

Computed Tomography (CT)

Consumer Information

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What is Computed Tomography?

Computed Tomography is commonly called "CT". It was once called a "CAT" scan, though advances in scanning technology have resulted in the A being removed from the acronym. CT is a way of using X-rays to take pictures or images in very fine slices through the part of the body that the doctor has asked to be investigated. One way to think of it is of taking slices through a loaf of bread.

When CT scanners were first invented, they took one slice at a time and were quite slow when compared to today's machines. Most modern scanners now take more than one slice at a time. This may range from 4 to 64 slices and up to 320 slices for the most recent machines. This is referred to as "multi-slice" or "multi-detector" technology and may be abbreviated as MSCT or MDCT.

When you take slices from your loaf of bread, you are able to see much more detail about the structures that make up the loaf. It is likely that this is why your doctor has chosen this test. The slices that are taken by an MSCT scanner are often less than 1 millimetre thick.

Once the [radiographer](#) (or medical imaging technologist) has taken the scan, these very thin slices can be put all together to reconstruct the loaf (or in this case your body). Once they are put back together the radiographer can cut it into the slices that will help the radiologist (a doctor who has specialised in diagnostic imaging) to see the parts of the body that are of interest. Each scan is created specifically for the part of the body of interest and the condition that needs investigation. This will often involve creating several sets of pictures taken in different directions and also some 3-Dimensional (3D) pictures.

With all of these different slices and 3D reconstructions, the [radiologist](#) (a specialist doctor) will have a very detailed picture of the structures making up your body. This should help them to make a diagnosis (in other words, to understand the cause of your current problems) so that the right treatment can be planned as soon as possible.

How do I prepare for Computed Tomography?

You should receive instructions from the hospital or private radiology practice where you are having the CT scan prior to your appointment. If you are an

inpatient in a hospital, the nurses caring for you will ensure that the appropriate preparations are carried out. These instructions are **very important** as they may affect the accuracy of the test or require that the test be rebooked if you are not properly prepared for the CT scan.

Some tests require no preparation, these include: brain, sinus or facial bones, temporal bones (inner ear), spine, knee or wrist, and CTs of the bones.

Many types of CT require an injection of an iodinated contrast material (see [Iodine-containing contrast medium \(ICCM\)](#)) to show blood vessels and some organs. For these tests, most hospital departments or radiology practices will ask you to fast (not eat or drink) prior to your appointment. Fasting for 2-4 hours is common and it is usually permitted to drink water over this time to avoid dehydration (losing too much water from your body). It is important that the need to fast does not affect you if you have special dietary requirements (e.g. diabetes). Please check with your doctor or the hospital or radiology practice where you are having the CT if you have any concerns.

If you do require an iodinated contrast injection for your test, it is likely that you will be taken into an area where a radiologist, a radiographer or a nurse will discuss iodine contrast with you. They will then use a needle to insert a cannula (a small plastic tube) into a vein in your arm or the back of your hand so that the iodine contrast can be inserted into the cannula during the test.

While the iodinated contrast used for injections is considered very safe, there are precautions that must be taken when using it, particularly if you have poor kidney function or diabetes.

Tests investigating your abdomen may require you to drink a different kind of iodinated contrast solution to outline your intestine (part of your digestive system). This will also require fasting. This drink is given in a different way depending where you are having the CT done. You will usually be asked to drink part of the whole dose an hour prior to the scanning time and the rest of it just before entering the scanning room.

Depending on the type of scan that you are having and the hospital or radiology practice, you may be asked to change into a gown to avoid parts of your clothing affecting the scan.

If you have any concerns regarding fasting, the iodinated contrast injection or your medication you should contact your own doctor or the hospital or radiology practice prior to your appointment.

Again, it is important to follow the instructions you are given to ensure that the test is done safely, accurately and efficiently and so that you do not need to have the scan rescheduled or repeated.

What happens during Computed Tomography?

CT scans are designed to look at specific parts of the body and are tailored for each person, to investigate their particular condition. This means that all CT scans are slightly different.

The CT scan equipment is a large square machine with a circular hole or gantry, sometimes described as looking like a "donut". The general process involves you lying on a bed attached to the scanner (this may be feet first or head first depending on the part of the body being looked at). The bed will then be raised up to a height level with the circular hole in the scanner and the bed slides in and out of the hole several times while pictures are being taken. It is important to try not to move during the scan as it will affect the quality of the pictures and make them harder for the radiologist to interpret.

