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Unilateral Solutions

Megan Quilter, Au.D



Learning Outcomes

- After this course, participants will be able to discuss what unilateral hearing means.
- After this course, participants will be able to identify fitting considerations for those with unilateral hearing.
- After this course, participants will be able to list solutions that are available for those with unilateral hearing.

What Does “Unilateral Hearing” Mean?

- **World Health Organization:** Does not provide a specific definition for "unilateral hearing" or "unilateral hearing loss" in its International Classification of Functioning, Disability, and Health (ICF) or other documents.
- **American Speech Hearing Association:** Unilateral hearing loss (UHL) means that hearing is normal in one ear but there is hearing loss in the other ear. The hearing loss can range from mild to very severe.
- **American Academy of Audiology:** Hearing loss that affects only one ear is known as unilateral hearing loss (UHL). Having one ear completely ineffective or has no useable hearing. This hearing loss can range in degree from mild to profound.
- **Agreed upon:** UHL can occur in both adults and children.

Is Unilateral Hearing Loss the Same as Single-Sided Deafness?

- Single-sided deafness (SSD) is one form of unilateral hearing loss.
- SSD is when one ear is completely ineffective or has no usable hearing.
 - This means that the person might not perceive any benefit from a traditional hearing aid.
 - A person with SSD might have normal hearing or they might have some degree of hearing loss in their better ear.

Possible causes of UHL

- Hearing loss that runs in the family (genetic or hereditary)
- An outer, middle, or inner ear abnormality
- Some syndromes
- Illnesses or infections
- Head injury
- Exposure to loud noise
- Traumatic brain injury (TBI)



Prevalence statistics



- The prevalence of unilateral hearing loss (UHL) can vary depending on the population studied and the criteria used for defining UHL. However, it's estimated that UHL is relatively more common in the general population than we may think.
- The overall prevalence of UHL in adult Americans was 7.2% (95% confidence interval 6.1%-8.6%), with 5.7% (4.8%-6.7%) having mild and 1.5% (0.1%-2.1%) with moderate-or-worse UHL (1)
- The prevalence of SSD in the United States is estimated at 0.11%–0.14% (271,122 to 345,064 adults), depending on PTA definition used. (2)

(1) Golub JS, Lin FR, Lustig LR, Lalwani AK. Prevalence of adult unilateral hearing loss and hearing aid use in the United States. *Laryngoscope*. 2018 Jul;128(7):1681-1686. doi: 10.1002/lary.27017. Epub 2017 Nov 29. PMID: 29193112.

(2) Kay-Rivest E, Irace AL, Golub JS, Svirsky MA. Prevalence of Single-Sided Deafness in the United States. *Laryngoscope*. 2022 Aug;132(8):1652-1656. doi: 10.1002/lary.29941. Epub 2021 Nov 10. PMID: 34757636; PMCID: PMC9085960.

Legal Definitions of Hearing Loss as a Disability

Hearing loss does not automatically qualify patients for Social Security Admin benefits.

The SSA has a Blue Book it uses to determine whether a person with hearing loss qualifies as disabled.

If you have hearing loss you qualify as disabled if have:

- An average air conduction hearing threshold of 90 decibels or more in the good ear.
- An average bone conduction hearing threshold of 60 decibels in the better ear.
- A word recognition score of 40% or less in the better ear, as determined by standardized tests.
- SSA will most likely turn down the application for unilateral ☹️



Unilateral hearing is IMPORTANT

1. Sound localization/ Reduced spatial awareness
2. Speech understanding in noise
3. Social and Communication Implications
4. Educational and Occupational Impact
5. Emotional and Psychological Well-being
6. Safety Concerns
7. Quality of Life
8. Risk of Sudden Deafness



Treatment options

Depends on underlying cause, severity, individual specific needs and impact on QoL

Number of different options available:

1. Contralateral Routing of Signal (CROS)
2. Bone-Anchored Hearing Aids (BAHA)
3. Cochlear implantation
4. Bone conduction
5. Assistive listening devices
6. Aural rehabilitation
7. Communication Strategies
8. Monitoring and Management
9. Medical Evaluation



