

# Unilateral Hearing Loss:

Advocating for Children through Early Intervention Services and in the Classroom

Presented by:

Melissa Tumblin and Mary Humitz, AuD

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## Learner Outcomes

After this course, participants will be able to:

- Identify the challenges that a unilateral conductive hearing loss can cause in children.
- Explain the value of classroom advocacy and early intervention services for both families and their children during the critical years of development and beyond.
- Explain the benefits of treating unilateral hearing losses using a bone conduction device.

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## Objectives:

- Understanding Unilateral Hearing Loss (UHL)
  - Being educated as to why one good ear is not good enough
- How Early Intervention services can help
- Why advocating in the school classroom is paramount
- Why being educated and informed can make a difference for your child
  - A child should always be given the opportunity to try a hearing device. Especially, during the critical years of development

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## Unilateral Hearing Loss: Advocating for children through Early Intervention services and in the classroom



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## Microtia and Atresia in Review



- Microtia is a congenital deformity affecting the outer ear (pinna) where the ear does not fully develop during the first trimester of pregnancy.
- Aural Atresia is the absence or closure of the external auditory ear canal.

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## Microtia and Atresia in Review



Grade I

Grade II

Grade III

Grade IV

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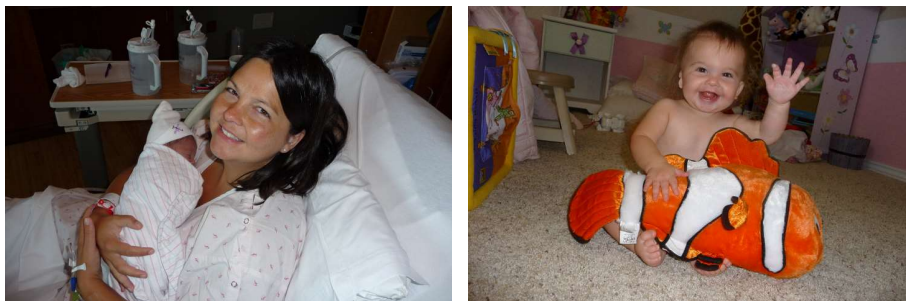
## Microtia and Atresia in Review

### Quick Facts:

- Microtia and Atresia is a congenital deformity. (not caused by the parent during pregnancy (not environmental)).
- Microtia and Atresia is more common in males and affects the right ear more often (even though it can be bilateral).
- Microtia and Atresia occur more often in Latino/Hispanic, Native Americans and Asian ethnicities. (Most common in Ecuadorian and least common in African American).
- 1 out of every 6,000 births.
  - (Approximately 500 babies are born in the US each year. ~33,000 in the US and over 750,000 in the world).
- There are reconstructive options for Microtia and Atresia, including prosthetic ears.

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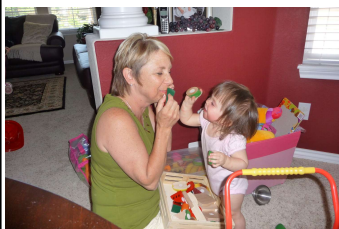
## Our Story



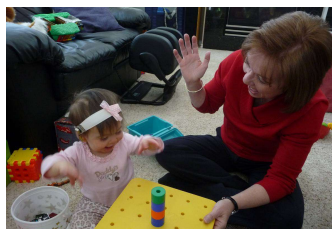
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## Why Early Intervention Services are Important

- Confusion, overwhelmed, and not being educated immediately



Occupational Therapy



Speech Therapy



Physical Therapy

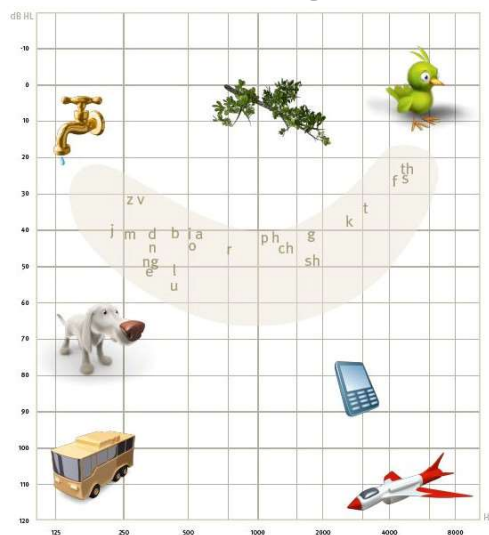
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## Understanding Unilateral Hearing Loss

- Why is this important?
  - One good ear is not good enough!
    - Ability to localize sound is gone (whispers, sneaking up, etc..).
- Being educated about hearing loss & newborn hearing screening.
  - Critical years of development (birth to 3 or age 5).
- Recognizing speech delays and auditory processing delays.
  - Number of words spoken at age.
- Each one of us manages our hearing loss differently.
- UHL is an invisible disability.

