



Bimodal Hearing

Maximizing Success in School for Children with Cochlear Implants

BIMODAL HEARING BASICS

Definition:

Bimodal Hearing is the use of a cochlear implant in one ear and a hearing aid in the opposite ear.

One Child, Two Ears

To maximize the success of children with hearing loss, each ear must be evaluated and considered individually and together as a system. This holds true even for children with cochlear implants. The contralateral ear may have usable hearing and should be fitted with a hearing aid if deemed appropriate by the child's audiologist.

Many people wonder how hearing with a hearing aid differs from hearing with a cochlear implant. Ultimately, both devices have the same goal: to improve hearing. Although the mechanics may be different, these devices can work together to provide children with significant benefits and optimal outcomes.

The Difference Between Hearing with a Hearing Aid and a Cochlear Implant

Hearing Aid

A hearing aid acoustically amplifies and delivers sounds to the auditory system through sound waves. The sounds delivered must pass through the damaged parts of the auditory system before reaching the brain for processing. The greater the damage, the more severe the hearing loss. For many people hearing aids are sufficient to improve hearing to an acceptable level of benefit. Cochlear implantation is considered for individuals who require access to sound that a hearing aid can not provide.

Cochlear Implant

A cochlear implant delivers electrical signals that represent sounds directly to the auditory system. The electrical signals bypass damaged areas of the auditory system and stimulate the hearing nerve directly. Cochlear implants are usually recommended for ears with severe to profound hearing loss and can significantly improve hearing.

AB Makes It Simple for Schools

Want to learn more details about how a cochlear implant processes sound and stimulates the auditory system? Visit AdvancedBionics.com/TFS and click on Tools for Learning about Hearing Loss and Cochlear Implants to download the "Becoming Familiar with a CI" pdf.



Why is Bimodal Hearing becoming the standard of care for children with one cochlear implant?

Over the past 10 years, more children have been implanted who use hearing aids. This change has led to a growing population of children who have usable hearing in their non-implanted ear. These children stand to benefit from hearing aid use in combination with a cochlear implant.

Which school-age children may benefit from Bimodal Hearing?

Children who have usable residual hearing in the unimplanted ear and exhibit any of the following at school may benefit from Bimodal Hearing:

- Difficulty following conversation in the noisy cafeteria²⁻⁶
- Trouble identifying where sound is coming from on the playground or during gym class¹⁻³
- Fatigue by the end of the day⁶
- Lack of interest in music^{5,7,8}
- Difficulty hearing other students' comments during class discussions²⁻⁶

BIMODAL HEARING TERMINOLOGY

Binaural Hearing Advantage: the positive outcome that occurs when the brain is able to integrate and use information from both ears to improve access to important sounds, like speech, resulting in better hearing

Contralateral Ear: the ear opposite of the cochlear implant

Sound Localization: use of different loudness and timing cues between ears to determine what direction sound is coming from

BIMODAL RESEARCH

Does research demonstrate that adults and children who use one cochlear implant benefit from Bimodal Hearing?

Numerous studies have documented the benefits of Bimodal Hearing compared with the use of a single cochlear implant. These benefits are realized because hearing in both ears provides the brain with additional cues that improve listening across various situations.

Research suggests that Bimodal Hearing may provide the following benefits:

Sound localization¹⁻³

Speech understanding in quiet and noise²⁻⁶

Music perception and enjoyment^{5,7,8}

Acquisition of auditory and language skills⁹⁻¹¹

Ability to hear low pitch sounds¹²⁻¹³



Bimodal in the Real World

"With both the Link and Implant, I am able to hear sounds that I haven't heard since my hearing loss began (including my cat's incessant meowing which I'm not sure I missed...) I'm able to capture wonderfully clear sounds and speech with just the implant itself, but the addition of the Link adds such a richer sound to my surroundings, adding a more natural tone."

— Jessica, AB recipient

What are the qualitative benefits of Bimodal Hearing?