Treatment options

Number of different options available:

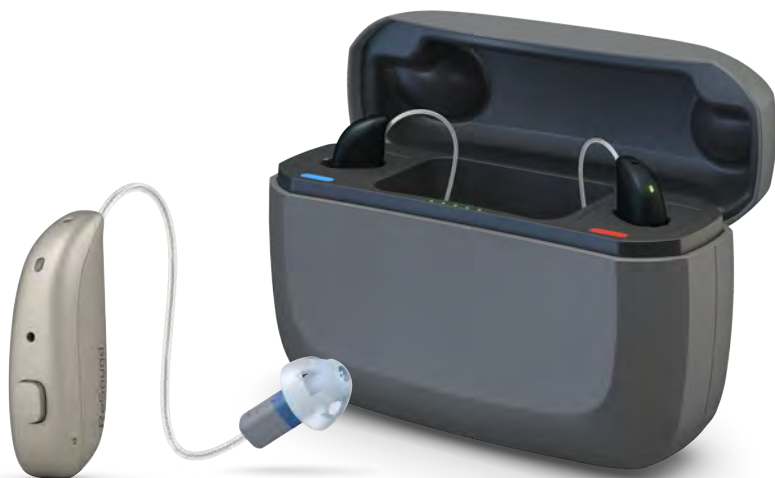
1. **Contralateral Routing of Signal - CROS/ BiCROS**
2. Bone-Anchored Hearing Aids (BAHA)
3. **Cochlear implantation / Bimodal hearing**
4. Bone conduction
5. **Assistive listening devices**
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9. Medical Evaluation

Treatment options

Number of different options available:

1. **Contralateral Routing of Signal - CROS/ BiCROS**

New Nexia CROS transmitter



CX160S-DRWC

ReSound GN

Normal hearing
(PTA $\leq$ 25 HL)

Severe or worse
(PTA $>$ 70 HL)



