


For professionals




**Trends in Bone Conduction:
Considerations for Treating Both Ears**


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CAM MKTP-082 March 2019


Hear now. And always.




Agenda




- Introduction
- Clinical benefits of bilateral Baha systems
- Baha system candidacy
- Bilateral features of the Baha 5 Sound Processor
- Bilateral fitting considerations



Learner Outcomes



- List the potential benefits of bilateral Baha fittings
- List the candidacy criteria for bilateral Baha fittings and describe the most appropriate candidates for this type of fitting
- Describe the features in Baha Fitting Software that support bilateral fittings for Baha recipients



Using Bone Conduction to Treat Hearing Loss

Conductive and Mixed Hearing Loss



Single-Sided Deafness



Baha® Systems

Baha Connect



Baha Attract



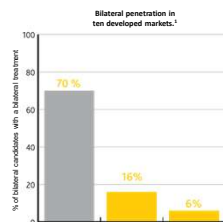
Non-Surgical



Getting the Best Outcomes for Patients

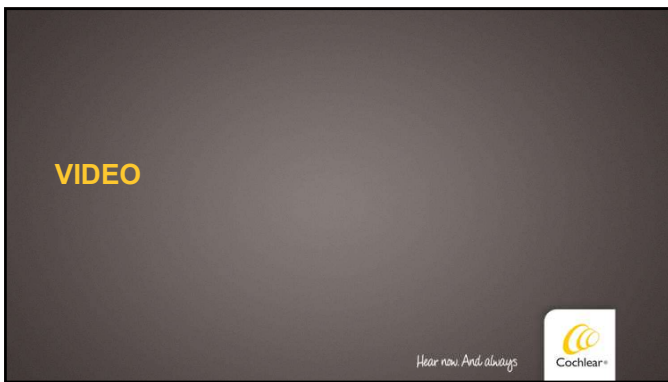
For decades, treating people with bilateral hearing loss with two hearing aids has been the standard of care. The benefits are well established, and providing just one hearing aid to these people seems counterintuitive to most.

But what about bone conduction?



1. Statistics compiled by the Bone Conduction Association (BCA) and Cochlear. All figures are estimates and are not intended to be used for clinical or regulatory purposes. © 2017 Cochlear Limited. All rights reserved.







Improved Ability to Localize Sounds

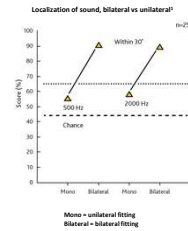
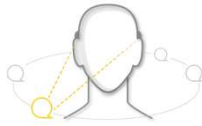


Several studies demonstrate clear localization benefits when comparing a unilateral bone conduction fitting to a bilateral fitting.¹⁻³

Bilateral patients are able to localize sound within 30°

9 TIMES OUT OF 10

Unilateral patients are close to chance level²



1. Rosser AJ, Day AE, van der Pijl A, Møller AR, Gannon CJ. Auditory evaluation of bilaterally fitted bone-conduction hearing aids. *Audiology*. 2011;50:158-167.
2. Naylor GJ, van der Pijl A, Møller AR, Gannon CJ. Auditory evaluation of bilaterally fitted bone-conduction hearing aids. *Audiology*. 2011;50:158-167.
3. Day CE, Naylor GJ, Gannon CJ, van der Pijl A, Møller AR. Bilateral bone conduction hearing: Improved hearing ability in children with bilateral conductive hearing loss. *Ear Hear*. 2013;34:889-894.

Improved Hearing in Noise



Available clinical evidence suggests that a two ear approach leads to improved hearing in noise.¹⁻³



Difference in Speech Reception Threshold in Noise between bilateral and unilateral bone conduction implant condition

Study	N	Mean improvement in SNR with bilateral vs unilateral BCI
Boorman et al. ¹	25	2.5 dB (sound and noise separated) P < .001
Prinain et al. ³	12	3.1 dB (sound and noise separated) 2.8 dB (surround sound)

1. Boorman RB, Wang P, Charles M. Bilateral bone conduction hearing aids for bilateral permanent conductive hearing loss: a systematic review. *Childsplay Hear Res Dev*. 2013;10(2):10-20.
2. Rosser AJ, Day AE, van der Pijl A, Møller AR, Gannon CJ. Auditory evaluation of bilaterally fitted bone-conduction hearing aids. *Audiology*. 2011;50:158-167.
3. Prinain C, Gannon CJ, Gannon J, Møller AR, Gannon CJ. Bilateral bone conduction hearing: Improved hearing ability in children with bilateral conductive hearing loss. *Ear Hear*. 2013;34:889-894.

