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Introduction to Audera Pro, GSI's Complete Clinical
Evoked Potential System
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- [Karen] Hi, my name is Karen Morris and I will be introducing the GSI Audera Pro. Before I get started, I do want to introduce our team of audiologists that participate in a lot of our trainings. I'm in the middle there. I'm a product manager as well as a clinical audiologist. Laura and Tony also are some of our trainers. Thank you so much for tuning in. Today, I have a lot to cover and I have three learning objectives. After this course, hopefully you'll be able to list three of the test modules that are available with the Audera Pro. You should also be able to navigate the software enough to collect and evoke potential and be able to list two integrated tools that might help with data interpretation. So we're gonna start with a general overview of the Audera Pro move on and I'm going to spend probably most of my time on the EP module and then I'll cover ASSR, OAE and report writing I will sprinkle in. So in each module to show you what a report might look like.

Okay, let's get started. The Audera Pro is a clinical auditory evoked potential system that includes a comprehensive battery of evoked potential tests. EcochG, ABR, MLR, et cetera. P300 and MMN are bolded here because those of you that use the Audera, the original Audera, we were not able to perform that test but you can with the Audera Pro. We also have ASSR module both DPOAE and TEOAE. And with those modules you can put out, put functions and spontaneous OAE. This is what the Audera Pro looks like in a vertical placement. It can have a very small footprint. The amplifier box or preamplifier is integrated into the main unit. So all you have coming out the back are your transducer cables and your patient cables that connect to the electrodes. We also use a modified Corti probe for OAE. There are five different configurations of the Audera Pro. Certainly if you already have it evoked potential or a OAE system that you use, you might not be interested in that module, but there's a full configuration that includes evoked potential ASSR and OAE one that only performs EP and ASSR. One that only does EP and OAE and then OAE only, or EP only. So whatever fits with your clinic and the types of tests that you run, there's a module that should fit your needs. I do wanna mention that OAE on the Audera Pro includes both TE and DPOAE. So this is the main unit of the Audera Pro. And here you can see it in the stand. The stand is

included with the Audera Pro. And traditionally, or if you use a stand, it really is nice particularly if you are performing evoked potential maybe in your balance suite or balance office, you can slip the Audera Pro in amongst all the other equipment. If it's quite nicely. Traditionally, the horizontal placement where the laptop would rest on top of the main unit can be used. Or for the adventurous, you can mount it to the wall. That could work out in certain situations. So that's also an option. Here, you can see the Audera Pro in action where it's the main unit is just beneath the laptop. The transducer cables and electrode cables are coming from the back of the Audera Pro leading to the patient. So at GSI, we really believe in providing everything that you're going to need to perform a diagnostic test. And this includes our audiometers and tip pedometers as well. So with the Audera Pro we will include two sets of air conduction transducers, the over the ear headphones and the insert earphones. And we also will include the bone oscillator. We include two patient cables.

So remember, there's no amplifier or preamplifier box, simply the two cables. And each one of them, is they're a little bit different but both are used to perform evoked potentials or ASSR. So the snap lead cable can be used with the snap electrodes. And here you can see the Ambu electrodes that's part of our starter kit. And you can use this electrode cable for most of your ABRs. ABR, MLR, P300, ASSR, even VEMP. The thing to keep in mind is the white snap lead is kind of an invisible jumper cable. So it's the positive, it's a joint of the positive right and left electro channels. So kind of an invisible jumper cable which you would not need. What's nice about this cable is you don't have to. All you to know is where to place the electrodes on the patient's head. And you don't have to worry about where the other end of the connector plugs into your units. So you simply have to get them on the head as shown here, which is a traditional ABR montage and you're ready to test. The five-lead cable would be needed should you be using a specialty electrode like the TM electrodes for ECoChG or the gold foil TipTodes. Or if you prefer to use the reusable disc electrodes with the paste, you would use this cable. Any electrode that has a DIN connector. And then for the same type of test, if you use this cable you can see the dashed line actually would

represent the jumper cables. So you'd have your four electrode leads plus a jumper cable when you're using this five lead patient cable. You can actually use this for all of your tests and never use the snap lead. We also include the digital input output cable which traditionally is used for EABR measurements. We also will be using this cable with our remote impedance box. This is what the remote impedance box looks like. It connects via that digital input-output cable. And it's a way to check impedance when you're next to the patient.

