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## **Fitting Fundamentals with Med EI**

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Hello and welcome from Med El. I am Andrea Headley Williams Med El Clinical Education Manager. I am pleased to speak with you today about fitting fundamentals with Med El. Not all cochlear implant companies are the same, so it is important to apply fitting parameters specific to each company.

Med El cochlear implants use long flexible electrode arrays that follow the cochlea's natural tonotopic stimulation. Finehearing coding technology supports rich, detailed sound perception. Med El is the only cochlear implant company to be approved by the FDA to preserve existing hearing.

Med El's implant design and fitting philosophy aim to provide the best opportunity for closest to natural hearing a bridge between technology and nature.

Think about directions for a moment. Do you use maps or gps? Why? Well, we can't find the best route to a destination unless you know where you want to end up. It's the same thing with fitting a cochlear implant.

It's important to know the typical parameters for fitting each cochlear implant. You need to keep in mind where your expected destination is. This will help you get to the destination more efficiently and effectively.

As a general rule, with Med El, the most important parameter to measure accurately is mcl. The MCL is the maximum comfortable loudness level. In other words, the sound should be very loud but not uncomfortable, just below uncomfortably loud.

Appropriately set mcls helps preserve the loudness of sounds in relation to each other as they occur in the listener's environment. Loud is loud, medium is medium, and soft is soft.

The Maestro software's default fitting parameters are appropriate for most patients. The default parameters are based on years of fitting experience and knowledge of Med El's cochlear implant technology as well as feedback from clinicians like you. There are cases, however, where other parameters will need to be adjusted either early on or with continued use of the cochlear implant. But in general, believe in the power of the defaults as they are the most appropriate settings for the majority of patients.

You might ask that if MCLs are set to maximum, does that mean the patient is hearing at maximum loudness all the time? The answer is no.

Patients only hear at maximum comfortable loudness OR MCL when 1 the volume is set at 100% and 2 the input level is about 105dB split. At all other times, stimulation occurs below MCL and is based on the sound input level.

Remember, not all MCLs are created equal. MCL for Med El is maximum comfortable loudness. It's important to remember the device specific guidelines when working with different CI manufacturers. If you are using loudness growth charts, please be sure to use the appropriate one for each manufacturer because the typical fitting ranges and dynamic ranges differ.

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I'm going to give you one example for a quick fit approach with mcls, perhaps used at an initial fitting or prior to any necessary fine tuning.

Measure Art Fit or Auto Art, which will set mcls to the ECAP threshold, a conservative starting place, yet should be audible to the recipient. Remember, ART is auditory response telemetry. Art Fit is a quick screener to measure art responses. AutoArt allows for the auto collection of art responses across all 12 electrode contacts. ECAPs are electrically evoked compound action potentials yielding responses within the range of audibility.

After Art Fit or autoart measurements are obtained, go live in the Maestro software fitting screen on the Levels tab and raise MCLs globally using a loudness growth chart if appropriate and behavioral measures. Set volume to 100%. The patient should leave with default volume at 100% since if you're spending time getting accurate MCLS, you want the patient to have access to their full dynamic range. Hearing Soft as soft, medium as medium and loud as loud. Ensure sounds are not too loud but that normal conversational speech is comfortable.

Make progressive maps.

Adjust ASM or automatic sound management parameters if desired. Med EL's automatic five scene classifier adaptive intelligence in the mild setting is recommended for all ages.

Set bimodal synchronization for bimodal users, then program the processor.

When fitting any cochlear implant patient, it's important to know general averages for loudness levels, which may vary from manufacturer to manufacturer.

Med EL's maximum comfortable loudness levels or MCLs typically range between 8 and 15 charge units at the initial activation or first fitting appointment. Later, when the patient has achieved a more stable map. The MCL levels approximate 5015 to 25 charge units on average.

Keep an eye out for outliers in the map, especially very high MCL levels, which can be a red flag.

MCL set beyond a patient's maximum comfortable loudness levels could lead to overstimulation, poor performance or even facial nerve stimulation.

