

WHAT PARENTS NEED TO KNOW ABOUT

SAFE AND EFFECTIVE

IMAGING FOR CHILDREN

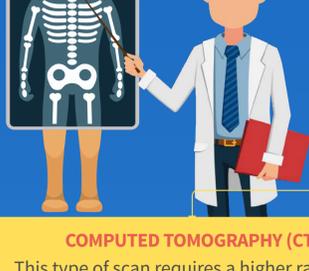


Children visiting the imaging lab are a special challenge for radiologic technologists (RTs) compared to adults, as they must balance a safe dose of radiation while creating a clear image for diagnosis and keeping their young patients still and calm.



While RTs face many risks and challenges, they are able to carry out pediatric procedures and are educating their young patients and patients' parents alike.

A PREVIEW OF PEDIATRIC RADIOLOGY



TYPES OF IMAGING THAT REQUIRE IONIZING RADIATION INCLUDE:

- CT
- FLUOROSCOPY
- RADIOGRAPHY

COMPUTED TOMOGRAPHY (CT)

This type of scan requires a higher radiation dose than standard radiography and takes cross-sectional images of a patient's internal organs and tissues that are then reconstructed by a computer. Approximately 5 to 9 million pediatric CT procedures are performed each year.

FLUOROSCOPY

This type of scan is used for interventional procedures and requires higher doses than scans for other types of procedures.

RADIOGRAPHY

An image is recorded to be evaluated at a later time.

The ALARA principle, also known as "as low as reasonably achievable," and the Image Gently Think-A-Head campaign have helped raise awareness to reduce dosage.

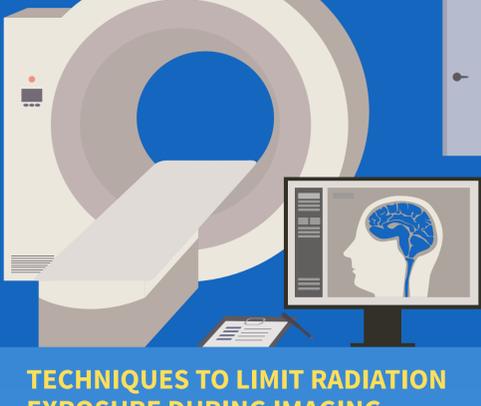
EFFECTS OF OVEREXPOSURE TO RADIATION

There is a general consensus that any dosage of radiation, no matter how small, is not absolutely safe for children.

A study cited by the National Cancer Institute found that a cumulative dose of

50 TO 60 MILLIGRAY

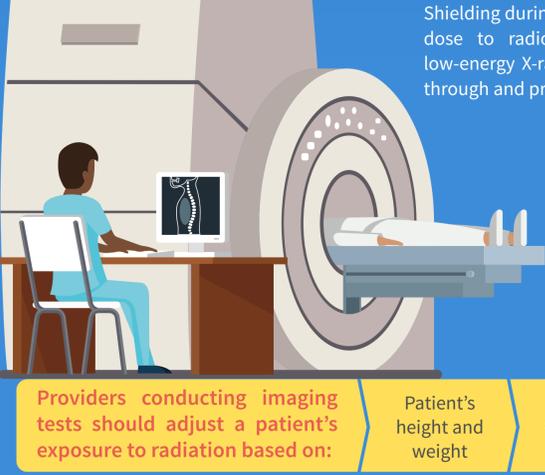
(mGy) administered to the head resulted in a three times greater risk of developing brain tumors as compared with those who received cumulative doses of less than 5 mGy to the head.



TECHNIQUES TO LIMIT RADIATION EXPOSURE DURING IMAGING

Shielding during a CT scan can "decrease the surface dose to radiosensitive areas by absorbing the low-energy X-rays while allowing the beam to pass through and produce a diagnostic image." ASRT

Using bismuth shields can lead to a 18 to 74 percent dose reduction in radiation-sensitive areas. However, the quality of the image produced using a bismuth shield has been questioned by the Association of Physicists in Medicine.



Providers conducting imaging tests should adjust a patient's exposure to radiation based on:

- Patient's height and weight
- Type of organ system scanned
- Region of the body that is scanned

An image's scan resolution does not always need to be high-quality in order to make a diagnosis.

Only absolutely necessary CT examinations should be performed on a pediatric patient. Other types of scans that should be considered prior to conducting a CT scan include ultrasound imaging and magnetic resonance imaging (MRI).