So if you press the impedance icon right here, it will check the impedance of each electrode without having to go over to the computer and press impedance. It's color coded, so that means the lights will appear green when the impedance is below five kilo ohms, yellow if it's between five to 10 and red, if it's above 10. If you have undesirable impedance number, you can re-scrub the patient right there place the electrode back on the patient's head, press the impedance button again and the values will update. If your system includes OAE, we include the GSI OAE probe. And for those of you that have the Corti, this looks pretty familiar. It's very similar, but not exactly the same. So the cable itself is considerably longer. It's almost three meters long because you're connecting to a computer dedicated system as opposed to a portable system. You don't need as much length if your system is portable. The Pro body is white in color instead of the silver that you're used to for the Corti. And that is a specialized plastic that we use because the Audera Pro plugs directly into the outlet, the mains outlet. So for safety reasons, we are using this particular plastic. So it looks a little bit different. And then finally, the probe calibration for the Audera Pro is located in the software. And that goes for all of our transducers. For the Corti the probe calibration is actually in the probe itself. So basically what this means is they're not interchangeable. So if you connect the Audera Pro probe onto the GSI Corti it won't recognize it because the calibration isn't there. And then finally, while there are differences, it does use the same probe tubes which is the blue probe tube you see here and the same ear tips as the Corti. So that makes it similar. You don't have to clean it. You simply remove the probe tube, replace it with a clean one, and you can move on with testing.

Okay, so just a quick summary, for hardware and that's the physical items that are included, you have the main unit with a stand, three transducers, two air conduction inserts and over the ear headphones, the B81 bone oscillator which is the latest and greatest with bone oscillators. It allows you to get a little bit higher intensity with less distortion, particularly in the low frequencies. Two patient cables are included. The five snap lead and the four snap lead and the five lead cable. A remote impedance checker, the digital input output cable which it allows you to use that checker and a GSI probe for OAE. We also include starter kits.

So when you open up the box, you can basically connect your device to the PC and you have everything you need to run at least 20 tests maybe more depending on the types of tests that you're using. So starter kits with everything you need, supplies you need are included with the EP systems and the OAE systems. There are only a few optional items. We really believe in providing everything that you might need in a clinical situation but a couple of optional items include the PC. And that's because a lot of our customers, a lot of you want to use your own computer. Perhaps you're already doing VNG and you're updating your EP system for a VEMP testing, and you don't want another laptop. You can install the software onto that laptop. So you don't need one that includes a software and printer. Printer is optional these days because many people are moving toward electronic reporting and they don't physically print any longer. Amplified speakers are an option with the Audera Pro. So some of our customers use amplified speakers when evaluating their cochlea implant patients but it's certainly not routine. So therefore it's an option. Isolation transformer is another option. And we recommend that when you're connecting other equipment to your Audera Pro. So the speakers, printer, maybe cochlea implant you should really have that isolation transformer. And that's where you plug all your equipment into that transformer. And then the transformer into the outlet. And then finally, the GSI VEMP biofeedback monitor is also an option. We recognize that not all of our customers, not all audiologists perform them. So, that is also an option. And I'll give you a little peek at that right now. The VEMP biofeedback monitor is intended to be used when collecting

cVEMPs. It gives a nice visual signal that corresponds to the status or amount of the patient's muscle activity and gives a visual target for the patient to achieve as they are performing the task for cVEMP. Again, it's optional. So if you do perform VEMPs on a regular basis, it may be something to consider. So this is what it looks like. You have the EMG biofeedback electrodes there on the patient's neck. You have a tripod mounted tablet, and then you place that within the visual field of the patient so they can clearly see what target they're attempting to achieve. You are able to use one electrode on the neck to measure both the EMG and the VEMP.

