

Rough Edited Copy

Cochlear Americas  
CA-CAN Chapter Meeting  
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>>SPEAKER: Good morning. My name is Sister June and if you can't hear well you can look at the board. It is large enough?

If you need to you can move forward. There is a Saturday over here.

>> She is coming back.

I am Sister June and this is Brian and we are leaders of this group and we meet monthly and I see new faces.

What we will do is go around very quickly and say who we are and what kind of implant we've had.

Laurel is a cochlear audiologist and she will speak today about how to understand our map and programming and we have time for questions and answers.

I am Sister June and I have 2 cochlear implants. First in one996 and second in 20one0 and less than a month ago I upgraded to N 6 and it is great.

>> My name is Brian Gallat. Also 2 implants. Since 20oneone.

>> I have Terry Gains and I have not had implant yet. Zone of secretary.

>> I am his wife and I am with him.

>> So they can hear.

>> I have one implant, 2 years. Very good.

>> My name is Jean and I have an old implant in this ear, one996 I hope to upgrade as soon as they come out. I was just bilaterally implanted 2 weeks ago and I was just turned on Thursday. So this is my first challenge with this side.

I live alone. The dog doesn't talk much. You have to be around people, it is sort of different.

>> My name is Brian and I had mine since 09 and I have the freedom cochlear.

>> I am Fred and I have a cochlear nucleus 5 on the right hopefully to get up graded to

nucleus 6 soon.

>> I am Renee, I am here with my mom to hear, so is my sister. We want to learn about nucleus 6 and how to go about with the upgrade.

>> I am Ruth I've had my 5 for 5 years and I am hoping to upgrade on mine.

>> I am Dottie, I am here to help hear and understand also.

>> I am Peggy, I get my first cochlear implant next Friday. I am single sided deaf.

>> I am Michelle and I have one on my left ear, nucleus 5.

>> I am sister Marie and I had experimental hybrid in 20oneone. When the hybrid was approved I was upgraded to the N 6. Now I am getting used to that.

>> I am Lillian and this is my first time being here. I can't hear, I don't know what anyone is saying.

>> My name is Neal, I wear a Baha device and I have worn it almost 5 years so I am counting the days for my upgrade, first week of February of next year.

To jump back quickly, the lady with your 2 daughters. You are very lucky you have that support. That is the most important thing you can go through with this, to have someone holding your hand if necessary. That is a huge -- that is a huge plus when you go into any type of upgrade or whatever you are going through.

>> There is a lot to learn.

>> Exactly. I just thought I had to say that. It is so important. Some people go through it alone and if at all possible, you don't need to know a thing about the process, you just have to be there for your mom and who ever would help with that. I think most of us would agree with that.

>> This is Howard --

>> I am Howard Stork. I had this ear since October of one4.

The right environment I am okay. A lot of voices I can hear. Some I am in left field on.

This is my entourage, 2 more back there. It is nice to see you folks.

>> Nice to see you.

>> I am Bev and I just had my first cochlear the middle of July and activated the end of July. I am learning everything and I believe I had the hybrid, nucleus hybrid I believe.

>> Do you have something in your ear? A processor? Then you have a hybrid.

>> I am Mona Stark and I am here with my husband to find out more about the implant.

>> I am Barb Stark and these are my family, my husband Jim and Howard. We are happy to be here and learn a lot.

>> I am Dave and I have 2 implants in 20one2.

>> I am Ron and I had cochlear implant in February of 20oneone. It is not doing a great deal for me but I am here to see if anything new is going on. I had nerve damage and that is probable caused -- maybe it wasn't wise to have the surgery.

>> I am Lisa and I am a cochlear implant audiologist at the university.

>> Welcome. Before we have Laurel begin her presentation, I want to make sure that everyone is aware of this gathering that is going to be held in October. There are some flyers over there. It is a family reunion where you can meet other people. It is at the zoo.

I would like to invite everyone. I will pass these around and take one or 2 of these.

When hearing aids isn't enough. Everyone here knows someone with a hearing aid having trouble. This is a piece of literature you can give them. We will pass them around and you can spread the good news.

At this time I am going to turn it over to Laurel and she will present for us. At the end she will entertain questions about her presentation. If some of you have questions about the upgrades and another gentlemen wants to know how to get his secure. All of those questions are possible.

>> LAUREL: Hello everyone. Thank you for coming today and I would like to introduce myself. My name is Laurel Olson, I am audiologist by training but I support the clinics that place cochlear implants and Baha devices. I work on audiological side and surgical side.

