

Vol-2

Bimonthly Newsletter

beat

Bernafon ENT Audiology Trends



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Your hearing • Our passion

Welcome to Bernafon



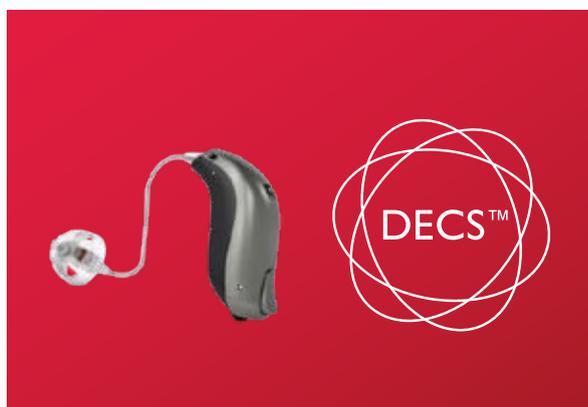
Dear Patrons,

We at Bernafon India, are overjoyed with the love and appreciation along with valuable suggestions received for our first edition of our newsletter "BEAT". This has given us tremendous motivation to keep this effort going on.

As a company which believes in constant innovation, Bernafon focuses on the core technologies which improve the overall hearing experience of the user along with keeping the hearing fatigue level at the minimum. In this series of innovation, we are coming out with a new range of hearing instruments, which will have a new platform – DECS™. Our Next edition will have complete details about it.

Looking forward for your continued support and motivation.

Kind regards,
Amit Dhir



ChannelFree™, proprietary Bernafon technology

Delivering amplification that adequately compensates for hearing loss is a huge challenge. No system will ever completely replace what is lost. Bernafon's ChannelFree™ signal processing is a fresh approach to better compensation for cochlear hearing loss. It is a radical departure from signal processing of the past.

What is ChannelFree™ signal processing? First of all, it is a core technology unique to Bernafon, based on patented signal processing methods. On a fundamental level, ChannelFree™ signal processing continuously adjusts the gain of the hearing instrument to amplify each phoneme individually. It does this without dividing the signal into fixed channels or bands.

Characteristics of speech

If we analyze speech, we can break it down into different time segments.



Figure 1: Parts of speech.

time (sec)

Let's start with **sentences**, as the longest unit of speech. Sentences might last an average of two seconds. It is important to note that the intensity or average level from sentence to sentence is almost constant. Except for extremely dynamic speakers, there is only small variation between sentences.

Looking at the next smallest temporal unit of speech – **words** – we see approximately three words per second. For words also, the level is approximately constant from one to the next. Even when we look at the unit of syllables (approximately five syllables per second), we see only small variations in level between **syllables**. This is because all syllables contain at least one vowel. Vowels or vocalized sounds are relatively constant in level because they share a common origin – the vocal chords.

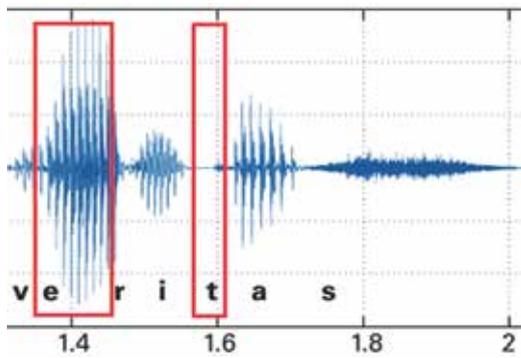


Figure 2: Level differences between phonemes “e” and “t”

It is only when we reach the smallest segment of speech –the phoneme (average ten phonemes per second) – that the picture changes. Phonemes are clearly heterogeneous in intensity. Phonemes consist of both voiced and unvoiced sounds. Because of this, the level changes dramatically from one phoneme to the next. For example, compare the vowel “e” to the consonant “t” in Figure 2.

Why is all of this important?

First of all, phonemes, because of their variation in intensity, are strongly affected by hearing impairment. Softer phonemes often fall below audibility. Even when they are audible, the difference between

loud and soft phonemes is exaggerated by cochlear hearing loss. Phonemes often become the source of confusion in understanding speech, especially for the hearing impaired.

Temporal Resolution

Modern hearing instruments deliver compressive amplification, providing more gain for softer sounds than for louder sounds. This is in compensation for the loss of outer hair cells (OHC) in the cochlea. Healthy OHC provide a very fast (~200 μ sec time constants) “natural” compressive amplification. You could say that hearing loss acts as an extremely fast expander. Extremely fast compression is needed from the hearing instrument to compensate.

ChannelFree™ processing provides very fast phonemic compression. In fact, ChannelFree™ processing analyzes and adjusts gain 20 000 times per second. This means that each phoneme is analyzed and adjusted on average 2,000 times. The result is that each phoneme receives the amplification it needs, with soft unvoiced consonants receiving more gain than loud vowels. In this way, ChannelFree™ processing acts more like the healthy cochlea.