So here you would connect actually to the EP system as well. And then this is actually what the patient would see. The green bar would indicate that the patients within the target, their muscle tension is sufficient. And within that target that we've set, if it's blue or outside of the orange target range, which is right here, then they're not achieving that. So even if you have a patient that's lifting their head up off a table or the bed, they do can because that's hard. It is possible to cheat a little bit by lifting the shoulders. And by using the biofeedback, the patient clearly knows whether or not they're sufficiently performing the task. Okay moving on, we include, remember that was an option, we include user manuals, user for the nuts and bolts of the software. It's kind of like an encyclopedia. So if you notice something in the software and you don't know what it means, you can go to the user manual and look it up and it'll be explained to you. Of course, we want you to read the manual. So I should stress that. And then we have an application manual that's included and that's a little bit more clinical. Where to put the electrodes, what to look for, et cetera. How to mark the waves, what the markers are. So just a guide, usually for people that are just getting started performing the evoke potentials. Quick guides. We include these with all of our GSI products, but this can come in handy as you're getting and learning this new system. Once your clinic acquires one. So it's a really nice way to step through very basically how to start a test, how to run a test. It doesn't replace the manual. It's more of a quick and simple version of that. So we find these to be very helpful especially in the beginning. So OAE, ABR, ASSR, quick guides for each of the tests modules. Okay, in summary, we've got

a nice sleek design. We have an embedded amplifier with lightweight patient cables, bedside impedance checker, B81 oscillator and the OAE probe for OAE systems. So all these things are included with the Audera Pro. So okay, let's move on to the EP module. So now I'm gonna show you how to run a test in the evoked potentials. So we include a number of evoked potential protocols. So you don't have to start from the beginning. There are some there using common parameters that most people are using. You can modify those to match your clinic protocols so you don't obtain any unexpected results. So we also include normative data for infants and adults and a variety of tests stimuli. CE-chirp, CE-chirp Octave Band.

So, the same stimuli that were in the original Audera. Some speech stimuli which could be interesting. And then the traditional click and toneburst stimuli. There are many different measurements that you can perform for EcochG area ratio as well as amplitude ratio are included. Digital filters can be applied during the collection or after the collection is over to allow you to kinda see what the wave form might look like had different filterings, filter settings been used. Block averaging, bayesian waiting, residual noise and SNR measures are included for all wave forms for both EP and ASSR. And then you can quickly obtain a wave form correlation which is a comparison of the similarities between two recordings, two wave forms. And you'll get a correlation coefficient which will tell you how similar they are. And then you can also split the wave form. So if you collect alternating polarity, you can split the wave form into its rare and con parts. And then finally, we've added a VEMP analysis module which I'll show you in a moment that assists you in analyzing your VEMP data that's included with the software. So okay, when you launch or double click on the Audera Pro icon, the opening window will appear. And this gives you a lot of information, mainly whether or not you're connected. So if you're connected to your Audera Pro, the PC is communicating with the Audera Pro you'll see a nice check mark. If not, you'll see an X. So, you know right away whether or not maybe you forgot to turn the Audera Pro on or maybe the cable that connects the PC to the main unit has become disconnected. So you'll be able to tell right away whether or not you're ready to test. Over on the left

side, you'll see the serial number of your unit as well as your patient name, if it's entered there. So you'll be able to see that straight away. When you're entering patient information, I recommend you do that from the opening screen. All you need to enter is a first name and last name. That's the only information that's required. So you can quickly go in and start testing your patient. If you are going to access the latency intensity function or normative data, then a date of birth has required. All the other information in the patient information window is optional. You can certainly enter it. If you want to enter their physical address, contact information, phone number, et cetera, but none of that is required.

Okay, also from this screen, once you've entered your patient name, you're ready to go into any of the test modules. EP, ASSR, DP or TE. So the only one of these five that's different is the VEMP icon. This last icon here indicates the VEMP analysis a module that would only be accessed after you've collected your VEMPs in the EP module, and you want to analyze them. So that one is different than the other four. The other four icons are test modules. So in this case, I'm showing you EP. So we're gonna start with that. So this is the opening screen for the EP module. And the white area is where your wave forms are going to appear. So this entire area here left and right will fill in as you collect your wave forms. So that's called the acquisition screen. At the very top is the top tool bar. This is where you could edit your patient information. You can access additional way forms that maybe you've collected. You can select your markers for the wave forms that or the tests that you're collecting. In this case it's an ABR. So you'll see one, two three, four and five in Roman numerals. You have cursors. You have a way to sort your way forms according to decibel order of acquisition or click rate, your latency intensity icon, your filter setting icon, et cetera. So that's your top tool bar. The bottom tool bar is what I call the collection tool bar. So these are all the things that you're going to want to have access to during evoked potential test. So your acquire is to start away form. So if you load the EP module, you can click on the acquire button and a test will begin immediately. You can select your intensity, your ear, your stimulus, phase, et cetera. So that's your collection tool bar. The side toolbar accesses display

options for your wave forms that you're looking at. You can increase and decrease the size of your wave forms. Probably the most important is selecting that impedance icon. And then your amplifier settings. We allow, if you look at one through nine, those are report pages essentially. So when you collect wave forms, arrange them on the page, maybe perform other tests such as TEOAE, each one of those would be a page in your report. So I'll show you what that looks like in a moment when we look at the collection. And then finally there is a scroll bar there which allows you to scroll to the bottom of the page, the acquisition page that allows you to see all the parameters for each and every wave form that you're collecting.

