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Academia

CLAYTON FISHER

M.Cl.Sc., Audiologist

(Hands On)
REM Basics with CARL

Wednesday, October 26, 2022

12:00PM EST

inventis
Audiology & Balance

Another how-to REM workshop?

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Yep, but here's how this one's different:

1) Focuses entirely on **practical** aspects of REM, **not on the theoretical**
2) We are going to **do a fitting** together, using real equipment, **not just talk** about it
3) We are going to **make mistakes** together and try to **troubleshoot** problems

REM

=

Real

Ear

Measurement

About Me

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I have worked with various organizations to help clinicians do their job better

- Optimizing equipment to make clinician's lives easier, more streamlined
- Creating best-practice protocols that optimize patient outcomes but are not overly burdensome for clinicians
- Training and supporting clinicians to ensure they have the required skills and understanding to perform optimally clinically

Workshop Goals

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Learning Objectives:

1) Feel more comfortable with your REM **equipment and software**

2) Feel more comfortable with **calibration** and **techniques** needed to ensure accuracy

3) Feel comfortable **interpreting** your REM results and fitting data and **improving** upon it

…and get motivated to use your equipment!

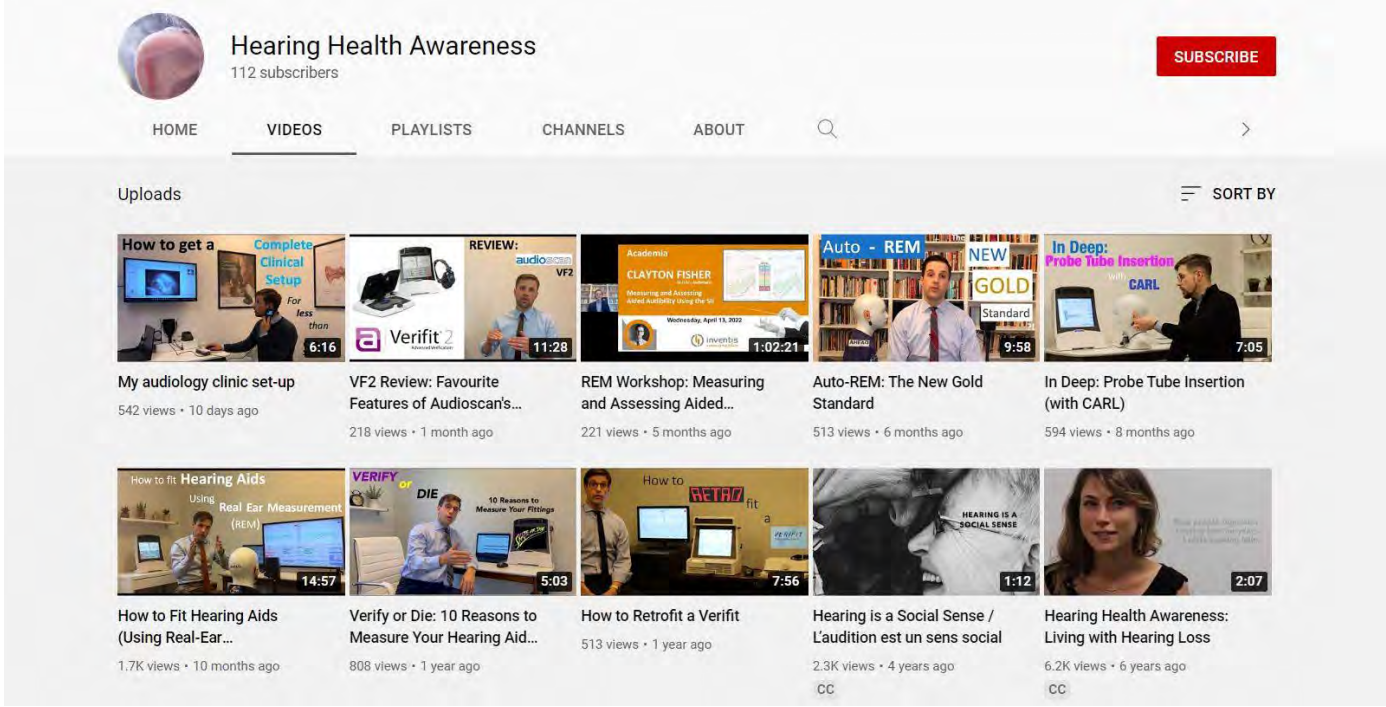
Workshop Outline

- **Part 1: Context on today's talk (the "Why")**
  - What we will not be talking about
  - Our relationship with our audiology equipment
  - A little about my *non*-audiological background
- **Part 2: Getting comfortable by *doing***
  - Practical REM equipment and patient set-up
  - Ensuring measurement accuracy during REM
  - Interpreting REM results and making improvements