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## Understanding Unilateral Hearing Loss



child friendly hearing care

### Degree of hearing loss

0-25dB Normal Hearing Limits

26-40dB Mild Hearing Loss

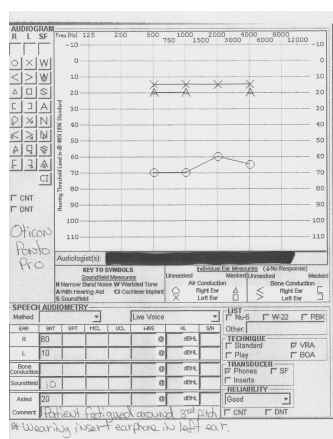
41-55dB Moderate Hearing Loss

56-70dB Moderately Severe Hearing Loss

71-90dB Severe Hearing Loss

> 91dB is Profound Hearing Loss

## Finding our way with Ponto



## Finding our way with Ponto



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## Helpful Options and Resources

- IFSP, IEP or 504 Plan
- Therapies (speech), ASL sign, and visual phonics in the classroom
- IDEA laws for hearing impairment
- Grants through EI provider programs and services
- Community events and support groups for individuals and their families in the same situation



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## Take-A-Ways

- One good ear is not good enough!
- 1 Ear can never hear as well as 2 ears can.
  - Challenges and delays, safety issues, misunderstandings (acting out), fatigue, the inability to localize sound, and missing out on life's sounds.
- Advocating for parents and their children is priceless.
  - Not everyone is informed about services, products, and help.
- Guidance and education is key! It is always okay to ask.
  - Parents should know they can always ask for help. Educators and therapists are here to help our children.
- Sharing what we already know and learning from each other helps us gain more knowledge, allowing us to work together doing even more good.
- It is always okay to seek multiple medical opinions.

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## Helpful Resources



- Microtia and Atresia Support:
  - The Ear Community Organization, [www.EarCommunity.org](http://www.EarCommunity.org)
  - The Microtia and Atresia Support Group on Facebook
- State Early Intervention service providers:
  - School districts, schools for the deaf, universities, and children's hospital networks
- AudiologyOnline/continued: [www.AudiologyOnline.com](http://www.AudiologyOnline.com) and [www.continued.com](http://www.continued.com)
- The HLAA (Hearing Loss Association of America): [www.HearingLoss.org](http://www.HearingLoss.org)
- The EAA (Educational Audiology Association): [www.edaud.org/](http://www.edaud.org/)
- AAA (American Academy of Audiology): [www.audiology.org](http://www.audiology.org)
- ASHA (American Speech and Hearing Association): [www.ASHA.org](http://www.ASHA.org)
- NCHAM (National Center for Hearing Assessment and Management): [www.infanthearing.org](http://www.infanthearing.org)

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## Helpful Resources

- Vanderbilt University's Mama Lere Hearing School at Vanderbilt: <https://ww2.mc.vanderbilt.edu/HearingHearingAids/>
- Gallaudet University: <http://www.gallaudet.edu/about>
- California Ear Institute: <http://www.californiaearinstitute.com/>
- House Ear Institute: <https://hei.org/>
- Stanford Ear Institute: <https://med.stanford.edu/ohns/healthcare/earinstitute.html>
- EHDI (Early Hearing Detection and Intervention): [www.EHDIMeeting.org](http://www.EHDIMeeting.org)
- Marion Downs: [www.MarionDowns.com](http://www.MarionDowns.com)
- Hands & Voices Organization: [www.HandsandVoices.org](http://www.HandsandVoices.org)

Oticon Medical: [www.oticonmedical.com/us](http://www.oticonmedical.com/us)

