Small, Powerful, SMART - Why Baha® in 2018?

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Cochlear’s Mission

We help people hear and be heard.

We **empower** people to connect with others and live a full life.

We **transform** the way people understand and treat hearing loss.

We **innovate** and bring to market a range of implantable hearing solutions that deliver a lifetime of hearing outcomes.
Agenda

• Foundations of Baha®
• Baha® Technology Today
• Baha® for your Patients
• Introducing the Baha® SoundArc
• Reimbursement considerations
• Q&A
Foundations of Baha® Technology
Osseointegration

- The process by which living bone tissue bonds with titanium
- Makes direct bone conduction possible
- Provides the basis of long-term predictability and success of the Baha® system
Baha® Foundations

• Invented and developed in the 1970’s by Professor Brånemark and Dr. Tjellström
• Approved by the FDA in 1995 for mixed and conductive hearing loss and in 2002 for single-sided deafness
• About 40,000 people in the United States now hear with a Baha® solution¹

¹ Cochlear Internal Recipient Data, December 2017

Dr Tjellström and the first Baha recipient, Mona Andersson (in 2012)
Evolution of Baha® Technology
Cochlear™ Baha® 5 Sound Processor

User-friendly ergonomic shape

Compatible with all Baha Systems

Discreet streamlined design

Power and connectivity on the inside
Surgical Options

Processor
_Baha 5 suite of processors_ attach for incredibly smart, unbelievably powerful hearing

Connection
_BIM400 Implant Magnet or BA400 Abutment_ connect recipients for a lifetime of hearing

Implant
_BI300 Implant provides a strong foundation_
The Baha® BI300 Implant provides early access to sound as the stable foundation for the Baha Connect and Attract Systems.

The long-term clinical performance of the BI300 is proven through 5 years\(^1\) of continuous clinical study. The wider 4.5 mm diameter and TiOblast™ surface enhances primary and long-term stability.

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Proven to Integrate with Soft Tissue

IT'S ALL IN THE SURFACE

The industry’s broadest abutment portfolio.
Smooth Magnet Attached to a Strong Foundation

Sleek titanium casing with rounded edges to minimize soft tissue irritation.

Established coupling to facilitate removal of the implant magnet for future upgrades and possible MRI > 1.5 Tesla.

Strong foundation for efficient single-point sound transmission and future hearing options.
Good clinical outcomes can be expected when transitioning from a skin-penetrating to a magnetic system using the same BI300 Implant, if the soft tissue in the implant area is healthy and has sufficient thickness. A pre-operative softband evaluation is important to ensure correct expectations and achieve patient satisfaction.¹

### At-a-Glance

<table>
<thead>
<tr>
<th>Baha® Attract</th>
<th>Baha® Connect</th>
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<tbody>
<tr>
<td>The internal implant is completely hidden beneath the skin</td>
<td>The direct connection maximizes the hearing performance</td>
</tr>
<tr>
<td>The specially designed Baha® SoftWear pad adapts comfortably to the shape of the head</td>
<td>With DermaLock technology the hair and skin around the abutment can be safely preserved and abutment is barely visible</td>
</tr>
<tr>
<td>The Baha® Attract System’s internal magnet can be MRI scanned safely up to 1.5 Tesla</td>
<td>Only minor surgery is required and the healing process is generally quick</td>
</tr>
<tr>
<td>Transition path for patients whose hearing deteriorates</td>
<td>The implant and abutment can be MRI scanned safely</td>
</tr>
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</table>
A Portfolio to Fit Your Patient’s Hearing Needs

The world’s smallest sound processor*

The world’s smartest power device*

The world’s most powerful head-worn solution**


Baha® 5 Portfolio

Bone Conduction Thresholds

- 45 dB
- 55 dB
- 65 dB

Frequency [Hz]

dBHL

Bone conduction thresholds averaged across 500, 1000, 2000 and 3000 Hz.
Baha® 5 Sound Processor

The incredibly small and unbelievably smart Cochlear Baha® 5 Sound Processor is packed full of features and is ideal for patients who need full features in a small package.
Baha® 5 Power Sound Processor

The smart Cochlear Baha 5 Power Sound Processor is packed full of features and is ideal for patients who need more power, longer battery life and on-device control.

