Objectives

- Learners will gain knowledge on current Oticon Medical Ponto processors.
- Learners will gain knowledge on fitting range of processors and candidacy.
- Learners will gain knowledge on bone conduction output versus air conduction output.

Ponto 3 – The Definition of Power

Ponto 3 – The Definition of Power

Output – more loud and soft sounds

Output

Bandwidth - greater range of high and low tones

Bandwidth

Clarity - without distortion

Clarity

These are all at core of our development and the fundamentals for delivering Ponto Sound Quality.

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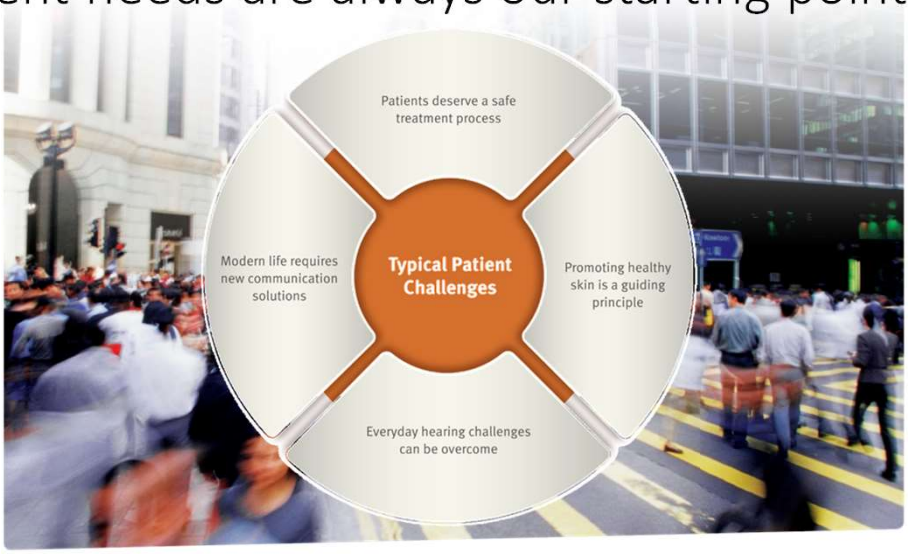
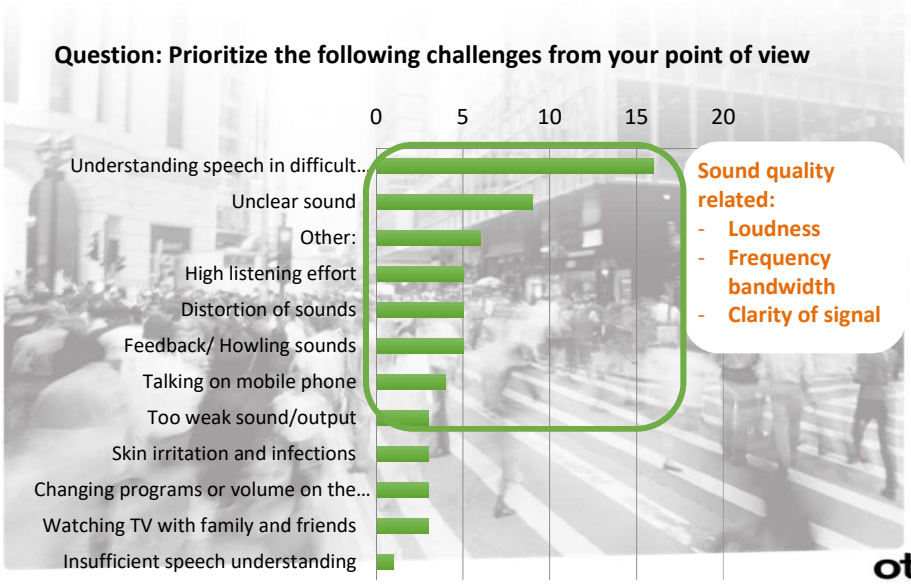
Patient needs are always our starting point

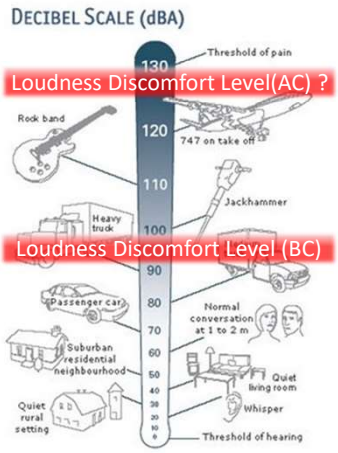


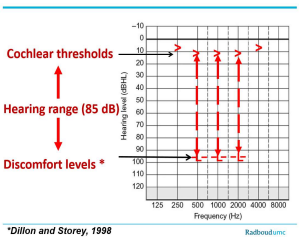
Ponto 3 – The Definition of Power



Results from internal research interviews.

Ponto 3 – The Definition of Power





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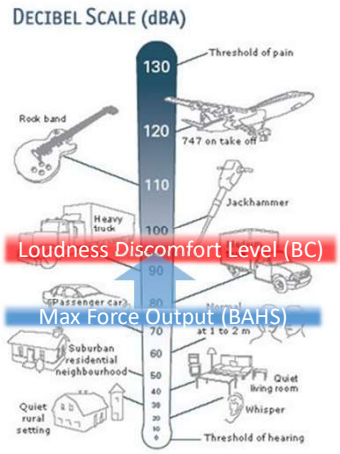
Ponto 3 – The Definition of Power



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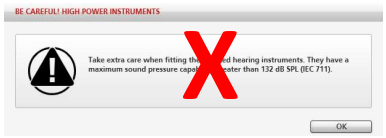
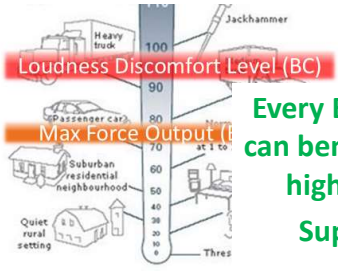
Ponto 3 SuperPower

To be associated with …

- High max. ~~power~~ force output (~~MPO~~ MFO)





Every BAHS patient can benefit from the higher MFO in SuperPower

Ponto 3 SuperPower

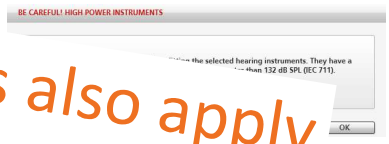
as we know it in traditional hearing aids

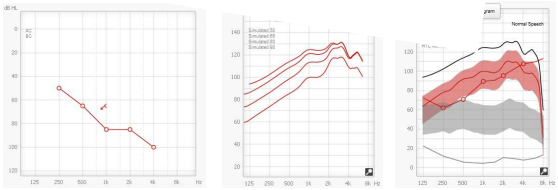
Dynamo

Associated with …

- High max. pow
- Big hearing losses

Does this also apply to BAHS?



