

## Revalidatie van Geleidingsverlies en Gemengd Gehoorverlies

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## Technische hoorrevalidatie

### Doel

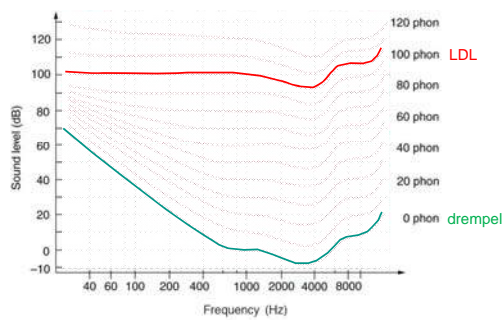
- zoveel mogelijk geluid (spraak, muziek, etc) hoorbaar maken
- afbeelding geluid op hoorspan luisteraar

### Parameters

- Versterking - 'gain'
  - (zacht) geluid hoorbaar ('bovendrempelig') maken
- Maximum uitgangsvermogen - 'Maximum Power Output'
  - (zeer) hard geluid binnen onaangename luidheid
- Signaalbewerking
  - optimale invulling van hoorspan

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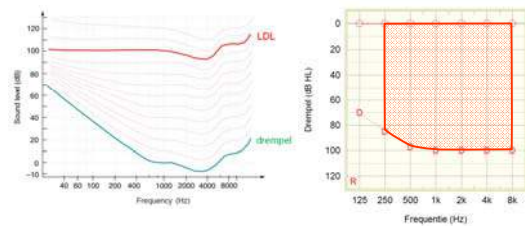
## Luchtgeleiding: Fletcher-Munson curves



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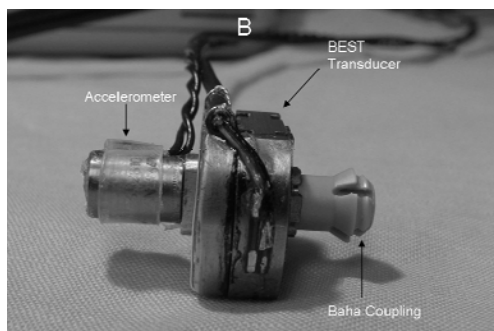
## Hoorspan - Luchtgeleiding

SPL-O-Gram ← → Audiogram



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## Directe Beengeleiding



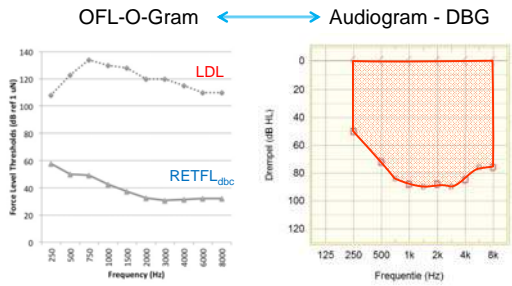
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## OFL-meting in situ



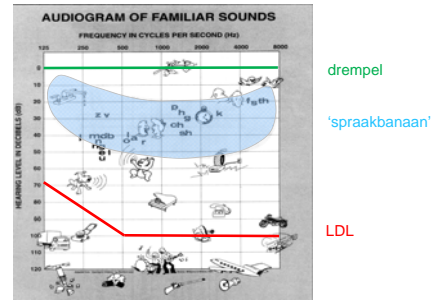
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### Hoorspan - Directe Beengleiding



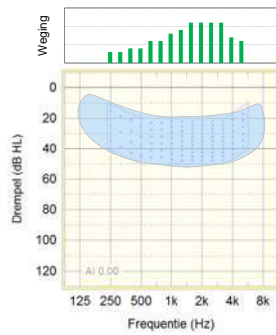
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### Spraak en omgevingsgeluid (dB HL)



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### Articulatie Index (AI): Count-the-Dot