What we won't cover today

We will not discuss:

- The well-documented, known benefits of REM
- Why choosing to ignore best-practices is unethical



For more info on these topics…

- Check out the videos on my YouTube Channel: hiips://www.youtube.com/channel/UCvaPjC3au95PAUtD6WRI0Hw

What we won't cover today

I promise that we will not discuss:

- Terminology
- Prescriptive methods

For more info on these topics…
Check out:

- A textbook
- 20Q articles (Gus Mueller)
- AO REM videos

My assumptions

If you're participating today, I assume:

- You know REM is key to ensuring ideal patient outcomes, and
- You want to be doing REM routinely, but you're not, or
- You're doing REM routinely, but you want to understand it better and feel more confident

Why I use REM

“Audibility always wins…” – Gus Mueller

- If you want to ensure audibility is adequate, you need to measure it; improve it
- The *improvement* in audibility achieved in a fitting is a key factor in predicting the degree of benefit with hearing aids
- Thank goodness for automatic aided SII, unaided SII, and SII *difference* calculations

SII = Speech Intelligibility Index = % of speech audible to patient

Context for this workshop

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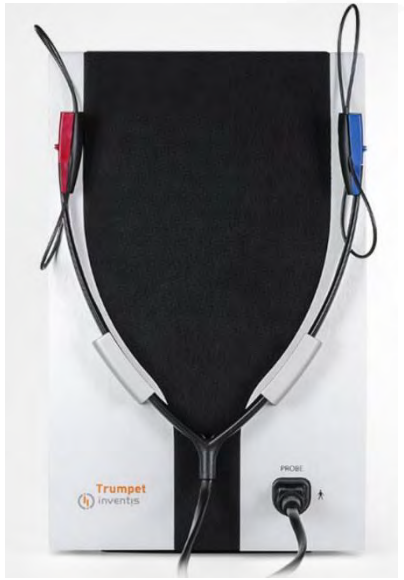
The Good:



Software suite
Maestro

- **REM systems have evolved**
  - Computer-based
  - User-friendly
  - Portable
- **So has the way we learn, teach and practice**
  - Patient simulators: meet **CARL**!
  - Allows practice of key techniques
  - Allows safe environment for mistakes

AHEAD
SIMULATIONS

Context for this workshop

The *Not-So*-Good:

- **I've realized, through experience, that many clinicians**
  - Are not gear-savvy
  - Are not "technical" per se
  - Are not fully comfortable with their equipment
- **In addition…**
  - Training varies greatly across programs
  - Practicums can help create good habits, or bad ones
  - It is easiest to just maintain the status quo

Myth Buster

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Which of these do you think is the biggest barrier to REM uptake?

a) Ignorance of benefits

b) Cost of equipment

c) Access to equipment

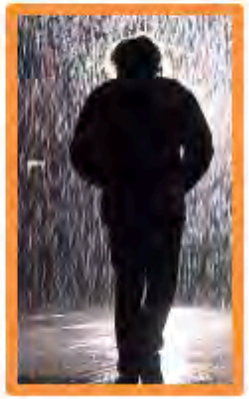
d) None of the above

Myth Buster

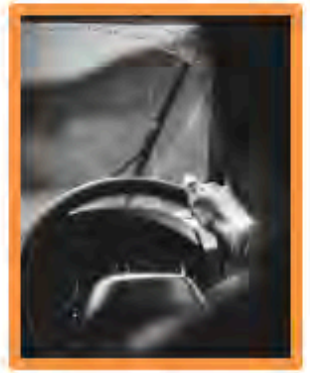
According to a 2010 survey of clinicians by The Hearing Journal, about half (48%) of clinicians who have a REM system in their office

don't use it!

Anecdotally, I can confirm this is true from working for two larger hearing aid clinics



Why then?