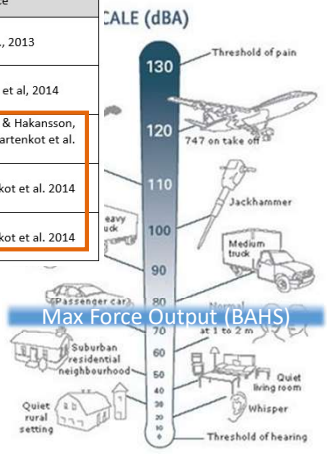


Ponto 3 – The Definition of Power

Objective measurement of the MPO of several hearing devices

Device	Measured MPO	Reference
Sophono Alpha 1	56 dB HL	Hol et al., 2013
Bonebridge	65 dB HL	Mertens et al, 2014
Standard Baha Divino / BP100	67-69 dB HL	Carlsson & Hakansson, 1997 Zwartenkot et al. 2014
Ponto Pro	67-69 dB HL	Zwartenkot et al. 2014
Baha Cordelle	80 dB HL	Zwartenkot et al. 2014

http:// www.snikimplants.nl



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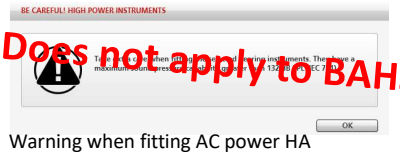
What about the risk of using a SuperPower device?

- BAHS's **MFO** is well below patients' LDL
- ➢So no risk of "over-fitting" by using a BAHS Power device



Does not apply to BAHS

Warning when fitting AC power HA

- **Gain** is prescribed to HL (and can be set low enough)
- Patient can max turn up volume 10 dB
- ➢So no risk of "over-amplification"

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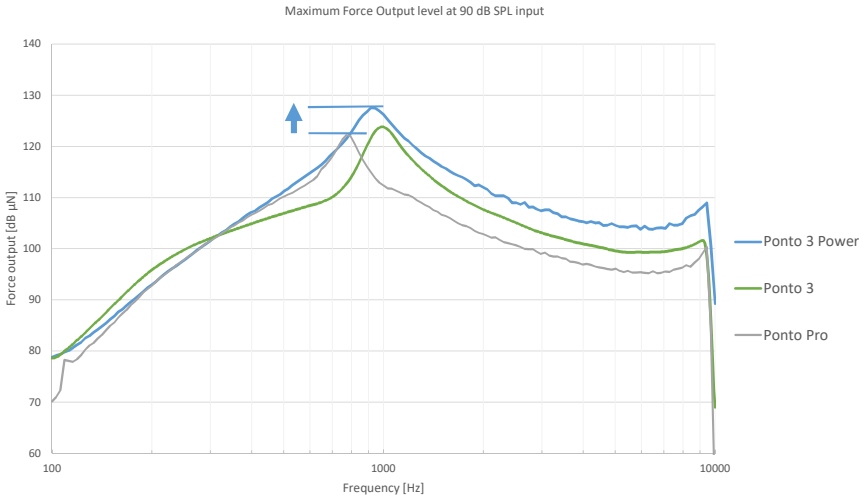
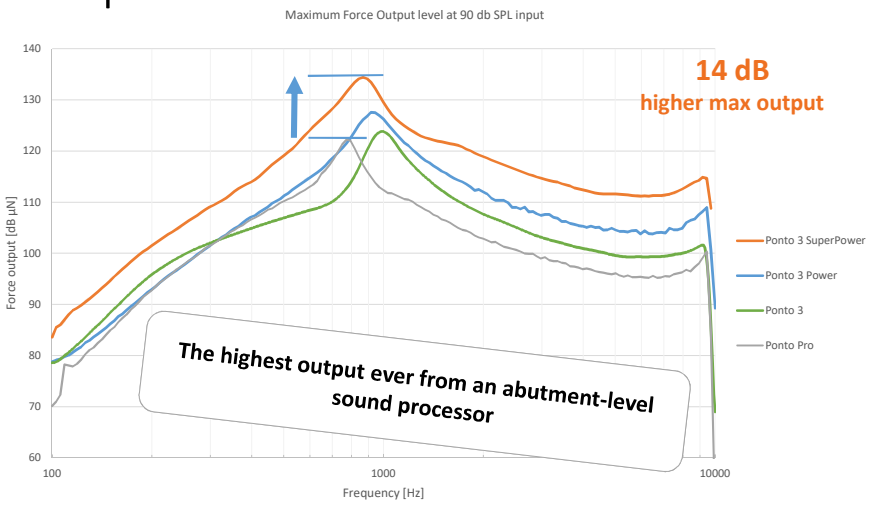
Ponto 3 – The Definition of Power

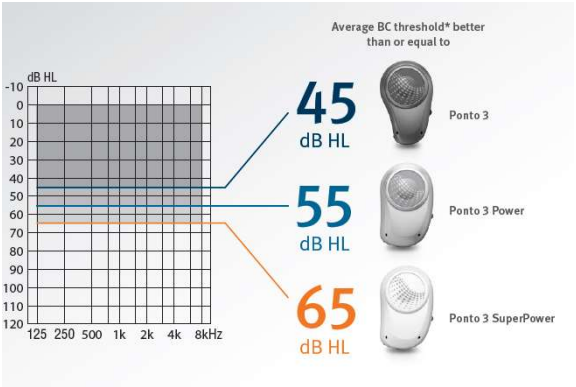


Ponto 3 SuperPower



Ponto 3 – The Definition of Power

65 dB HL



FDA cleared

Ponto 3 SuperPower

- Ponto 3 SuperPower max output made possible by a combination of:

- **Step-up Transducer technology**

- **Inium Sense platform technology**
- **Battery management**

UltraDrive™ technology together with the Inium Sense platform boost the signal to the transducer while minimizing the risk of feedback.

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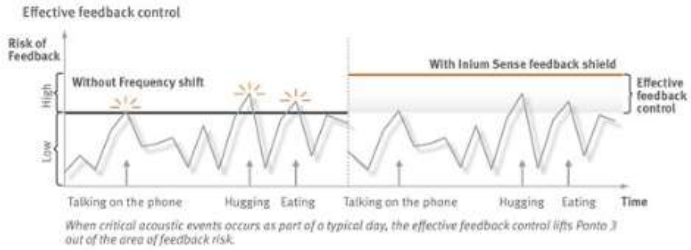
Ponto 3 SuperPower



When critical acoustic events occurs as part of a typical day, the effective feedback control lifts Ponto 3 out of the area of feedback risk.

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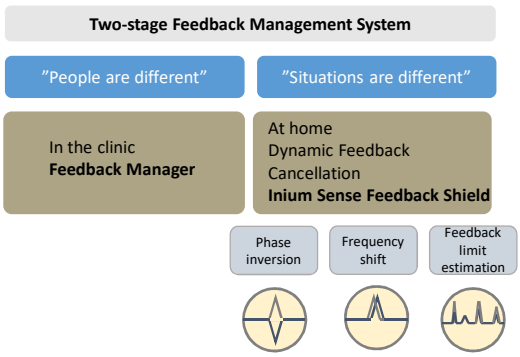
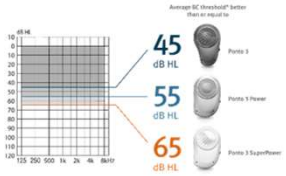
Ponto 3 SuperPower

- INIUM Sense Feedback Management;
  - Minimizes the risk of feedback
  - Allows for high amplification



Ponto 3 SuperPower

The fitting range is not the whole story....



All candidates benefit from more power and higher output – LOUD sounds should sound LOUD!

- Softband and headband users - remember skin attenuation
- For SSD - to match their normal loudness perception in best ear
- For more moderate / severe loss
- For progressive loss - remember longevity

Ponto 3 SuperPower

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Ponto 3 SuperPower

- **All** candidates benefit from higher output.
  LOUD sounds should sound LOUD
  - Softband and head band users – the perceived loudest sound is, due to skin attenuation, weaker as compared to abutment solutions.
    - SuperPower will be better at compensating for the loss
  - SSD patients - best ear has normal LDL, sound from the device should match it.
  - Patients with conductive and mixed hearing losses

Ponto 3 SuperPower

Ponto 3 SuperPower is not a niche product!

