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Check with local AB representative for regulatory approvals in your area.

Pictured on the cover:
**Charles H.,** AB Recipient with his mother and sibling



sonova
HEAR THE WORLD

Advanced Bionics

# The Foundation of Better Hearing

*AB Implantable Technology*

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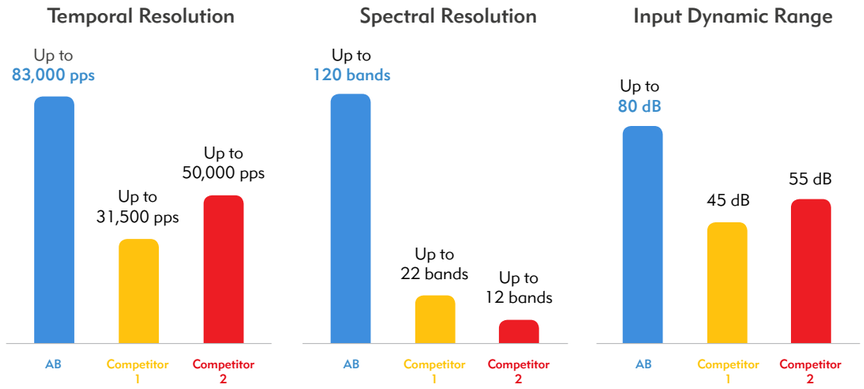
## Implantable Technology — the Foundation of Better Hearing

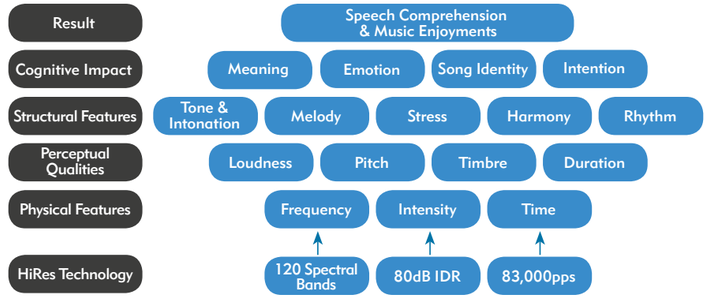
The HiRes™ Bionic Ear System from Advanced Bionics (AB) consists of forward-thinking technologies that work together to provide the best CI based hearing possible. It is the capability and unsurpassed digital processing power that sets the HiRes™ Ultra cochlear implant apart from other cochlear implants.

HiResolution implantable technology is the foundation for optimal hearing. **The quality of the sound delivered by a cochlear implant system is a direct result of how well the system captures and delivers the details of sound.** The HiRes Ultra cochlear implant was designed to deliver all of the loudness, pitch, and timing information that is essential for natural sound perception and appreciation of music: it automatically encodes the widest range of intensities (up to 80 decibels), it is capable of delivering frequency information to 120 cochlear places using a patented delivery method called current steering, and it provides up to 83,000 updates per second. [1]




## Access to Speech and Music

AB recipients can use fine spectral and temporal information to hear sound accurately, enabling them to better understand tonal information in speech and to enjoy music.[6,7,8] An adult will have the best opportunity to reconnect with the hearing world; a child can have access to the best speech and language development possible.[9,10,11]

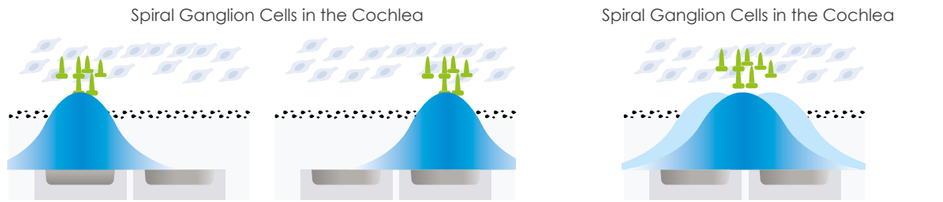



## Bidirectional Communication Link Between Implant and Sound Processor

All Advanced Bionics recipients or their caregivers can be confident that the implant is functioning properly and that they can benefit from all features of our technology thanks to the proprietary Bidirectional Inductive Communication Link that relays information about the implant's functional status in real time back to the sound processor. The implant together with the sound processor build a closed loop that ensure proper functioning of the system.