Improved Audibility



A bilateral fitting of a bone conduction solution provides a summation effect. This will improve the dynamic range and speech perception in quiet.¹



Difference in Speech Reception Threshold in Quiet between bilateral and unilateral bone conduction implant condition

Study	N	Mean improvement in SRT with bilateral vs unilateral BCI
Boorman et al. ¹	25	4.0 dB (P < .001)
Hammann et al. ³	23	4.0 dB
Prinain et al. ⁴	12	5.4 dB (P = .001)

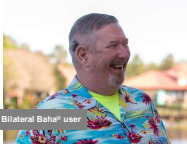
1. Boorman RB, Wang P, Charles M. Bilateral bone conduction hearing aids for bilateral permanent conductive hearing loss: a systematic review. *Childsplay Hear Res Dev*. 2013;10(2):10-20.
2. Rosser AJ, Day AE, van der Pijl A, Møller AR, Gannon CJ. Auditory evaluation of bilaterally fitted bone-conduction hearing aids. *Audiology*. 2011;50:158-167.
3. Hammann B, Gannon J, Gannon CJ. Bilateral bone conduction hearing: Improved hearing ability in children with bilateral conductive hearing loss. *Ear Hear*. 2013;34:889-894.
4. Prinain C, Gannon CJ, Gannon J, Møller AR, Gannon CJ. Bilateral bone conduction hearing: Improved hearing ability in children with bilateral conductive hearing loss. *Ear Hear*. 2013;34:889-894.

Improved Patient Outcomes


The published clinical evidence clearly suggests that a two ear approach in bone conduction leads to improvements in the patient's ability to localize sound and hear in noise. It also suggests that a bilateral solution can improve audibility and lead to greater patient satisfaction.

The RIGHT PATIENT will benefit from a BILATERAL SOLUTION¹

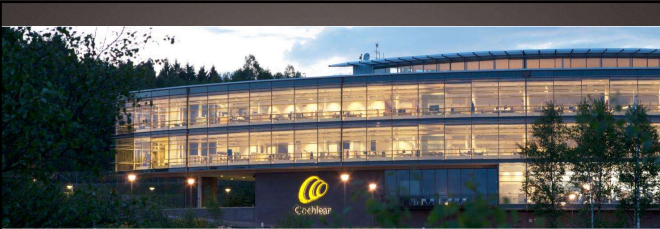
1. Johnson RE, Wang P, Chaffin NH. Bilateral Bone-Anchored Hearing Aids for Bilateral Permanent Conductive Hearing Loss: A Systematic Review. Otolaryngol Head Neck Surg. 2012;167(2):210-20.



Bill K. - Bilateral Baha® user




Josh G. - Bilateral Baha® user

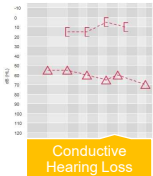


Choosing Candidates for Bilateral Baha® Systems

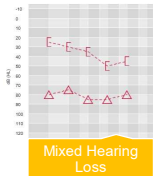
Hear now. And always.




