Testing Outside of the Booth
Perspectives and Learnings

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VA Rehabilitation Research & Development
National Centers of Excellence

National Center for Rehabilitative Auditory Research
NCRAR's mission is to improve the quality of life of Veterans and others with hearing and balance problems through clinical research, technology development, and education that leads to better patient care

- Human Auditory Systems
  Peripheral, Central Processing
- Human Balance Systems
  Peripheral, Central Processing
- Ototoxic Exposure
- Chronic Tinnitus
- Hearing and Aging
- Noise Exposure
- Blast Exposure
- Speech Intelligibility
- Hearing Aid Processes
- Access to hearing healthcare
Acoustical Spectral Signatures
Auditory Isolation Performance

Headphone Maximum Permissible Ambient Noise Levels

- ANSI S3.1-2008 MPANLs
- Creare Wireless Screener
- JHU Ambient Noise, mean
- PVAMC Ambient Noise, mean
- HDA 200 Sennheiser
- HDA 300 Sennheiser

Measuring Acoustical Spectral Signature

- NIOSH Sound Level Meter App
- Developed by CDC
- Meets Type 2 requirements of IEC 61672:3 SLM standard when used w/ external microphone.

Active Noise Suppression

- Bose QuietComfort 35 Wired Active

Note: This is presented for example purposes only and does not represent an endorsement of any individual product by the NCRAR or the presenter.
Listen for the tone?

Active Ambient Noise Monitoring prior to making the measurement
• Ambient and impulsive noise
• Broadband
• Narrowband (frequency selective)

Platform Considerations: OtoID and others

2006 2011 2013

2015 2017 Beyond

VA Ototoxicity Identification Device OtoID

• ANSI S3.6 Screening Device
  • With
  • 105 dB SPL output from 250 to 20,000 Hz
  • Active wide and narrow band ambient noise monitoring
  • Automatic Threshold determination test
  • Auto SRO screening test
  • Cellular Modem and/or Network data transmission
  • Oto-Acoustic Emissions measurement
  • Without
  • Bone Conduction measurements
  • Contralateral Masking
  • Word or Speech intelligibility testing
The Promise of Portable Automated Rapid Testing (PART)

Behavioral verification involved comparison of intelligibility of speech through the iPad system and a calibrated audiometer.

iPad thresholds were as good or better than the thresholds obtained with speech audiometry, for participants with SRTs of 5 dB HL (27 dB SPL) and above.

https://bgc.ucr.edu/games
iPad-Based Tests of Auditory Processing

- Spatial Release from Speech Masking

![Spatial Release Graph](image)

iPad-Based Tests of Auditory Processing

- Spectrotemporal Modulation Sensitivity

![P.A.R.T. Graph](image)

Summary

- Automated testing outside of the booth has been occurring for over 20 years for NCRAR research.
- Measure your ambient acoustical signature and select appropriate transducers with acceptable Passive Attenuation.
- We continue to learn about methods to identify hearing loss and discomfort, and someday, hopefully, be able to treat it.
Acknowledgements and Citations

This research was supported by:

Dept. of Veterans Affairs Rehabilitation Research and Development, National Institutes of Health/National Institute for Deafness and Communication Disorders