Key features:
- LED visual indicator
- New volume rocker
- Built-in tamperproof battery door
- Program/streaming

Bluetooth® SMART
Cochlear™ True Wireless™
Made for iPod, iPhone, iPad
The revolutionary Cochlear Baha® 5 SuperPower Sound Processor utilises Baha® and Nucleus® technology to make it the only head-worn sound processor for up to 65 dB SNHL.
BCDrive™ Technology
Powered by BCDrive™ Transducer Technology

BCDrive™ Transducer

- Less distortion\(^1\)
- More reliable\(^2\)
- Twice as efficient\(^3\)

In the BCDrive transducer, the spring and magnet forces are symmetrical. This produces a clearer signal compared to a traditional asymmetrical transducer design\(^1\).

Using Efficiency to Meet the Unique Needs of Patients

The different applications of BCDrive technology deliver patient benefits across the entire Baha® 5 portfolio.

2. OFL90 measured on skull simulator TU1000.
The SuperPower Challenge

- At very high power levels, sound waves will propagate across the entire skull.
- This prevents some SuperPower patients from reaching sufficient gain.
- Addressed by moving the microphones away from the hard bone.

Acoustic Radiation
Addressing Acoustic Radiation

Hard skull bone

Soft tissue
Two Positions
UTE Increases Available Gain by 7-10dB

Less chance of feedback

N=8 patients  CBAS internal measurements
Directionality is Maintained

Back microphone

Front microphone
Ardium™ Smart
The first and only smart sound processor

Ardium™ Smart platform

- SmartSound® iQ
- Smart Connectivity
- Smart App
SmartSound® iQ
The Scene Classifier II in SmartSound® iQ measures the input sound level and signal-to-noise ratio to define and categorise the patient’s acoustic environment.

It selects the best signal processing strategy utilising:

- Active Gain
- Active Balanced Directionality
- Noise Manager II
Using the information from Scene Classifier II, Active Gain automatically adjusts the amplification levels to match the patient needs across different listening situations.

Unlike conventional compression where gain is determined based solely on the input level, Active Gain will further individualise the settings to better match your patients’ listening preference.

In Baha Fitting Software, you can also adjust the gain settings in each acoustic scene to match the patient’s individual needs.
**Active Balanced Directionality**

Controlled by Scene Classifier II

**Balanced Directionality**
seamlessly blends the omni and directional settings.

**Adaptive Beamwidth**
actively adapts to the listening situation.
Noise Manager II reduces noise while actively maintaining important speech information.

Using spectral subtraction, the noise signal is identified and reduced before amplification.
Smart Connectivity
Smart Connectivity

Technology has come a long way
Smart Connectivity

Less advanced dongle systems

Less advanced dongle systems stream sound to and from bulky neck-worn hardware.
Cochlear 2.4 GHz wireless technology streams stereo sound directly from a wireless accessory to the sound processor.
Smart Connectivity
True wireless technology

The first bone conduction platform to utilize Bluetooth® Smart and Made for iPhone technology that lets users stream audio and control their sound processor directly from an iPhone.
With Bluetooth® technology designed by Apple, Baha® 5 sound processors are the hearing implant industry’s only Made for iPhone® Hearing Devices.

- Streamed phone calls, music and turn-by-turn navigation
- Live Listen and device control
The First Smart App for Bone Conduction

Advanced control of sound processor and wireless accessories, personalisation and support – directly from iPhone®, iPad®, iPod touch® and also Android™ smartphones.
True Wireless™ Accessories

Cochlear™ Wireless TV Streamer

Cochlear™ Wireless Mini Microphone 2+

Cochlear™ Wireless Mini Microphone 2
Treating Patients with the Baha® System
Why Baha® Technology?

Direct Bone Conduction:
Works independently of ear canal and middle ear
Direct transmission gives clear and natural sound
Pre-operative testing is possible
High wearing comfort
Safe and straightforward surgery
Predictable outcome
Conductive & Mixed Hearing Loss
Candidacy is based on **bone conduction** thresholds

- Bone Conduction PTA equal to or better than 65 dB at 0.5, 1, 2 & 3 kHz
- Bilateral fitting requires symmetric bone conduction thresholds
  - Less than 10 dB on average (0.5, 1, 2 & 3) or less than 15 dB at individual frequencies

Single-Sided Deafness
Normal hearing in the good ear

- Defined as Air Conduction PTA equal to or better than 20 dB at 0.5, 1, 2 & 3 kHz
- Surgery can be considered for children 5 years of age or older
Baha® for Conductive & Mixed Hearing Loss (CMHL)
Conductive & Mixed Hearing Loss (CMHL)

- Direct bone conduction bypasses the outer and middle ear
- Baha® solutions treat conductive & mixed hearing loss
  - Atresia
  - Chronic middle ear disease
  - Cholesteatoma
  - Congenital abnormalities
- Baha® devices do not have to overcome conductive component, only amplify for any sensorineural component
Hearing Aids