ChannelFree™ processing has the highest temporal resolution of any hearing system, and can correctly amplify the smallest parts of speech.

Frequency Resolution

Of course, compensation for hearing loss requires the ability to adjust amplification per frequency.

(This is why multi-channel systems were developed.) ChannelFree™ processing is completely different from the early single-channel compression systems, which provided constant compression characteristics across all frequencies. ChannelFree™ processing allows independent adjustment of amplification at any frequency. In Bernafon’s Oasis fitting software, gain and compression characteristics can be adjusted at any standard audiometric frequency. This allows the amplification to be precisely tailored to the hearing loss.

There is another important difference to multi-channel systems. In a channel-based system, the gain can be adjusted for each channel, but within the channel, the gain is fixed. This can lead to a “stair-step” effect in the frequency response, especially if the gain requirement is changing significantly across frequency. In contrast, ChannelFree™ processing smoothly interpolates across frequency, providing the highest quality sound experience

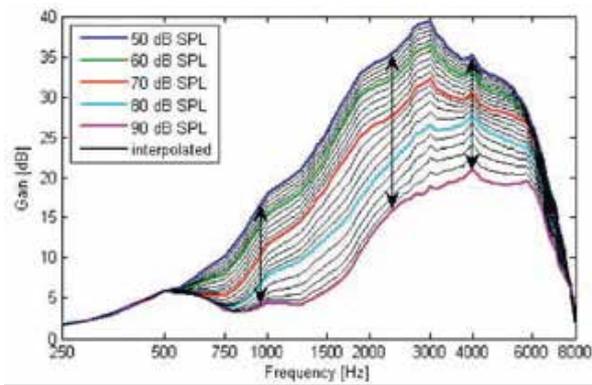


Figure 3: Independent adjustment of compression across frequencies

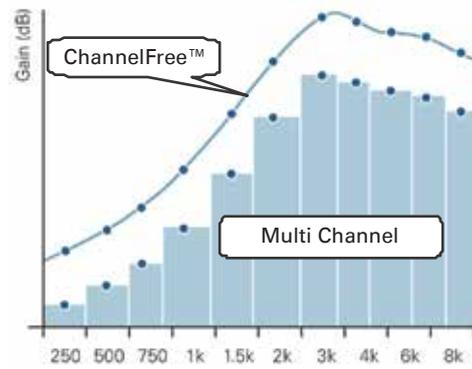


Figure 4: Comparison of frequency resolution in ChannelFree™ vs. multi - channel processing.

Maintaining spectral contrast

As we have seen, it is important to reduce the temporal contrast (i.e. the moment-to-moment variation in intensity) in the signal because this is exaggerated for hearing impaired people. This is due to the loss of OHC. Amplifying soft sounds without over-amplifying loud sounds is a key component to successful fittings.

At the same time, the frequency or spectral contrast must be maintained. This is because cochlear hearing loss also reduces spectral contrast (or frequency selectivity). Multi-channel systems can only reduce spectral contrast. ChannelFree™ processing is unique in that the spectral contrast is never degraded. The result is clear natural sound with maximum intelligibility.

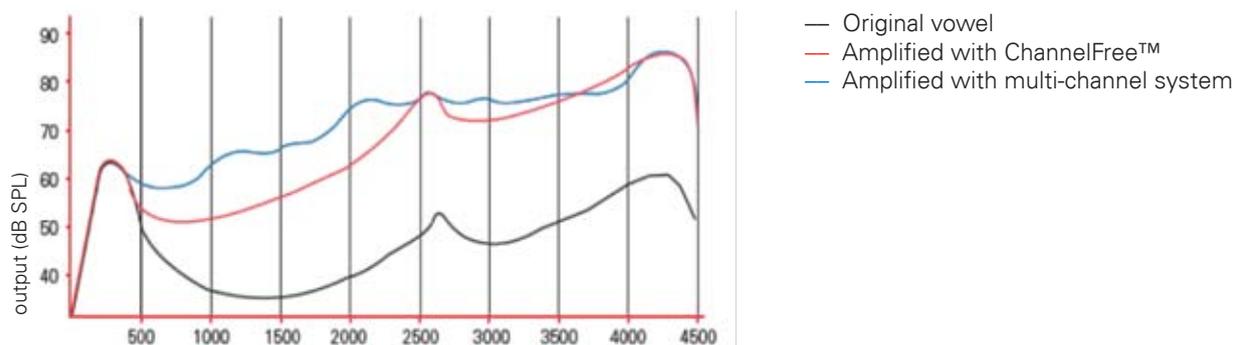


Figure 6: Spectral smearing may result from a multi - channel system (blue curve). ChannelFree™ maintains spectral contrasts in the original signal (red curve).