Mueller HG, Picou EM. Survey examines popularity of real-ear probe-microphone measures. Hear Jour. 2010;63(5):27-32.

The Big Barrier

Lack of training and familiarity with equipment and procedures greatly impacts the use of REM and thus patient outcomes

Clinicians who don't use REM are often not comfortable with:

- Hardware and software
- Calibration and ensuring accuracy
- Interpreting results and making adjustments to improve the fitting

Let's "Talk Shop"

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"A piece of gear you can depend on is honestly a big part of my mental and emotional security…"

- Brian Lam, Wirecutter

Our Relationship with Gear

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Obviously, we're not *all* gear-heads…

Where do you place yourself on this scale?

I only have / want the minimum knowledge I need to get by

I want to know ever feature, usage and specification

Note: I'm probably around here

My background outside Audiology

I was an aspiring musician before becoming an audiologist

- yep, I played guitar in heavy rock band

As such, I've always dealt with equipment

- Guitars, amps, petals, patch cords, etc.
- Troubleshooting on stage: feedback, intermittent sound, no sound, etc.

Lean In… to your equipment

Equipment is part of audiology… so

- Ask a more experienced colleague to give you an overview of equipment you're unfamiliar with
- Use a cancelled appointment as an opportunity to learn a new feature, or troubleshoot issues that came up in clinic earlier that day or week
- Take a little time over lunch to fool-around with your equipment, look over the user guide, etc.
- Be curious and have fun… Your REM system should be your best friend! Get to know it.

…and be thankful you don't have to use legacy equipment, as pictured below

FONIX 6500-CX

Disclosure

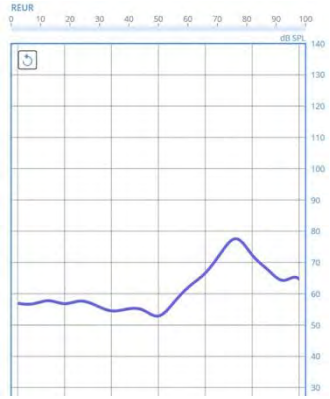
Truthfully, I have not been using Inventis equipment for that long…

- I was using a different manufacturer, and have switched
  - Each brand of device is different
  - Change is hard at first!
  - I'm still learning… but the best way to learn is by *doing*!

Part 2: Let's fit CARL!

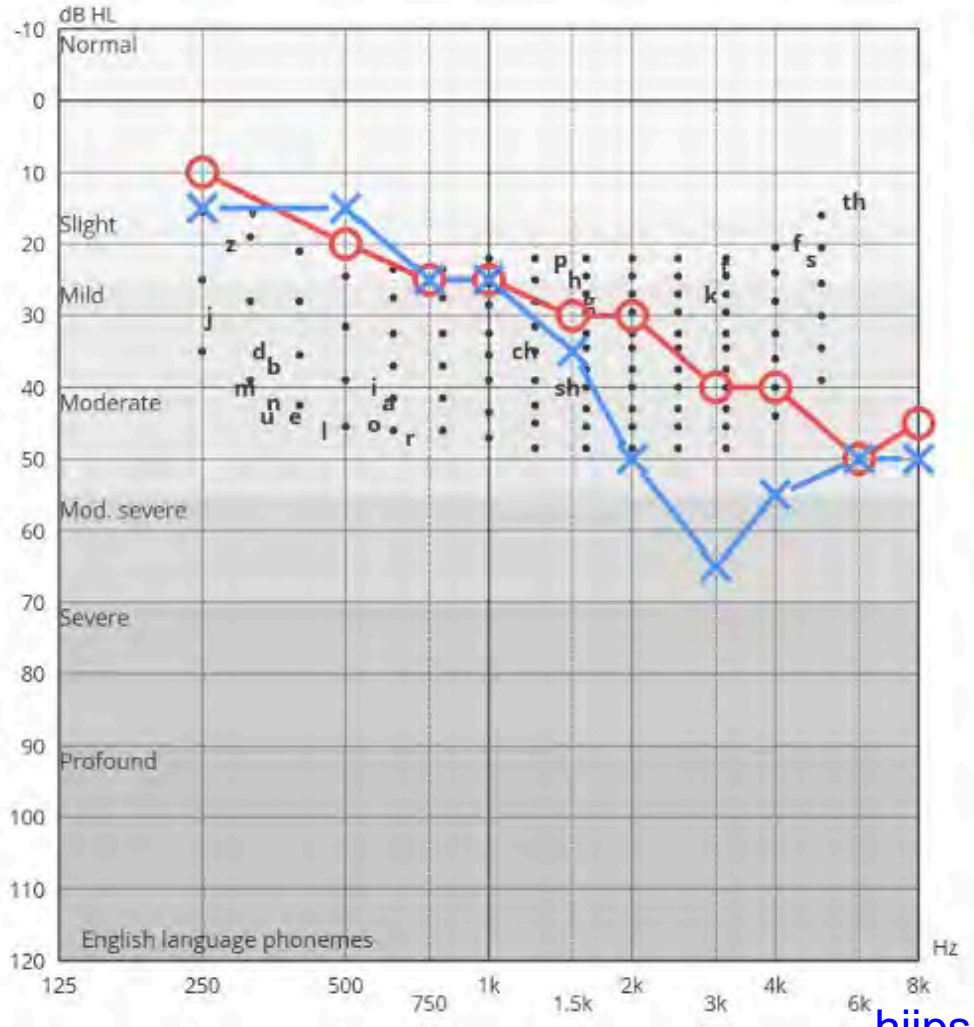
CARL is a patient simulator with **realistic ear canal acoustics**