## Current Steering: Hear the Most Subtle Pitch Changes

The number and placement of the actual electrode contacts should not determine the pitch differences a recipient can detect. Under software control, the 16 independent current sources of the AB implant can steer stimulation to 120 separate locations along the cochlea, thereby increasing the amount of frequency information that can be delivered.[2] Recipients may take advantage of this enhanced spectral information to hear more pitches, which can improve speech understanding in noise, music appreciation, and tonal language perception.[3,4,5] In fact, researchers have shown that AB cochlear implant recipients have a potential total number of spectral bands (distinct pitches) across the electrode array of up to 451 with current steering technology.[6]




**Conventional stimulation**
Single electrode contact stimulated and focused on adjacent SG cells

**Current steering**
Two electrode contacts simultaneously stimulated and focused on SG cells between the actual contact locations

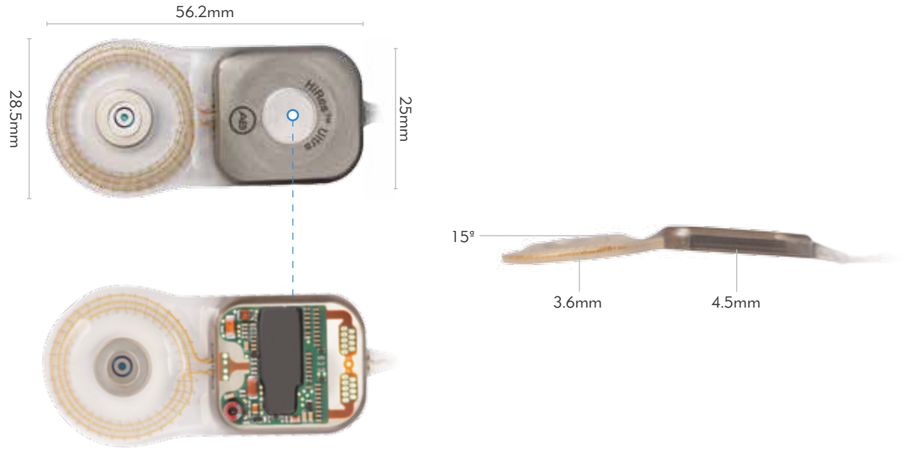
Current Steering allows to stimulate the Spiral Ganglion cell population between electrode contacts.

# HiRes Ultra implant

The HiRes™ Ultra cochlear implant was developed in collaboration with leading cochlear implant surgeons to meet the surgical need and those of the recipient.

## Low Profile

To make insertion easy and to provide flexibility for surgeons, the implant is designed for a shallow 1mm ramped recess, requiring minimal drilling to reduce surgery time. The thin 4.5mm profile and small footprint offers a discreet solution once implanted, making it suitable for both adults and children.




## High Impact Resistance

The HiRes Ultra exceeds the industry standard for impact resistance[12,13,14] and allows recipients to participate in everyday activities and sports without worry. All implant components are highly reliable and durable.[15,16,17]

## MRI Compatible

The HiRes Ultra implant is FDA and TÜV approved for 1.5T MRI with the magnet in place — ready for the most widely recognized standard of care MRI procedure. A simple headbandage procedure utilizing an Antenna Coil Cover is all that is required if a patient needs to undergo MRI imaging — no surgical procedure is necessary.

If higher image resolution is required, such as for fMRI or Arterial Spin Labeling, the HiRes Ultra is approved for 3T MRI with the magnet removed. For these cases, you can easily remove the magnet and replace it through a small incision, without requiring the implant itself to be removed.