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Ponto 3 SuperPower

- Ponto 3 SuperPower combines a descreet-, small design and a battery that lasts.
- Abutment-level processor - no strings or need for any bulky ear- or body-worn devices

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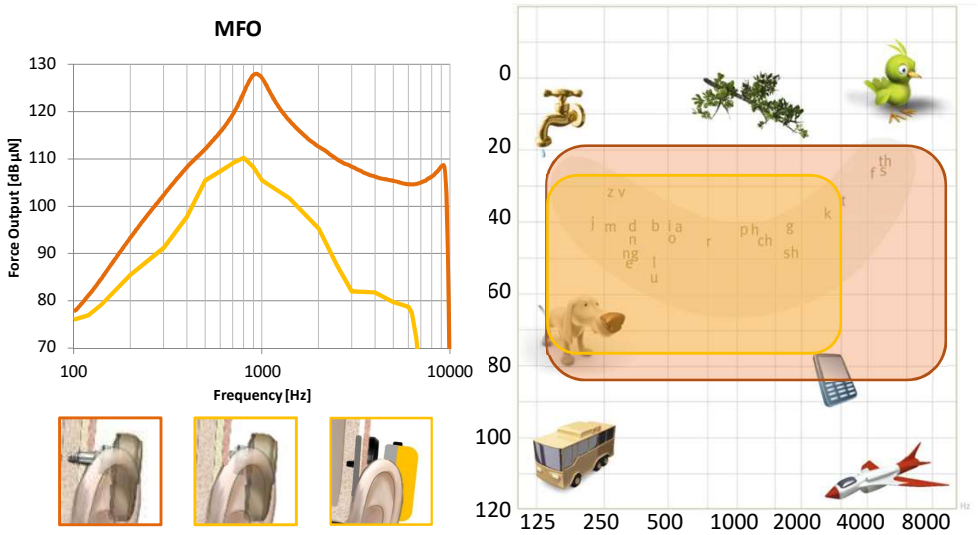
Direct drive vs. skin drive



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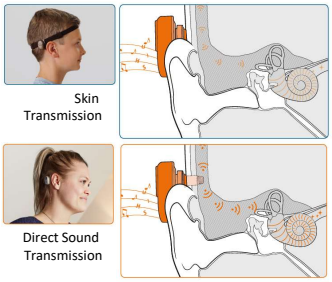
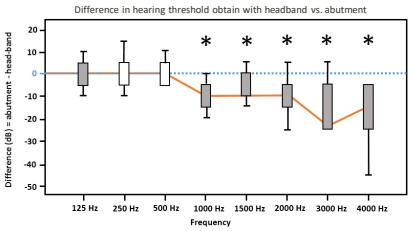
Benefits of Direct Sound Transmission

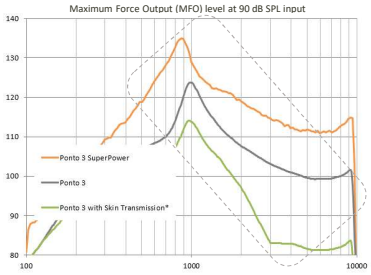
- Sounds are attenuated in Skin Transmission solutions – even with Softband correction.



- Direct Sound Transmission systems can provide an extra 10-20 dB of output in the mid to high frequency range.[5]



- The mid to high frequency range contains the most important sound information for speech understanding.



** MFO of Ponto 3 corrected by Skin Transmission dampening as measured in ref 5.*

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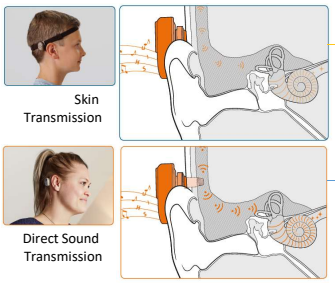
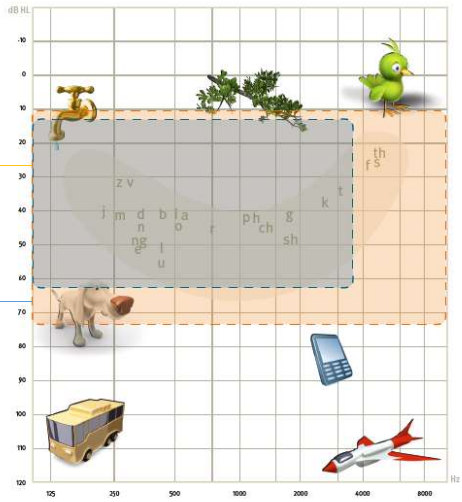
5. Verstraeten et al (2008) Comparison of the audiologic results obtained with the bone-anchored hearing aid attached to the headband, the testband and to the 'snap' abutment. Otology & Neurotology 30: 70-75

Direct drive vs. skin drive

- Consequence of skin attenuation of speech phonemes





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Hear the difference between Direct Sound Transmission and Skin Transmission systems

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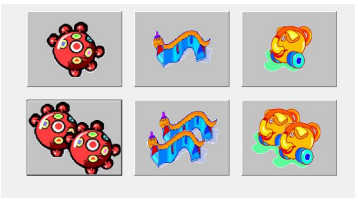
Learn faster – A test of learning speed[1]

- Principal investigator:
  Prof. Andrea Pittman
- Participants:
  17 children (mean age: 11 years old);
  16 with conductive hearing loss,
  1 SSD.

- Conditions:
  Power version of Ponto optimally fitted on abutment and softband.



- Task:
  Listen to and learn six new words.

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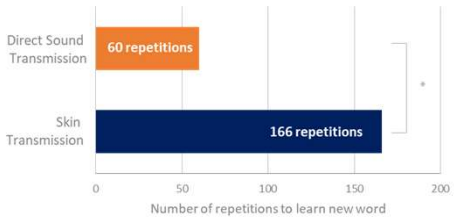
1. Pittman, A. L. Bone conduction amplification in children: Stimulation via a percutaneous abutment vs. a transcutaneous softband. Ear Hear (under review).

Learn faster – 2.5 x faster learning[1]



Children learn new words
2.5 x faster
using a system with
Direct Sound Transmission
compared to a solution
with Skin Transmission.[1]

Because sound matters

About the research - Watch the video

1. Pittman, A. L. Bone conduction amplification in children: Stimulation via a percutaneous abutment vs. a transcutaneous softband. Ear Hear (under review).

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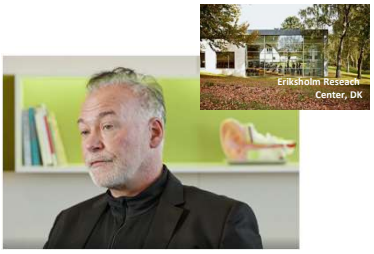
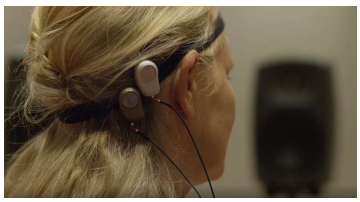
Direct drive vs. skin drive



- Principal investigators:
  Prof. Thomas Lunner & Oticon Medical
- Participants:
  16 adults (mean age: 58 years old)
  with conductive or mixed hearing loss



- Conditions:
  Power version of Ponto optimally fitted on abutment and softband

1. Everybody wears **sunglasses**.
2. He is still lying on the **sofa**.
3. The student will write a long **report**.
4. The whole town came to the **wedding**.
5. His daughter wants to go to **college**.
6. Yesterday was the film's **premiere**.
7. The factory port was not **closed**.