- Reduced effort to hear
- Feeling balanced
- Enhanced sound quality
- Improved awareness of environmental sounds
- More confidence and spontaneity in social situations^{2,3,14}
- More likely to initiate conversations with both familiar and unfamiliar speakers^{2,3,14}
- Less need for repetition in conversation^{2,3,14}
- Preservation of the auditory pathway on the contralateral side through continued auditory stimulation
- Nonsurgical alternative for the contralateral ear if bilateral implantation is not an option

Bimodal in the Real World

"My AB Hearing Aid (Naida Link) was activated last Wednesday, and it is WONDERFUL!! My family, friends, and I are so happy with my hearing using the implant, and the compatible hearing aid makes it even better! I have a new confidence hearing conversations in public settings and also using the phone."

— Annie, AB recipient

AB Makes It Simple for Schools

Tips for Bimodal Success:

- Keep a log of the specific technology the child uses in each ear.
- Be sure to have contact information for the audiologist(s) who manage both the cochlear implant and the hearing aid.
- Learn if any program numbers have been designated for special listening situations, such as a noisy cafeteria or an auditorium.

Need help keeping track of your student's equipment?

Visit [AdvancedBionics.com/TFS](https://www.advancedbionics.com/TFS) and click on Bimodal Hearing to download the Bimodal Technology Tracking Form.



BIMODAL HEARING TECHNOLOGY

Who are the professionals involved in the Bimodal fitting process?

The cochlear implant audiologist may fit both the cochlear implant and hearing aid or may work in conjunction with a hearing aid audiologist or specialist.

Can any hearing aid be used for a Bimodal fitting?

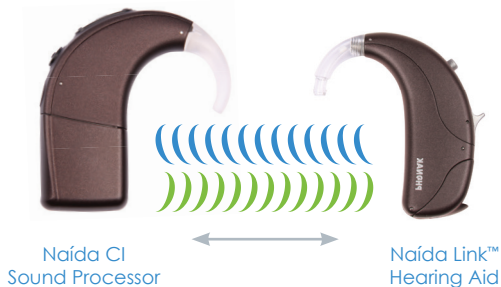
Yes, any type of appropriately fit hearing aid can be worn on the contralateral ear and provide Bimodal hearing. However, for children who have an AB cochlear implant, there are advantages to using a Phonak Naída Link™ hearing aid. The Link hearing aid in combination with AB's Naída CI sound processor provides a unique Bimodal Hearing Solution and optimizes Bimodal benefit.

How does the Bimodal Hearing Solution maximize the benefits of Bimodal Hearing?

The Naída Bimodal Hearing Solution from AB and Phonak provides the first hearing aid specifically designed to work with a cochlear implant system. It features the AB Naída CI sound processor and Phonak Naída Link hearing aid. Because they use the same platform, the Naída CI sound processor and Naída Link are able to communicate with each other in a way no other hearing aid and cochlear implant combination can match.



Bimodal fitting with the Bimodal Hearing Solution



The Naída CI sound processor and Naída Link hearing aid use the same platform, process sound in a similar way, share sound signals, and communicate with each other.

Standard Bimodal Fitting



The Naída CI sound processor and hearing aid work as two separate systems.



BIMODAL HEARING TERMINOLOGY

Bimodal Hearing Solution: use of a Naída CI sound processor in one ear and a Naída™ Link hearing aid in the other ear for optimal Bimodal benefit

Bimodal Streaming: the ability to simultaneously receive auditory input in both the Naída CI and a compatible Phonak hearing aid wirelessly

Binaural VoiceStream Technology™: allows the Naída CI and the Naída Link to share sound signals and communicate with each other in real time to maximize hearing performance.



ComPilot: a versatile accessory that can be used as a remote control* or to stream audio input wirelessly to the Naída CI and/or a compatible Phonak hearing aid

Naída CI: cochlear implant sound processor

Naída Link Hearing Aid: a behind-the-ear hearing aid specifically created to work with the Naída CI

*Available with SoundWave 3.0

What are the distinct advantages of the Bimodal Hearing Solution?