The radiographer performing the scan may ask you to hold your breath for some scans. The length of time for each breath hold is usually under 10 seconds. Most scanners in use now are able to give instructions in different languages to help you understand what you need to do and what is happening. They will also often have ways of communicating with you if your hearing is poor.

The first few scans are usually done to set up the machine ready for the test. When the test is programmed into the computer by the radiographer and the scan is ready to go, they may remind you to keep still. If your test requires an iodinated contrast injection, the radiographer will come into the room to administer it using either a hand held syringe or a mechanical pump. The pump helps to put the iodinated contrast in at a set rate and allows for the scanner to target specific areas of the body.

When the iodinated contrast is injected, most people will get a strange metallic taste in the mouth and feel a warm sensation through the body. This warm sensation may concentrate around the groin or buttock region and can feel like you may have wet yourself, even though you have not. Do not be concerned if this happens, it is a common sensation and usually goes away within a couple of minutes.

Once the radiographer has reviewed the images briefly to check that the appropriate areas have been shown, they will come into the room to help you off the bed. The radiographer will not be able to give you any results after the scan; this is the responsibility of your doctor and the radiologist who interprets the pictures from the scan and provides a report to your doctor.

Once out of the scanner room, it is likely that you will be shown to an area where someone will check with you to make sure that you are feeling OK after the scan. They will then remove the cannula so that you can go home.

Are there any after effects of Computed Tomography?

The vast majority of people who have a CT scan have no after effects at all. After the test, you

should be able to eat and drink as normal and resume regular activities.

If you have an injection of iodinated contrast, the sensations of warmth and the strange taste usually experienced should go away within a few minutes. In very uncommon cases, some people may be allergic to the iodinated contrast given into the vein in your arm or the back of your hand.

It is not possible to predict if a person will be allergic to the iodinated contrast, though the staff at the hospital or radiology practice are well trained to deal with allergic reactions should they arise. It is important to make the radiographer or nurse aware of any other allergies that you may have, prior to having the injection.

People who are allergic to the iodinated contrast used in CT may get some of the following symptoms (see [Iodine-containing contrast medium \(ICCM\)](#)) for a detailed description of allergic reactions and how they are treated):

- Nausea and/or vomiting
- A skin rash or hives
- Itching
- Sneezing and/or watering eyes
- Dizziness and/or headache
- Gagging or feeling of suffocation or swelling of the inside of the throat or mouth
- Change in blood pressure

If you do feel any of these symptoms after your scan, it is important to tell the radiographer or nurse immediately. If these feelings come on after leaving the hospital or radiology practice, you should return there immediately (if this is close by) or attend the nearest doctor or emergency department.

How long does Computed Tomography take?

As mentioned earlier, each test is different and so the time it takes to complete the scan will vary depending upon why you are having it. CT scans that do not require an injection or much preparation are usually quite quick and may be completed within 5 minutes.

In the case of tests which require you to drink a contrast solution or have an injection, the preparation time is often much longer than that of the scan itself. When a drink is required for an abdominal scan (of your stomach or tummy), you are often asked to have that drink an hour before the appointment time. This may be done prior to you arriving at the hospital or radiology practice or while you are in the waiting area.

If you are asked to arrive early, the time leading up to the scan will often be used to prepare you. This may include getting you changed into a gown, discussing the need for injection of iodinated contrast or contrast to drink, inserting a cannula and explaining what to expect from the test.

Even when you are having a scan that requires an injection or a drink and other preparation, the length of the scan itself (in other words the amount of time

you are in the CT scanner machine) is usually under 10 minutes.

What are the risks of Computed Tomography?

Radiation exposure:

As is the case with most tests and medications prescribed by your doctor, CT does have risks that cannot be avoided. These risks however, can be minimised by the highly trained staff at the hospital or radiology practice you are attending.

A CT scanner uses X-rays to obtain the pictures required for the radiologist to make a diagnosis. As is commonly known, X-rays are a form of radiation and must be used carefully by trained professionals to decrease the risks involved.

The risks of radiation exposure are explained fully in the item entitled *Radiation Risk of Medical Imaging in Adults and Children*, but in summary these are:

- A very small increase in the risk of developing cancer later in life. This low risk is considered to be outweighed by the benefits provided by the scan.
- Risk to an unborn child if you are pregnant. This risk could take the form of a very small increase in the risk of cancer or a malformation if you are exposed to radiation during the first months of your pregnancy.