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## Helpful Articles

- "The Right Ear Is From Mars" - <https://www.nytimes.com/2004/09/14/science/the-right-ear-is-from-mars.html>
- "Singled Sided Hearing Loss in Children: What is the effect of single sided hearing loss on my child's function and development?" - <http://www.californiaearinstitute.com/ear-disorders-singled-sided-hearing-loss-children-ear-institute.php>
- "Children with unilateral hearing loss are more likely to struggle in school" - <https://www.news-medical.net/news/20130720/Children-with-unilateral-hearing-loss-are-more-likely-to-struggle-in-school.aspx>
- "1-Sided Hearing Loss Lowers Language Skills: Kids With Hearing Loss in 1 Ear Have Lower Speech-Language Scores Than Siblings With Normal Hearing" - <https://www.webmd.com/children/news/20100510/1-sided-hearing-loss-lowers-language-skills#2>
- "Left and Right Ears Not Created Equal as Newborns Process Sound, UCLA/University of Arizona Scientists Discover" - <http://newsroom.ucla.edu/releases/Left-and-Right-Ears-Not-Created-5480?RelNum=5480>

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Thank you for  
helping all of our  
kids thrive so they  
can be super  
everyday!

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## Unilateral Hearing Loss:

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## Objectives:

- What is Bone Conduction?
- Candidacy
- What is BrainHearing™?
- Sound Matters

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## Financial Disclosure

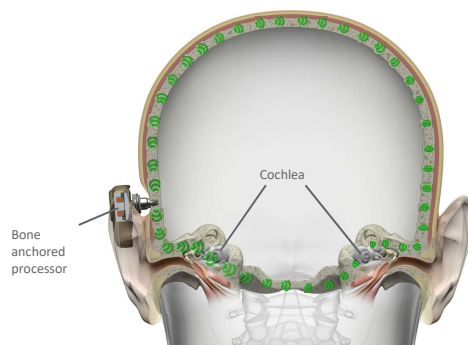
**Financial:** I am a paid employees of Oticon Medical, LLC

Course content describes the Oticon Medical Ponto Bone Anchored System

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## What is a Bone Conduction System?

- Sounds are converted to vibrations, which the skull transmits directly to the inner ears.

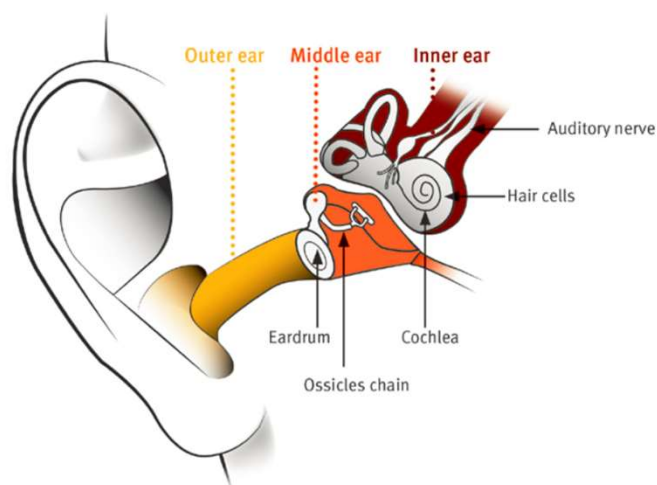


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## Candidacy

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## Candidates for a Bone Anchored Solution



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## Children with Conductive and Mixed Hearing Loss

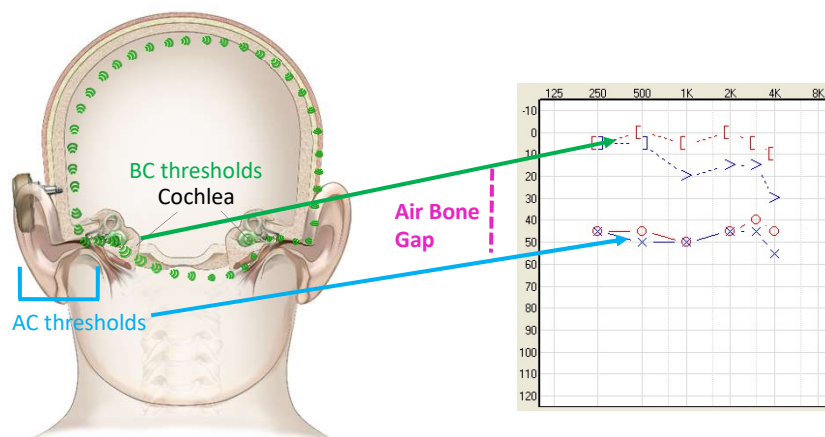
Unilateral or bilateral typical diagnosis:

- Atresia/Microtia
- Chronic otitis media
- Cholesteatoma
- Middle ear dysfunction/disease
- External otitis
- Syndromes (e.g. Treacher Collins, Goldenhar, CHARGE...)