Translated from Danish.

- Task:
  Recall words after listening to 7 sentences (SWIR test[4])

Remember more – A memory and recall test[2]

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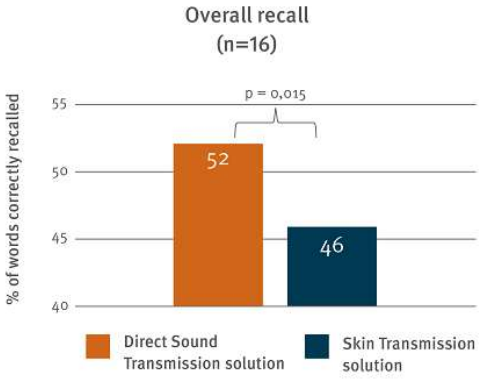
2. Lunner, T., Rudner, M., Rosenbom, T., Ågren, J., and Ng, E.H.N. (2016) Using Speech Recall in Hearing Aid Fitting and Outcome Evaluation Under Ecological Test Conditions. Ear Hear 37 Suppl 1: 145S-154S.

Direct drive vs. skin drive



13% relative improvement in recall performance with **Direct Sound Transmission.** Fewer resources are needed to process the signal, and more resources can be used for remembering.[2]

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About the research - Watch the video

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2. Lunner, T., Rudner, M., Rosenbom, T., Ågren, J., and Ng, E.H.N. (2016) Using Speech Recall in Hearing Aid Fitting and Outcome Evaluation Under Ecological Test Conditions. Ear Hear 37 Suppl 1: 145S-154S.

Fitting Examples

Output

Oticon BrainHearing™ Technology

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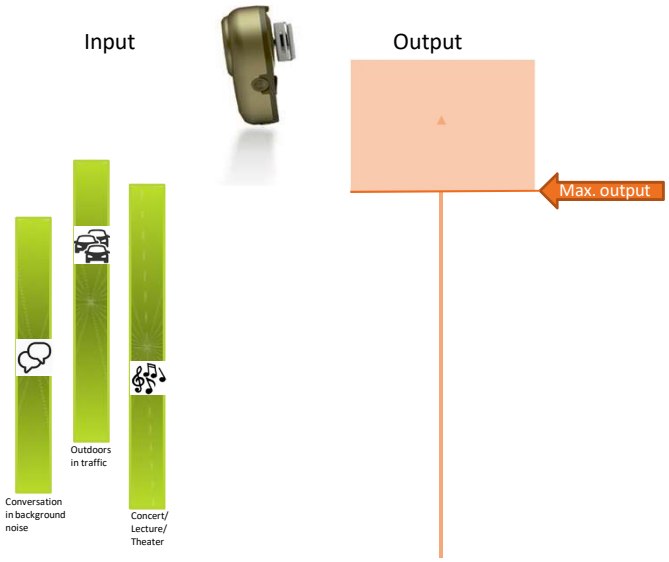
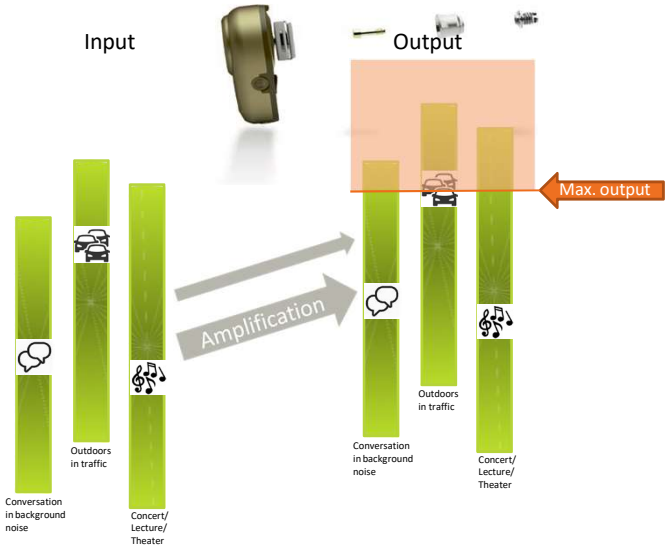
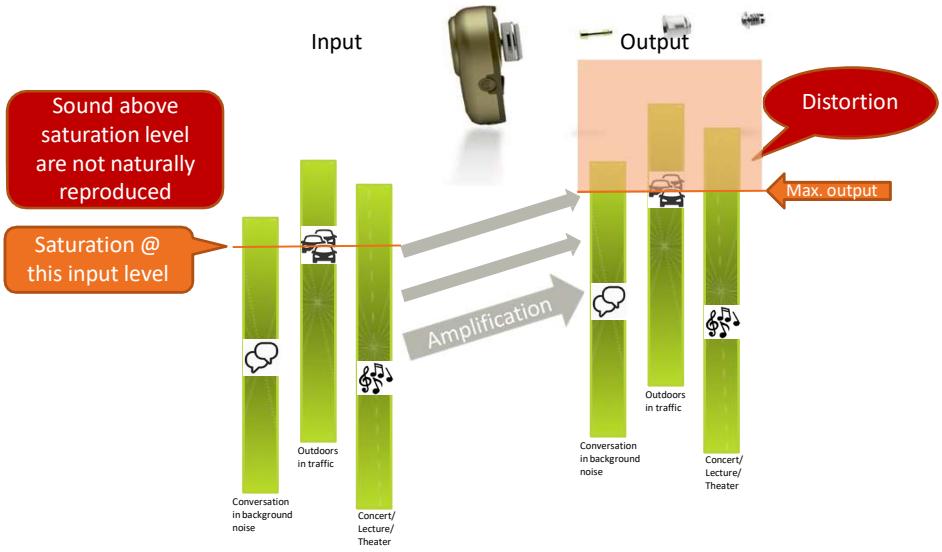
Why all bone anchored users benefit from higher maximum output



Why all bone anchored users benefit from higher maximum output



Why all bone anchored users benefit from higher maximum output



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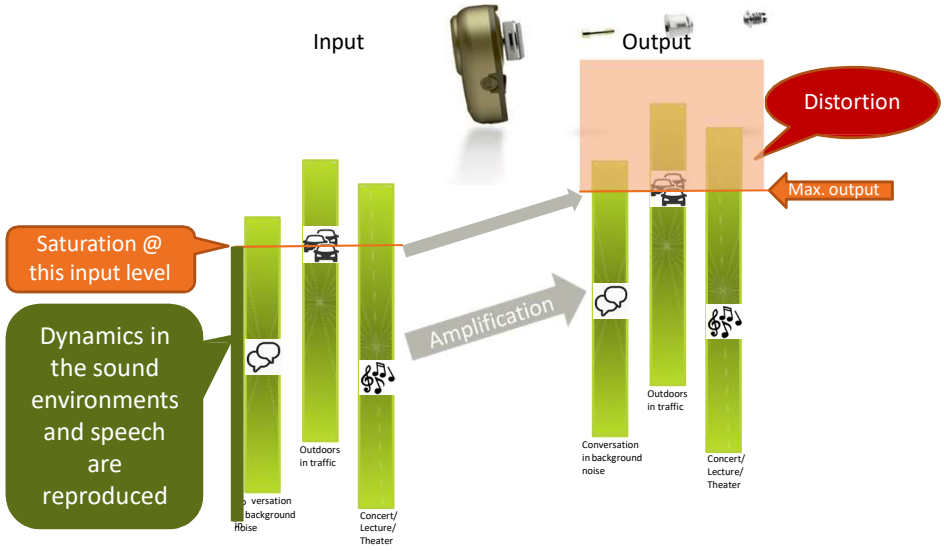

