonoscopy)

What is CT colonography?

CT colonography, also known as "virtual colonoscopy," is a minimally invasive alternative to traditional colonoscopy that uses CT (rather than a colonoscope – a video camera attached to a long, thin tube) to screen for polyps and other lesions in the large intestine. Because of its minimally invasive nature, CT colonography has a lower risk of complications, such as perforation of the colon, than traditional colonoscopy, and patients undergoing CT colonography generally do not require sedation, which is typically used in traditional colonoscopy.



What can I expect during the procedure?

Just as with a traditional colonoscopy, the bowel must be cleansed prior to the procedure. You will be asked to begin a bowel cleansing regimen two days before your exam. If you have heart, kidney, or liver disease, make sure to inform your doctor before beginning the cleansing regimen.

When you arrive in the exam room for your appointment, you will change into a gown, and the technologist will take your medical history. You will then lie on your left side, and a very small, flexible tube will be inserted just two inches inside the rectum. The colon will be filled with CO2 to expand the area and allow for full visualization. The CO2 gas may cause discomfort similar to naturally occurring intestinal gas. Images will be taken while you lie on your back and then on your belly. The entire exam takes approximately 30 minutes.

After the test, you can resume your regular activities. Discomfort from the excess CO2 gas will fade as the body quickly absorbs it. The radiologist will review the images and send a report to the referring physician within one business day. Approximately 12-25% of patients undergoing CT colonography are called back for a follow-up colonoscopy and polyp removal.

CT Cardiac Calcium Scoring

What is CT cardiac calcium scoring?

CT cardiac calcium scoring is a quick, painless, and low-risk procedure that uses a CT scan of the heart to look for the presence and extent of calcified plaque in the coronary arteries (the vessels that supply oxygen-containing blood to the heart) in order to asses a patient's risk of coronary artery disease. The level of plaque buildup found is expressed in a calcium score:

- A score of 0 indicates no buildup or risk of coronary artery disease (CAD);
- 1-10 shows minimal buildup and risk;
- 11-100 indicates some buildup and intermediate risk; and
- a score over 400 indicates extensive plaque buildup and high risk of CAD.

Cardiac calcium scoring can detect plaque buildup before symptoms of CAD appear, providing the opportunity to treat the disease proactively and prevent further damage.

Who should consider this test?

If you have risk factors for coronary artery disease, your physician may recommend cardiac calcium scoring to more precisely assess your personal risk. Common risk factors include

- Family history of CAD
- High LDL cholesterol
- High blood pressure
- Obesity
- Tobacco smoking
- Diabetes
- Physical inactivity

If one or more of these apply to you, ask your doctor if cardiac calcium scoring would be advisable for you.

What should I expect during the procedure?

When you come back for your exam, you will be asked to change into a gown and remove any jewelry. To begin the test, the technologist will position you on your back on the CT exam table. No contrast material is needed for this test. Electrodes will be attached to your chest and an electrocardiograph (ECG) so your heart rate can be monitored throughout the procedure. To capture images, the exam table will move through the CT machine. You will be asked to lie very still and to hold your breath for 10-20 seconds at a time so the technician can get clear images. The entire exam should be complete within about 20 minutes.

You can resume your regular activities immediately following the test. The radiologist will review the images and send a report to your referring physician within one business day.

CT at Iowa Radiology

CT is an invaluable imaging tool that can aid in the diagnosis a broad range of conditions. Any CT scan done at Iowa Radiology will be ordered by your doctor, who knows your history best and will weigh the risks against the benefits of having a CT scan. If your doctor has ordered a CT scan or recommended CT screening for conditions such as colon cancer or coronary artery disease, feel free to contact us at Iowa Radiology. We provide a wide range of CT tests in a safe, patient-centered environment. Our CT services include

- Routine head
- Mastoids, orbits, ear
- Sinus/facial bones
- Soft tissue neck
- Routine chest
- Cardiac calcium score
- Virtual colonoscopy
- Abdomen/pelvis
- Upper extremity
- Lower extremity
- CT angiography
  - Abdomen/pelvis
  - Brain
  - Carotids
  - Chest
  - Coronary

We strive to provide both the best patient care and the best customer service possible. If you ever have any questions or concerns about an exam at one of our clinics, feel free to give us a call.

Contact Iowa Radiology

Click Here

Sources

1 "What Are the Benefits of CT Scans?" Radiologyinfo.org. Radiological Society of North America, n.d. Web. 15 April 2016.

2 "CT Scan vs. MRI." *Differen.* Diffen LLC, n.d. Web. 15 Apr 2016.

3 "Radiation Dose in X-Ray and CT Exams." Radiologyinfo.org. Radiological Society of North America, n.d. Web. 25 May 2016.

4 Storrs, "How Much Do CT Scans Increase the Risk of Cancer?" *Scientific American.* Scientific American, 1 July 2013. Web. 15 April 2016.

5 "Radiation Effects at Low Doses." *LBL.gov*. National Council on Radiation Protection and Measurements, 9 Aug 2000. Web. 20 July 2017.

6 "Contrast Materials." *Radiologyinfo.org.* Radiological Society of North America, n.d. Web. 15 April 2016.