16h

Battery life when
streaming audio to
the opposite ear

Contralateral Routing of Signal CROS

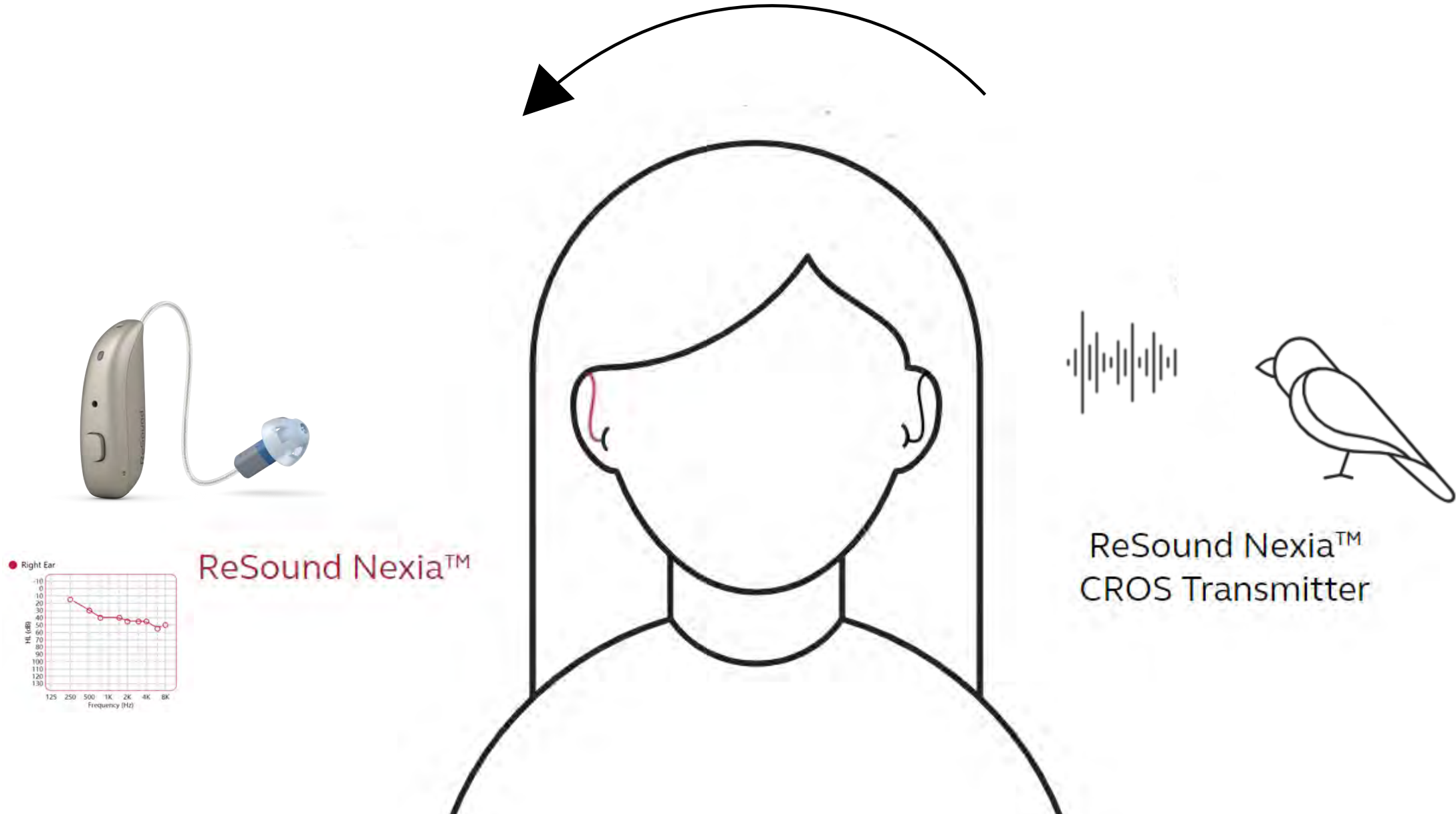


ReSound Nexia™



ReSound Nexia™
CROS Transmitter

Bilateral Contralateral Routing of Signal BiCROS



Benefits of a CROS/BiCROS

1. Sound Awareness
2. Improved Sound Localization
3. Enhanced Speech Understanding
4. Increased Comfort and Convenience
5. Social and Communication Benefits
6. Reduced Listening Effort
7. Improved Quality of Life (QoL)



Unaidable is not always deaf

Those who have little-to-no usable hearing in one ear could have SSD and a "deaf" ear or they could have bilateral hearing but have poor word recognition in one ear. Either way, these patients may not benefit from amplification in the poorer ear.

With this in mind, one could think of those with an unaidable ear as people with single-sided hearing!



Ears with "poor" or "very poor" word recognition scores may also be considered unaidable

