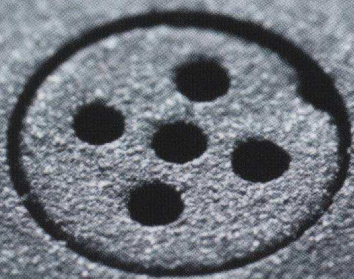


# Baha Intenso™

*Powerful yet discreet*



Hear now. And always



Cochlear







# Power and discretion in one

Patients with substantial hearing losses need high levels of amplification. Until now, many of them have had to make compromises. Some may have chosen a bulky, body-worn device in order to gain sufficient output, while others have prioritised discretion over audibility. With the Baha Intenso™ they no longer need to compromise!

Baha Intenso™ has been specifically developed to provide maximum power and discretion. This head-worn device combines advanced digital signal processing with multi-band active feedback cancellation to provide unrivalled hearing performance and crystal clear sound quality.

The benefits offered by this unique device include:

**Power:** greater performance for maximum audibility

**Sound Quality:** advanced digital signal processing for superior sound quality

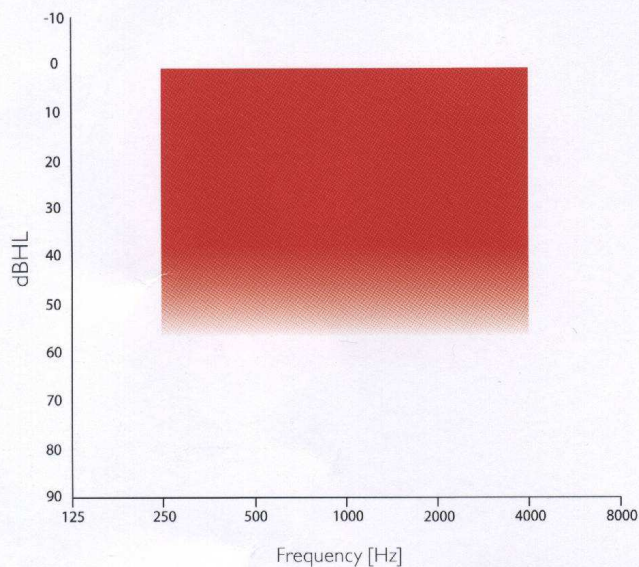
**Design:** discreet, head-worn convenience for ultimate ease-of-use





# Head-worn convenience for more people

FITTING RANGE FOR BAHА INTENSO™  
(DEGREE OF SENSORINEURAL HEARING LOSS)



## Mixed hearing losses

People with a substantial mixed hearing loss need a powerful, head-worn Baha®. These devices send sound directly to the cochlea, effectively bypassing the conductive element of the hearing loss. Baha Intenso™ provides a peak output force level of 124 dB (OFL), thereby extending the effective fitting range to 55 dBHL sensorineural loss (excluding conductive loss). Given this power, patients will no longer have to compromise between their power requirements and the desire for an aesthetically pleasing head-worn device.



Peter Barrett is the first licensed UK commercial pilot with a Baha. Despite his hearing difficulties, Peter can continue to work as a pilot through the assistance provided from his Baha.

## Progressive hearing losses

Many patients with a mixed hearing loss or Single Sided Sensorineural Deafness (SSD™) may experience deteriorating thresholds, so any solution must take this into account. The additional power of Intenso allows you to continue to meet patient amplification requirements over time. Similarly, the tone control helps you to adjust the low frequency output to match a sloping hearing loss. Importantly, Intenso focuses not only on peak output but also provides maximum power across the full bandwidth promising greater audibility.