Okay, before I show you an actual collection, when you mark a wave form, and you do that by simply selecting the marker that you want to mark up from the top tool bar, hover over the wave form and left click once and it'll label the wave. Two markers will appear. The top mark is latency. So that's what we're looking at most of the time. The bottom marker is amplitude. So if you wanted to look at the amplitude, you would grab that marker and pull it down to the trough of your wave form. And when you do that, then you'll be able to view the amplitude of the wave form. Okay, so let's just show the video here, which will show you how a collection is run. I'm gonna go ahead and load that and start. So this is the opening window. Remember when you launch the EP module, it'll open up right to this acquisition screen. I do wanna point out that right away, the EEG is going to be active. So you'll see that bouncing around as you're getting your patient ready for the test. So what I'm going to do is select load settings, and I'm going to load the adult clinic protocol that's included. And when I do that, look at the bottom collection tool bar the intensity level is going to change. It's starting at 80 dB right here, click. This is how I would select my stimulator or transducer. And if I wanted masking, my phase is rarefaction. I can double click on my rate and enter a rate, any rate that I want. And now I'm gonna access the amplifier settings. So here is where you can alter your filter settings for your collection. So if you do not wanna use the default ones, you can certainly change them. And then you'd want to save that protocol so it has the filter settings that you want. So in this case, I have two channels.

Channel A is right ear channel B is left ear. And I'm going to change the low pass filter and both of these to 1500 Hertz. So you can see how easy it is to change that filter setting. Click okay, now I'm ready to test. So what I'm going to do is click on the impedance icon or I could use my remote impedance checker. It takes a few moments before impedance will display and then that looks pretty good. So I'm gonna go ahead and acquire my data. So right away, you can see the wave form load. I'm testing my right ear. And I do wanna call your attention here to the upper left corner where the number of sweeps and artifacts will appear. I'm looking at my EEG, which looks fairly quiet. So I wouldn't expect too many artifacts. Here you can see a nice wave five appearing there. And if I wanted to mark it, I would simply select wave five from my top tool bar.

First, I'm gonna move that where I want it on my page. I'm gonna select wave five and I'm going to just select their wave five and mark it. If I wanted to mark wave three, I just simply select wave three from the top tool bar hover over my wave form left click once, and it will appear. And then I'm going to also label my wave one. So I'm gonna pause a little bit. And so I've collected my ADGB right ear. Normally I wouldn't maybe replicate maybe not because the wave form is quite robust. But what I'm gonna show you now is I'm gonna navigate over to my pages.. Here you can see page one, two and three are kinda dark. So I know that I've already placed information on those pages. So I'm gonna show you a completed ABR series where by selecting, here's my latency intensity function. I'll show you that in the report as well. It makes a little more sense when you have more wave forms. So I'm gonna go over to page two where you can see all the way forms I've collected. Sort according decibel. Gonna make them a little bit smaller, so they fit really nicely on the page. And here you can see a collected 80, 60, 40, and 30 in both ears and marked my wave forms. I've also collected TEOAE on my patient. And I placed that information on page three. And then page one is where I've placed the text of my report. So here you can see I've got history, summary recommendations. I was able to place my latency intensity function. And when I print, I get a nice report in the exact order of where I placed the information on my pages.

Okay. So just a few other things, you can display the latency and amplitude to the right of your marker by enabling that in the software. And you can see how it looks there on the wave form. I can also view all the recording information, all my marked peaks, my inner peak latencies. If I had any other calculations there, all I have to do is select the recording information icon which is at the bottom of the side toolbar. There are two filter types, smoothing and band pass. Smoothing just simply makes the wave form look slightly better by smoothing out some of the noise. If I wanted to apply band pass filters, I can select high pass and low pass and look at the wave form as how it would appear had I used those during collection. You cannot widen them out, but you can narrow them. So if you're high pass filter, during collection is a hundred, you can move it to 150, but not 50 if that makes sense. So you can only narrow the range.