Fitting Considerations CROS/BiCROS

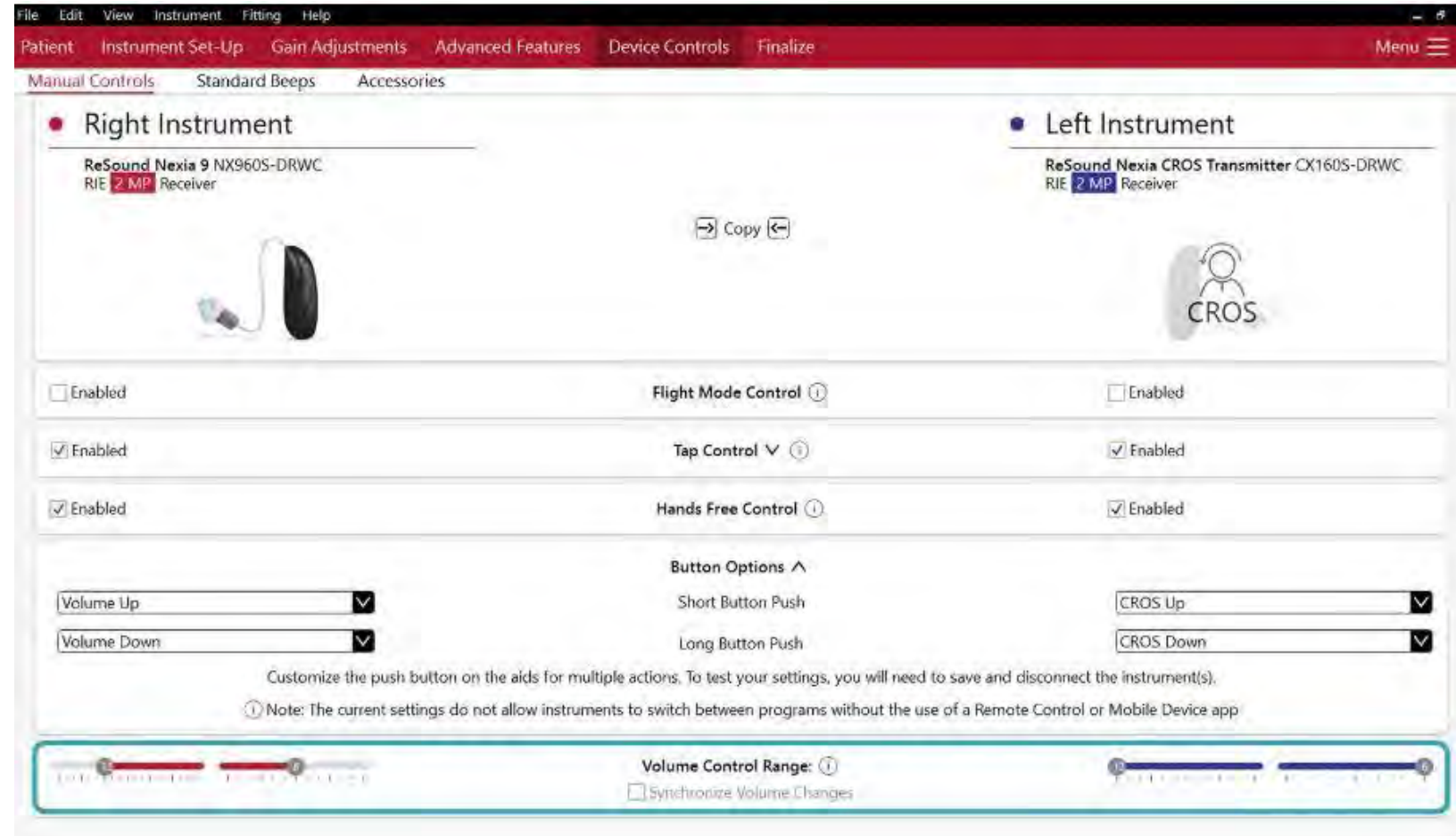
- Devices show up in SmartFit as Nexia and Nexia CROS transmitter
- For BiCROS fitting, program the hearing aid/receiver side in the same manner as a standard fitting
- CROS balance control can be found in advanced features



Pro Tip: The mute button in SmartFit for the receiver side will mute the output (not the mic). For testing levels of with/without CROS, mute the transmitter side

Tips for Fitting CROS/BiCROS

- User balance adjustment might be needed in situations where the HA wearer wants to hear more or less from the CROS or BiCROS transmitter side
- In the Manual Controls screen, use the short and long button press options for CROS up/down functionality on the transmitter side, and volume up/down on the receiver side



CROS/BiCROS Charging System



Premium Charger



Standard Charger



Desktop Charger

Treatment options

Number of different options available:

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Bimodal Hearing- a unilateral solution

Smart Hearing Alliance

Bimodal hearing is a hearing condition in which an individual utilizes two different sensory modalities to perceive and process sounds.

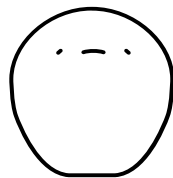
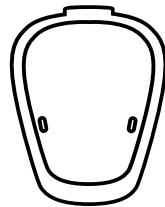
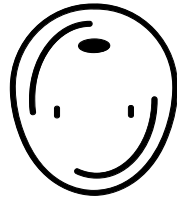
Specifically, in the context of hearing, bimodal hearing typically refers to the use of both natural acoustic hearing and electric hearing through a cochlear implant or other implantable hearing device.

This combination allows individuals with hearing loss to access and process sounds through two distinct means:



Bimodal definition

Acoustic stimulation in one ear (hearing instrument) and electrical stimulation or bone conduction in the opposite ear (cochlear implant or bone conduction implant).