- No patient needed, no risk of harm
- He's great for practicing common clinical procedures:
  - REM
  - Wax removal
  - Ear impressions
  - Etc.



hiips://aheadsimulations.com/

CARL's Audiogram



		R	L	BIL
AC		O	×	⊗
AC	Mask.	△	□	△
UCL		U	U	
BC		<	>	
BC	Mask.	[	]	
FF				
FF	Mask.	S	S	S
FF	Aided	A	A	A

Audibility index		
	R	L
AC	64 %	42 %

Pure tones average		
	R	L
AC	25	30
BC	-	-

Freq. [Hz]: 500, 1k, 2k

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Step 1: Patient Set-up

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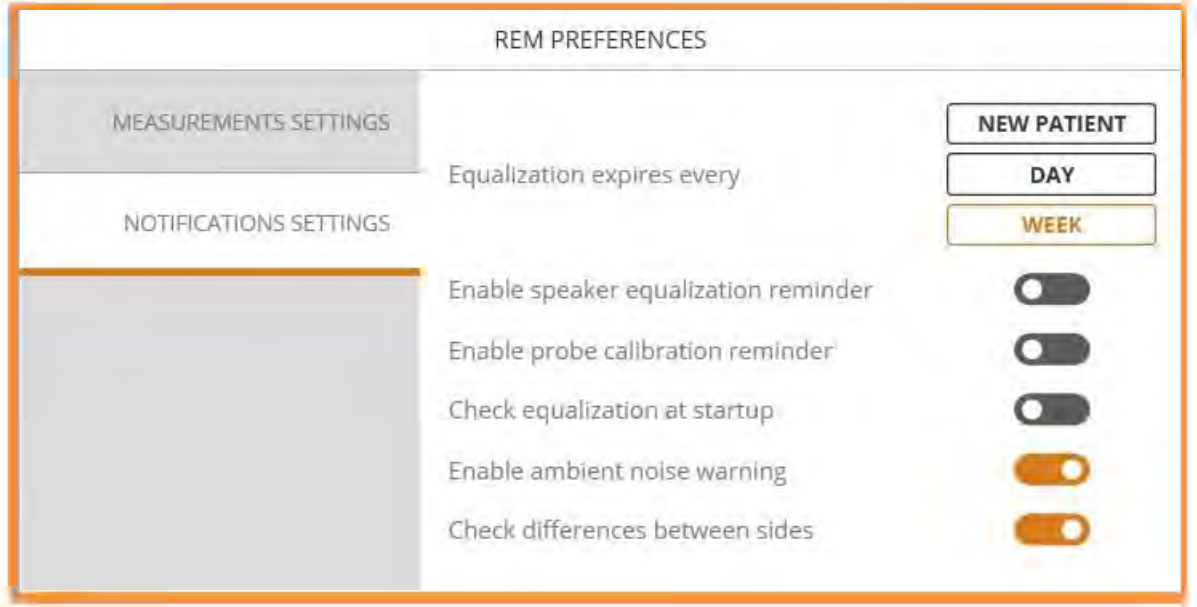
After positioning patient, perform