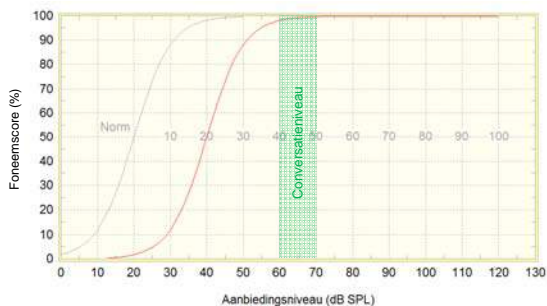
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### Versterking

- Versterking als functie van gehoorverlies
- Wanneer is versterking voldoende?
  - criterium: 100% zinsverstaan op conversatieniveau
- Aannames
  - Conversatieniveau
    - 60 – 70 dB SPL
  - Spraakdrempel
    - 50 % zinsverstaan ≈ 50 % foneemscore NVA woorden

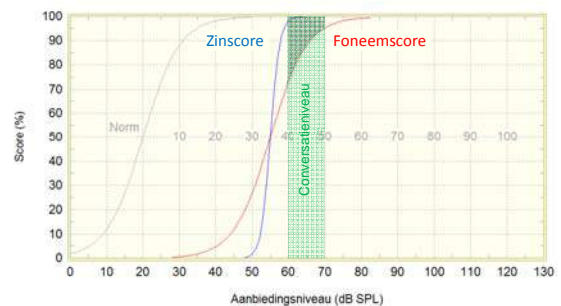
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### Ideaal: (geholpen) drempel ≤ 20 dB HL → NVA-foneemscore ≈ 100% bij 60 dB SPL



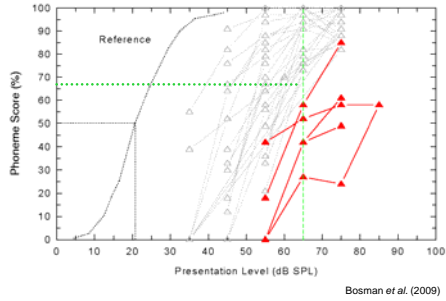
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### Welke versterking is juist voldoende? Zinscore ≈ 100% bij 60 dB SPL ↔ 35 dB HL



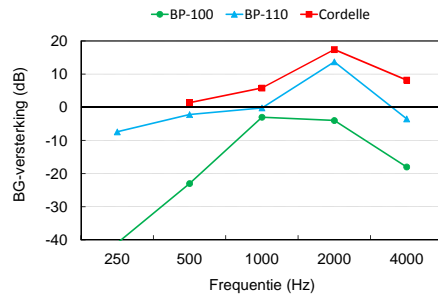
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### Baha Intenso – Foneemscores (N=25)



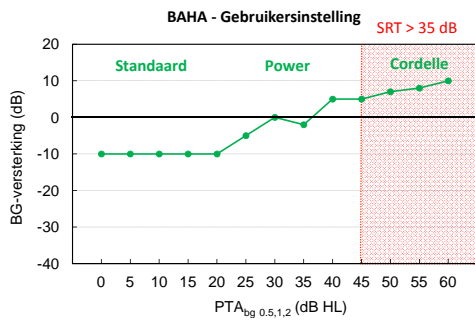
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### BG-versterking: VV drempel -/- BG-drempel



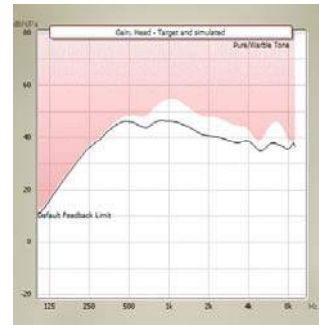
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### BG-versterking 0.5, 1 en 2 kHz



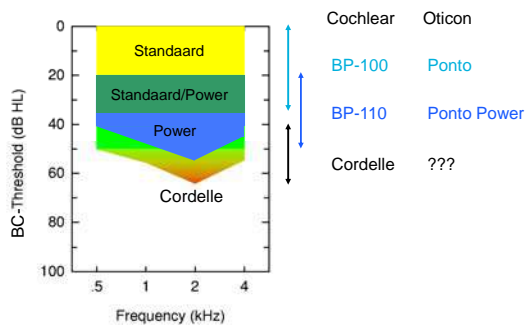
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### Maximale stabiele versterking