ReSound Nexia™

ReSound OMNIA™

ReSound ONE™

ReSound ENZO Q™ / ENZO 3D™

ReSound LiNX Quattro™ / LiNX 3D™



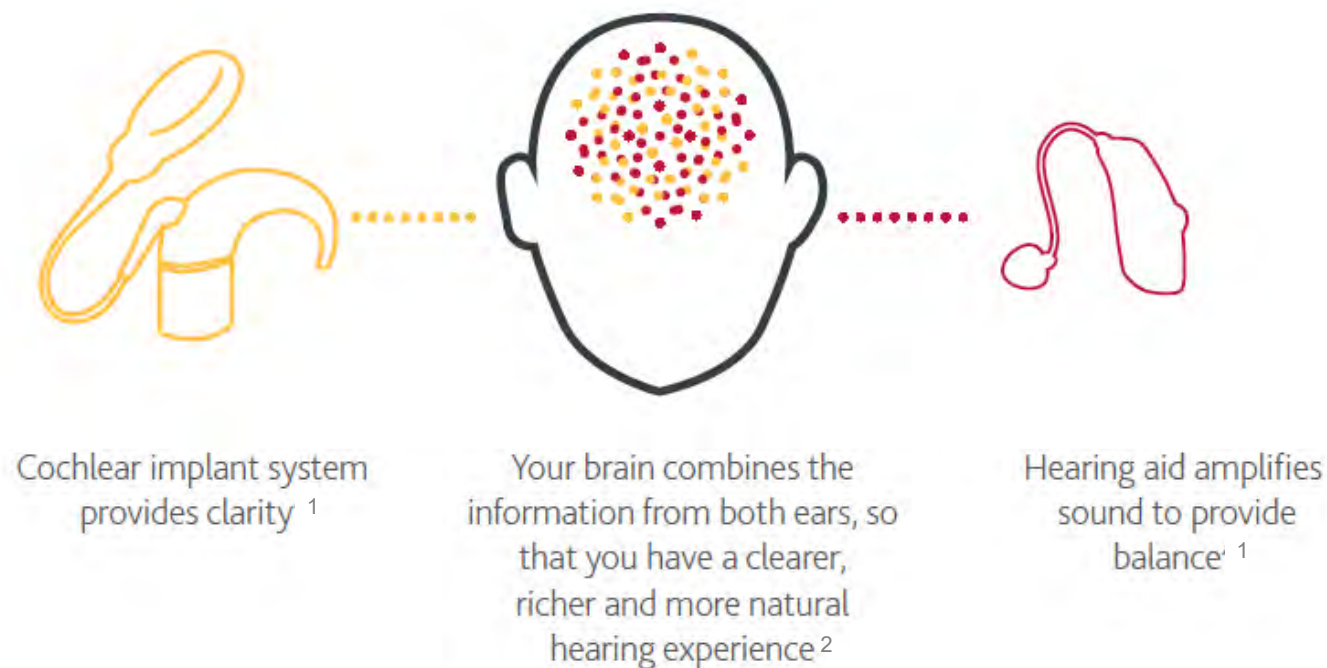
Bimodal Areas of Importance

1. Improved Speech Understanding
2. Sound Localization
3. Natural Sound Perception
4. Enhanced Music Perception
5. Redundancy and Robustness
6. Improved Quality of Life
7. Individualized Solutions

**Why Do
We Have
Two Ears?**



Benefits of Bimodal Hearing



Potential benefits:

- Better hearing performance in background noise¹
- Music appreciation³

1 - Ching T, van Wanrooy E, Dillon H. Binaural-bimodal fitting or bilateral implantation for managing severe to profound deafness: a review. *Trends Amplif.* 2007;11;161-192.

2 - Potts LG, Skinner MW, Litovsky RA, Strube MJ, Kuk F. Recognition and localization of speech by adult cochlear implant recipients wearing a digital hearing aid in the nonimplanted ear.

