Beyond the Audiogram: Diagnostic and Verification Tools to Improve Hearing Aid and Cochlear Implant Fittings

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DISCLAIMER

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Defining the Problem

- Hearing sound (audibility) is the beginning, not the end of successful hearing rehabilitation
- Typical hearing testing and hearing aid verification define only part of the problem
- Current hearing aids and cochlear implants have features not testable with audibility-based measures

Under-utilized tools

- Real World Validation (APHAB)
- Expanded Word Recognition Testing
- Frequency Lowering
- Dedicated Noise Reduction Programs
- Impulse noise reduction
**APHAB**

- Abbreviated Profile of Hearing Aid Benefit (Cox and Alexander 1995)
- Identifies frequency of listening difficulty in 4 areas:
  - Ease of Communication (Quiet settings)
  - Reverberation
  - Background Noise
  - Aversiveness (Sensitivity to sudden loud sound)

**APHAB**

- Included in Noah hearing aid fitting framework used by nearly all hearing care professionals
- Takes less than 5 minutes to complete
- Can compare function to others in similar normative groups and between interventions
APHAB Question Samples

1. When I am in a crowded grocery store, talking with the cashier, I can follow the conversation.
2. I need a lot of information when I'm listening to a lecture.
3. Unexpected sounds, like a smoke detector or alarm bell, are uncomfortable.
4. I have difficulty hearing a conversation when I'm with one of my family at home.
5. I have trouble understanding the dialogue in a movie or at the theater.
6. When I am listening to the news on the car radio, and family members are talking, I have trouble hearing the news.
7. When I'm at the dinner table with several people, and I'm trying to have a conversation with one person, understanding speech is difficult.
8. Traffic noises are too loud.
9. When I am talking with someone across a large empty room, I understand the words.

Expanded Word Recognition Tests

- Binaural Unaided Testing
- Aided Testing at 60 dB SPL

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Frequency Lowering

- Addresses “dead hair cell” regions
- Can provide 15 to 20% improved word understanding with 4-6 weeks practice
- Available from all major manufacturers

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Noise Reduction Programs

- Automatic scene analysis programs are great but...
  - Several factors produce greater difficulty than can be addressed by these programs:
    - Severity of loss
    - Slower processing due to age
    - Attention issues
- Dedicated, fixed directional programs can often provide more control and predictability in noise
Impulse Noise Control

- Many people have hyper sensitivity to high intensity, short duration (loud impact) sounds.
- Often reported as “hearing aids are too loud”
  - Incorrect lowering of overall amplification
  - Sacrificing dynamic range and audibility
- Most current instruments have a specific control for this type of sound

Meet Our Patient

- 75 YO Male Veteran
- HA user since 2004
- Loss of hearing aid benefit in last few years
- Audiogram and word recognition suggest no viable hair cells above 2000 Hz
Pre-Intervention APHAB and fitting

Percentiles:
- EC: 85
- RV and BN: 95
- AV: 50

Notes on fitting:
- Frequency lowering set to default
- Only an "automatic" program
- No t-coil

New Hearing Aids, and...

- Frequency lowering set to cochlear condition
- Additional programs
  - Directional
  - T-coil
  - Roger

But did it improve his situation?
Summary

- Hearing loss is more complex than an audiogram and a single word list can assess.
- Current hearing aids and cochlear implants have technology to address these complexities.
- Your hearing care professional already has tools which can help choose and verify the benefit of these technologies.
- Working together, you can most likely improve your day-to-day hearing and quality of life.
Questions?

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“Ask Dr. Brad”
https://www.youtube.com/user/AskDrBrad