Is there an increased risk of cancer from medical radiation, especially CT scans?

There is disagreement in the scientific/medical community about the risk of cancer from radiation due to CT scans. Some recent scientific studies have concluded from the limited data available that exposures to radiation levels found during CT scans may slightly increase the risk of future cancer; other recent studies conclude that there is not an increased risk. If you assume that there is a small risk, the degree of estimated risk for developing cancer varies depending on the scientific study, but some have proposed that for every 1,000 children undergoing a single CT scan of the abdomen, 1 cancer may be caused by CT (risk of 1 in 1,000). This needs to be compared against the risk of developing cancer over one’s lifetime. For those same 1,000 children, about 400 (or 40%) will eventually develop cancer regardless of exposure to medical radiation.

Another way to look at this is that the predicted additional risk of a CT scan could potentially increase a patient’s risk of cancer over their lifetime to 40.1%, as opposed to the nearly identical risk of 40% without the scan. This predicted potential increase is very small compared to the known incidence of cancer. Even though we do not know for certain if a small risk of cancer induction is associated with the radiation dose of common CT scans, the most cautious approach is to take all reasonable steps to make sure that the right radiation dose (especially no unnecessary increased dose) is used for the CT scan of the child. This has been the mission of the Alliance for Radiation Safety in Pediatric Imaging since its inception in 2007.

Finally, the benefits of the CT examination in terms of helping the health care team make decisions for the care of the child are far, far in excess of the potential risks, if the risk exists at all.

If my doctor orders a CT scan, should I let my child have it?

Like any medical test, the beneficial information gained from the test should outweigh the risk of having the test performed. CT is a very powerful and valuable imaging technique that can provide important and even life-saving information. Sometimes, however, imaging tests like ultrasound and magnetic resonance imaging (MRI) can provide the same information as CT but not expose your child to any radiation. You should ask your doctor and imaging provider whether these alternatives are appropriate for your child’s situation. If a CT is the best test, then make sure that your imaging provider uses appropriate low dose techniques to minimize radiation exposure during the test.

How can I be sure that my imaging facility is using appropriate reduced radiation techniques?

Some facilities that perform CT scans on adults do not use radiation dose reduction techniques when scanning children. You won’t know unless you ask, and it is reasonable and within your rights to do so. Your imaging provider should be able to provide you with information about what they do to reduce radiation doses during CT (such as reducing CT tube output, performing single phase scans, reducing exposure to areas away from the clinical concern, etc.). Other things to ask about include whether the facility has American College of Radiology accreditation, whether the CT technologists are credentialled, and if the person interpreting the studies is a board-certified radiologist or pediatric radiologist.
Who should I talk to about my concerns?
Any discussion should start with your child’s physician. They will know or can inquire if the imaging center to which they refer utilizes appropriate pediatric CT scanning techniques, and if a non-radiation imaging test might be as useful for your child’s situation. If not, you should ask to speak with the technologist or radiologist at your imaging facility so that your concerns and questions can be answered. Additional information can also be found elsewhere in this website, and at the links provided.

Last week my 4-year-old son began complaining of headaches after saying he had fallen earlier in the day. He then began to vomit, and our pediatrician referred us to a local hospital emergency department for evaluation. Although my son was doing better, the emergency department doctor ordered a brain CT scan to make sure that there was nothing wrong. He did not discuss with us the risk of radiation before the exam. Fortunately, the CT scan was normal and my son is fine. Now, however, I have begun to worry that by letting them do the CT scan, and that we may have needlessly exposed him to radiation that could harm him later in life. Did we do the right thing?

The decision to perform any imaging test is based on many factors and it is easy to second-guess decisions after the fact, especially when the results are normal. For the situation you have described, even if the physician had discussed the radiation issues before the test, the CT would still be performed to exclude that there were no serious problems for your son. The very small risk from radiation exposure from this one exam is much less than the risk of missing a brain injury from his fall. If similar situations arise in the future, it is always reasonable to ask your physician if there are other methods of getting the same medical information that do not require radiation exposure, and if the facility providing the imaging uses dose reduction techniques wherever possible.

Our daughter was born prematurely and had a prolonged and difficult hospital stay, not coming home until she was four months old. During that time, she had many x-rays for her chest (she was on a ventilator), some fluoroscopy studies (for placing feeding tubes), and several CT scans of her brain (she had some bleeding problems). She was left with some mild cerebral palsy, and she has had other x-rays since. Now that she is 16 years old, I am wondering if she has a higher risk of getting cancer because of all of those x-rays and CT scans that she was exposed to?
Minimizing radiation exposure to the newborn is especially important, since the younger the child, the more sensitive their tissues are to the effects of radiation. However, in the complex medical scenario that you describe with your daughter, imaging is often vital to proper medical treatment. In a premature infant, chest radiographs are often necessary to make sure that life saving lines and tubes are in the proper place, and brain imaging is often needed to make sure that there is no brain injury that might need special treatment. Again, it is a balance between medical need and the very small future risk that most experts think exists for medical radiation. As far as her individual increased risk of getting cancer as she gets older, it is much smaller than the risks that we take every day, such as driving a car. There is no need to do special screening tests or take other special measures.

I was in a car crash as a teenager, and had several CT scans and x-rays while I was in the hospital. Now that I am 32 years old, I am worried about my risk of cancer. What cancers should I be looking out for?
The risk to you from the CT scans you had while evaluating your injuries from a car accident is likely very
much less than the risks those injuries might have caused you. There really is no need to undergo any special screening for cancer because you have had CT scans. Further, there is no specific type of cancer that is more likely to develop as a result of normal diagnostic radiation exposures, and there is no way to tell if any individual cancer was caused by radiation. You should follow the screening recommendations of your physician as is appropriate for your age and family history, but special screening is not needed.

Our family travels a lot. We recently had to go through one of those new x-ray screening systems. I know that they are supposed to be “safe”, but I am concerned about the radiation that my children received, as well as the radiation I will receive when flying for business. Are these new x-ray scanners really safe?

The whole body x-ray scanners that are being introduced for increased airport security work very differently from the x-ray machines that screen your luggage, and from medical x-ray equipment. Traditional x-ray images are made when an x-ray beam travels through an object (whether a person or a carry-on bag) and makes an image that depends upon the relative amount of x-rays that pass through the object. Airport body scanners use an extremely low dose of x-rays and make an image by recording the number of x-rays that are reflected back from the person. In this way, hidden objects that are harder than normal soft tissue can be detected. The dose delivered to anyone is equal to only about 15 minutes of daily background radiation. Most of the x-rays do not even penetrate below the level of the skin. Other whole body scanners do not use x-rays at all, instead using what are essentially radio waves to image through clothing. So while people may have many reasons to object to these new scanners, concerns about excessive radiation exposure should not be one of them.

I understand that children are more sensitive to radiation, and that reducing their exposure is important. However, I have recently had to have several x-ray studies, including two CT scans, and I wonder if anyone is doing anything about radiation exposure in adults?

Since its creation by the four founding member societies, the Alliance for Radiation Safety in Pediatric Imaging has grown to include over 60 societies, including 21 international, who share our concern and support our efforts to responsibly reduce radiation exposure for children. One of the gratifying results of this effort has been recognition of the need to reduce radiation exposure for all patients undergoing medical imaging. To that end, the American College of Radiology and other societies have begun a campaign analogous to Image Gently®, called Image Wisely. Recognizing that radiation reduction is important for all patients, the Image Wisely campaign seeks to achieve the same awareness and change of practice for adults that Image Gently has done for children.