1) Speaker (Room) Equalization

- Modifies the speaker frequency response, based on acoustics of room
- Weekly, daily, or anytime you change something or are in a new space



2) Probe Tube Calibration

- Makes resonances of probe tubes acoustically invisible
- Also, probably fine to do once a week

Patient Set-up

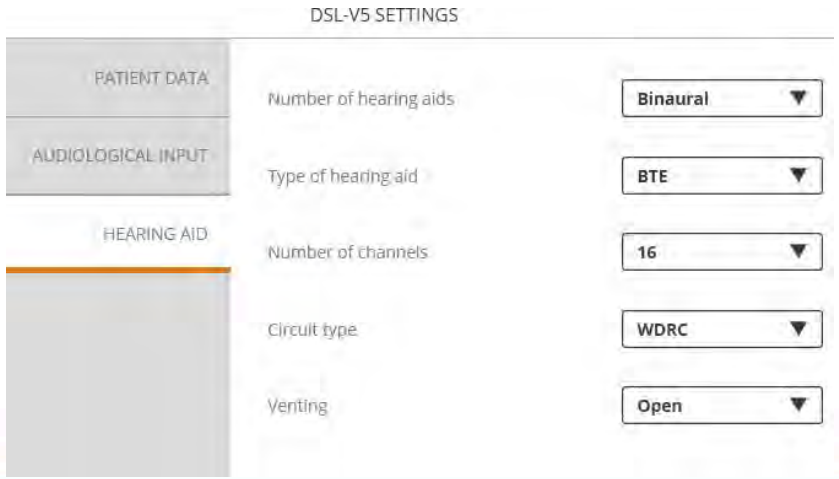
3) Probe tube Insertion

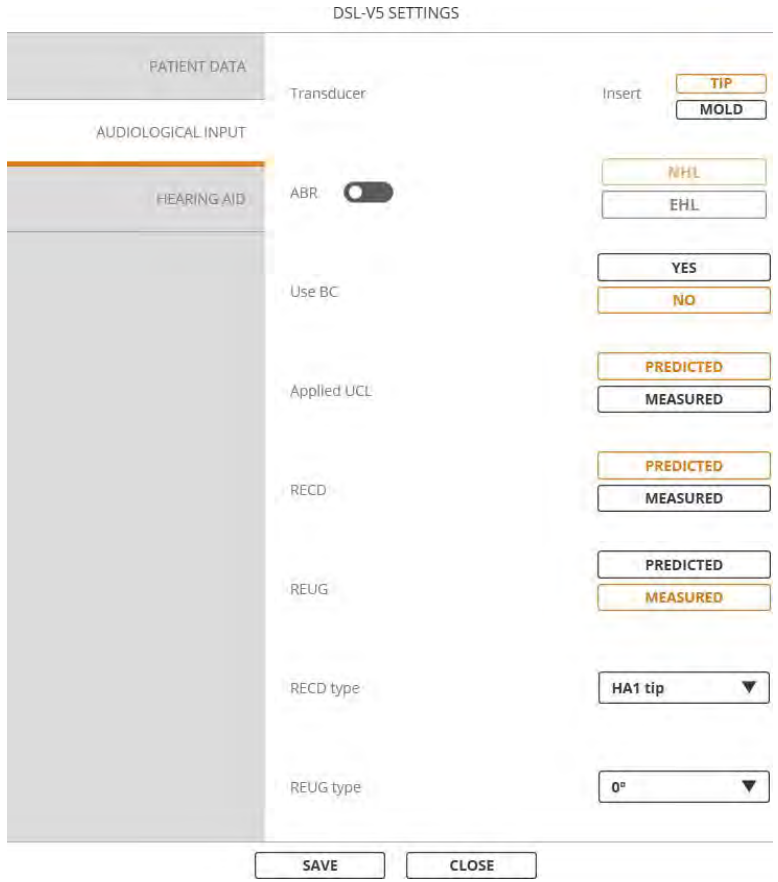
- Use lanyard to hold tube in place
- Depth matters; go deep, or go home
- Don’t be shy, you can’t perforate an eardrum with a probe tube!
- Check probe placement with otoscopy
- Luckily, CARL does not have wax, bendy canals, hairy canals, thin canals, etc.