The extra power of Baha Intenso™ ensures that children using the Softband can access the sounds crucial to speech and language development

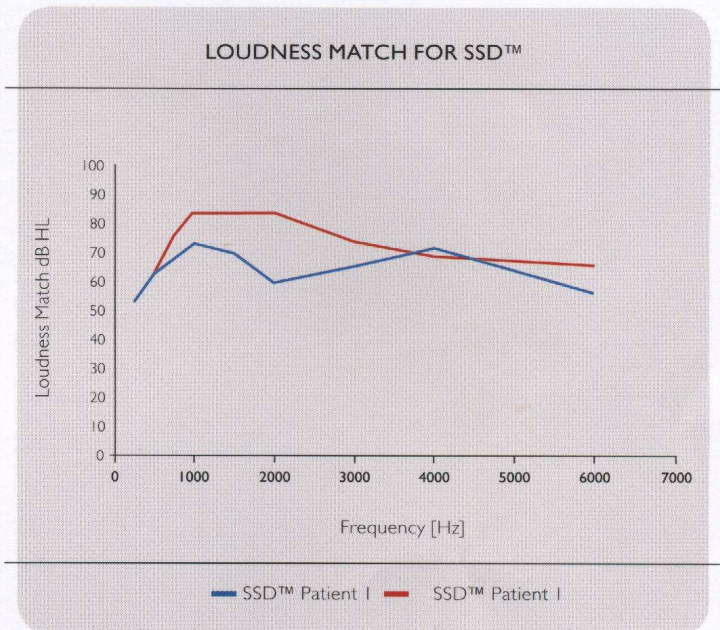
## Children

Scientific reports have highlighted the obstacles that children with untreated hearing impairments experience in language and educational development<sup>1</sup>. Baha Intenso™ promises increased audibility by providing access to the high frequency speech sounds that are critical to normal speech and language acquisition.

Many younger children will need to use a Baha® Softband for a period prior to implantation. This inevitably results in some loss of power\*, as the transmission of sound is not as efficient as with an implanted Baha. Here, the additional 5-10 dB of power provided by the Intenso may prove crucial. Using Intenso before surgery can help to ensure that the child receives enough amplification to benefit from Baha.

\*The Softband solution works like other traditional bone conductors, i.e. the signal passes through the skin and is thus weakened. The overall power experienced is therefore not as great as with the Baha sound processor directly attached to an implant that allows direct bone conduction.

<sup>1</sup> Yoshinaga-Itano C. (2003) Early intervention after universal neonatal hearing screening: impact on outcomes. *Ment Retard Dev Disabil Res Rev.* 9(4):252-66.



Loudness matching results from two SSD™ patients indicating the difference in head transfer function (adapted from Soli, 2004<sup>2</sup>).

## Single Sided Deafness (SSD™)

Recent reports have shown that patients with Single Sided Sensorineural Deafness (SSD™) can benefit significantly from a Baha solution<sup>3</sup>. In noisy situations they find the rerouting of sound directly from the impaired side to the hearing ear very helpful. To cope with the often significant variability in skull transfer function, Baha Intenso™ provides additional headroom so that people with increased interaural attenuation can receive the power they require. The additional power allows more patients with SSD™ to benefit from a Baha solution.

<sup>2</sup> Vermiglio, A. J. & Soli, S. D. (2004). A Measurement of Sound Level Perception when using the Bone-Anchored Hearing Aid (BAHA) for Trans-Cranial Stimulation of Individuals with Single-Sided Deafness. Paper presented at 3rd International Hearing Aid Research Conference, Lake Tahoe, 25-29 August.

<sup>3</sup> Hol, M.K.S. (2005). BAHA- New indications and long-term patient satisfaction, Nijmegen.







# The world's most powerful head-worn Baha

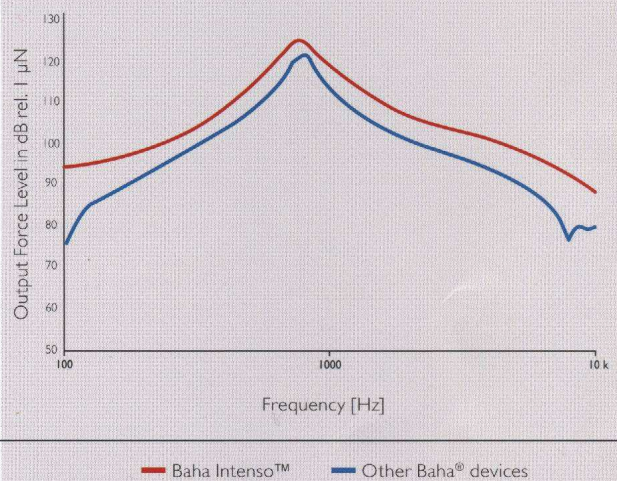
## Maximum power and discretion

Meeting the demands of patients needing more power from a head-worn Baha required investigating the core of our technology: the transducer.