So here's a dramatic example of band pass filtering where the top wave form was collected using band pass filters of 100 to 3000 Hertz. I dropped the high or the low pass filter to 1500 Hertz. And you can see what a difference that makes. Certainly, if you're collecting this in your clinic you might wanna do a little troubleshooting because this is a little dramatic but it gives you the idea of what a digital filter can do. A quick cross correlation can be obtained by setting the cursors and you're getting a cross correlation between the two cursors. And here you can see is simply set the cursors and you can see the correlation appear. The number closer to one, the more the wave forms are or the better. Okay, moving on to the VEMP analysis module. And just very briefly, what this does is allows you to mark your oVEMP or your cVEMP and it will automatically calculate the asymmetry ratio for you. It will save the marked wave forms in the EP module and saves a report. So what most people will want. There are some other things that the VEMP analysis module can do. One of them is rectification. And rectification is a way to correct for asymmetrical muscle contraction using pre-stimulus EMG activity. So it's possible to rectify your wave forms. You can view each sweep in the recording and it also allows you to call or exclude some of the sweeps from the grand average either manually or automatically. So let me show you how that works. So here you can see two VEMPs that I collected on myself. I have the two wave forms

there that appear in my list of recordings. All I have to do is go back to the opening screen and launch the VEMP analysis module. Right away, I'm asked to select which wave forms I want to analyze. It's easy here 'cause I only have two. And I select okay and there are my recordings and I have to mark them. So I just grabbed my N1 and P1 and place it on the wave form as I want. And you can see the asymmetry ratio up at the top is automatically calculating as you move those. You can see your P1 and N1 latencies as well as the amplitude relative to zero. You can save the report and go back to the evoked potential module. There are my, that's my raw data. I'm gonna load my VEMP report. Here you can see the wave forms are marked. I can move them around the page however I want them for the report. If I don't want rectification, I can right click on that and remove the rectification and anything I want for the report as I showed you with the EP module.

Okay, now we're going back to the PowerPoint. Couple other things that we have in the VEMP analysis module is the ability to rectify. Here, you can see what that looks like. The top wave forms are unrectified. The bottom are rectified. And we know that the rectified wave forms are always gonna be smaller in amplitude. And here's the calling screen where you can see each sweep in your VEMP recording and you can not call them or you can call remains remember means exclude or manually. You can do it automatically or manually by simply deselecting. And then the wave form would be recalculated. We do include quick guides for cVEMPs and oVEMPs. So you're able to use the analysis module straight away. Okay, moving on to the ASSR module. The ASSR module is quite a bit different than the original Audera, the old Audera. So the new Audera Pro allows you to stimulate binaurally presenting up to four frequencies per ear for a total of eight frequencies. You'll be able to see a quick on-screen indication that a response is present at that particular frequency. And then you can view the data in polar plot and FFT form. So the data is displayed both ways. This is the opening screen. Their acquisition screen for ASSR looks very similar to the ABR where you have your EEG, your side toolbar, your collection tool bar and you actually will be able to see the ASSR wave forms. I know a lot of software, you don't see the

wave forms. They're there, but they're behind the scenes but you will be able to see them. And then you have your stimulus information. So this is where you can look at the stimuli and you select the frequencies that you want to test. So you don't have to test all four frequencies. You can simply test one or maybe two but you would select which ones. And they're here you can see what the amplitude modulation rate would be for each one of the frequencies. And the once you've selected your frequencies you simply select activate stimuli and the test will begin. The default stimulus starts at ADDB with insert your phones. So if you're not gonna use, you can alter that if you want or if you're not gonna use insert your phones you would change it from the stimulus dropdown menu. There are two ways to test. You can use an automatic sequence or a manual test. The automatic sequence is a starting intensity of 80 dB SPL goes down and 10 dB steps. And the stimuli are the frequencies that you've activated. The other way is to perform manual testing where you would select the test frequencies, activate the stimuli, select the starting intensity from the bottom collection tool bar and then whichever ear you're going to test, you would just select that ear on the collection toolbar. Testing both ears, you would select the right and the left icon there.

