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“Can We Try That in Bb?” Hearing Loss and Music
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**Programming Cochlear Implants for
Listening To and Playing Music:
Realistic Expectations vs. Hopeful
Aspirations**

Dr. Brad Ingrao
e-audiology.net



Doc, I want to be able to...

- Enjoy music with my CI
- Play music with my CI for fun
- Play music with my CI professionally

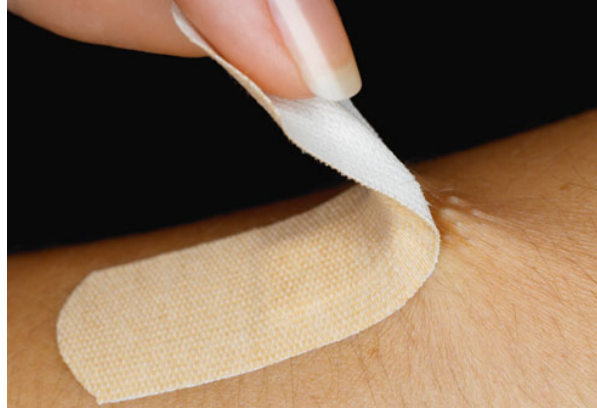
Q: Are these possible?

A: It depends



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Let's Get Right To It...



Music Simply Will Not Be the Same

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Variables to Consider

- Audiologic History
- Musical Training
- Musical Genre(s)
- Is it Live, or is it Memorex?
- Electrical Hearing Age
- Patient Motivation

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Audiologic History

- Duration of hearing loss
- Progression of Hearing Loss
- Technology History
- Cortical Stimulation Gaps
 - Initial hearing loss to hearing aids
 - Candidacy to Implantation
- Rehab History

Musical Training

- Age of first exposure
- Genre variety
- Formal training
- Single vs. multiple instruments
- Willingness to switch instruments

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Musical Genres

- Experience playing/listening to multiple vs. single genres
- Measured hearing abilities in different genres
- Willingness to change genres

Live vs. Recorded

- Recorded Music
 - Recording Fidelity
 - Playback fidelity (compression, speakers, amp, etc.)
 - Sound Level at CI
- Live Music
 - Acoustic vs. amplified
 - Mic/Pre-amp technology
 - Sound Level at CI

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Electrical Hearing Age

- 0 to 12 months – Speech in Quiet
- 12 – 36+ month – Speech in Noise
- 36+ - ??? Music

Patient Motivation

Are they willing to...

- Pay for additional face time with you
 - Diagnostics
 - Rehab
 - Counseling
- Pay for professional musical training
- Be flexible re: genre, instruments, venues, etc.

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What about the Research?

- Research on music and CI's shows
 - Rhythm is more accurately perceived
 - Large inter-subject variability
 - Errors in pitch and timbre perception are also quite variable
 - Most show improvement with training
- **HOWEVER**
 - Many of these studies have VERY small cohorts, so be cautious.

So, What Do We Do???

- Ensure mapping is suitable
- Remember that we are **HABILITATING** not Rehabilitating
- Resist the urge to run before walking
- Provide real world solutions to offset limitations

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Mapping Goals

- Broadband Audibility
- Loudness Balance Across Channels
- Maximum pitch specificity potential
 - Varies by manufacturer
- Maximum usable dynamic range
 - This will take time to build
- Verify all the above in the booth (may not be covered by insurance)

HAB not ReHAB

- CI patients are building an electrically based auditory system
- Focus should be on consistent, broadband audibility
- Beware of over tweaking
 - Re-starting adaptation
 - Risk of overstimulation
 - Over-reliance on placebo effect

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Crawl, Walk, Run

- Musical development plan should mirror normal auditory development
 - Rhythm
 - Simple pitch (within the range of best audibility)
 - Intervals
 - Chords, etc.

Real World Solution 1

- Determine threshold of A/D limiter
 - Have pt. download SLM app and calibrate
 - Play their selected music through FF speakers
 - Note SLM app level where they first detect distortion
 - Instruct on how to use this data, the app and inverse square law to adjust in the real world

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Real World Solution 2

- Counsel to focus on how music makes them feel, rather than what it sounds like
- Pick 10 favorite songs
- Write down how that song used to make them feel
- Identify the attribute responsible for that (rhythm, pitch, instrumentation)

Real World Solution 2 (con't)

- Pack away their 10 favorites
- Download or buy 10 RANDOM albums/CDs
- Listen to the songs and identify those that contain the attributes listed
- Keep the ones that work, trade in the ones that don't
- Repeat and build a new top 10

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Backup Plan

- Consider alternative instruments and genres with simpler harmonic structures
 - Diatonic instruments
 - Drums
- Download “visualizer” app
 - appreciate music visually as well as auditorily
- Use visual tuner when playing

Some Resources

- Munich Music Questionnaire
http://s3.medel.com/pdf/US/bridge/MUMU_Questionnaire_EN.pdf
- Musical Ears and Music Notes
http://s3.medel.com/pdf/US/bridge/23054_30_Bridge+Catalogue+US.pdf
- HOPE Notes
<http://hope.cochlearamericas.com/listening-tools/HOPE-notes>
- ABCLIX
<https://itunes.apple.com/us/app/ab-clix/id642933228?mt=8>

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Summary

- Hearing loss forever alters music perception
- Neither CI's nor Audiologists can currently “fix” this
- Your patients must control how they deal with those realities
- The world of music is vastly larger than most people think
- If they are willing, they WILL find their music

Questions?

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