First, we created new Power Transducer Technology, which we then combined with the latest developments in Lean Cell manufacturing processes. This led to several improvements, including a leap in transducer power performance driven by a 675 cell battery.

The enhanced Baha transducer now provides additional output, particularly in the low and high frequency ranges. This extra power meets the needs of patients with a more substantial hearing loss, thereby facilitating better speech understanding.

MAXIMUM OUTPUT FORCE LEVEL FOR BAHAs<sup>®</sup> DEVICES

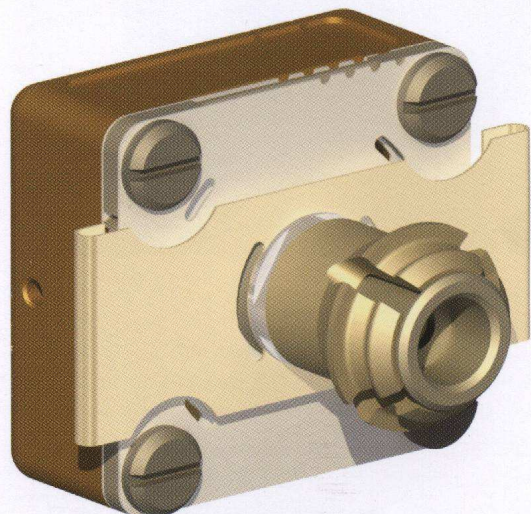


Baha Intenso™ upgrades output performance across the frequency range.

## Upgrading head-worn performance

Intenso's new transducer boasts more than 15 design improvements. While no single improvement was a revolution in transducer design, each one represented a vital step towards higher quality and reliability.

The plastic frame was replaced with a metal frame, giving a stronger structure and higher resistance to external forces. We also introduced advanced laser welding to reinforce the total transducer structure.





# The feedback challenge



## Active Feedback Cancellation (AFC)

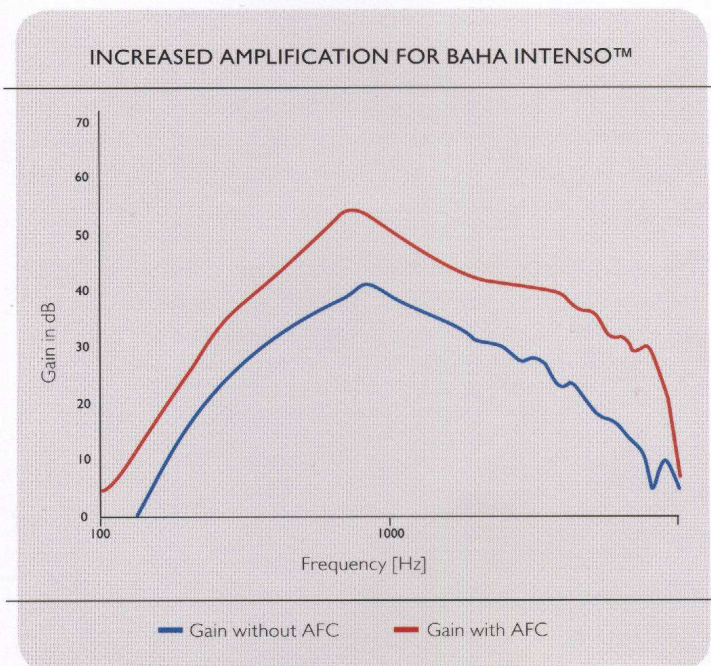
Unlike conventional acoustic hearing instruments, there are two main sources of feedback in a Baha. The first is mechanical feedback produced by vibrations of the transducer occurring between 400-1000 Hz. The second is acoustic feedback occurring between 1500-3000 Hz. To overcome these problems we developed the world's first Multi-band Active Feedback Cancellation System.

## Less feedback with Baha Intenso™

Feedback is one of the most common challenges for Power patients. Apart from distorting the signal, feedback can be a source of annoyance and frustration.

