Frequently Asked Questions

Radiation exposure from CT: A guide for parents

Welcome to the Mae Boettcher Center for Pediatric Imaging at The Children’s Hospital. Families often have questions about CT scans for their children. Below are some questions that we are frequently asked. If you have other questions, please ask one of our staff and they would be glad to explain things to you.

What is a CT?
CT, also known as a CAT scan, sends x-rays through the patient’s body to form a picture of the inside of the body.

What is an x-ray?
An x-ray is a beam of radiation, similar to light, that can penetrate through the body.

How is CT different than an x-ray film?
To make an x-ray film, an x-ray machine sends x-rays through a patient toward a film. Some of the x-rays are stopped by the patient’s bones and organs, creating a “shadow” on the film. (figure 1)

With CT, an x-ray machine circles around the patient, sending x-rays as it goes around. Using a computer, pictures are created that look like many “slices” of the body. These pictures tell more about the inside of the body than x-ray film. (figure 2)

Does CT use radiation?
Yes. Because CT uses x-rays, a small amount of radiation is given to the patient.
How much radiation is used?
All of us receive small amounts of radiation all the time—mainly from the sun and the soil.
Scientists call this background radiation. The amount of radiation used in CT and x-ray films can be compared to the amount of background radiation we receive every day.

<table>
<thead>
<tr>
<th>Source of radiation</th>
<th>Days of background radiation</th>
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<tbody>
<tr>
<td>3-hour airline flight</td>
<td>1.5 days</td>
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<tr>
<td>Chest x-ray</td>
<td>2 days</td>
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<tr>
<td>Head CT</td>
<td>4 months</td>
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<tr>
<td>Abdominal CT</td>
<td>1.5 years</td>
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Is this radiation harmful to my child?
Even small amounts of radiation carry a low risk of being harmful. The effect of a small amount of radiation is not clearly understood, but doctors assume that it slightly increases the risk of cancer.

On the other hand, CT provides very useful information that usually makes it worth the risk.

How does a CT increase cancer risk?
We should begin by looking at the overall lifetime risk of cancer for a child who has not had a CT scan. Unfortunately, studies have shown that an average of 700 out of 3,000 American children will eventually die from cancer; almost all of these deaths occur later in life after the child becomes an adult. If each of these children had a single abdomen CT scan as an infant, this might increase to 701 out of 3,000. In other words, about 1 in 3,000 infants who have an abdominal CT might eventually die from cancer later in life due to radiation from that CT.

How can the risk be minimized?
At The Children’s Hospital, we use the lowest amount of radiation needed for each CT.

The easiest way to minimize the risk is to perform the CT scan only when it is appropriate.

Are there alternatives to CT?
First of all, if your child ever faces a serious or emergency condition that requires CT, you should not hesitate to do it. In these situations, the benefits clearly outweigh the risks.

Sometimes, after examining your child, your child’s doctor may find that he or she may be safely observed without having to have a CT. Waiting may be difficult, but it may avoid having to give the child radiation.

Other radiology tests such as MRI or ultrasound do not use radiation and can sometimes provide similar information as CT. But they may not be as useful, and are usually less available than CT. Also, MRI may require anesthesia, which carries other risks.

If the CT is normal, does that mean it should not have been done?
A normal CT provides valuable information.
If there is enough concern, then CT should be done whether it turns out positive or negative.

What should I do if I still have concerns?
You should discuss any additional concerns with the doctor ordering the examination. If your doctor cannot answer your specific question, he or she may contact one of the radiologists on staff.
If you feel you need to speak with a doctor before your child receives a CT scan today, one of our staff members can page a radiologist participating in this study. The radiologist will speak with you as soon as he or she becomes available.