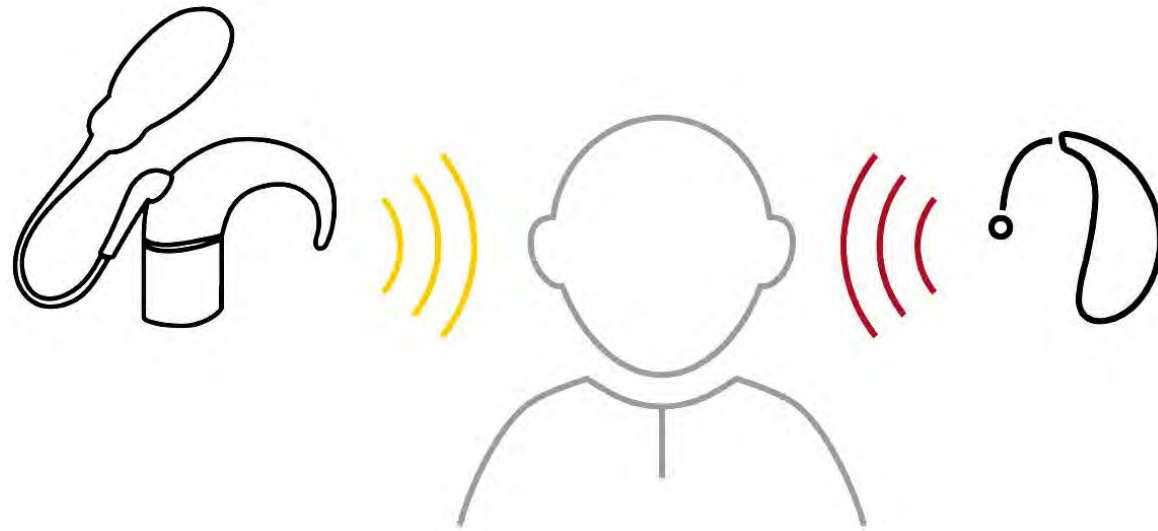
Farinetti A, Roman S, Mancini J, et al. Quality of life in bimodal hearing users (unilateral cochlear implants and contralateral hearing aids). *Eur Arch Otorhinolaryngol* (2015 Nov); 272, 3209-3215

3 - Sucher CM, McDermott HJ. Bimodal stimulation: benefits for music perception and sound quality. *Cochlear Implants International.* (2009 Jan); 1; 10(S1):96-9..

Smart Bimodal System

Up to 70% of CI users could benefit from bimodal hearing¹

In Cochlear's multicenter study, 98% of subjects in study were bimodal²



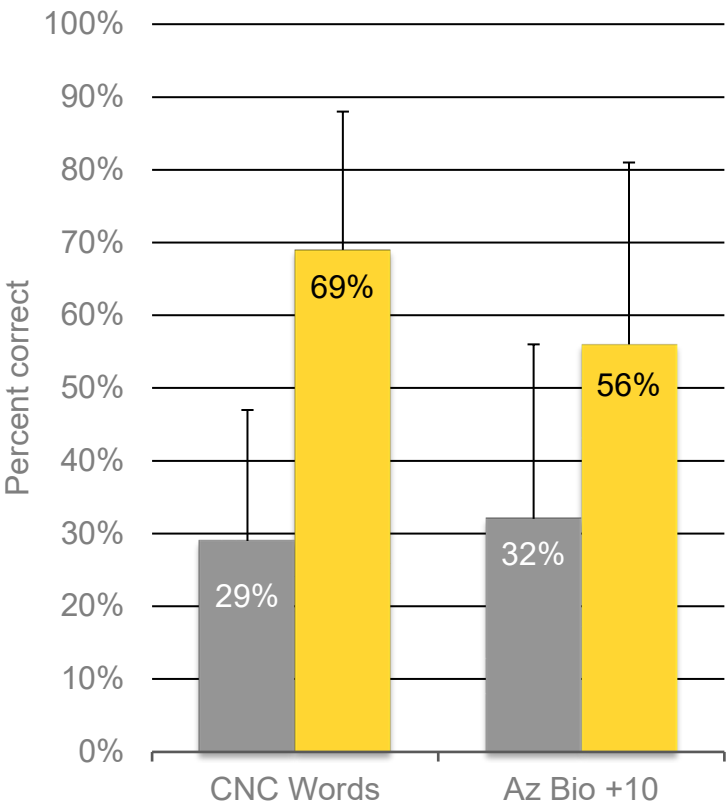
¹ - Holder, J., et al. (2018). Current Profile of Adults Presenting for Preoperative Cochlear Implant Evaluation. *Trends in Hearing*. Volume 22:1-16

² - Clinical Evaluation of the Cochlear Nucleus CI532 Cochlear Implants in Adults Investigator Meeting. 2019 Apr.