Baha Intenso's™ Multi-band Active Feedback Cancellation (AFC) system uses phase cancellation to keep feedback to a minimum and to deliver over 10 dB of additional gain without any modification of the original signal. While this increased gain covers the entire frequency range, there is extra emphasis on the higher frequencies. This strategy provides more access to vital speech cues in this area.

An additional benefit of extending the feedback limits is that Baha Intenso™ delivers the most amplification possible. Patients can therefore enjoy superior speech understanding in more situations. The AFC system also keeps feedback to a minimum.



Intenso's AFC increases available gain before feedback.

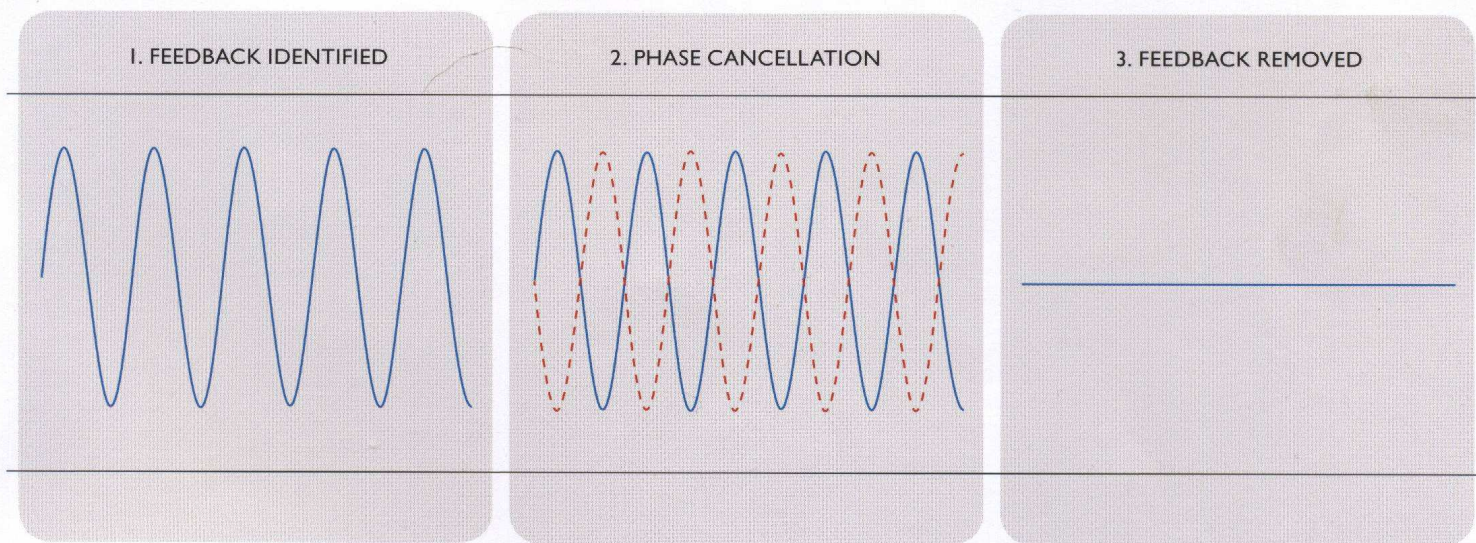


## Phase cancellation without gain loss

Previous approaches to feedback management required a reduction in gain or the creation of a notch filter in the hypothetical frequency region of feedback. Both of these solutions led to a loss in gain and audibility, and an inability to meet the needs of significantly hearing impaired patients.

Intenso's multi-band AFC system is enabled by digital signal processing, which maximises the performance of the new Power Transducer Technology. This system uses phase cancellation rather than gain reduction to remove feedback, without decreasing the amplification or distorting the signal. The result is an extra 5-10 dB of gain. This can be accessed in all frequencies – particularly those containing vital speech information.

The AFC system is always on the alert for either mechanical or acoustical feedback. When feedback is detected, the system determines its exact frequency, amplitude and phase. It then generates a precise counter signal. Within milliseconds, feedback is reduced without distorting or removing any information from the amplified signal.