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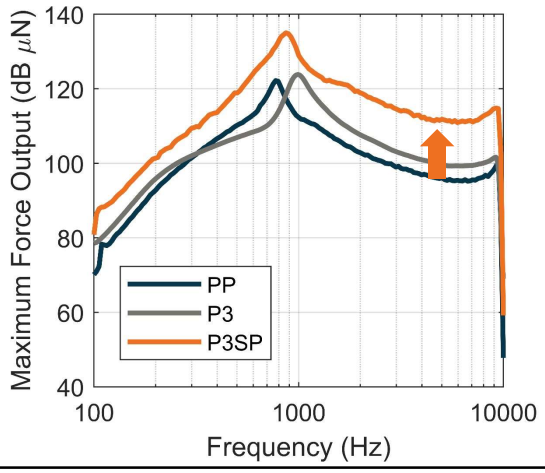
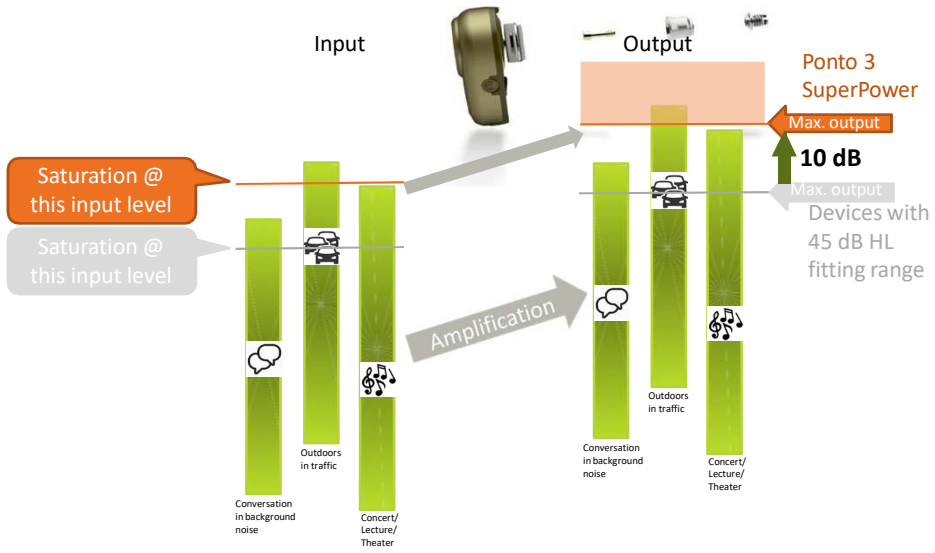


Ponto 3 SuperPower (P3SP)

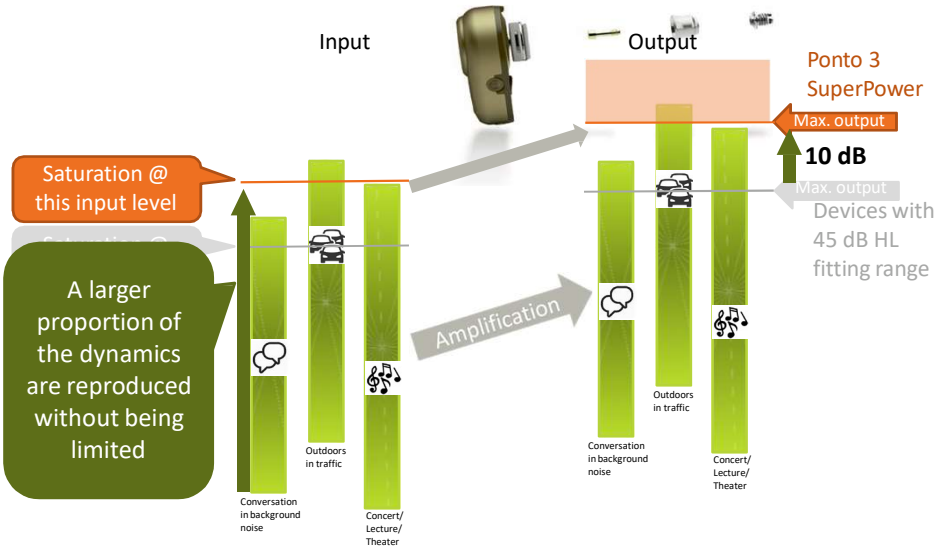
Ponto 3 (P3)

Pro Pro (PP)

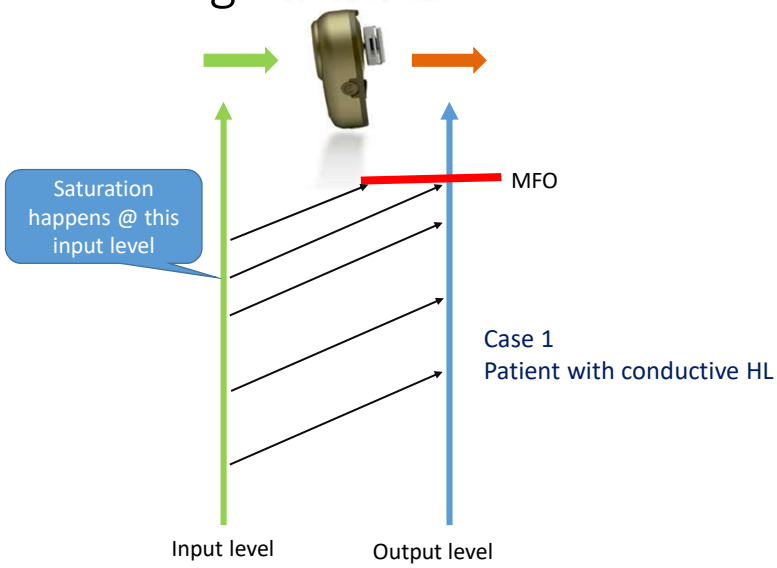
Why all bone anchored users benefit from higher maximum output



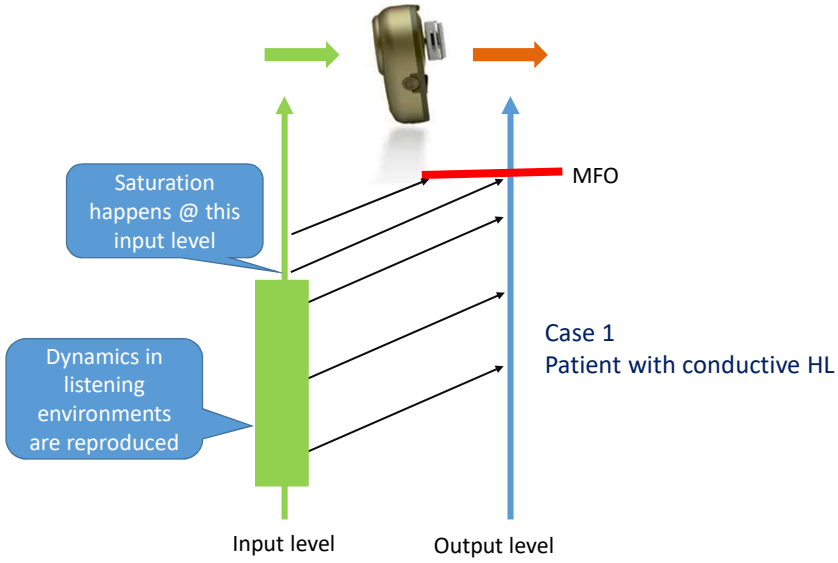
Why all bone anchored users benefit from higher maximum output