Once you've started a test, right away, you're going to see the SNR and the noise graphs. And we know with evoked potential, the longer you collect, the less noise, the amount of noise in the recording should go down. So you'll see a nice visual of that. Also once you've started a test, the stimulus information will become active. As soon as you see a green, the frequency in green, that means a significant response is present at that frequency. So here you can see present response at 1000 in both ears and 4,000 in the right ear. So that will show straight away on the screen. If you select the polar plot spectral graph icon you'll get significant more information. And this is a little bit different for those of you that use the old Audera that will show you frequency. When you look at the polar plot, it's only one frequency versus the Audera Pro shows you every frequency that you're testing in the polar plot. The vector, which is the line, the red and blue lines, the longer the vector, the stronger the response. The circle at

the end of the line, the smaller that circle, that means the smaller the deviation. And the more certain you are that a response is present. The frequency itself, so a 4000, 2000, 500 if it's in green, that means it's a significant response. Black is no response. That exact same data appears in the spectral graph. So we just take that information and put it on the spectral graph. And if you look at that, that is amplitude on the Y and over frequency on the X-axis. And you can see the red bars indicate the responses from the right ear. They're much taller or larger in amplitude as they are in the polar plot. The blue responses are a little bit smaller and then the gray down at the bottom is the background noise. So it gives you a nice visual of the response. The data table is at the bottom. And a significant response is when the signal to noise ratio exceeds 6.13. Noise of course has to be fairly low. So we don't assign a positive response or a present response when it's in fact noise. Once you're done testing, you can put the results on an SPL or HL audio gram, according to just the responses or each individual trial.

So you can easily copy that audio gram to the page or print the audio gram straight away. So here's what the audio gram would look like. Okay, moving on to TE and DPOAE modules. Both TE and DP are provided on our dare pros with OAE. So I'm gonna go through both of those. TEOAE gives you a time wave form and an FFT display of the results. It will display a cross correlation, SNR and TE amplitude for each frequency band and an overall cross correlation measure. You can customize the passing criteria and it's within TEOAE that you could record a spontaneous OAE should you want. Here you can see the TEOAE screen, which looks fairly similar to ABR and ASSR. The white area being where your TE results are going to appear. And here you can see results for the right ear and I just quickly want to show you that the gold is the response. The green is the noise. So there should be separation between the noise and the response. And then here you can see the exact values for each frequency band. So I'm actually going to load a video that's gonna show you a recording for the left ear. So I've already collected my right ear. All I have to do at the bottom toolbar, is select the left ear. My results are going to load there and you can

see the test is running. The number of presentations of the click stimulus is going to appear in the upper left corner. And you can quickly see the noise separating from the response. You can see the frequency bands 1000 to 4000 Hertz, which will show the correlation the amplitude of the response and the signal to noise ratio. Once the test is completed, the overall result pass will appear. So that's how easy it is to perform a TE. Okay, so let's talk a little bit about DPOAE. So the DPOAE module includes a number of default test protocols, normative data sets. You can create or customize an unlimited number of protocols, just like you can in the other modules. you can customize your passing criteria and it's within the DPOAE module that you'd perform input output functions. So what I've done here is load the protocols that are available with the DP module. So the default protocol is going to be a six frequency protocol diagnostic. There are two protocols that are collected using a much finer or many more points per octave, one that's 13 points and one that's 17 points.

So these are the protocols that would take a little bit longer during the test because you're testing many more frequencies. There's a couple of input-output functions that were already created and a screening protocol, which screens from frequencies five to 2000 Hertz. So all the protocols by default are high frequency to low frequencies, but that could be changed. If you wanted to view the specifics of the protocols before you get started, you would simply select one of them and down at the bottom is where you would see the specifics of that protocol. The capacity criteria, or the stopping criteria could be added to a test by selecting that, should say here I was in the general tab and now I'm moving to the stopping criteria tab. I'm just giving you a highlight. So the stopping criteria is, allows you to shorten a test if you will. So you can stop the test as soon as it passes that frequency and doesn't continue to test. Or you could also have the protocol stop once a pass is obtained, or if there's no chance to pass. So this could be used in the example of a four frequency protocol. Five, four, three, and two. If you pass the first frequency of the patient passes, it will stop the test because even if the fourth frequency refers, it still will be an overall pass. In the case of no chance to pass, if the first two frequencies refer, for example, the test would stop because it

wouldn't be possible to obtain a pass. So this is a way to make perhaps your screening protocols a little bit quicker. None of the default protocols have stopping criteria enabled. So if this is something that you're interested in, you would want to enable that for the protocols. And then finally is the default passing criteria. So all the DPOAE protocols are defaulted to a signal to noise ratio of 60 dB as a minimum to pass as well as a minimum amplitude of negative five dB. So that is also something that you are able to alter. And then finally the percent of frequencies that would need to pass in order to get an overall pass. So in this case, it's set to 70%. So what that would mean in a four frequency protocol is you'd need at least three of the frequencies to pass in order to obtain a pass. If you want to be more stringent, you might want to change that to a hundred percent, which would mean that all the frequencies would have to meet these criteria in order to pass. So that would be up to the clinician.