Intenso's AFC system identifies the exact frequency, amplitude and phase of the feedback signal (either mechanical or acoustic).

A signal that is opposite in phase to the input is created automatically to cancel the feedback.

The result is that feedback is removed without distorting the original signal.







# Smooth sound in a **changing** world

## Superior sound quality

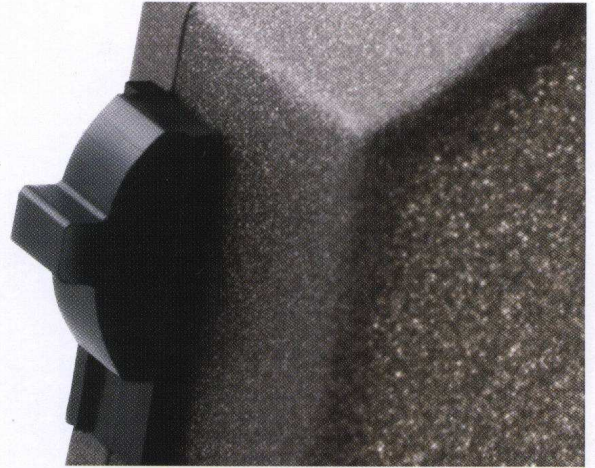
Baha users expect a superior listening experience wherever they go. Baha Intenso™ utilises advanced digital signal processing techniques to automatically respond to changes in the listening environment, ensuring optimal sound quality at all times.

## Digital signal processing

Digital processing helps to preserve the temporal differences in speech through linear amplification for mid-level signals. Intenso uses Output Compression to reduce louder sounds and improve comfort. In very quiet situations the system implements expansion in order to minimise the effects of annoying, low-level noise.

To reduce the annoyance of rapid, impulse sounds, dual time constants are implemented. When an impulse sound is detected, Intenso speeds up its attack and release times so that the intensity of the impulse sound is reduced. The moment the impulse sound ends, the gain quickly reverts to its previous level. The dual time constant system eliminates the "pumping" sensation so often associated with compression.

These advancements work hand in hand to improve the sound quality without the unwanted side effects that are often produced by extra amplification.



## Three dedicated listening programs

Program 1 maximises speech understanding in typical listening situations. In this setting compression is used sparingly to prevent louder environments from causing discomfort.

Due to the wider dynamics of louder listening situations, many people prefer additional compression as it can provide a more comfortable signal. Program 2 addresses this by lowering the kneepoint of the output compression, thereby providing more compression across the input range. Additionally, Program 2 reduces low frequency amplification to increase comfort in noisy situations. For many patients, these two advances allow a higher volume setting to be used in noisy situations, thereby providing greater access to the speech signal.

External audio sources such as FM devices or MP3 players can be heard in all listening programs. If your patient would prefer to listen to only the external audio source (ie. with Baha microphone turned off) Program E provides that option. Consuming very little power if no accessories are attached, Program E also allows your patients to quickly mute the Baha, without needing to turn it off or adjust the volume control.

These programs make listening effortless regardless of the situation.



# Accessories for improved **connectivity** and comfort

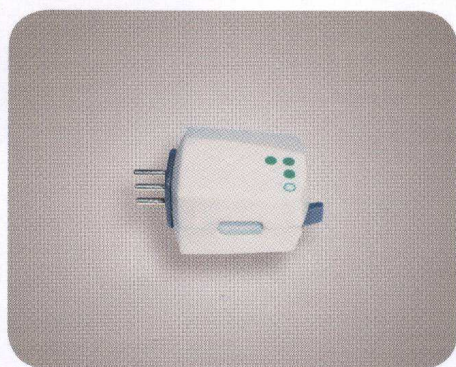


Specially designed accessories provide maximum access to a wide array of technologies that enhance the listening experience in different environments. These accessories can all be easily connected to the Baha Intenso™.



## Audio adapter

Allows direct input from personal equipment such as stereos, TVs, and MP3 players.



## MicroLink Baha FM-receiver

Enables access to most FM transmitters. For more information and orders, contact your local Phonak distributor: [www.phonak.com](http://www.phonak.com).



## Telecoil unit

Improves sound quality and speech understanding with loop facilities in the home and other buildings.