Easy to Hear

The Phonak Naída Link is the only hearing aid designed to treat sound in the same way as the Naída CI sound processor, making it easy for children to hear with them together. Specifically, the devices share sound processing technology, volume behavior, and program alerts. Studies show that individuals experience greater listening comfort and a proven advantage for hearing in noise compared to using a cochlear implant and any other hearing aid.¹⁵

School Advantage: Children feel that their hearing is balanced between both ears as they walk into the auditorium for a lecture and both Naída devices adapt similarly.

Easy to Use

Both the Naída CI sound processor and Naída Link use the same advanced automatic technology to react to and adjust in the same way and at the same time to changing sound situations.

Shared automatic technologies include:

QuickSync++ Provides one-touch control of the child's processors for easy, instant, simultaneous adjustments to volume and program settings on both ears.

SoundRelax* Softens sudden loud sounds, such as slamming doors or clanging dishes.

UltraZoom* Focused listening on a small group of voices in front while reducing distracting noise for improved communication in noisy environments.

WindBlock* Reduces wind noise to improve comfort and ease of listening in windy conditions.

School Advantage: Children can enjoy focused listening with classmates for a small group assignment while the chatter from other small groups around them is reduced.

*Not approved for pediatric use in the United States

+Available with SoundWave 3.0



Easy to Communicate

The Naída CI sound processor and Naída Link do not process sound independently like other Bimodal systems. Through Binaural VoiceStream Technology™ these devices are able to share sound signals and communicate with each other. They work together to intelligently focus on the most important sounds while significantly reducing unwanted noises. This breakthrough technology allows children to hear clearer sound simultaneously in both ears.

Binaural VoiceStream Technology Includes:

DuoPhone** Automatically streams phone calls to both ears for stereo hearing and easier conversations in noise while using the telephone.

School Advantage: A child can call their parent for a ride home from the noisy locker room after basketball practice and easily hear the conversation in both ears.

StereoZoom** Extraction of a single voice from a noisy crowd so one-on-one conversation requires less effort. Requires a Naída Q90 sound processor.

School Advantage: A child can listen to their best friend in the cafeteria while background noise is reduced.

ZoomControl**

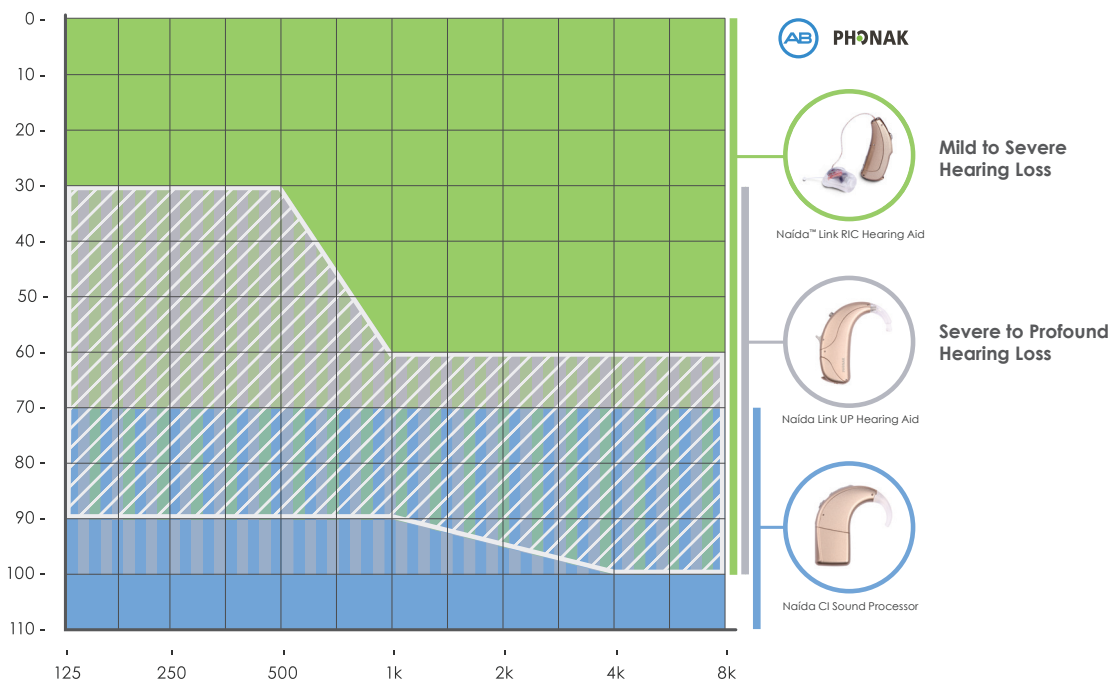
Focused listening on a speaker to the front-back or right-left for improved communication in noisy environments.