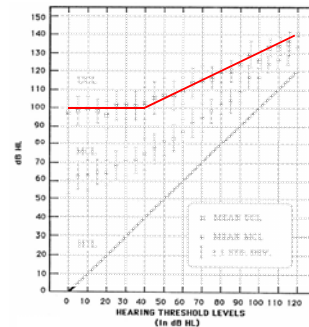
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### Aanpasbereik Baha/Ponto



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### Onaangename Luidheid – Pascoe (1988)



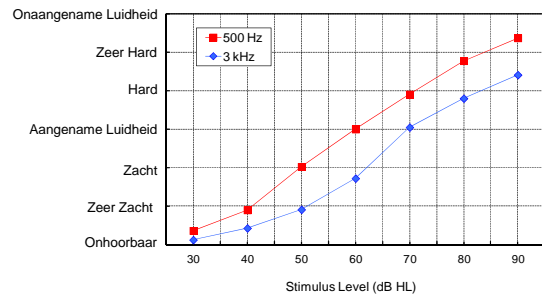
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### Luidheidsschaling (WHS)



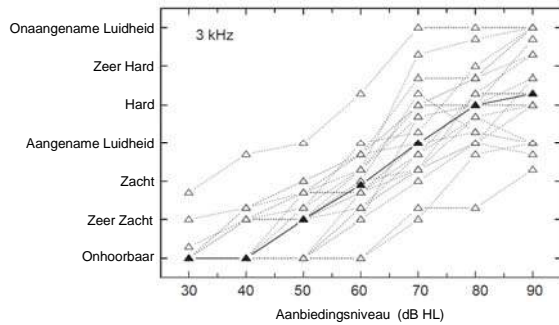
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### Luidheidsschaling - Baha Intenso



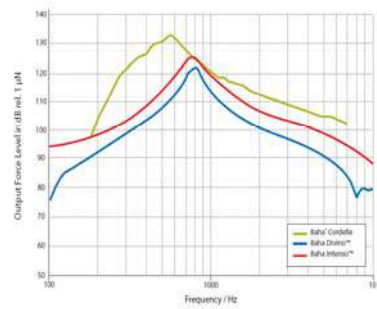
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### Baha Cordelle (N=23)



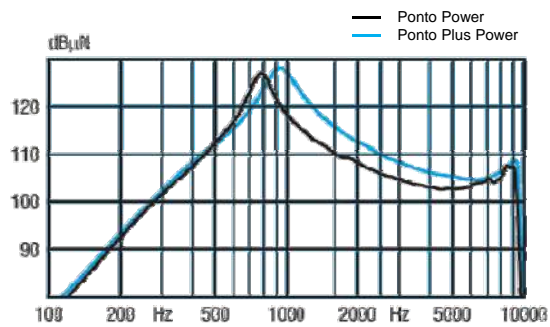
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### Maximum Output Baha (TU-1000)



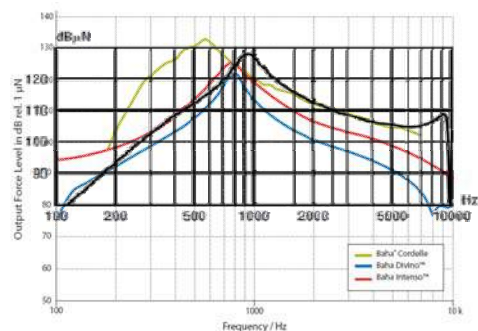
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### MPO - Ponto Plus Power vs Ponto Power



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### Ponto Plus Power vs Baha Cordelle



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## Transcutane oplossingen

- Magnetische fixatie met geïmplanteed frame
  - Sophono: Alpha 1/2
  - Cochlear: Baha Attract
- transcutane demping vibraties
- Implanter actief element
  - Med-El: Bonebridge
  - BCI - Håkansson
- transmissieverlies zend-ontvangstspoel



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## Directe drempel -/- BG drempel

percutane vs transcutane drempel

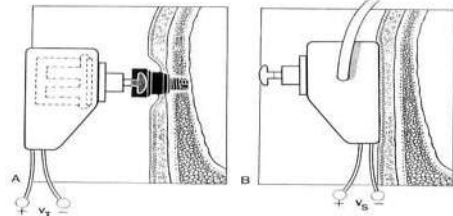


Figure 2. Hearing thresholds measured using Békésy audiometry with skin penetration (A) and without skin penetration (B).