Hearing loss is indeed a complex and difficult problem. ChannelFree™ signal processing is a completely fresh and novel approach to compensation for hearing loss. It provides:

- Phonemic compression to amplify the softest parts of speech without over-amplifying loud sounds
- The flexibility to adjust amplification at any frequency, precisely tailoring the fitting for the individual hearing loss
- No degradation in spectral contrast, allowing the maximum information to be transmitted by the impaired ear

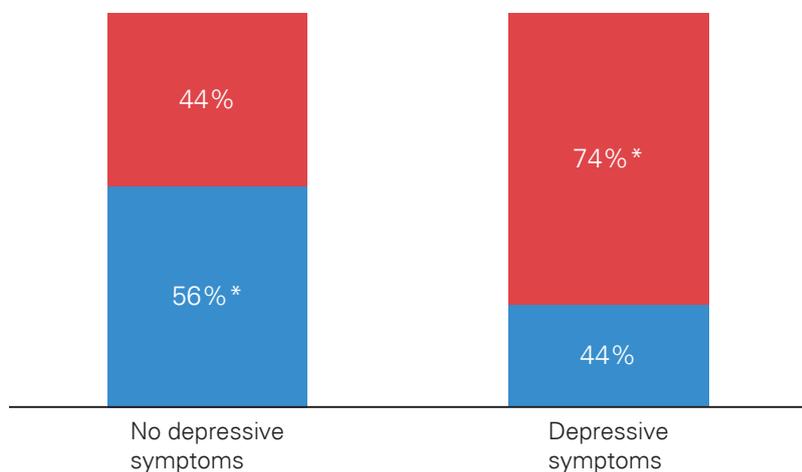
The result is clear and natural sound, without compromise. No multi-channel processing can do this only ChannelFree™. ChannelFree™ systems are only available from Bernafon.



Hearing Aids improve Hearing - and a LOT more

Trends derived from the EuroTrak databases 2009 - 2015 (Published : May 2016)

Sleep problems: an indicator of depressive symptoms

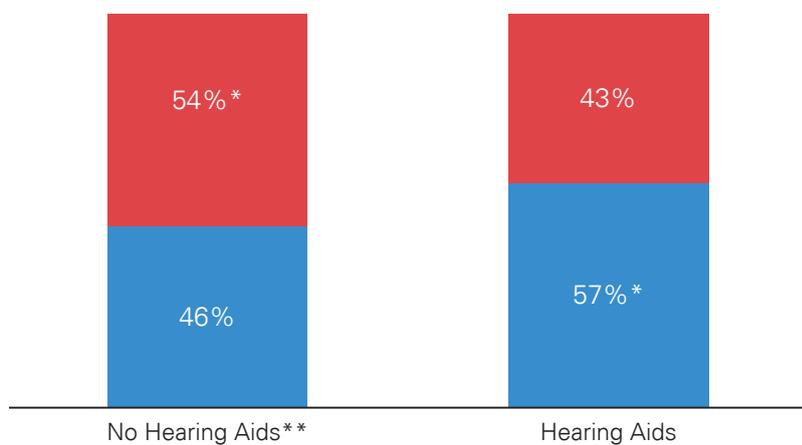


Are you generally satisfied with the quality of your sleep?

■ Satisfied with sleep quality ■ Not satisfied with sleep quality

*Differences are statistically significant (95%)
No depressive symptoms n=2,137
Depressive symptoms n=527
Depressive symptoms are measured here using the PHQ-2 Scale ≥ 3

People with hearing aids sleep better

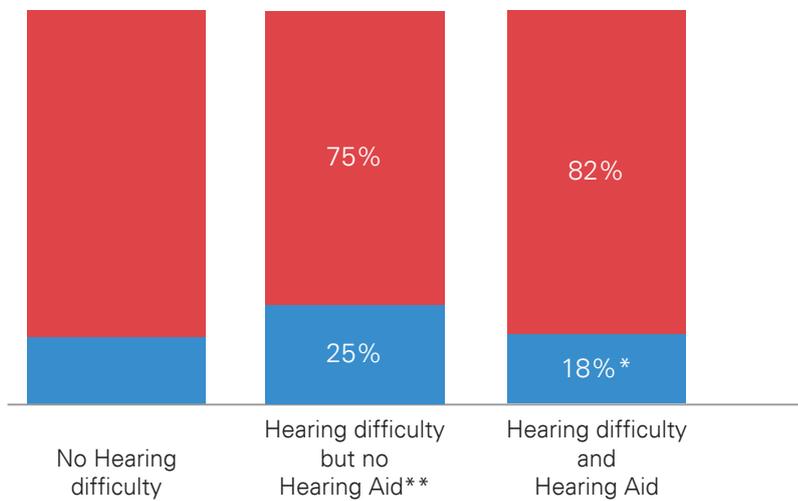


Are you generally satisfied with the quality of your sleep?

