



# The Neurofibromatosis Association

Registered Charity No 1078790



## THE AUDITORY BRAINSTEM IMPLANT

### What is an auditory brainstem implant (ABI)?

The auditory brainstem implant (ABI) is an electronic device that enables people with Neurofibromatosis Type 2 (Nf2) to hear a sensation of sound following removal of a tumour from the auditory (hearing) nerve. Part of the ABI is implanted surgically and part of it is worn externally. It works by electrically stimulating the cochlear nucleus in the brainstem to produce a sensation of sound.

### Who might be suitable for an ABI?

An ABI might be considered for a person who has lost or will lose their hearing in both ears following the removal of bilateral acoustic tumours. Bilateral acoustic tumours occur in people who have Nf2. Generally, one will not be able to use a hearing aid or cochlear implant following removal of the acoustic tumour because the auditory (hearing) nerve may be damaged.

### What does the ABI look like?

The ABI has both internal and external parts. The internal components consist of a receiver stimulator that is implanted underneath the skin behind the ear. The electrode array is placed onto the cochlear nucleus in the brainstem. It is connected to the receiver stimulator by a series of silicone covered wires. The external parts consist of a box type speech processor that is worn like a personal cassette player. The speech processor is attached via a cable to a microphone worn behind the ear, like a behind the ear hearing aid. The microphone is held in place over the internal coil by a magnet. The external parts of the implant can be removed at any time, for example when sleeping or swimming and bathing.

### How does the ABI work?

- Sound is picked up by the behind the ear microphone
- The cable sends the sounds to the speech processor
- The speech processor filters and analyses the sounds and codes it into digital signals
- The coded signals are sent back along the cable to the transmitting coil
- The transmitting coil sends the coded signals to the implant underneath the skin
- The implant delivers the signals to the electrodes on the cochlear nucleus
- The electrodes stimulate the cochlear nucleus, producing a stimulation that can be interpreted as sound

This whole process happens very quickly so that the ABI user will hear sounds as they occur.

### What will I be able to hear with an ABI?

About a month after the ABI surgery you will have to come back to the hospital for programming and rehabilitation with the implant. Normally, the process of getting used to listening with the implant may take many weeks or even months. The sound will be very strange at first and possibly not very meaningful. Results from experience to date shows that ABI users may be able to obtain the following benefits:

- Detection of environmental sounds
- Improvement in the ability to lipread conversations
- Ability to follow the rhythm of speech and detect short and long speech sounds

Some of the limitations of using an ABI have also been described and they are as follows:

- Many noises may sound the same at first and it may be difficult to identify what you hear with the ABI
- It is normally not possible to understand speech without lipreading
- Some patients may not be able to hear anything at all after the ABI

## MRI scans and the ABI

Patients with an ABI should consult their implant surgeon before having an MRI (magnetic resonance imaging) scan. In some cases it may be necessary to remove the internal magnet prior to fitting an ABI if MRI scans are required for long term follow up. Generally patients are not recommended to have an MRI scan after they have had an ABI.

## How do I get an ABI and how many people have one?

There are two main centres carrying out ABIs in the UK, Manchester and Cambridge. The Manchester team has carried out most of the ABIs including one, which was performed in Birmingham. Currently there are about 4 people implanted in the UK each year.

## ABI Centres in the UK

Professor R T Ramsden  
 Professor of Otolaryngology  
 Dept of Otolaryngology Head-Neck Surgery  
 Manchester Royal Infirmary  
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 Addenbrooke's Hospital NHS Trust  
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## Cochlear Website

For more information about the ABI please visit the Cochlear website at [www.cochlear.com](http://www.cochlear.com)

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