These general parameters are important to keep in mind with all patients, but especially when you have patients with unique loudness requirements and or cochlear abnormalities.

One of the settings that may be manipulated within the Maestro Fitting software is thresholds. It's important to know the parameters of each cochlear implant system since each system operates differently for a Med EL recipient, threshold levels should be inaudible most of the time. Using default parameters of locking thresholds to 8% of the MCL is a completely appropriate place to start.

There are instances, however, where you may wish to measure thresholds, and if so, be sure they're inaudible.

An example of when that might be would be if MCLs are set appropriately and soft sounds are still too soft. You can increase the perception of soft sounds by measuring thresholds or adjusting other parameters such as maplaw or sensitivity.

If you choose to measure thresholds, here is one option for a quick fit approach. Unlock thresholds, then set the fine tuner volume lower range to 0%. This will allow you to change the default volume control to 0%. Change the dynamics tab in the upper right hand corner of the fitting screen to threshold.

Ensure all electrodes are selected by hitting Control A, then go live and increase stimulation until patients report a buzzing sound. Then decrease thresholds globally until buzzing goes away. For example, two arrow clicks down on the computer keyboard or 6% below the measured threshold to ensure inaudibility. Remember, an up or down arrow click changes the stimulation by 3%.

Of course, this approach works best with persons who can accurately and reliably report loudness.

Let's take a look at how that looks in the software.

**Unlock thresholds** Navigate to the finetuner volume range and pull the slider bar down to zero. Ensure the lower volume range is set at zero and ensure the default volume shows zero percent. Under the Dynamics tab, make sure Dynamics is set to threshold or 0%.

Highlight all electrodes by selecting Control A, then go live. Click on the black carrot to the bottom left of the bar to ensure you are measuring threshold. Then increase stimulation until the patient reports a buzzing.

Then decrease the stimulation by two arrow clicks or 6% to set the level below the level of audibility. Make sure to reset your volume range to its original setting and verify that you have returned the default volume setting to 100% when you have finished measuring threshold.

Normal sound field thresholds for Med EL recipients average about 30 decibels. If you are getting poorer than expected thresholds, you can follow these basic troubleshooting steps. Always troubleshoot the equipment first, including changing the mic cover, then ensure your MCLs are accurate. If thresholds aren't measured, consider measuring them, but if so, be sure they are set to a level of inaudibility. There are additional steps as well, but if you get to step three without resolve, we

recommend you contact your Med EL representative for further troubleshooting.

Support.

FS4 is one of our fine hearing strategies and is the default fitting strategy in Maestro. It provides that fine structure or timing cues that mimic the way our ear responds naturally to low and high pitched sounds. It's important to note that MCLs and thresholds are strategy specific, so if you choose to change strategies with your patient, it's very important to reassess MCLs and thresholds if measured to ensure they are set appropriately.

A study from Trevor R and Rajan examined the speech perception and subjective preferences of 13 subjects with metal cochlear implants with Flex Soft electrodes 31.5 millimeters in length. FlexSoft electrodes were implanted on one side and the patients had normal hearing on the other side. These unilaterally deafened CI recipients were provided with two maps and asked to compare the two programs, FS4 and FS4P, each day for two weeks. The subjects were asked to switch between the two maps in the morning and then complete a short questionnaire with each answer to be given on a 10 point scale. Five questions were included in the questionnaire.

The researchers concluded that the subjective benefit of the FS4P coding strategy was significantly greater than the subjective benefit of FS4 on all five questions of the questionnaire, the authors of the study also noted that unilaterally deafened cochlear implant users are in the unique position of being able to assess and and compare the quality of speech coding strategies directly with the corresponding sound percepts of their normal hearing ear. While research has shown that cochlear implant users with FS4 and FS4P MAPs have similar speech perception scores, users with unilateral hearing loss may show a Preference for an FS4Pmap over one with FS4.

FS4 and FS4P coding strategies can be accessed under the Strategy tab in the med el software.

FS4 is the default setting in Maestro.

To change to FS4P, simply click FS4P. Make sure to remeasure MCLs and thresholds if changes are made to the fitting strategy.