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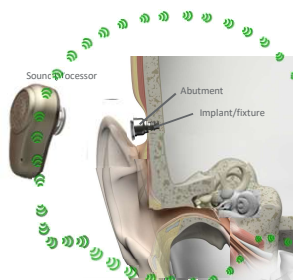
## Conductive and Mixed Hearing Loss



## Bone-Anchored Device Compared with Traditional Hearing Aids



## Direct Bone Conduction Stimulation



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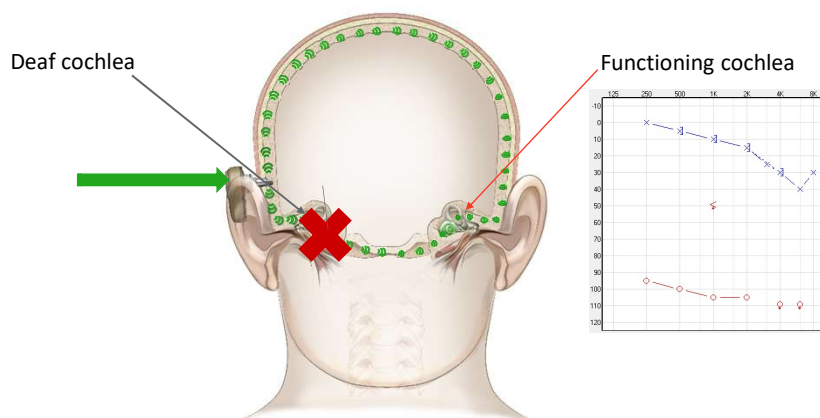
Softband:  
Comfortable & Safe to wear



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## Single-Sided Deafness (SSD) (Unilateral Sensorineural HL)



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## Other Patient Indications for Bone Conduction – Fluctuating Hearing Loss

### Softband

- Non surgical option with children who should eventually grow out of middle ear problems that create a fluctuating conductive hearing loss

### Benefits:

- No risk of over amplification if wearing on days when hearing is normal
- Ear canal remains open – small canal, wax, drainage does not affect function
- Hearing is constant. The amount of fluctuation is all related to the middle ear and Ponto on softband overcomes any middle ear issue



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## BrainHearing™

Because the Brain is the Most Important  
Part of Hearing

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## Pediatric Considerations

- “Children are learning language, and do not have the capacity to “fill in the blanks” for sounds that are not audible”
- “Children spend most of their time listening to the speech of other children and women, which has greater high frequency content than that of males”
- “Children have more demanding listening environments than adults for understanding speech... Enhancement of audibility is required either through increased level, increased SNR, or improvement of the listening environment”

AAA Pediatric Amplification Guidelines, 2013

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## Hearing Loss in Only One Ear, “What’s the big deal?”

### Listening & Learning Challenges

- Any time listening is not easy it will be harder for a child with unilateral hearing loss to pick up new words.
- Hearing from a distance is a challenge.
- Children with unilateral hearing loss may be **10 times** more likely to fail a grade in school or need special help to keep up in school.
- 1/3 to 1/2** of children with hearing loss who have not received help to hear better have problems learning in school.
- Also, because most rules of social interaction are learned via subtle auditory cues and visual cues, rather than direct teaching, it isn’t a surprise that about **1/5** of these children will develop behavioral or social issues.

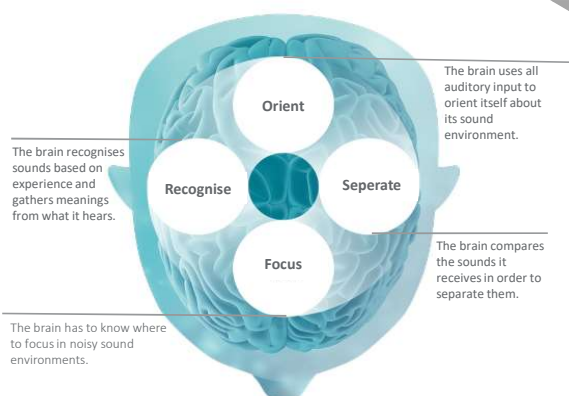
<http://successforkidswithhearingloss.com/resources-for-parents-of-children-with-hearing-loss/unilateral-hearing-loss>



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## What is BrainHearing?