Okay, I'm gonna show you a video of a DPOAE. But before that I wanna kinda talk through this screen here. This is the acquisition screen for DPOAE. Here, you can see this as a left ear result and I have one frequency selected there. And when I have that frequency selected, the spectrum DP data and level are all specific to that data point. What's nice about the spectrum is here you can see, because this is a fairly nice size as greater than zero dB SPL response. At that frequency, you can see that the response here is significantly taller or higher than the noise bands surrounding it. So that's what you typically will see with a pass result. So a nice vertical line here in the spectrum indicating the response at that particular frequency. The noise is here in green, dark green. So this is the noise. The light green is actually standard deviation of the noise. So I've disabled that actually during my collection. The level you'll see the 65,55 is what the protocol is set at, but you'll see the actual levels here during the test. DP data such as the DP in a SPL. The noise floor whether or not it meets the criteria. And then the overall refer here in the upper corner will give you the result of the DPOAE as your testing. So that'll be updated continually during the test. To start a task, you simply have to select the ear. So I've already collected one in the left ear. So now I'm going to collect one in the right ear by simply selecting that. So let's go ahead and start

the video so you can see what it looks like. And I'm actually gonna show you as I select the different frequencies that I've tested you'll see the spectrum level on DP data is all going to update according to that specific data point. During my collection screen, it is possible for me to change the settings. And I'll show you that in a moment. I just my right ear. So I'm gonna go ahead and test. Do you want to stop it a little bit here? This solid line that you see here is an actually an estimate of the noise level. And then these vertical lines is the actual calibration. So you'll only see that during the beginning phase of the test. Once it runs through the calibration, the OAE will start. So we're starting, all our protocols start in the high frequencies. Here you can see the first data point, the second data point, and we're proceeding through the test. You see the noise floor appearing and the right ear results are displayed as solid red triangles.

So as I select the different data points here, I can add some normative data if I want. I did mention that we include norms, so you can add it to the collection screen or you can add it to your analysis screen. So that went fairly clip quickly. I wanna show you the icon. There was an icon up on the top toolbar that I selected which is my display or my report setting. And this is how I would be able to see both the right ear and the left ear results on the same page. I could have more than one result appear. And in that case, it would be a dashed line that would appear along on the same graph. I've already, I put some normative data there and I see my noise as well. Okay, moving on to reporting. So one of the benefits of the Audera Pro is you're able to create one report that includes any of the test modalities. So you can have an EP result, a VEMP result, DP, TE, and ASSR, all in one report. It's different than in the original Audera. It was one database, but the DPOE report would be separate from the EP report, if you will. So using the Audera Pro you can combine them into one report. So you can start with page one of your report that would have your text information, perhaps the latency intensity function like you see here. Here are all the wave forms. And this reflects the data that I showed you in the video where I have a threshold for click. I can simply load my TEOAE results onto page three of my report. And if I wanted, I can put an image of the DPOAE result right in the page as well. And then last of course, is the whoops, I

didn't put it here but you could put the ASSR audiogram as well. Most of this, you would load up the EP or the TOAE module, and then simply select the different test types that you want to include in your report. So in summary, the Audera Pro is a clinical evoked potential system includes OAE TE and DP, ASSR. We include a comprehensive battery of test types to get you started. And it's very quick and easy to collect the data. I do also want to say at GSI, we are committed to training. So we have many individual trainings that we offer on each one of the modules. Some are very just overall general. Some are just very specific such as how to create or save a unique protocol. And we know how important it is that you access all the features that are available to you to help you during your tests situation with your patients. So we wanna make sure you have everything you need.

Thank you so much for tuning in. Please feel free to email me or call me, text me if you have any questions and be sure to look at audiology in line, as well as our website for additional training opportunities. Thank you.