Baha System Candidacy Review



Conductive Hearing Loss



Mixed Hearing Loss



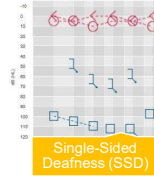
Single-Sided Deafness (SSD)

FDA Indications for Implantation

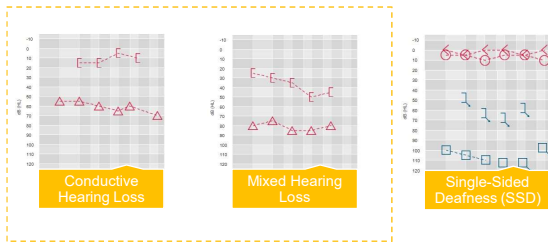


Single-Sided Deafness

- ≥ 5 years of age for surgical solution
- Normal Hearing in the contralateral ear
 - > Defined as PTA Air Conduction thresholds equal to or better than 20 dB at 0.5, 1, 2 & 3 kHz
- Functions by transcranial routing of the signal



Baha® System Candidacy

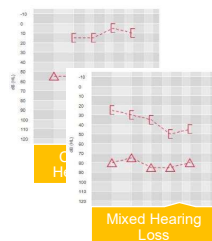


FDA Indications for Implantation



Mixed & Conductive Hearing Loss

- ≥ 5 years of age for surgical solution
- ≤ 65 dB HL Bone Conduction PTA
 - > PTA of 0.5, 1, 2 & 3 kHz
- For bilateral fitting, symmetric bone conduction thresholds are defined as less than 10 dB difference on average (0.5, 1, 2 & 3 kHz) or less than 15 dB at individual frequencies



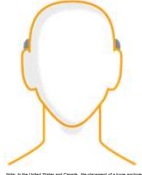
Bilateral Baha System Candidacy



Audiological indications¹

- Bilateral mixed or conductive hearing loss
- <10 dB difference on average (PTA4) or
- <15 dB difference at individual frequencies

To achieve binaural hearing, bone conduction thresholds should be symmetrical.²



Note: In the United States and Canada, the placement of a Baha system should be contralateral to the hearing loss (e.g., right).

Common otological causes (adults)

- Bilateral chronic otitis media, or other conditions leading to persistent air bone gap

Common otological causes (pediatrics)

- Bilateral microtia/atresia
- Ear canal stenosis
- Treacher-Collins syndrome

1. Johnson ME, Wang P, Chouffe M. Bilateral Bone-Conduction Hearing Aids for Bilateral Permanent Conductive Hearing Loss: A Systematic Review. Otolaryngol Head Neck Surg. 2013;150(2):210-20.

2. Johnson ME, Wang P, Chouffe M. Bilateral Bone-Conduction Hearing Aids for Bilateral Permanent Conductive Hearing Loss: A Systematic Review. Otolaryngol Head Neck Surg. 2013;150(2):210-20.

Candidacy Evaluation



Pre-operative testing can be used to predict post-operative benefit¹



1. Mero S, Papp C, Alvar F, Magis M, Lucchini A, Barone M (2015) Individualized headband simulation test for predicting outcome after percutaneous bone conduction implantation. Acta Otolaryngologica. 135(5):258-66

Steps for Evaluation



1. Fit the sound processor to the patient using a SoundArc or Softband and the Baha Fitting Software
2. Perform objective testing with and without Baha and compare
 - ✓ SSD: Spatially separated speech in noise
 - ✓ Conductive/Mixed: Speech or speech in noise
3. Evaluate subjective benefit
 - ✓ Informal assessment: "How does it sound?"
 - ✓ Formal assessment: Questionnaire (ie, APHAB)
4. Counsel the patient

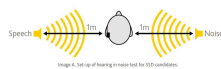


Image A. Set-up of hearing in noise test for SSD candidates.

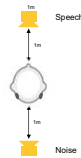
Bilateral Baha System Evaluation



Tips for demonstrating bilateral Baha Systems

- Fit on Softband or SoundArc ensuring it doesn't touch sound processor on contralateral side
- Consider programming both sound processors so that they can be linked for Active Balanced Directionality
- Balance the loudness for the second side to the initial side

A take-home trial with the second device may be used to establish benefit.