After calibrating…

Step 2: Software Set-up

- **Check your fitting parameters**
  - Choose your prescriptive targets
  - HA style
  - acoustics, etc.





Optional: Run Resonance Curves

1) Check ear canal resonance with pink noise

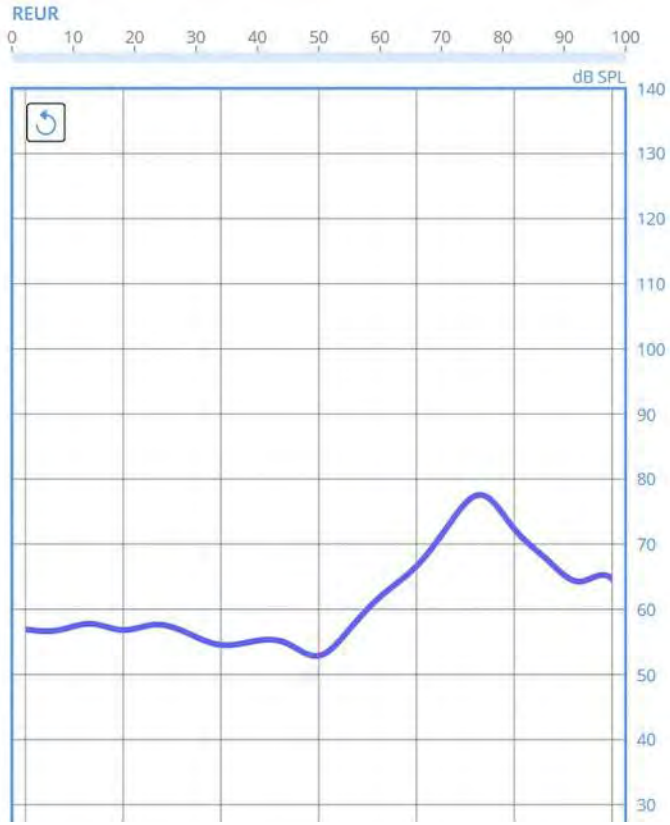
- REUR should look reasonable

2) Check occluded response

- Mute HA, insert, and run REOR
- How much does HA act like an earplug when not amplifying?

3) Troubleshoot, if needed

- Has probe tube moved?



Step 3: Aided Speech

Next, “best-fit” your hearing aids using your favorite fitting formula: DSL, NAL, Manufacturer

- **Complete your level calibration**
  - If the fitting is open, or heavily vented, choose “open fit” and mute HA for cal.
- **Start your aided speech measurements**
  - Despite unaided SII predictions, it is still a good idea to run an unaided speech curve at 65dB

Step 4: Interpret Results

Since **we've dotted our i's** and **crossed our t's**, we are confident that the picture that is painted is a **true reflection of audibility in the patient's ear**

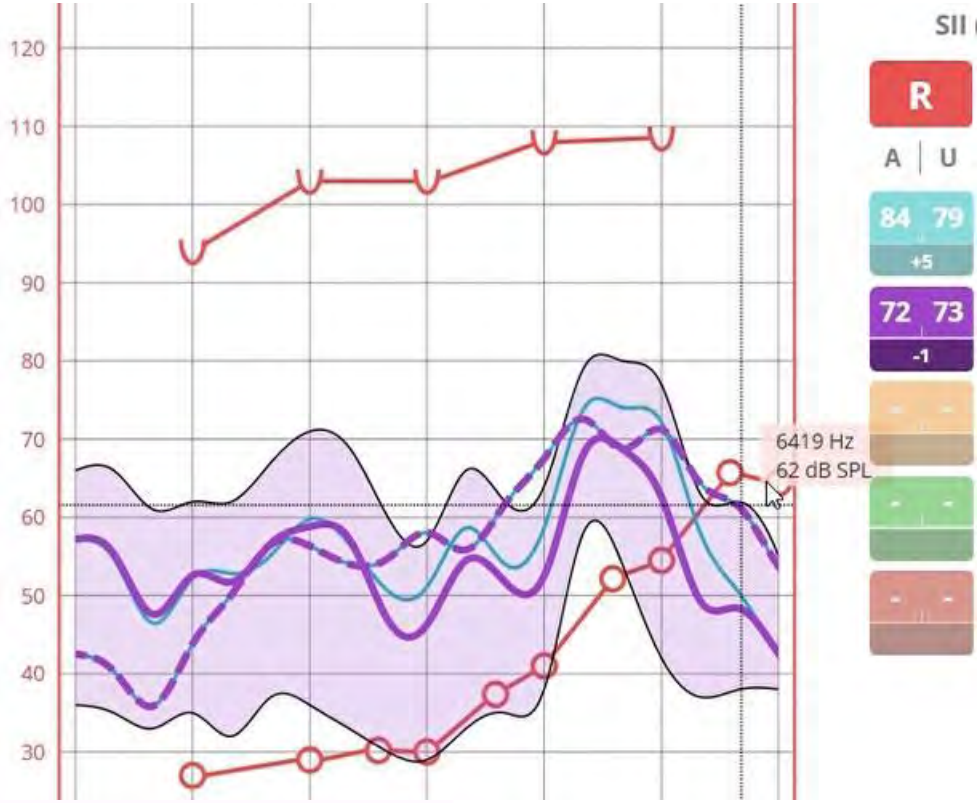
- What does the fit-to target look like?
- How much improvement in audibility is there?
- Can you improve audibility while keeping average speech "Comfortable, but Slightly Loud"