## Electrodes Designed for Choice: Without Compromise

The HiRes Ultra implant offers two electrode designs, the straight HiFocus™ SlimJ electrode and the precurved HiFocus™ Mid-Scala electrode, to offer the surgeon a choice based on their practice preferences and the recipient's anatomy. Both electrodes share the HiFocus™ design elements.

HiFocus electrode contacts are encased in a slim flexible tapered silicone carrier to minimize insertion forces and damage to cochlear structures during surgery.[18,19,20] HiFocus electrodes are designed with balanced stiffness, which allows for easy insertion within the scala tympani while making it less prone to bend upwards towards the basilar membrane and translocate. By minimizing cochlear disruption, HiFocus electrodes offer an increased opportunity for better hearing outcomes.[21,22]

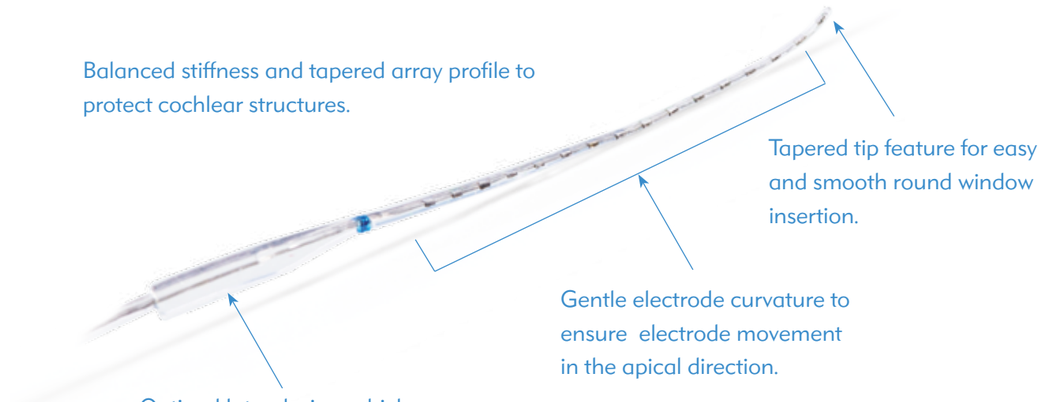
HiFocus SlimJ electrode

HiFocus Mid-Scala electrode

The HiFocus SlimJ or HiFocus Mid-Scala electrode provide the surgeon with maximum surgical flexibility based upon surgical preference while maintaining patient performance.[19,20,21]

## HiFocus SlimJ

The HiFocus™ SlimJ electrode is the latest approved electrode technology, designed for ease of handling and insertion. It is offered as a straight electrode with a gentle curvature, designed to be easily and smoothly inserted by freehand technique or with forceps. The main benefit of the gentle curvature next to easy insertion is to ensure electrode movement in the apical direction.




### Confidence of Insertion

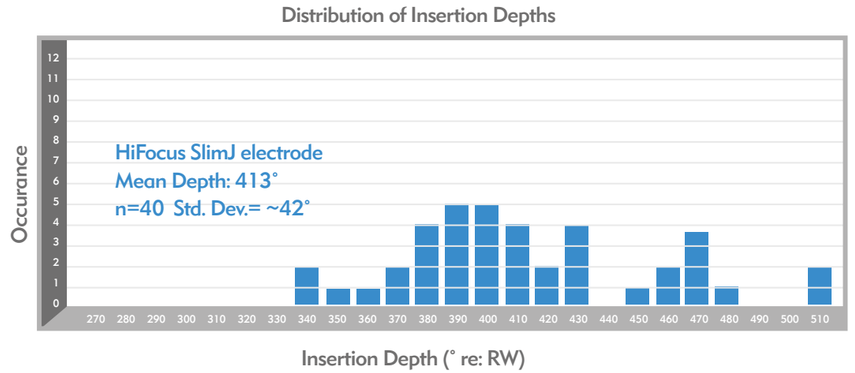
Key to the design are the elements that allow a surgeon to easily handle the electrode in the surgical space and insert with minimal trauma to the delicate cochlea structures.[19] **The SlimJ electrode has been designed to have balanced stiffness and flexibility to offer smooth insertion and protect cochlear structures.** The wing feature allows for the best possible visualization of the cochlea, and precise control of the angle and speed of insertion. It provides an easy area for a surgeon to hold and control the electrode, even into the facial recess.