Considerations for testing:

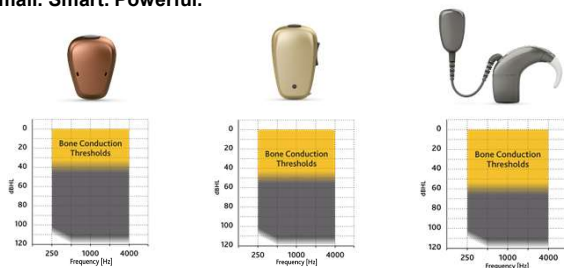
- > Compare results for unilateral condition to bilateral condition for speech in noise
- > Test with speech in front and noise behind for best results




Baha 5 Sound Processors




Small. Smart. Powerful.




Bilateral Features:
Active Balanced Directionality


Scene Classifier II analyzes the listening environment and automatically selects the best signal processing strategy for both sound processors in any given situation.




Scene Classifier II

Quiet environments




Active Bilateral Directionality

The automatic ear-to-ear exchange optimizes each sound processor's setting for the actual listening situation.


Bilateral Features:
Active Balanced Directionality


Scene Classifier II analyzes the listening environment and automatically selects the best signal processing strategy for both sound processors in any given situation.




Scene Classifier II

Speech from front in noise




Active Bilateral Directionality

The automatic ear-to-ear exchange optimizes each sound processor's setting for the actual listening situation.


Bilateral Features:
Active Balanced Directionality


Scene Classifier II analyzes the listening environment and automatically selects the best signal processing strategy for both sound processors in any given situation.



Scene Classifier II

Multiple speakers in noise



Active Bilateral Directionality

The automatic ear-to-ear exchange optimizes each sound processor's setting for the actual listening situation.

Bilateral Features: Active Balanced Directionality

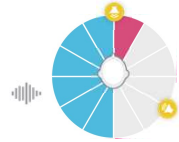


Scene Classifier II analyzes the listening environment and automatically selects the best signal processing strategy for both sound processors in any given situation.



Scene Classifier II

Multiple speakers
in noise



Active Bilateral Directionality

The automatic ear-to-ear exchange optimizes each sound processor's setting for the actual listening situation.

Bilateral Features: Active Balanced Directionality

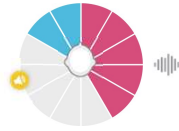


Scene Classifier II analyzes the listening environment and automatically selects the best signal processing strategy for both sound processors in any given situation.



Scene Classifier II

Single speaker from
beside/behind in noise



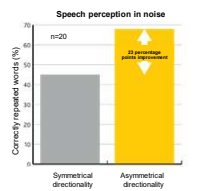
Active Bilateral Directionality

The automatic ear-to-ear exchange optimizes each sound processor's setting for the actual listening situation.

Improved Speech Perception in Noise



In the initial clinical testing, test subjects* experienced improved speech perception when using an asymmetrical mode in a noisy and complex listening situation.



In a noisy and complex listening situation, test subjects


Improved speech perception by **23 percentage points** when using an asymmetrical directionality mode.¹




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*Test subjects with simulated conductive hearing loss. Speech was presented slightly from behind and bubble noise from the front.

Bilateral Features: Bilateral Wireless Streaming






Using the phone in noisy situations
Direct with the iPhone® or Wireless Phone Clip




Hearing over distance
Wireless Mini Microphone or the mic in your iPhone




Conversations in noisy environments
Wireless Mini Microphone or the mic in your iPhone



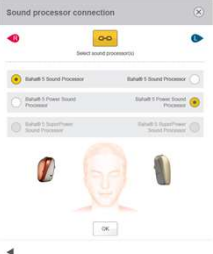
The Ardium™ Smart Platform
A unique technology enabling a direct-to-device connection to both ears.