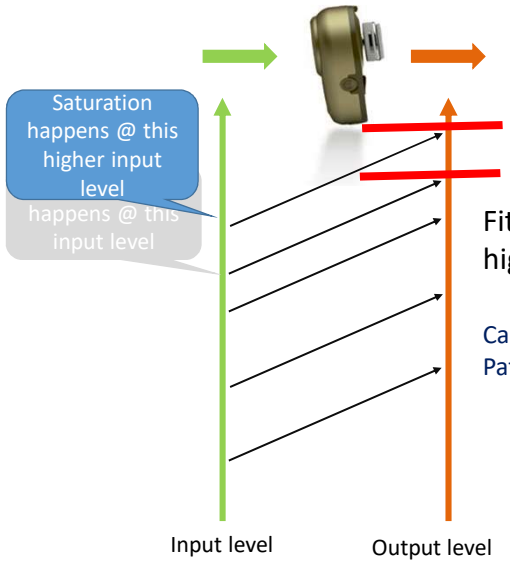
Using a BAHS with higher MFO



Using a BAHS with higher MFO



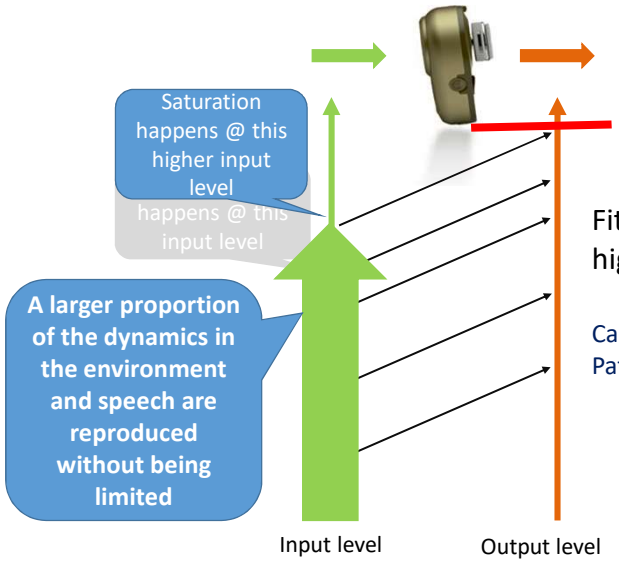
Using a BAHS with higher MFO



Fit a device with a higher MFO

Case 1
Patient with conductive HL

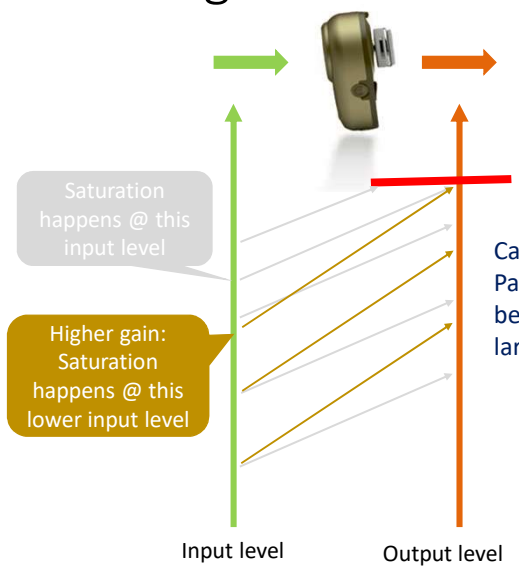
Using a BAHS with higher MFO



Fit a device with a higher MFO

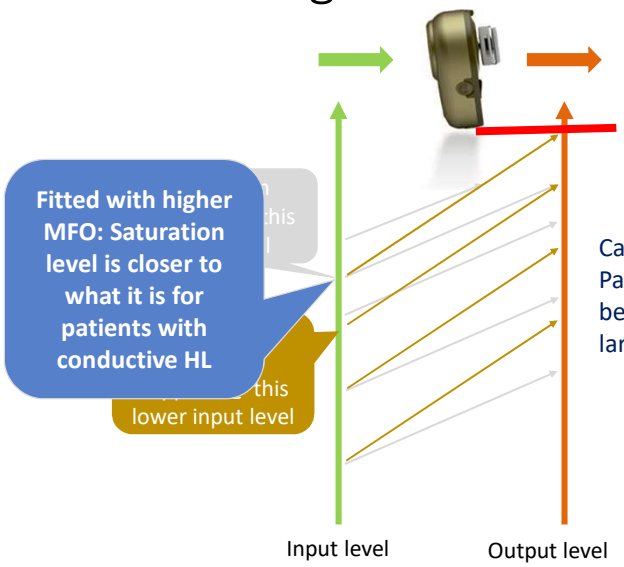
Case 1
Patient with conductive HL

Using a BAHS with higher MFO



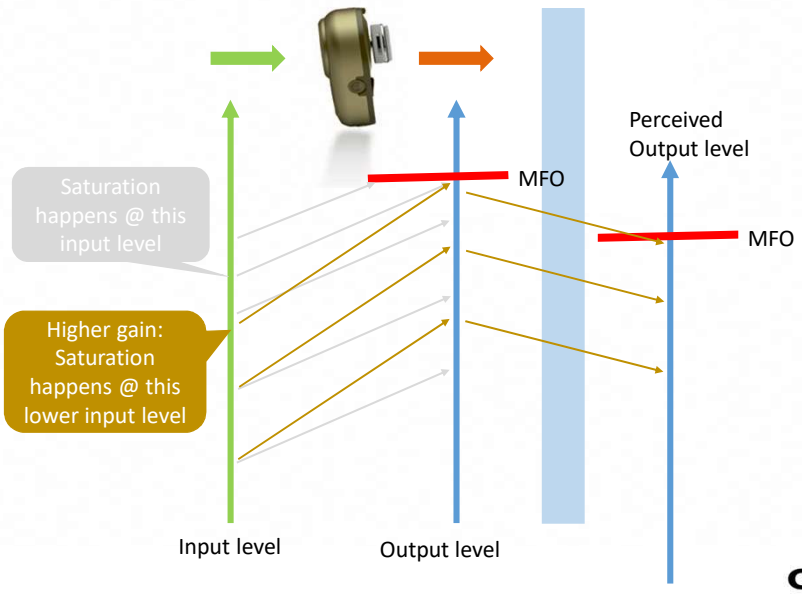
Case 2
Patients who need more gain because the hearing loss is larger, softband fitting or SSD

Using a BAHS with higher MFO



Case 2
Patients who need more gain because the hearing loss is larger, softband fitting or SSD

Using a BAHS with higher MFO



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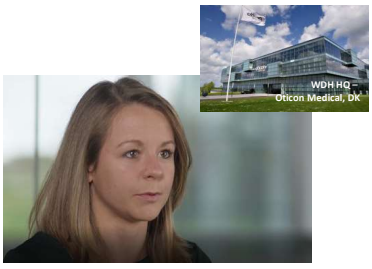
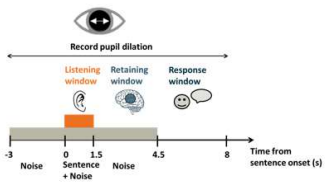
Less effort – An objective measure of listening effort[3]



- Principal investigator: Oticon Medical
- Participants: 21 adults (mean age: 59 years old) with conductive or mixed hearing loss.