We will discuss objective measures in future webinars. However, I want you to be thinking of the benefit of objective measures and how incorporating them into your fitting protocol can improve patient outcomes and save you valuable clinic time. ARTFIT is an auditory response telemetry screener measuring ECAP measurements on four electrode contacts. An ECAP is an electrically evoked compound action potential measuring responses within the range of audibility through the cochlear implant. AutoArt is the auto auditory response telemetry measurement assessing responses on all 12 electrode contacts in under two minutes and determines the responsiveness of the nerve at the cochlear level.

ESRT is the electrically evoked stapedial reflex threshold triggered by electrical stimulation from the cochlear implant, evoking responses that form it. L correlate with upper loudness levels or MCLs and can be used to verify mapping.

Anatomy based fitting, or abf, is the adjustment of frequency bands to the electrode contact position specific to a given recipient and their cochlea.

Easy troubleshooting for any metal audio processor can be done using the finetuner Echo remote control. Simply place the coil of the processor or in the case of a Rondo series, the entire processor on the finetuner Echo and look for that bright green LED to illuminate to environmental sounds like your voice.

The Maestro software also includes the System Check Tool. This can be used to determine if both microphones of an audio processor are working properly.

For the check, the signal levels of both microphones are measured and the difference between the measured levels is calculated.

If this difference exceeds the allowable difference of 3dB between the two microphones, the graph will be highlighted to make this indication. It is then recommended to remove the mic cover and recheck if the difference persists. Further troubleshooting may include replacing the audio processor.

Here you can also see the status indicators for battery level and battery health for the Rondo 3 audio processor.

LED status indicator lights are built into our audio processors.

Helpful troubleshooting resources are available on our website at [www.medel.com](http://www.medel.com) and the Med El YouTube channel.

On the Med El website under Support, you can find a wealth of resources for recipients and caregivers, professionals, educators and candidates, including registering for virtual support sessions, product support, and rehabilitation resources, among many others.

Your patient may choose to use the Finetuner Echo remote control or download the AudioKey app to a compatible smartphone. The AudioKey app can function as a remote control, has a Find My Processor function usage Statistics allows for bilateral streaming pairing and provides access to dual sync for bimodal streaming with a Starkey hearing aid.

Downloading the Hear Care app and pairing the Sonnet 2, Sonnet 3 or Ronda 3 processor to the app allows patients access to system checks of their external equipment as well as implant diagnostics on the internal device. The recipient can also backup processor configurations. This ensures that a patient can manage their hearing technology effortlessly, whether they are at home or on the go.

You and your patients are encouraged to create a MyMed EI account.

This portal provides access to digital tools and resources for recipients, family members and hearing care professionals and is needed to use the Hear Care app.

Regardless of the duration of implant use, you should consider unique patient factors that may impact programming parameter adjustments at each appointment. Patients who have a history of meningitis may also have cochlear ossification, which often inhibits the ability to achieve adequate loudness growth.

Patients with enlarged vestibular aqueduct, eva or LVA can experience loudness fluctuations in their maps, requiring more frequent mapping visits or other considerations. Even active middle ear issues can alter a patient's percept of loudness.

Other factors to consider that can impact your fitting approach include slower than expected progress, unreliable reporters, inconsistent processor use, exceptionally long lengths of deafness, and of course, abnormal cochlear anatomy or injury. Please contact your med EI representative for assistance with any concerns regarding patient programming.

And last but not least, just because you can change a parameter with your patient doesn't mean you should. If patients have a stabilized map and performance, all factors considered, you don't have to make changes to their maps, change microphone covers, perform listening checks of equipment, test

speech perception, and administer sound quality or quality of life questionnaires to assess promotion progress.

We have a multitude of resources to set you up for success with your med EI recipients, including audiology, online webinars, maestro software, quick guides and compatibility charts, sound quality questionnaires, audiology support available for more than 12 hours each weekday and of course, your med EI representatives.

Thank you for your attention. Please feel free to contact Med EI at 888-633.

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