■ Satisfied with sleep quality ■ Not satisfied with sleep quality

*Differences are statistically significant (95%)
**Refers to a group with a similar degree of hearing loss as hearing aid owners (the top 50% group)
No Hearing Aids n=1,122
Hearing Aids n=527

Depressive symptoms (PHQ-2)

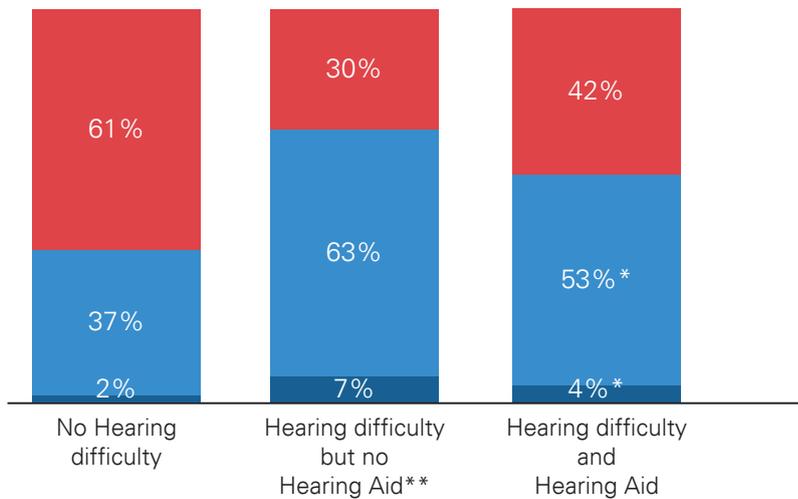


Are you generally satisfied with the quality of your sleep?

■ Yes ■ No

*Differences are statistically significant (95%)
 **Refers to a group with a similar degree of hearing loss as hearing aid owners (the top 50% group)
 No Hearing Difficulty n=21,922
 No Hearing Aids n=857
 No Hearing Aids n=2126

Dementia symptom



Getting more forgetful in the last year?

■ Yes somewhat more
 ■ Yes much more
 ■ No

*Differences are statistically significant (95%)
 **Refers to a group with a similar degree of hearing loss as hearing aid owners (the top 50% group)
 No Hearing Difficulty n=21,922
 No Hearing Aids n=857
 No Hearing Aids n=2126

↑ UP-COMING EVENTS

26th Annual National Conference of the
Indian Society Of Otolaryngology
 17th, 18th & 19th November 2017

At **Hotel Babylon International**
 VIP Road, Raipur, Chhattisgarh, India

1st Announcement
 & Early Bird Registration



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Dr. Ashish Nigam
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A Success Story of 500+ Cochlear Implants at MAA ENT Hospitals using Veria Technique

MAA ENT Hospitals has performed 500 implants till now with “zero” infection & “zero” hard and soft failures. We follow the Veria technique and the program was started in 2003 under the mentorship of the originator of this technique, Dr Trifon Kiratzidis. Veria technique is transcanal surgery without jeopardising the anatomy and function of middle ear, mastoid cellular system and its functional mucosa. Cochlear implant is recommended for the individuals who have bilateral hearing loss of severe to profound degree (in case of children, profound hearing loss strictly) and are showing limited benefits with hearing aids. Cochlear implantation can be done in individuals of any age irrespective of hearing loss onset being pre- or post- language development. The youngest child who had received cochlear implant at MAA ENT Hospitals was of age 8 months. Cochlear implant candidacy at MAA ENT Hospitals is established based on standard medical, audiological, speech, language and psychological evaluations.

Since 5 years, cochlear implant is switched on at the time of surgery at MAA ENT Hospitals. This is done to avoid the formation of fibrous tissues around the electrodes; our preliminary research analysis have shown that this helps in keeping the impedance of the electrodes low and electrodes shows less fluctuation in terms of impedance in the long run. Patient is discharged on 5th day of the surgery and sutures are removed on a follow up visit after 10 days. It is of utmost importance that sound stimulation is given to the patient 24x7 for continuous processing of sound across the auditory nervous system. First map is done on the 15th day of the surgery and auditory verbal therapy starts soon after. During the first year of implantation patients/caretaker are advised to come for follow up map after every 3 month and in the following years annually. Auditory verbal therapies are given by trained Speech and Hearing professionals. In lieu to adopting best recording keeping practices and to ensure maximum implant benefits, lesson plans of auditory verbal therapies and progress reports of each cochlear implantee is updated on a monthly basis.



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FOR PRECIOUS
MOMENTS OF LIFE



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