

MRI compatibility with cochlear implants

MRI compatibility is an important consideration

Magnetic Resonance Imaging (MRI) uses a very powerful magnet to provide detailed images of a person's internal organs and tissue. It is often used to provide early detection of many different conditions so that treatment can be more effective.

MRI is the fastest growing medical imaging technology in the world.¹ In fact, it's predicted that most people will need at least one MRI in their lifetime.

As implanted medical devices can interfere with MRI scans, it's important to consider the compatibility of this increasingly popular technology with your choice of cochlear implant.

HOW DOES A COCHLEAR IMPLANT AFFECT MRI?

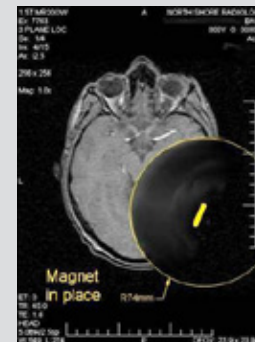
There are two main ways a cochlear implant can affect MRI:

1. The internal implant contains a magnet, which holds the external sound processor coil in place. **When placed in an MRI scanner, this magnet can cause a blur or 'artifact' over the medical image**, which may hinder the Doctor's ability to make an accurate diagnosis of brain scans. As a quarter of all MRI scans are performed on the brain, having the flexibility to remove the internal magnet if required is an important consideration when choosing a cochlear implant.
2. **The magnetic field used in MRI will naturally pull on the magnet within the cochlear implant.** As MRI scan strength (Tesla) increases, so does the force of the pull on the internal magnet.

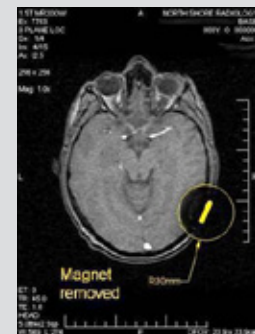
For these reasons, Nucleus® implants from Cochlear™ have been designed with a removable magnet. This ensures Nucleus recipients have access to the latest MRI technology for the best possible medical diagnosis. The magnet does not always have to be removed, but Cochlear recipients have the option if required.

Other brands may not feature a removable magnet. This means that recipients may be limited by older MRI technology or may need their entire implant removed, even for a scan of a different part of the body such as the knee.

Implant removal requires surgery. Once an implant is removed, it cannot be re-used, meaning a new implant is required. Recipients will also require further rehabilitation once the new implant is in place.



A 1.5 Tesla MRI scan of a Nucleus implant recipient with magnet in place. The yellow line represents implant placement. The implant magnet creates a large artifact on the image, hindering an accurate diagnosis. For bilateral implant recipients, the entire brain would be obscured.



A 1.5 Tesla MRI scan of a Nucleus implant recipient with magnet removed. The yellow line represents implant placement. The artifact on the image is significantly reduced and does not interfere with diagnosis.²

Images courtesy of Royal North Shore Radiology (Sydney, Australia)



Patient undergoing an MRI scan.

WHY IS COMPATIBILITY WITH HIGH STRENGTH MRI SO IMPORTANT?

MRI strength directly relates to the quality of the medical image produced. A higher Tesla number means better image resolution, more reliable detection of medical abnormalities and faster scanning times.

1.5 Tesla strength MRIs are considered standard at present, however 3.0 Tesla scans are becoming increasingly popular due to their superior image quality. With the continuing trend towards higher strength MRIs, the compatibility of cochlear implants with MRI is an important lifetime decision.

WHY MRI OVER X-RAY OR OTHER TYPES OF IMAGING DEVICES?

There are a variety of imaging techniques available to obtain images of the body such as X-rays, CT scans, PET scans and ultrasounds. Different techniques are required for different reasons. MRI is becoming increasingly popular thanks to its ability to capture detailed images of soft tissue and joints, plus its ability to diagnose other conditions such as heart disease and breast cancer. Additionally,

MRI does not use radiation such as other techniques like X-Ray, making it a safer option.

DO ALL COCHLEAR IMPLANTS HAVE THE SAME MRI COMPATIBILITY?

No. MRI compatibility differs between cochlear implant manufacturers. Nucleus implants from Cochlear are approved for MRI scans at 1.5 Tesla with the internal magnet in place and 3.0 Tesla with the magnet removed.³

No other implant manufacturer can offer this level of MRI compatibility.

HOW DOES THE REMOVAL PROCEDURE WORK?

The magnet can be removed in a simple outpatient procedure before the MRI takes place. A temporary fixing disc is then used to hold the external coil in place, meaning that the recipient only experiences hearing downtime during the actual scan, when the sound processor cannot be worn. Once the MRI is complete, a sterile magnet is re-inserted into the implant.

OTHER CONSIDERATIONS

The magnetic field used in MRI can cause a weakening of the internal magnet in a cochlear implant. As a result, the sound processor coil may not remain firmly in place. The ability to replace the internal magnet resolves this issue.

A SUMMARY OF THE KEY BENEFITS OF NUCLEUS IMPLANTS BY COCHLEAR

- The industry's most MRI compatible implant.
- A removable internal magnet to allow for high strength MRI scans AND less obstruction of brain scan images if required.
- The ability to safely undergo a 1.5 Tesla strength MRI with the internal magnet in place.
- The industry's only implant to be considered safe at 3.0 Tesla, with the magnet removed.
- The flexibility to adapt to future advances in MRI technology without having to remove the entire implant.

1. www.mediexchange.com website, showing USA figures for 2007.

2. Risi F, Saldanha A, Leigh R, Gibson R. Magnetic resonance imaging safety of Nucleus 24 cochlear implants at 3.0 T. International Congress Series; 1273 (2004) 394–398.

3. MRI compatibility varies by country depending on regulatory approvals in each country. Regulatory approval in Japan, Thailand and Indonesia clears recipients for 1.5 Tesla scans with the internal magnet removed. Scans at 3.0 Tesla are not currently approved for cochlear implant recipients in Japan, Thailand or Indonesia. Please contact your local Cochlear representative or clinic for further details.

Hear now. And always

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