The most important part of hearing



BrainHearing™ is about a fundamental understanding of how hearing works – and how the brain makes sense of sound.

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## What is an Implant System?



Direct bone  
conduction  
through an  
**Abutment** and  
**Implant**

Ponto is an auditory osseointegrated bone conduction implant system

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## What is an Implant System?



Direct bone  
conduction  
through an  
**Abutment** and a  
**Ponto Processor**

Ponto Implant System

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For children under the age of 5, or for those who do not have an implant and abutment, the Bone Anchored Hearing System can be used with a headband:

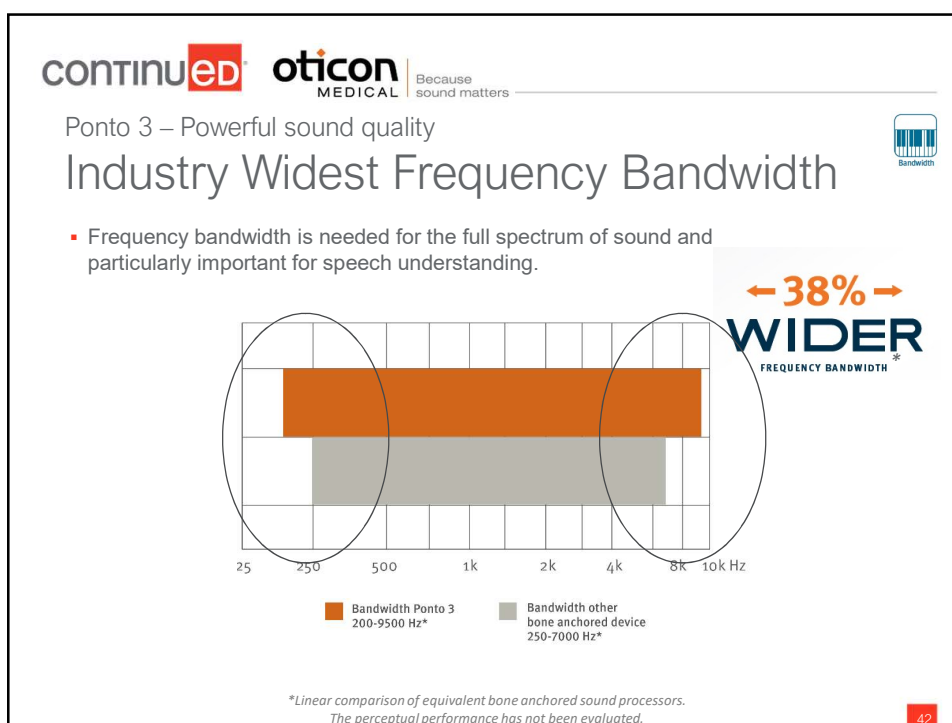


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# Sound Matters

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## The Importance of Extended Bandwidth

- Task: Learn 5 new words
- 2 groups of children,
  - one listened to limited bandwidth -> 4.6kHz
  - the other listened to extended bandwidth -> 9 kHz
- Research question:  
How many trials do they need to be able to pair the word and picture correct?

- Sothnud
- Doztul
- Fosnush
- Stomun
- Homtul



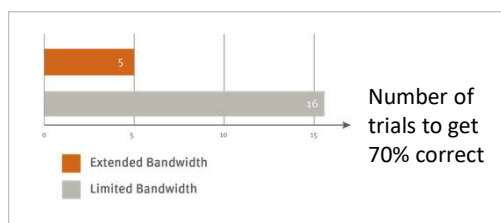
Pittman (2008) Short-term word-learning rate in children with normal hearing and children with hearing loss in limited and extended high-frequency bandwidths. Journal of Speech, Language and Hearing Research. Vol5; 785-797

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## The Importance of Extended Bandwidth

Results:

Children **learn** new words **3 times quicker** with **extended bandwidth** compared to the children who listen to limited bandwidth.



Pittman (2008) Short-term word-learning rate in children with normal hearing and children with hearing loss in limited and extended high-frequency bandwidths. Journal of Speech, Language and Hearing Research. Vol5; 785-797

\*The study included both normal hearing and hearing impaired children who were exposed to limited and extended bandwidth. No conclusion can be drawn from this study with regards to Ponto 3.