Smart Bimodal Drives Patient Performance and Satisfaction

HEARING PERFORMANCE

■ Bilateral Hearing Aids ■ Bimodal Hearing at 6 months



HEARING PERFORMANCE

Satisfied or Very Satisfied

Satisfaction

96%



Ability to understand what is said on TV

76%



Ability to understand conversations in a small group

79%



Hearing performance in background noise

58%



Ability to listen to and appreciate music

68%



Ability to understand people on the phone

71%



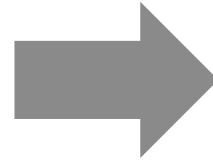
Bimodal Performance Outcomes: What Do We Expect?



28%

CNC words pre-operatively

Average hearing performance
with two hearing aids.¹



75%

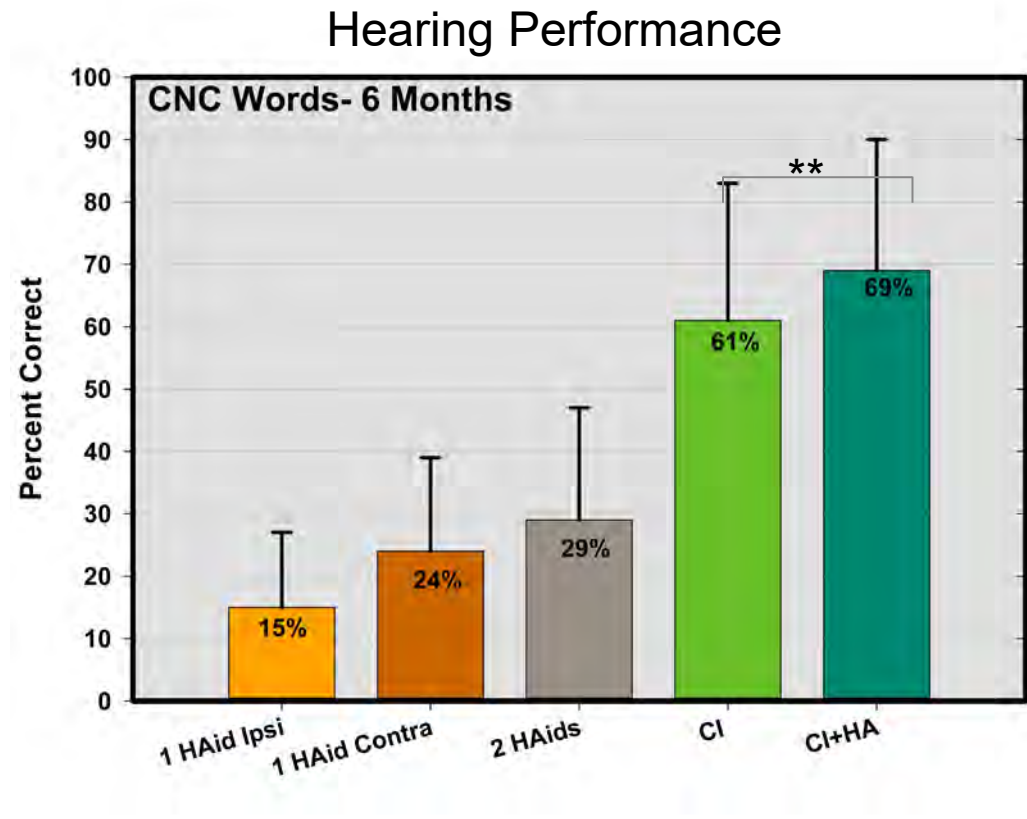
CNC words post-operatively

Average hearing performance with a
cochlear implant and hearing aid.¹

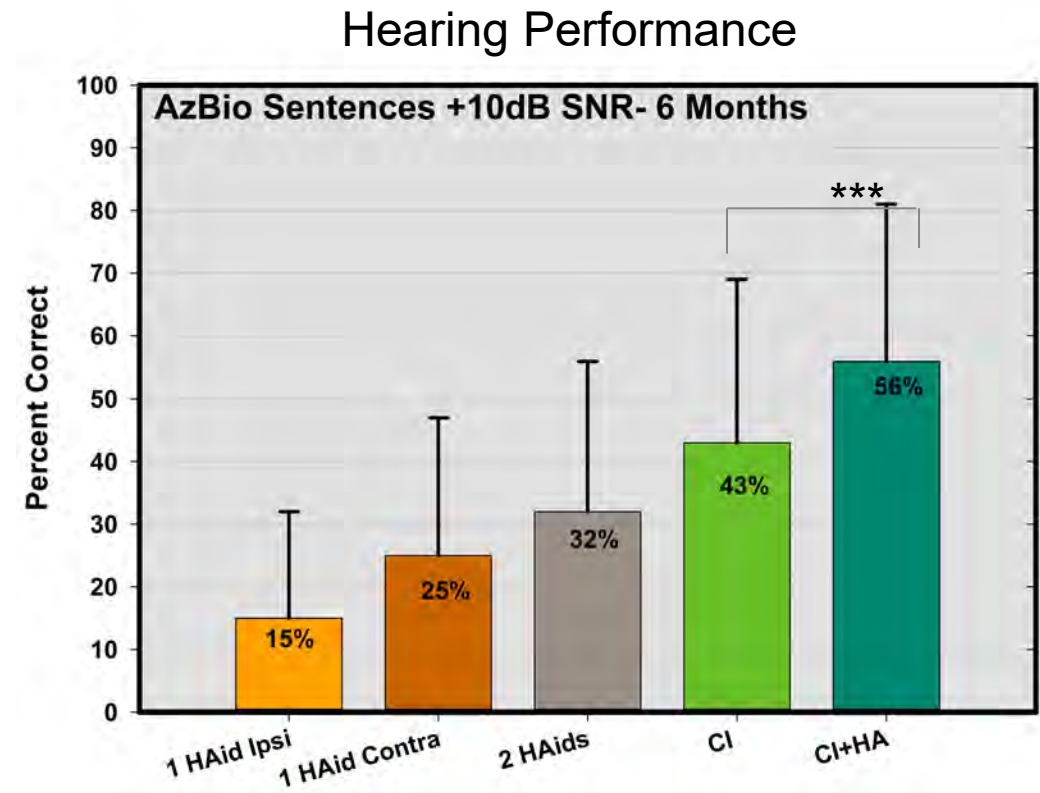


1. Gifford RH, Dorman MF, McKarns SA, Spahr AJ. Combined electric and contralateral acoustic hearing: Word and sentence recognition with bimodal hearing. Journal of Speech, Language, and Hearing Research. (2007 Aug) 1;50(4):835-43.

Speech Understanding with Two Ears (N=94)¹



**p=0.002



***p<0.001



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Unilateral and Assistive Listening Devices

1. Improved Signal-to-Noise Ratio
2. Enhanced Speech Clarity
3. Improved Sound Localization
4. Personalization
5. Reduced Listening Effort
6. Flexibility
7. Improved Communication and Social Interaction



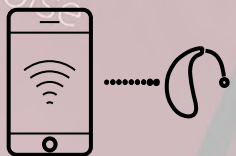
ReSound Multi Microphone

A smart and flexible hearing aid microphone



Bluetooth® LE Audio

Calls and streaming from device



Direct connectivity to smartphone, tablets and computers for calls and streaming using Bluetooth Low Energy

Broadcasting



Stream sound to hearing aids using new TV streamer with Auracast technology and ready for Auracast Public Transmission

TV Streamer +



ReSound GN



New TV-Streamer+

Streamlined design





Thank you

Megan Quilter, Au.D