The HiFocus SlimJ electrode can be introduced into the cochlea by a surgeon's preferred approach — by using round window, extended round window, or small cochleostomy, requiring only a 0.8mm opening. The tip feature is intended to ease the insertion through the round window.



### Full Spectral Coverage

A marker provides visual indication of insertion depth — the 23mm indicator represents approximately 420° in a standard cochlea, covering the main spiral ganglion population[23] to provide optimal spectral coverage.




**Graph showing angular insertion depths of HiFocus SlimJ across 40 samples[19]**

### Cochlear Structure Preservation

Cochlear structure preservation allows for the best possible hearing outcomes in recipients. Studies have shown that recipients may perform better when cochlear structures are undamaged by the electrode insertion.[18,21,22,23] The HiFocus SlimJ electrode can be inserted and reinserted up to three times.

**Histology showing HiFocus SlimJ electrode ideally positioned in the Scala Tympani (Eshraghi Scale '0')[19]**

*"Based on our multi-center studies in association with investigators at UCSF over the past 18 years, and a review of published reports, the results with the Hifocus SlimJ electrode are remarkable. The HiFocus SlimJ preserves cochlear structures better than any other lateral wall electrode tested to date."*

**Steve Rebscher,** *Specialist, Department of Otolaryngology, School of Medicine, University of California, San Francisco*

# HiFocus Mid-Scala

The HiFocus™ Mid-Scala electrode is the smallest styleted precurved electrode designed for an consistent positioning in the scala tympani to avoid and protect the delicate cochlea structures.

Only pre-curved electrode in the market designed for an easy controlled one hand insertion.

Tapered Tip feature for Round Window insertion, with Straight Tip region to avoid tip fold over

Only electrode in the market designed to be placed mid-scala in the scala tympani.

## Consistency of Placement

Key to the design are the precurved shape, allowing the HiFocus Mid-Scala electrode to be inserted consistently with minimal cochlea trauma,[20] a straight tip region to avoid tip fold overs, and if desired, the electrode can be loaded on a dedicated insertion tool to support a controlled insertion.

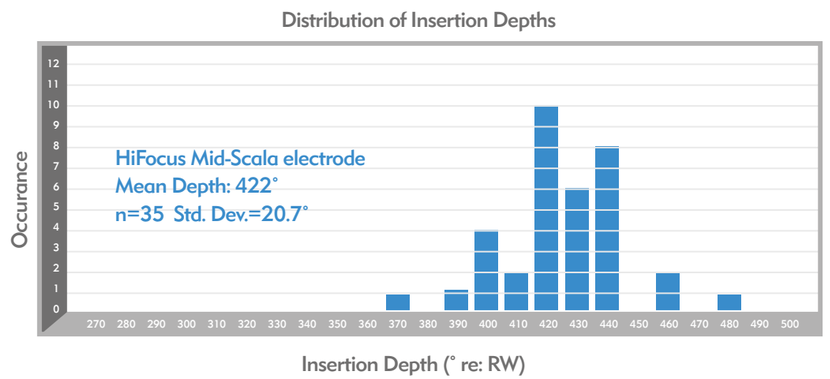
The HiFocus Mid-Scala electrode can be introduced into the cochlea by a surgeon's preferred approach — freehand or by use of the insertion tool. It can be inserted through the round window, extended round window, or small cochleostomy approach, requiring only a 0.8mm opening. The tip feature is intended to ease the insertion through the round window

The distal blue marker can be used to ensure the electrode is properly positioned prior to the off stylet technique, thus avoiding tip fold over issues. The proximal blue marker provides a visual indication of a 'full' insertion depth — representing approximately 420° angular insertion in a standard cochlea, covering the main spiral ganglion population[23] for optimal spectral coverage.