+12 +23

Step 5: Adjustments

Make adjustments to target to improve audibility, **prioritizing 2 - 4 kHz** for open fittings and **0.5 – 4 kHz** for closed fittings

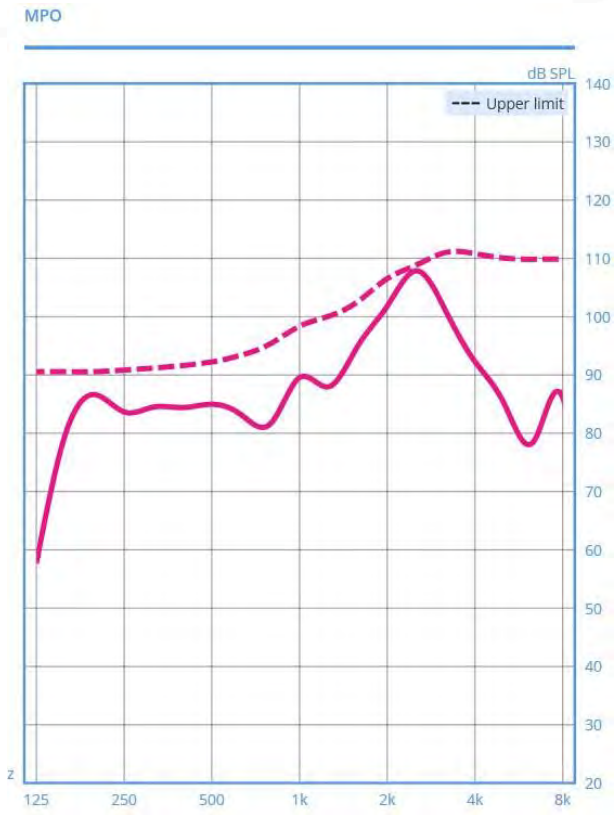
- **Use “On-top” mode**
  - Facilitates adjustments
- **Again, complete your level calibration**
  - If the fitting is open, or heavily vented, choose “open fit” and mute HAs for cal.



Step 6: Run Other Inputs

Deviation from target should be examined for different input levels

- **Soft speech** (55 dB) should be "Comfortable, but **Slightly Soft**"
- **Loud speech** (75 dB) should be "**Loud, but OK**"
- **MPO** should be kept **below UCL**s especially in ear canal resonance for open fittings, and
  - Not too low for closed fittings



Troubleshooting

What common problems issues can you run into?