Minimising risks from radiation include making sure that every CT scanner in use is regularly maintained and calibrated (tested and set to ensure accuracy) by specialised technicians. This is required by State and Federal laws. In addition, radiographers are trained to use the lowest possible radiation dose to achieve quality images that will allow the radiologist to make an accurate diagnosis of your problem.

In addition to using specialty equipment, the radiographer will only scan the part(s) of the body required. They will also do their best to avoid scanning areas that are particularly sensitive to radiation and this may involve the use of shields made of lead or bismuth (a type of metallic substance). Radiation is only on while the scan is being performed and there is no radiation remaining in the room or in your body after the test.

Contrast Medium

There is also a small risk of allergic reaction to iodinated contrast when it is injected. This is not a risk for contrast that is swallowed. It is not possible to predict whether you will be allergic to iodinated contrast and even if you have had it before, and not had an allergic reaction, this does not mean you will not have one the next time you have a contrast injection. The staff at the hospital or radiology practice are well trained to deal with allergic reactions should they arise. It is important to make the radiographer or nurse aware of any other allergies that you may have prior to having the injection. If you are allergic to other foods or drugs, it increases the chance that you will have an allergic reaction to iodinated contrast.

People who are allergic to the iodinated contrast used in CT may get some of the following symptoms:

- Nausea and/or vomiting
- A skin rash or hives
- Itching
- Sneezing and/or watering eyes
- Dizziness and/or headache
- Gagging or feeling of suffocation or swelling of the inside of the throat or mouth
- Change in blood pressure

After the test, you should be able to eat and drink as normal and resume regular activities. If you do feel any of these symptoms after your scan, it is important to tell the radiographer or nurse immediately. If these feelings come on after leaving the hospital or radiology practice, you should return there immediately (if this is close by) or attend the nearest doctor or emergency department.

Please see *Iodine-containing contrast medium (ICCM)* for further information regarding the risks of contrast medium.

What are the benefits of Computed Tomography?

CT scans are a fast, effective and accurate way of assisting your doctor to make a diagnosis and treat your condition. They are readily accessible throughout most of Australia and can usually be performed quite soon after referral.

Who does Computed Tomography?

In Australia, CT must be performed by [radiographers](#) (also known as medical imaging technologists). The CT scans are interpreted by [radiologists](#) who will examine the images taken by the radiographers in great detail and write a report that is sent to your doctor.

Where is Computed Tomography done?

CT may be done at most registered hospitals and private radiology practices in Australia. Your doctor may refer you to a particular hospital or radiology practice but you can generally take the request your doctor has given you to a facility that suits your location and finances.

The exception to this is if you are having a highly specialised type of CT (e.g. scanning of a child or baby, coronary artery CT scanning or CT colonography) because not every CT scanning facility is able to do these specialised types of tests. When you make your appointment, you will be asked what type of scan you need to have and will be told if they are able to perform that particular type of scan.

When can I expect the results of my Computed Tomography?

The time that it takes your doctor to receive a written report on the test or procedure you have had will vary, depending on:

- the urgency with which the result is needed
- the complexity of the examination
- whether more information is needed from your doctor before the examination can be interpreted by the radiologist
- whether you have had previous X-rays or other medical imaging that needs to be compared with this new test or procedure (this is commonly the case if you have a disease or condition that is being followed to assess your progress)
- how the report is conveyed from the practice or hospital to your doctor (in other words, email, fax or mail)

Please feel free to ask the private practice, clinic, or hospital where you are having your test or procedure when your doctor is likely to have the written report.

It is important that you discuss the results with the doctor who referred you, either in person or on the telephone, so that they can explain what the results mean for you.

Useful websites about Computed Tomography:

- Medical Journal of Australia:
http://www.mja.com.au/public/issues/180_1_1_070604/dic10124_fm.html
- USA Food and Drug Administration:
<http://www.fda.gov/cdrh/ct/what.html>
- Impactscan.org:
<http://www.impactscan.org/>

Please note:

This information is of a general nature only and is not intended as a substitute for medical advice. It is designed to support, not replace, the relationship that exists between a patient and his/her doctor. It is recommended that any specific questions regarding your procedure be discussed with your family doctor or medical specialist

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