# Small and versatile for easy handling

## Ergonomic, head-worn design

The head-worn sound processor has easily accessible, ergonomically designed controls that make program selection and volume changes swift and easy. Intenso comes in four different hair-tone colours for maximum discretion.

## Program mute

When no electronic accessories are used, patients can easily mute the microphone and save battery power without needing to either adjust the volume control or physically remove the device.

## Information beeps

These beeps alert users to any changes they may have made to the program setting. They also draw their attention to the need to replace batteries, in order to avoid losing functionality at inopportune times.





# Baha<sup>®</sup> – A proven success

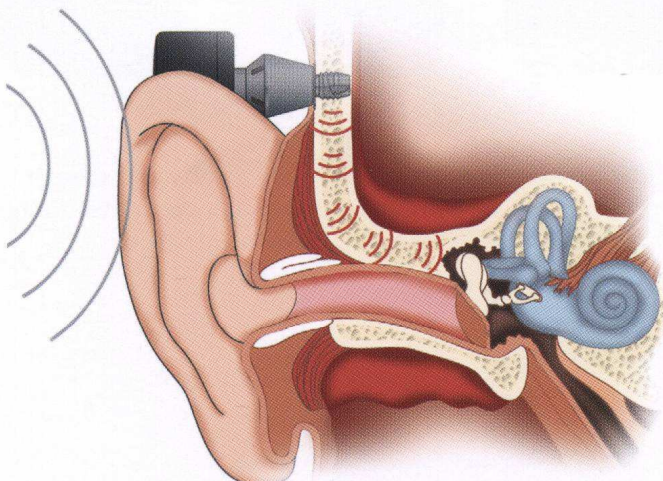
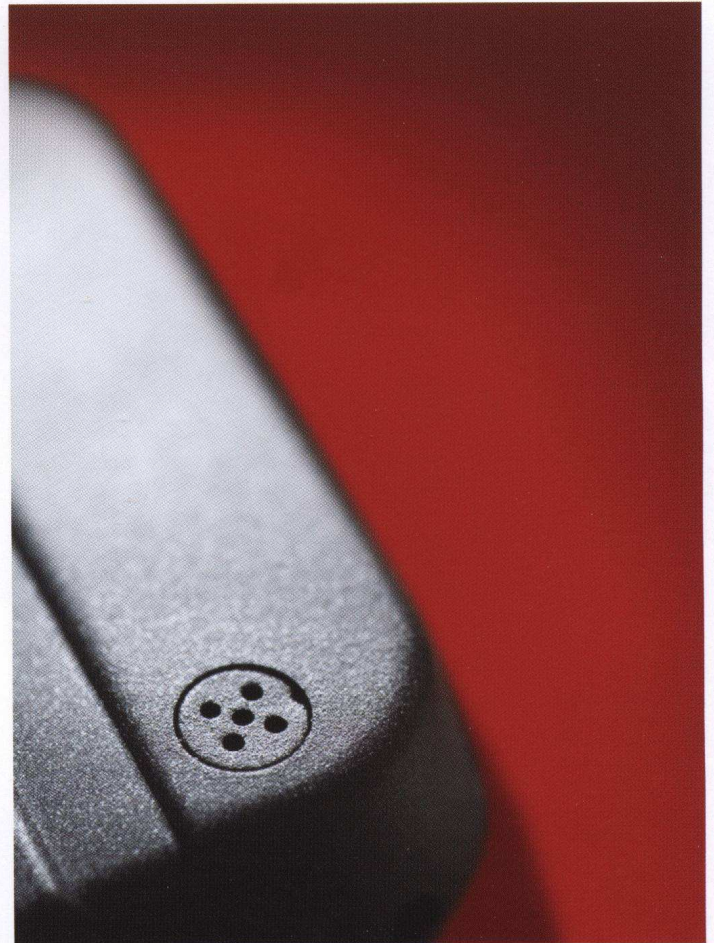
The Baha system has been used to successfully treat over 35,000 patients worldwide.