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## The Importance of Direct Sound Transmission

- Does direct sound transmission affect cognitive tasks, and listening effort?
- How do we measure the affects of DST?
  - Determine ecological listening situations
  - Compare listening effort between groups



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## The Importance of Direct Sound Transmission

### SWIR test

Sentence – final Word Identification and Recall

Cognitive Outcome Measure  
at Ecological Signal-to-Noise Ratios

Lunner T, Rudner M, Rosenbom T, Ågren J and Ng EHN (2016). Using speech recall in hearing aid fitting and outcome evaluation under ecological test conditions. Ear & Hearing; 37; 145S- 154S

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## Method, SWIR Test

... at an SNR which allows 95-100% intelligibility  
(typically +5 ... +15 dB)

Task: listen to speech in noise

1. They all wear sunglasses

Lunner T, Rudner M, Rosenbom T, Ågren J and Ng EHN (2016). Using speech recall in hearing aid fitting and outcome evaluation under ecological test conditions. Ear & Hearing; 37; 1455- 1545

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## Method, SWIR Test

Task: repeat last word

1. They all wear sunglasses

<sup>1</sup> Lunner T, Rudner M, Rosenbom T, Ågren J and Ng EHN (2016). Using speech recall in hearing aid fitting and outcome evaluation under ecological test conditions. Ear & Hearing; 37; 1455- 1545

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## Method, SWIR Test

Task: **repeat** last word (of 7 sentences)<sup>1</sup>

1. They all wear sunglasses<sup>2</sup>
2. He is still in bed
3. The student writes a long report
4. The whole town came to the wedding
5. His daughter is going to college
6. Yesterday, the film premiered
7. The factory gate was not closed

Task: **recall** final words



100% intelligibility  
but < 100% recall

"Erm ...  
*closed* ...  
*premier* ...  
*bed* ...  
*sunglasses*..  
... umm ..  
hm!"

<sup>1</sup> Lunner T, Rudner M, Rosenbom T, Ågren J and Ng EHN (2016). Using speech recall in hearing aid fitting and outcome evaluation under ecological test conditions. Ear & Hearing; 37; 1455- 1545

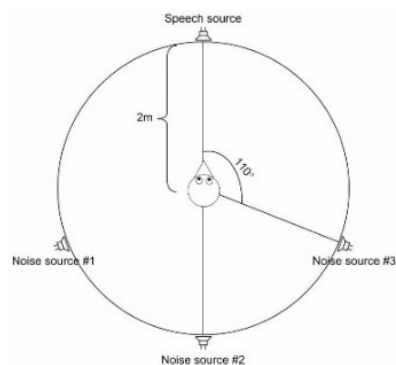
<sup>2</sup> Test conditions used sentences in Danish which have been translated here into English