School Advantage: A child can talk with a friend seated next to them on the bus.

*Not approved for pediatric use in the United States.

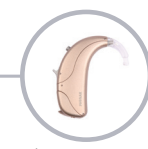
+Available with SoundWave 3.0.

Bimodal Hearing Solution Fitting Range



Mild to Severe Hearing Loss

Naída™ Link RIC Hearing Aid



Severe to Profound Hearing Loss

Naída Link UP Hearing Aid



Naída CI Sound Processor

TOOLS for SCHOOLS™



Easy to Connect

Children can wirelessly stream music, television, cell phone calls, Roger™/FM, and input from tablets to both ears, and enjoy the benefits of stereo hearing. There is a wide selection of Phonak wireless accessories that stream audio directly to both devices for effortless hearing.

School Advantage: A child can wirelessly stream audio to both ears while completing an assignment on a school tablet.



Roger



RemoteMic



TVLinkII



DECT Phone

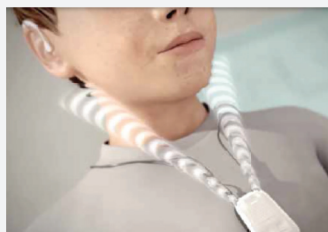


EasyCall



ComPilot

*Visit phonak.com for details on the benefits each accessory provides.



Phonak ComPilot Accessory

A remote control* and streamer that wirelessly connects audio input from any Bluetooth-enabled device to a Naída CI sound processor and/or a compatible Phonak hearing aid.

*Available with SoundWave 3.0

Bimodal in the Real World

"I can carry on conversations in a restaurant with ease, hear my boyfriend calling me from another room, and even talk on the phone with the T-Mic or my Roger pen streaming into both ears. It's astounding how clear I am able to localize sounds through these intelligent and cohesive devices; two ears are definitely better than one!"

— Jessica, AB recipient

How can I keep track of my student's Bimodal system?

Advanced Bionics has created a simple form you can use to keep track of your student's technology. Visit AdvancedBionics.com/TFS and click on Bimodal hearing to download the Bimodal Technology Tracking Form.



PHONAK

The Power of Two Working Together as One

The innovation DNA of AB and Phonak have combined to deliver performance technologies that will change the way you hear.

To learn more about the unique advantages of hearing with Advanced Bionics, please contact an AB representative, or visit AdvancedBionics.com.