## Full Spectral Coverage

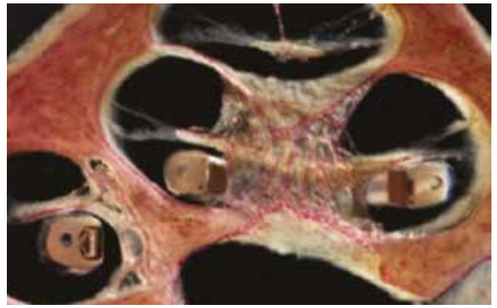
The length and curvature of the HiFocus Mid-Scala allows for proven consistency of full spectral coverage with 422° insertion depth signifying coverage of main Spiral Ganglion cell population[23] with a tight standard deviation of 20.7°.




**Graph showing angular insertion depths of HiFocus Mid-Scala across 35 samples**[17]

## Cochlear Structure Preservation

The shape of the HiFocus Mid-Scala places the electrode within the scala tympani, close to the spiral ganglion cells for maximum performance.[18,23] The electrode dimensions easily fit within the scala tympani which has been shown to protect the delicate structures of the cochlea[20] whilst avoiding damage to the modiolus, osseous spiral lamina and the basilar membrane.[20,24,25] **HiFocus Mid-Scala, being located central to perimodiolar, has an ideal basal placement for high frequencies.**[24] The HiFocus Mid-Scala electrode can be inserted and reinserted up to three times.



**Histology showing HiFocus Mid-Scala electrode ideally positioned in the middle of the scala tympani.**

## AB-Phonak Hearing Solutions for your Patient

With the HiRes™ Ultra cochlear implant and the HiFocus™ SlimJ or HiFocus™ Mid-Scala electrodes, Advanced Bionics lays the foundation for the cochlear implant recipients successful hearing journey.

### A World of Sound

To enjoy the world of hearing a sound processor capable of automatically adapting to any type of environment is needed. The Naída CI sound processor from Advanced Bionics includes the T-Mic2™ microphone, the only in-ear microphone for natural sound quality, directional microphones, and intuitive onboard controls. The Naída CI also employs the full power of Phonak front-end signal processing, allowing recipients to effortlessly transition across challenging environments. From a whispered conversation, to a noisy restaurant, to an outdoor event on a windy day, the Naída CI sound processor is designed to help the recipient hear their best.

### Custom Solutions Made Easy

The Naída CI sound processor comes standard with HIBAN, a technology which enables devices from Advanced Bionics and Phonak to automatically establish a wireless ear-to-ear network for sharing of sound and controls. This network provides bilateral, bimodal, and unilateral listeners with a simple, custom solution for their current hearing configuration, that can easily transition to an alternate solution, should that configuration change over time. The Naída CI Q90 can be programmed to work with another Naída CI sound processor, the Phonak Naída™ Link hearing aid, or a Phonak Naída™ Link CROS device. For recipients who can use low frequency acoustic amplification in the implanted ear, the Naída CI Q90 processor can be converted to an all-in-one solution by simply adding a Phonak acoustic earhook. This gives the recipient the best combination of Advanced Bionics and Phonak technology in the same ear.

### Connectivity Options — the right solution for every hearing situation

The Naída CI Q90 cochlear implant system is fully compatible with Phonak Roger technology, the world's leading solution for superior speech-in-noise and over distance performance.[26] It's ideal for an all-inclusive listening experience including Bluetooth connectivity.

### Naída CI Bilateral Solution

Naída CI Sound Processor | Naída CI Sound Processor

### Naída Link CROS Solution

Naída CI Sound Processor | Naída Link CROS

### Naída Link Bimodal Solution

Naída CI Sound Processor | Naída Link Hearing Aid

### Naída All-In-One Solution

Naída CI Sound Processor | Naída CI Sound Processor with Acoustic Earhook



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