## Method<sup>1</sup>

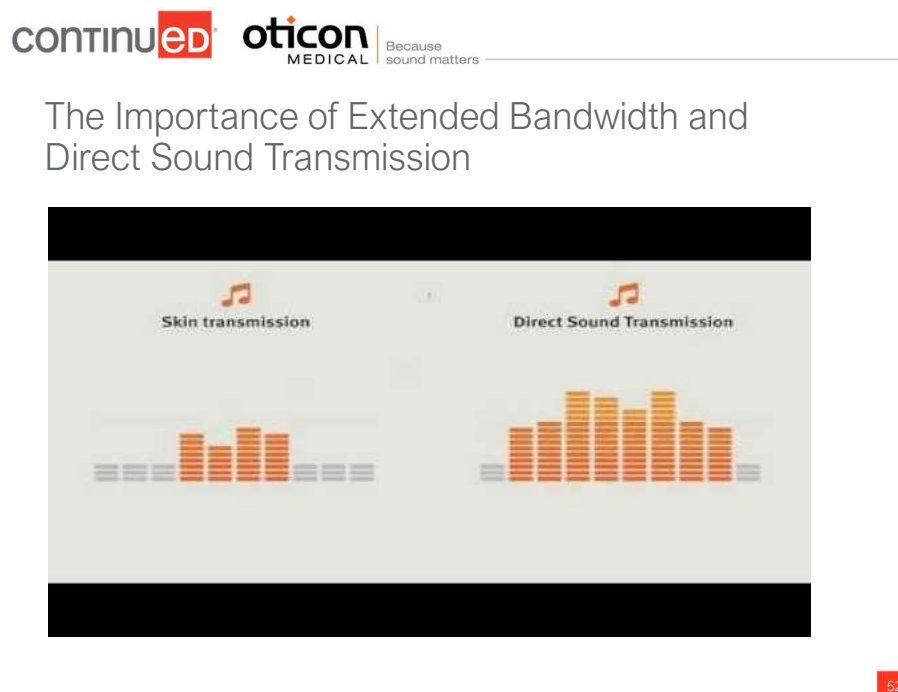
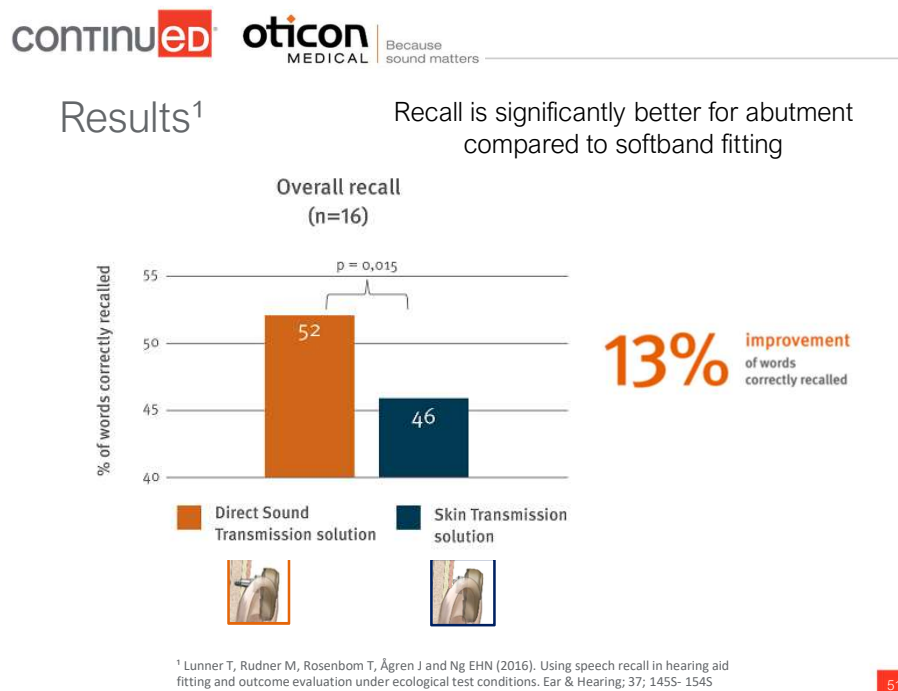
Ponto Plus Power optimally fitted  
on abutment and softband



### Speaker Setup



<sup>1</sup> Lunner T, Rudner M, Rosenbom T, Ågren J and Ng EHN (2016). Using speech recall in hearing aid fitting and outcome evaluation under ecological test conditions. Ear & Hearing; 37; 1455- 1545



**continued** **oticon** MEDICAL | Because sound matters

## Ponto 3 Family of Processors & Accessories

Ponto 3      Ponto 3 Power      Ponto 3 SuperPower

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**continued** **oticon** MEDICAL | Because sound matters

## Visit Oticonmedical.com

What is bone conduction hearing?

This method of hearing uses the natural sound conducting properties of bone. The Ponto System is an implant system for bone conduction hearing that is designed to overcome the many challenges of hearing loss.

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## Recap of Considerations for Bone Anchored Technology

- What is bone conduction
- Candidacy
- BrainHearing™
- Sound Matters

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## References/Resources

- De Wolf MJ et al. *Better performance with bone-anchored hearing aid than acoustic devices in patients with severe air-bone gap. The Laryngoscope* 2011; 121:613-16.
- <http://successforkidswithhearingloss.com/resources-for-parents-of-children-with-hearing-loss/unilateral-hearing-loss>
- Lunner, T., Rudner, M., Rosenbom, Ågren, J. and Hg EHN (2016). "Using speech recall in hearing aid fitting and outcome evaluation under ecological test conditions". *Ear & Hearing*; 37; 145S
- Pittman, A.L. (2008). "Short-term word-learning rate in children with normal hearing and children with hearing loss in limited and extended high-frequency bandwidths". *Journal of Speech, Language and Hearing Research*. Vol. 51; 785–797.
- Link to Ponto Sound Quality [https://youtu.be/X\\_nL8dKGP-o](https://youtu.be/X_nL8dKGP-o)

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