Probe tube issues:

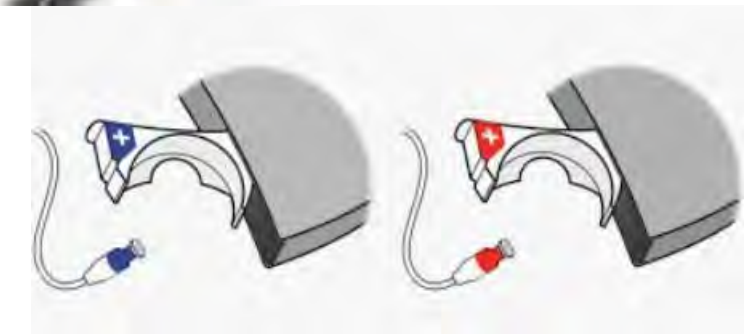
- Shallow probe tube placement **depth**
  - Can move out, especially if HA is removed
- Probe tube gets blocked with **wax**
  - It only takes a tiny amount of soft wax to block a probe tube completely

Making Mistakes

We all make clinical mistakes; the goal is to only make them once.

- **Errors with REM**
  - Swapping reference mics

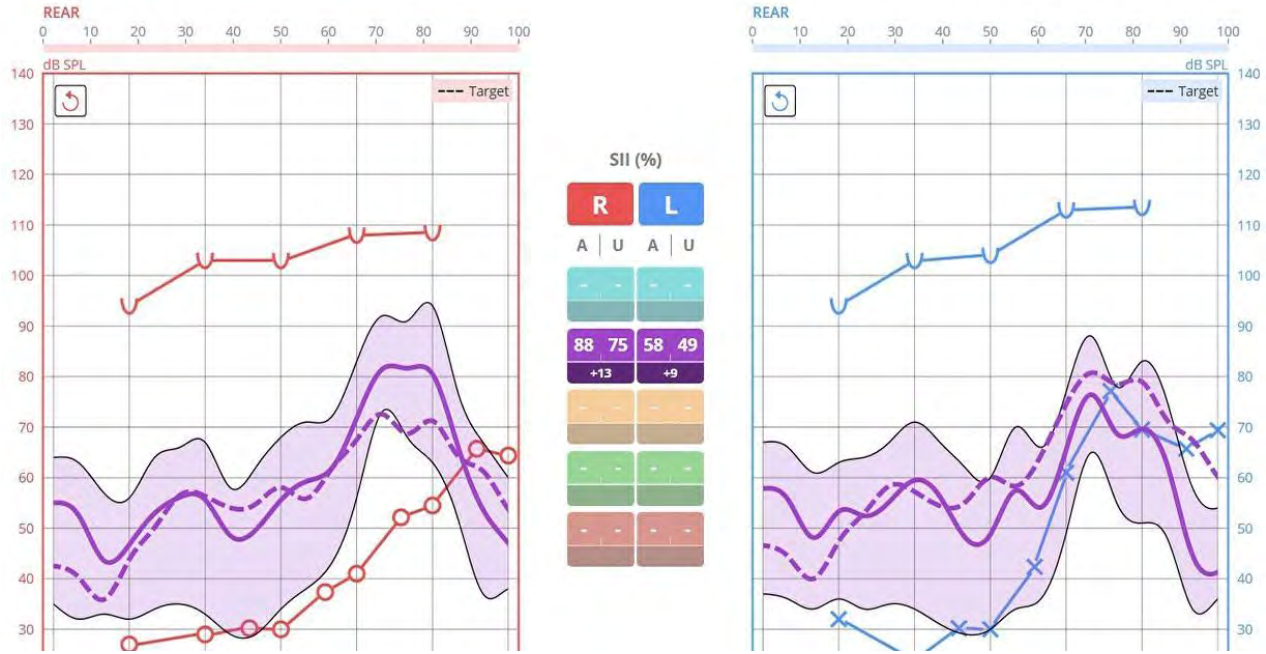
- **Errors with HAs**
  - Wrong receiver strength in software
  - Swapped receiver sides



Catching Mistakes

So, we all make mistakes… wouldn't it be great if we could catch them **while** they're happening?

- REM shows you problems that you would not otherwise know about



Summary

- Real-Ear Measurements are essential for improving patient outcomes.
- REM should not be viewed as being overly technically difficult; it’s not that hard!
- To feel more comfortable, we need lean into our gear, get to know it, roll up our sleeves, and try things out.
- CARL is great a patient to have in the office to practice on.
- Start a friendship with your REM system; it will last a lifetime!

More about CARL

- Today we were using “Base CARL”
- There is also “**Camera CARL**” which gives you visual feedback about where you are in the ear canal
- There is also **Audio CARL** who responds to acoustic stimuli…

Thank you for your attention.

QUESTIONS?

Contact: info@treatyourhearing.ca

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