Baha is the only implantable, bone anchored hearing treatment available. It works by combining a sound processor with an abutment and a small titanium implant placed in the skull bone behind the ear. The system is based on osseointegration\*, through which living bone tissue integrates with titanium. The titanium implant becomes one with the bone, allowing sound to be conducted via the skull bone directly to the functioning cochlea.

As the Baha system completely bypasses the outer ear, ear canal and middle ear, it provides an attractive alternative for patients who cannot benefit from air conduction hearing aids.

The Baha system consists of three parts:

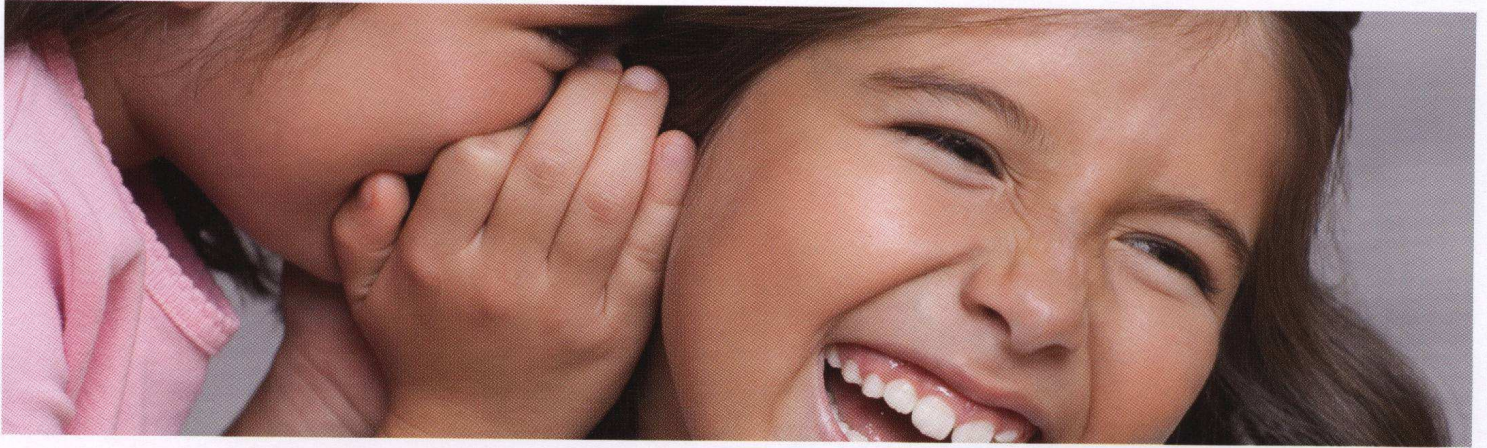
1. A **sound processor** that picks up sound vibrations.
2. A connecting **abutment** that transfers sound vibrations from the Baha device to the implant.
3. A **small titanium implant**, which is placed in the bone behind the ear, where it fuses with the living bone. This implant transfers the sound vibrations, via the skull bone, to the functioning cochlea.



*\*Baha is based on the Brånemark system<sup>®</sup>. In the early 1960's, Professor Brånemark discovered that titanium implants could be incorporated into, and accepted by, the human body thus forming a permanent structure. He termed this process "osseointegration". This system has been developed not only for Baha hearing implants but also for Cochlear's craniofacial reconstruction system, Vistafix<sup>™</sup>.*



# Cochlear – bringing people the gift of sound



Cochlear is the global leader in innovative, implantable hearing solutions. With our headquarters in Sydney and an additional 16 offices around the globe, we employ over 1300 people and distribute our products in over 90 countries.

Cochlear has been bringing the gift of sound to people all over the globe for more than 30 years. Innovation is at the heart of the company's product development. Whether that innovation is focused on performance or features, the principle is the same. We think of ways to deliver brand new capabilities, and improve those that already exist. We also incorporate world-class design in every aspect of our product development to deliver an unrivalled listening experience.

Two innovators, Professor Graeme Clark (Nucleus) and Professor Per Ingvar Brånemark (Baha), have infused the company and its products with a tremendous commitment and enthusiasm for helping people communicate and live life to the full. This, combined with cutting edge technology, is what continues to allow Cochlear to create revolutionary, solutions that are always user-friendly.

Hear now. And always