- The greater the air-bone gap, the more a Baha® system will outperform hearing aids

- Hearing aid prescriptions for conductive and mixed hearing loss require more gain and receive less clinical research than for sensorineural hearing loss

- Hearing aid fitting can be difficult if there is drainage from the ear, ear pain or a mastoid cavity present after mastoidectomy

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Baha® for CMHL

✓ Nothing worn on the external ear, which is helpful in cases where ear drainage is present

✓ Baha® does not need to be re-adjusted if the air conduction thresholds fluctuate because gain is only required for the bone conduction thresholds

✓ Pre-operative testing can be used to predict post-operative benefit

✓ Use of Baha® is associated with high user satisfaction and good long-term benefit

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Baha® for Single-Sided Deafness (SSD)
Two Ears

1. Help overcome the head shadow effect
2. Help understanding of speech in background noise
3. Help in the location of sound
## Impact of SSD

### Which problems have you experienced since becoming single sided deaf?

<table>
<thead>
<tr>
<th>Problem</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulties in public areas</td>
<td>5</td>
</tr>
<tr>
<td>Difficulties in meetings</td>
<td>2</td>
</tr>
<tr>
<td>Discerning direction</td>
<td>6</td>
</tr>
<tr>
<td>Difficulties as a pedestrian</td>
<td>56</td>
</tr>
<tr>
<td>Cannot be part of a group</td>
<td>54</td>
</tr>
<tr>
<td>Social exclusion</td>
<td>55</td>
</tr>
<tr>
<td>Lack of “stereo” hearing</td>
<td>79</td>
</tr>
<tr>
<td>Work is more difficult</td>
<td>39</td>
</tr>
<tr>
<td>Driving difficulties</td>
<td>19</td>
</tr>
<tr>
<td>Difficult on telephone</td>
<td>41</td>
</tr>
</tbody>
</table>

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1. Survey contained in “Hear the other side” — A report on single-sided deafness. More information can be found at www.singlesideddeafness.com: A report by the advisory board for single sided deafness. Available from Cochlear — article E80414A.
Common Treatments for SSD

- Patient remains untreated*
- CROS Hearing Aids (HAs)
- Steroids
- Medical intervention - surgery
- Bone Conduction Devices - Baha® System

*Patient or physician choice
How Does Baha® treat SSD?

Sound travels via direct bone conduction to stimulate the better hearing cochlea.
Baha® vs CROS Aids

✓ The Baha® system is a discreet solution worn on one side, while CROS hearing aids require users to wear devices on both ears.

✓ Baha® allows wireless streaming to be mixed with environmental mic from the bad side while CROS aids require turning off the bad side in order to stream.

✓ Baha® 5 sound processors are the only Made for iPhone solutions for individuals with SSD.

✓ The Baha® System bypasses outer and middle ear and sends clearer, more crisp sound directly to the inner ear.

✓ Studies show that the Baha® System provides better speech understanding in noise than CROS hearing aids.

Introducing the Cochlear™ Baha® SoundArc
Demo technology has not moved on

They work well but they are not always:

- Comfortable
- Discreet
- Easy to use
A need for an alternative choice

• The Baha® Softband is a good solution for small children

• But for older children there is an opportunity to provide an alternative option
Cochlear™ Baha® SoundArc

Comfortable - Stylish - Effective
Non-Surgical Candidates
Non-surgical Options for Baha®

**Baha® SoundArc**
Good performance, comfortable, stylish and discreet

**Baha® Softband**
Good performance, comfortable, optimal for young children
Candidates for a Non-Surgical Option

- Children under the age of 5
- Children over 5 who are not yet surgical candidates
- Medically compromised patient
- Patient preference
- May be a “gateway” to surgery
1970’s
Researchers at the University of Gothenberg discover osseointegration and create the Baha® System

1995
FDA approves the Baha® system for use in the US (approved for SSD in 2002)

2010
Baha® 3 systems set new standards for implant stability

2012
Cochlear’s DermaLock™ abutment is designed to further improve patient outcomes and surgical procedure

2013
Cochlear introduces the Baha® Attract

2014
True wireless is introduced to Baha® recipients with the innovative Baha® 4

2015
Baha® 5 is introduced – incredibly small, unbelievably smart

TODAY
Baha® 5 Systems expanded to offer more power and more choices
One smart solution. The power to choose.

Apps & True Wireless™
Baha® Fitting Software
Baha® SoundArc & Softband
Baha® Connect System
Baha® Attract System
Baha® 5 sound processors
Baha® BI300 Implant
Baha® Reimbursement
Brandy Harvey
Area Manager
Questions?