Health care professionals should strive to educate themselves on optimizing exposure settings and identifying indicators of a patient's need for a CT scan.



CHALLENGES AND RISKS OF PEDIATRIC IMAGING

TECHNIQUES TO INCREASE THE SAFETY AND EFFECTIVENESS OF PEDIATRIC IMAGING

Pediatric RTs can use various distraction techniques to help a patient sit still while the image is being taken.

- Singalongs or listening to music, depending upon the area of the body being imaged
- Set up the equipment ahead of time so that the child doesn't have time to develop anxiety or fear
- Explain that the X-ray equipment is just like the child's parent's camera, only bigger
- Play with toys
- Discuss a favorite cartoon character
- Use a calm and kind voice to sooth the child's fears
- Create a story around the experience

Advancements in other imaging modalities can lead to a decrease in imaging that requires radiation.

For example, elastography uses sound waves to determine the stiffness of tissue.

Contrast-enhanced ultrasound imaging has also been gaining acceptance by the pediatric community, though not all contrast agents currently used by pediatric radiologists are approved by the U.S. Food and Drug Administration (FDA).

Protection devices should be used when appropriate. Devices include:

- Thyroid shield
- Gonadal shield
- Breast shield

CHALLENGES IN PEDIATRIC IMAGING

It has been estimated that up to 85 percent of pediatric radiology cases are handled by radiologists specializing in adult imaging procedures, as this can cut costs for a health organization.



This has led to:

- The establishment of freestanding children's hospitals
- Dedicated pediatric departments hiring pediatric radiologists

Because children are still growing and developing, pediatric RTs face a unique challenge of balancing radiation protection and image quality.



BENEFITS AND RISKS OF USING RADIOLOGIC TECHNOLOGIES



Benefits include:

- The procedures can be noninvasive and often painless.
- These imaging technologies can lead to diagnosis and/or monitoring of therapy.
- They provide aid in interventional procedures.



Risks include:

- Tissue damage
- Increased risk of cancer

THE IMPORTANCE OF AN EDUCATED PATIENT

Pediatric RTs should understand the importance of educating the pediatric patient and parent about their imaging options, and the benefits and risks associated with each.

Parents have multiple sources of information available to them at their fingertips.

The Image Gently Alliance advocates to raise awareness "in the imaging community of the need to adjust radiation dose when imaging children. The ultimate goal of the Alliance is to change practice." Image Gently

The Image Gently Alliance provides resources to parents on CT scans, digital radiography, fluoroscopy and other nonradioactive imaging methods.

THE FDA HAS ALSO GIVEN THE FOLLOWING RECOMMENDATIONS TO PARENTS:

Parents should be informed of every step in the imaging process, such as any required advanced preparation, contrast agent or sedative.

Ask the physician about the safeguards available to diminish the risks associated with radiation technologies.



Stay informed of the child's medical-imaging history and always ask about the benefits and risks of every imaging procedure.

The International Atomic Energy Agency (IAEA) is another source of information on radiologic technology and imaging methods.

Parents should ask about alternative imaging methods.

CONCLUSION

Parents and RTs have a wide variety of sources of information at their fingertips. Protecting a child from overexposure to radiation should be the primary goal of both parents and pediatric RTs. As the Latin phrase "primum non nocere" states, health care professionals are bound by their oath to "first, do no harm."

SOURCES:

- <http://www.who.int/ceh/capacity/radiation.pdf>
- <http://www.imagegently.org/About-Us/The-Alliance>
- <http://www.radiologytoday.net/archive/r17211p24.shtml>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC693383/>
- <http://imagegently.org/Roles-What-can-I-do/Technologists>
- <http://www.choc.org/programs-services/radiology/#child-life>
- <https://www.itnonline.com/article/pediatric-imaging-growing-fast>
- <http://imagegently.org/Procedures/Digital-Radiography/Quality-Improvement>
- <https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/pediatric-ct-scans>
- <https://www.fda.gov/oc/FOIA/Response/InformationForPatients/Information-patients/index.htm>
- <http://www.intechopen.com/books/medical-imaging-in-clinical-practice/challenges-and-peculiarities-of-paediatric-imaging>
- <http://www.fda.gov/Radiation-EmittingProducts/RadiationEmittingProductsandProcedures/MedicalImaging/ucm298899.htm>
- https://www.asrt.org/main/news-research/radiologic-technology-news/2016/06/21/Study_Outlines_Pediatric_CT_Safety_Practices