

## Medical Imaging for NF1: Radiation Exposure

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Over the course of a lifetime, individuals with NF1 will likely have multiple medical imaging studies. Medical imaging technologies produce pictures of the internal structures of our bodies. They can help identify a health problem and guide treatment. There are several types of medical imaging technologies. The preferred type of medical imaging depends on the clinical problem and the part of the body involved. Some types involve exposure to radiation. We recommend limiting exposure to radiation when possible as it does increase an individual's risk to develop cancer. However, studies with radiation exposure are often necessary. Common medical imaging studies may include the following:

### No Radiation Exposure

1. Magnetic Resonance Imaging (MRI)

*MRI is the preferred type of medical imaging technology used in the care and treatment of individuals with NF1. It uses a combination of a magnetic field and radio waves to take pictures of the inside of the body. The images are particularly good for looking at neurofibromas in the spine and gliomas in the brain. Some NF clinics recommend all adults with NF1 have a baseline whole body MRI performed to assess the number and location of neurofibromas inside the body. There is no risk of radiation exposure with MRI.*

2. Ultrasonography

*Ultrasonography or ultrasound use echoes to produce images of the inside of the body. An ultrasound may be used to distinguish whether something inside the body is solid or fluid-filled. There is no risk of radiation exposure with ultrasonography.*

### Radiation Exposure

1. Radiography (X-Ray)

*Radiography passes an x-ray beam through the body. Parts of the x-ray are absorbed and other parts are not. This is what creates the picture. X-ray is most often used to image the bones. For example, an individual with NF1 may have an x-ray of their spine to monitor any spine curvature like scoliosis. Mammograms and fluoroscopy are also a type of x-ray. There is radiation exposure with an x-ray. However, radiation exposure is small and can be reduced with proper shielding. Typically, the benefit of using an x-ray exceeds the radiation risk.*

2. Computed Tomography (CT) or Computed Axial Tomography (CAT)

*CT and CAT scans use specialized x-ray equipment to create cross-sectional images of the body. Each image is a thin "slice" of the inside of the body, similar to the slices in a loaf of bread. CT images can provide more detail than a conventional x-ray. There is radiation exposure with CT and CAT scans. For example, one CT scan of the chest may have as much radiation as 140 x-rays of*

*the chest. Therefore, its use should be avoided when another test can provide the same information at comparable quality. Please note that use of CT and CAT scans should be performed when it is the ideal test, such as for follow up of an MRI or for assessment of a possible cancer within a symptomatic plexiform neurofibroma. In those instances, the benefit of using a CT or CAT exceeds the radiation risk.*

3. **Angiography**

*Angiography or an angiogram use X-ray to visualize the blood vessels in the body. It can assess for vascular aneurysms, narrowing, and blockages. There is radiation exposure with an x-ray. Typically, the benefit of angiography exceeds the radiation risk.*

**What to share with your doctor**

Medical imaging technologies with no or little radiation exposure are preferred for individuals with NF1. This will limit any unnecessary radiation to a population of individuals with an increased risk to develop cancer over their lifetime compared to the general population. Prior to use of CT and CAT scans, careful consideration of possible alternative medical imaging technologies should occur. Possible radiation-free alternatives, such as MRI and ultrasound, may be able to provide the same information. However, CT and CAT scans are sometimes the optimal test and should be performed when they may provide important healthcare information.

**Questions to ask your doctor if they recommend a CT scan**

1. Why are you recommending I have a CT scan?
2. What are the risks and benefits of a CT scan?
3. Is the CT scan medically necessary to answer the clinical question?
4. Is there an alternative test (such as MRI or ultrasound) that does not involve radiation?

For more information, visit:

Federal Drug Administration (FDA) guide on Radiation [www.fda.gov/Radiation-EmittingProducts](http://www.fda.gov/Radiation-EmittingProducts)

Image Wisely (Radiation Safety in Adult Medical Imaging) [www.imagewisely.org](http://www.imagewisely.org)