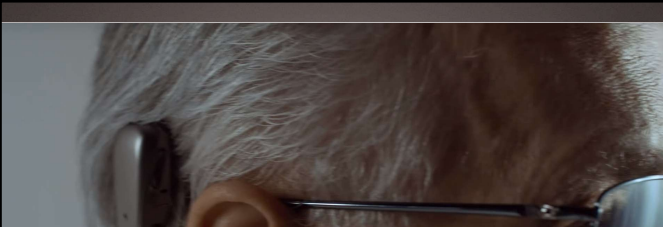


Bilateral Features: Baha Fitting Software Enhancements




- ✓ Active Bilateral Directionality can be enabled or disabled as desired
- ✓ Can fit a Baha 5 and Baha 5 Power as a bilateral pair
- ✓ Bilateral linking to allow program changes in both ears at once
- ✓ Copy audiogram feature for quick entry of bilateral audiograms in stand-alone software





Fitting Considerations for Bilateral Baha® Systems

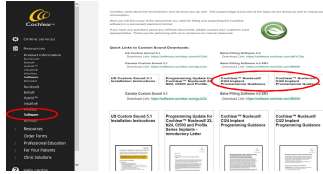
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Baha Fitting Software 5.4



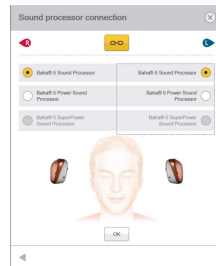
- 1 Link available in myCochlear Clinic or from your Cochlear Representative
- 2 Enter your email and contact info into download website
- 3 Click on unique link that is sent to your email to begin installation



Bilateral Fitting Tips



- Connect to both sound processors to begin programming
- Link button will allow changes to be made to both processors at the same time
- Can "link" matching processors or a Baha 5 to a Baha 5 Power



Bilateral Fitting Tips



- If processors are linked, BC Select options will be applied to both sound processors
- Measure BC Direct separately for each ear (do not need to plug the opposite ear)



Bilateral Fitting Tips



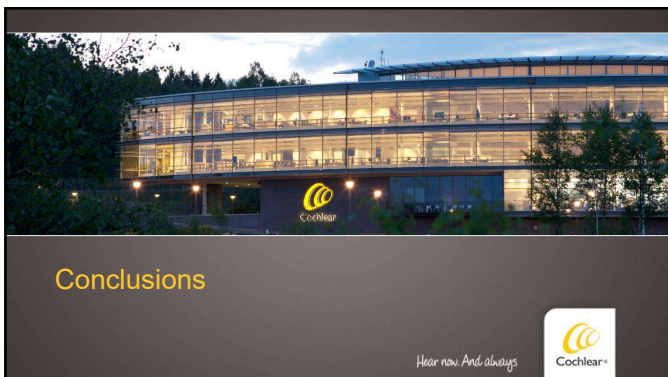
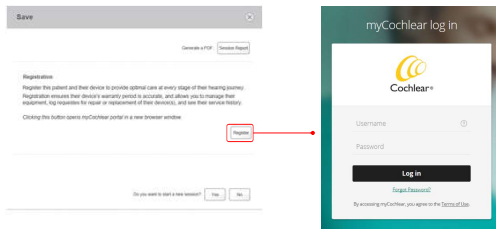
- To make changes to each ear separately, click the "link" button to unlink the processors
- Can use the arrows to copy the program settings from one side to the other
- Control Sync allows adjustments on one side to affect the other (e.g., program change or volume control)



Bilateral Fitting Tips



After successfully saving the sound processor(s) settings, there will be a link to register the device in myCochlear Clinic



Conclusions

Hear now. And always.



Summary



- Two ears are better than one: the right patients will benefit from a bilateral bone conduction solution¹
- Baha 5 sound processors have unique features to support bilateral fittings when appropriate



1. Janssen RM, Hong P, Challa MC. Bilateral Bone-Anchored Hearing Aids for Bilateral Permanent Conductive Hearing Loss: A Systematic Review. Otolaryngol Head Neck Surg. 2012;167(2):112-22.

Disclaimers



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This guideline does not address all elements of standard practice and accepts that individual clinicians are responsible to:

- Advise recipients of their choice and ensure informed consent is obtained prior to delivering care
- Provide care within scope of practice, meet all legislative requirements and maintain standards of professional conduct
- Apply standard precautions, and additional precautions as necessary, when delivering care
- Document all care in accordance with mandatory and local requirements.

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Cochlear Baha 5 sound processors are compatible with iPhone, iPad and iPod touch. For compatibility information visit www.cochlear.com/compatibility

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