- Conditions: Sound processors with different maximum output: Ponto Pro, Ponto 3, Ponto 3 SuperPower.



- Task: Listen to and repeat sentences, while an eye-tracking camera monitors pupil dilation, as a measure of listening effort.

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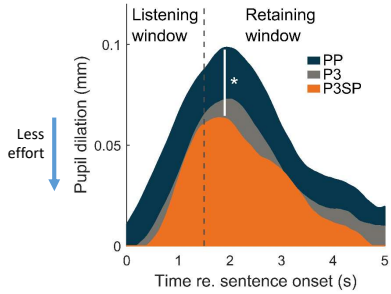
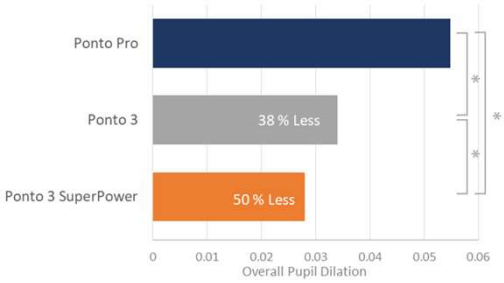
3. Bianchi, F., Wendt, D., Wassard, C., Maas, P., Lunner, T., Rosenbom, T., and Holmberg, M. Benefit of higher maximum force output on listening effort in bone-anchored hearing system users: a pupillometry study. Ear Hear (in press).

Less effort – Significantly less effort[3]

Listening window

Retaining window





A significant decrease in listening effort can be achieved with the **Ponto 3 SuperPower,** as indicated by reduced pupil dilation.[3]

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About the research - Watch the video

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3. Bianchi, F., Wendt, D., Wassard, C., Maas, P., Lunner, T., Rosenbom, T., and Holmberg, M. Benefit of higher maximum force output on listening effort in bone-anchored hearing system users: a pupillometry study. Ear Hear (in press).

Frequency Bandwidth

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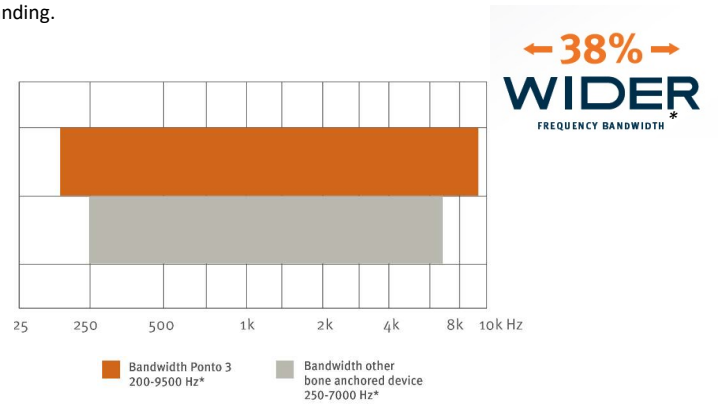
Ponto 3 – The Definition of Power

- Industry widest frequency bandwidth
- Frequency bandwidth is needed for the full spectrum of sound and particularly important for speech understanding.



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*Linear comparison of equivalent bone anchored sound processors. The perceptual performance has not been evaluated.

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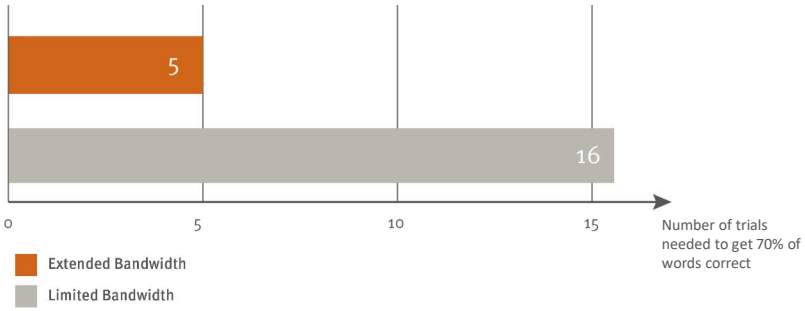
- The importance of extended frequency bandwidth

Children learn new words
3 times quicker with extended bandwidth[3*]



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*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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Clarity

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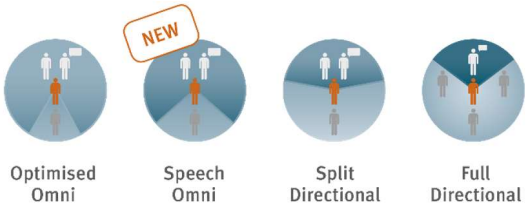
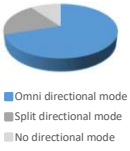
Ponto 3 – The Definition of Power

- FreeFocus optimized directionality
- In order to recognize a sound, users needs to know what is happening around them
- Ponto 3 features FreeFocus directionality system is designed to help the brain to focus while continuing to orient and separate sounds.





A typical user spends 70% of time in Omni mode
- We focus on improving the situations that matter

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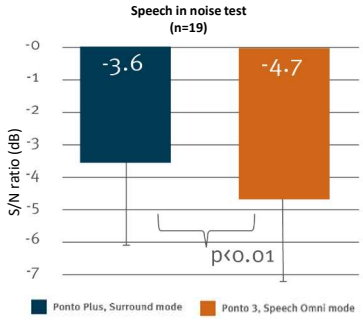
- The unique Speech Omni mode provides 15 % better speech understanding in the majority of situations*.



50% SRT for Danish speech test Dantale II; fixed noise level at 70 dB SPL.S
The test revealed 1.1 dB SNR improvement with Speech Focused which is equivalent to 15% improvement of speech understanding.

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*FreeFocus test report (2016), Oticon Medical report no 34425-00

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BrainHearing™

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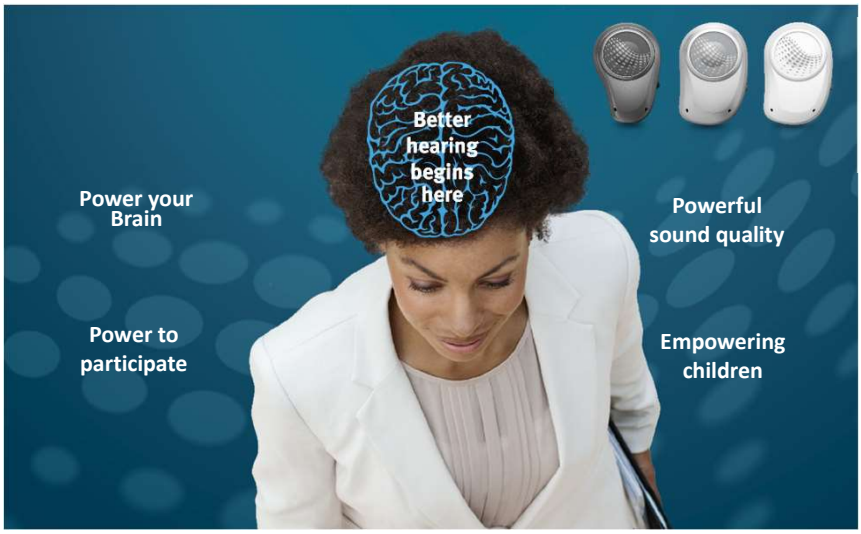
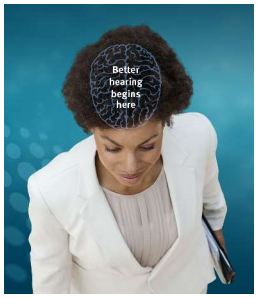