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## Directe drempel -/- BG drempel

percutane -/- transcutane drempel

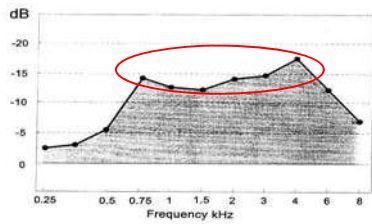
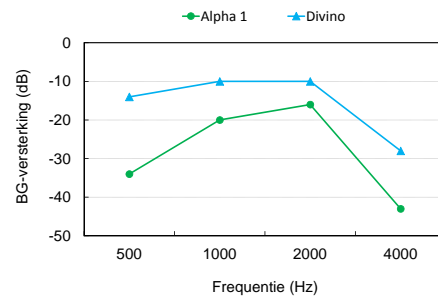


Figure 3. Average values (10 patients) of the difference, in decibels between Békésy curves with and without skin penetration. The shaded area represents an improvement (lowering) of thresholds with tbc vs bc.

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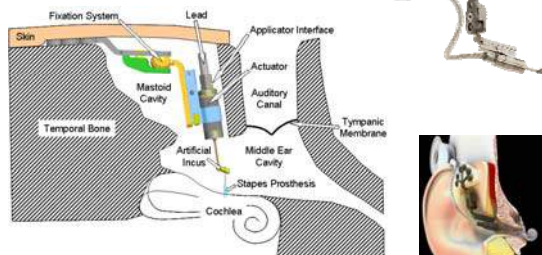
## BG-versterking: Sophono vs Baha Divino



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## Otosclerose - DACS

Cochlear  
'Direct Acoustic Cochlear Stimulator'



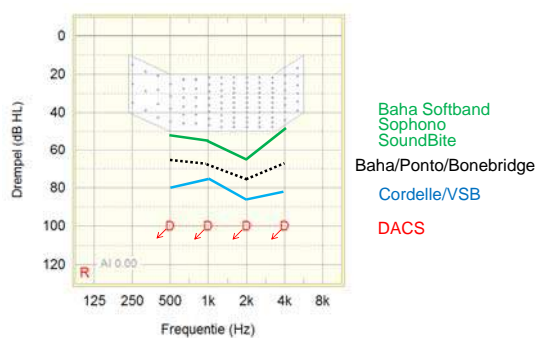
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## Sonitus - SoundBite



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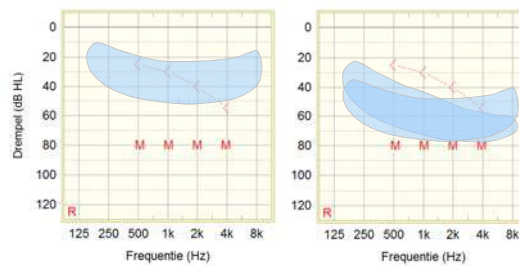
## Maximum Uitgangsvermogen



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## Signaalbewerking

- dynamisch bereik hulpmiddel



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## Aanpasbereik

- Percutaan - Baha/Ponto
  - < 35 dB standaard - BP-100/Ponto, Bonebridge
  - < 45 dB power - BP-110/Ponto Power
  - < 55 dB superpower - Cordelle
- Transcutaan - Baha Softband/Baha Attract, Sophono
  - < 20 dB
- Sound Bite - 'single-sided deafness'
  - < 20 dB
- Dacs - otosclerose
  - > 35 dB tot .. dB - nog niet bekend