References

1. Potts L, Skinner M, Litovsky RY, Kuk F, & Strube M. (2009). Recognition and Localization of Speech by Adult Cochlear Implant Recipients Wearing a Digital Hearing Aid in the Non-implanted Ear (Bimodal Hearing). *International Journal of Audiology* 20:353-373.
2. Ching TY, Hill M, Brew J, Incerti P, et al. (2005). The effect of auditory experience on speech perception, localization, and functional performance of children who use a cochlear implant and a hearing aid in opposite ears. *International Journal of Audiology* 44(12):677-90.
3. Ching TYC, Psarros C, Hill, M, et al. (2001). Should children who use cochlear implants wear hearing aids in the opposite ear? *Ear and Hearing* 22(5):365-380.
4. Jang JH, Lee JH, Chang SO, Oh SH. (2014). Effect of Aided Hearing in the Nonimplanted Ear on Bimodal Hearing. *Otology and Neurology*. 35(10):e270-6.
5. Dorman MF, Gifford RH, Spahr A J, McKarns SA. (2008). The benefits of combining acoustic and electric stimulation for the recognition of speech, voice and melodies. *Audiology and Neurology*, 13(2): 105-112
6. Holt RF, Kirk KI, Eisenberg LS, Martinez AS, & Campbell W. (2005). Spoken word recognition development in children with residual hearing using cochlear implants and hearing aids in opposite ears. *Ear and Hearing*, 26, 825-915.
7. El Fata F, James CJ, Laborde ML, Fraysse B. (2009). How much residual hearing is 'useful' for music perception with cochlear implants? *Audiology and Neurology*. 14(Suppl 1):14-21.
8. Kong YY, Stickney GS, Zeng FG. (2005). Speech and melody recognition in binaurally combined acoustic and electric hearing. *J Acoust Soc Am*. Mar17(3P1 1): 1351-61
9. Marsella P, Giannantonio S, Scorpecci A, Pianesi F, Micardi M, Resca A. (2015). Role of bimodal stimulation for auditory-perceptual skills development in children with a unilateral cochlear implant. *Acta Otorhinolaryngologica Italica* 35(6):442-8.
10. Nitttrouer S, Chapman C. (2009). The effects of bilateral electric and bimodal electric-acoustic stimulation on language development. *Trends In Amplification* 13:190-205.
11. Moberly AC, Lowenstein JH, Nitttrouer S. (2016). Early Bimodal Stimulation Benefits Language Acquisition for Children With Cochlear Implants. *Otology and Neurology* 37(1):24-30.
12. Shpak T, Most T, Luntz M. (2014). Fundamental Frequency Information for Speech Recognition via Bimodal Stimulation: Cochlear Implant in One Ear and Hearing Aid in the Other. *Ear and Hearing* 35(1):97-109.
13. Ching T. (2005). The evidence calls for making binaural-bimodal fittings routine. (2005). *Hearing Journal* November 2005 Volume 58 - Issue 11 - pp 32,34,36,38,40-41.
14. Farinetti A, Roman S, Mancini J, Baumstarck-Barrau K, Meller R, Lavieille JP, Triglia JM. (2015). Quality of life in bimodal hearing users (unilateral cochlear implants and contralateral hearing aids). *European Archives of Otorhino-laryngology* 272(11):3209-15.
15. Veugen LC, Chalupper J, Snik AF, van Opstal AJ, Mens LH. (2016) Matching automatic gain control across devices in bimodal cochlear implant users. *Ear and Hearing*. (2015 Dec 10, epub ahead of print).
16. Bess, FH, & Hornsby, BWY. (2014). The Complexities of Fatigue in Children with Hearing Loss. *SIG 9 Perspectives on Hearing and Hearing Disorders in Childhood*, 24(2), 25-39



Advanced Bionics AG

Laubisrütistrasse 28, 8712 Stäfa, Switzerland

T: +41.58.928.78.00

F: +41.58.928.78.90

info.switzerland@AdvancedBionics.com

Advanced Bionics LLC

28515 Westinghouse Place
Valencia, CA 91355, United States

T: +1.877.829.0026

T: +1.661.362.1400

F: +1.661.362.1500

info.us@AdvancedBionics.com

A Sonova brand

For information on additional AB locations, please visit
AdvancedBionics.com/contact

The AB recipients featured have not been compensated for the use of their quotes in this material. Not all products listed are available in all territories and not all features described here are available on all devices. Talk to your hearing healthcare professional to find the solution best suited to you or your child's needs.