Ponto 3 – The Definition of Power

- BrainHearing™ is about making listening easy
- Hearing loss puts an extra strain on the brain that has to work harder
- We provide audibility and signal processing that supports the brain's cognitive processes:

Direct Sound Transmission



Inium Sense platform

Oticon BrainHearing™ Technology

These are the prerequisite for delivering the output, bandwidth and clarity users need to experience powerful sound quality

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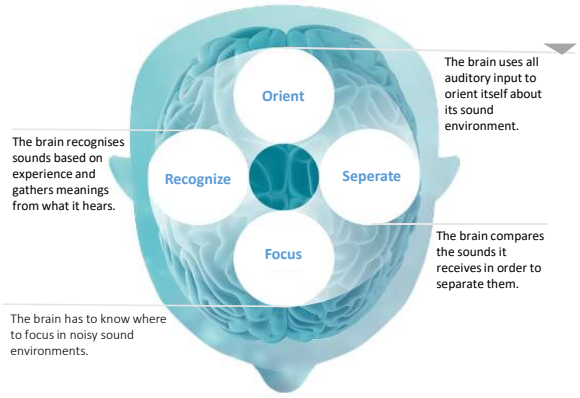
Ponto 3 – The Definition of Power

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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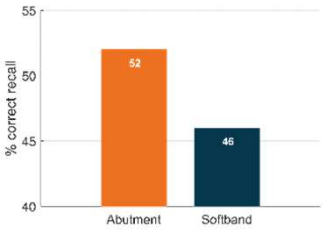
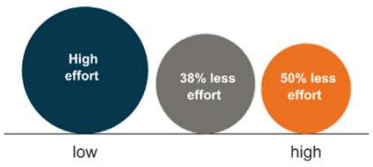
Remember more



With less effort



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Ponto 3 – The Definition of Power

Oticon BrainHearing™ Technology

The world's most powerful family of abutment-level processors

- ✓ BrainHearing™ for BAHS
- ✓ Direct Sound Transmission
- ✓ Inium Sense platform
- ✓ World's first single-unit SuperPower
- ✓ Highest output ever from an abutment level soundprocessor
- ✓ Widest frequency bandwidth
- ✓ Wireless power
- ✓ Reliable performance
- ✓ First ever DSL-BC

Ponto 3 – The Definition of Power

Features	Ponto 3	Ponto 3 Power	Ponto 3 SuperPower
Fitting range	45 dB HL	55 dB HL	65 dB HL
Peak OFL at 90 dB SPL	124 dB rel. 1µN	128 dB rel. 1µN	135 dB rel. 1µN
Frequency range	200 Hz – 9.5 kHz	260 Hz – 9.6 kHz	260 Hz – 9.6 kHz
Free Focus	X	X	X
Inium Sense feedback shield	X	X	X
UltraDrive™ technology			X
Wind Noise reduction	X	X	X
Speech Guard	X	X	X
Tri-state Noise reduction	X	X	X
Bineaural Syncronisation & Coordination	X	X	X
Dimensions (L*W*H)	34*21*11 mm	34*21*14 mm	34*21*14mm
Weight without battery	14 g	17 g	17 g
Battery size	13	675	675P
Up to 4 programs	X	X	X
Wireless connectivity	Via Oticon Medical Streamer & ConnectLine App	Via Oticon Medical Streamer & ConnectLine App	Via Oticon Medical Streamer & ConnectLine App
Tamper-proof battery door	X	X	X
Volume control	X	X	X

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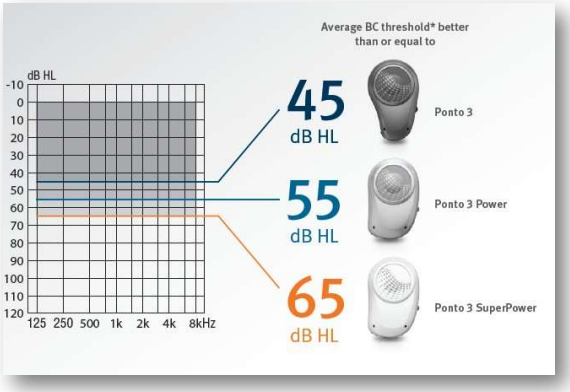

- It's time to rethink fitting ranges
- All bone anchored users can benefit from a Ponto SuperPower

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continued

Ponto 3 – The Definition of Power

- **Patients with conductive loss**
  - Higher MFO means better utilization of patients dynamic range
  - More natural sound in louder listening environments
- **Patients with mixed hearing losses**
  - Higher MFO gives larger dynamic range / headroom in the device, so more sounds are reproduced naturally without being limited
  - Higher gain needs excellent feedback management
- **Softband and head band users**
  - Higher MFO to adress skin attenuation
- **SSD patients**
  - Better ability to loudness match sounds from the device to the normal hearing ear

Ponto 3 SuperPower

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Ponto evidence – Impact beyond better hearing

LEARN FASTER[1]

System level
Direct Sound Transmission vs.
Skin Transmission
(Children)

2.5 x faster learning

REMEMBER MORE[2]

System level
Direct Sound Transmission vs.
Skin Transmission
(Adults)

13 % better recall

LESS EFFORT[3]

Product level
Ponto Pro, Ponto 3 vs.
Ponto 3 SuperPower

Significantly less effort

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1. Pittman, A. L. Bone conduction amplification in children: Stimulation via a percutaneous abutment vs. a transcutaneous softband. Ear Hear (under review).
2. Lunner, T., Rudner, M., Rosenbom, T., Ågren, J., and Ng, E.H.N. (2016) Using Speech Recall in Hearing Aid Fitting and Outcome Evaluation Under Ecological Test Conditions. Ear Hear 37 Suppl 1: 145S-154S.
3. Bianchi, F., Wendt, D., Wassard, C., Maas, P., Lunner, T., Rosenbom, T., and Holmberg, M. Benefit of higher maximum force output on listening effort in bone-anchored hearing system users: a pupillometry study. Ear Hear (in press).

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What is the data telling us?

If **audiological outcomes, learning and memory abilities** are considered important, please consider:

The choice of System
Direct Sound Transmission provides better patient outcomes - on children & adults
Skin Transmission solutions are not to be considered as a long term solution.

2.5 x faster learning[1]

13 % better recall[2]

The choice of Sound processor
Users obtain a significant decrease in listening effort when using a device with **higher maximum output**

Significantly less effort[3]

Pediatrics
Type of device and timing of implantation

1. Pittman, A. L. Bone conduction amplification in children; Stimulation via a percutaneous abutment vs. a transcutaneous softband. Ear Hear (under review).
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Ponto 3 – The world's most powerful family of abutment-level processors

Ponto 3
45 dB HL

Ponto 3 Power
55 dB HL

Ponto 3 SuperPower
65 dB HL

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Questions?

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609 240 6814

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References

1) 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

2) Briggs R, Hasselt AV, Luntz M, Goycoolea M, Wigren S, Weber P, Smeds H, Flynn M, and Cowan R (2015). Clinical Performance of a New Magnetic Bone Conduction Hearing Implant System: Results from a Prospective, Multicenter, Clinical Investigation. Otology & Neurotology, Jun; 36(5):834-41

3) Pittman AL (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.

4) FreeFocus feature test report (2016), Oticon Medical report no 34425-00

5) Wagener K, Josvassen JL, Ardenkjær R (2003) Desing, optimization and evaluation of a Danish sentence test in noise. International Journal of Audiology; 42: 10-17

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