If you cannot understand what I am saying. Please remember you can read the words on the board. I want to make sure everyone gets all the information. Especially Lillian. If you can't hear or understand me make sure you can -- can you see that to read it? Can you see it?

>> We can

Sound enters the ear, we use ears to listen and it is gathered by the Pinna. The sound waves go through ear canal and cause the eardrum to vibrate and it vibrates 3 bones in our inner ear. Those bones are now moving. Those push on the cochlea and then there is fluid within the cochlea and the cochlea is the hearing organ. That causes the movement to displace and the cells then activate. That activation sends response to hearing nerve. That is the pathway of natural hearing. A mechanical signal that transfers to electrical signal once it hits the auditory nerve.

Does that all make sense? Any questions about how that signal goes through the natural pathway.

>> What about the hairs in the ear, I thought that had something to do. I call them the hairs?

>> Hair cells?

>> I have seen pictures where it shows the shorter hairs do the high frequency sounds.

>> They are within the cochlea. The snail like -- inside, it is categorized like a piano. High pitch to low pitch. The hair cells are in the cochlea. Great question.

Now that we know how natural hearing works, let's talk about the audio gram.

How many people know what an audiogram is? Pretty familiar with it? You can probably tell me this slide. Humor me, let's talk about it.

On the X axis you will see frequency. That is pitch. That is the -- if you think about keys on a piano you have very low sounds and very high pitch sounds. Low sounds being like a fog horn and high pitch like children talking.

We want to know as audiologist how well you are hearing each of these pitches.

These pitches make up speech information. When we talk about cochlear implants, the main goal for us is to make sure that you are able to hear speech well.

So, we are testing all of these different frequencies for that purpose.

On the Y axis you will see that we are looking at a DB level. That is decibel and that is loudness. We want to know how loud to make the signal at each pitch. It could be different at each pitch.

If you have noise induced hearing loss and that was the reason, you may hear low pitch sounds really really well but high pitch sounds we have to make it very very loud for you to be able to hear it.

Once we get this information we have a chart that shows us how well you hear at each frequency.

You will see in later slides after you get your cochlear implant we want to know how well you are hearing at each pitch. We want to compare before and after to see how well the cochlear implant is performing. Not just words but beeps too. If we play a low tone or high tone, are you able to hear those at a normal soft level.

The gray shaded region you see up here (Indicating).

That is what we call a speech banana. That is where most of speech lies. We know that words are made up of different phonemes and sounds. The SH sound is a very high pitch sound. MMMM is a low pitch sound. Our goal is to make sure you hear all

of those sounds at the audible levels they are. That is the gray shaded region in the picture.

I know most people here have cochlear implant but I am not sure we all know how it works exactly. Let's talk about how the cochlear implant is actually working.

Remember we talked about natural hearing and the pathway. We are changing that quite a bit when we talk about electrical stimulation.

Sound is picked up through the microphone of sound processor. You will see you have 2 black dots on the processor. On the spine. They are the microphones and that is where sound is picked up.

The sound processor has a chip inside that analyzes the sound and tries to clean it up and make the most of the speech signal present and reduce the background noise. It is not perfect, we know it is not perfect, but that is the goal of the speech processor.

Clean up the signal a bit.

The signal is then sent through the cable to the coil. Which then sends RF signal across the skin to the internal implant. There is a magnet on the outside and inside and that is how they connect. But the way they transmit information is an RF signal. When you take the coil off and there is nothing on your head, you don't see anything. When you put it on those antennas are communicating.

Once the information gets to the internal implant it is then sent down to the electrodes within your cochlea. Those fire and they -- we are bypassing all of those steps we talked about with natural hearing. We are bypassing the external ear, middle ear bones and also the hair cells.

>> How about the process to decide which electrode to send it into?

>> There is a multi-step process. When sound comes in through microphones that signal is processed one way. So what directionality mode to use.

Once that signal gets to the next level, we look at all the channels and so there is a broadband control. All channels we will increase or decrease the gain for all the channels. There is 3 different what we call automatic gain control parameters. Slow, medium and fast acting. For different sounds, like door slams, slower sound.

There is a broadband gain control. Then there is a filter. Another filter by electrode.

On a per channel basis it will make decisions which electrode to file based on noise ratio. A lot of noise in the electrode. If not it will not choose that one. Same with wind noise reduction. If wind noise is in one of those electrodes it will not stimulate those. Then we have the coding which is ace. That will pick the most salient channels after that process is done. It is multi step process where several decisions are based on environment. A lot of those are new. Scan is doing the front end manipulation whereas before you would have to change the program to determine which microphone directionality you want.

>> Great answer.

>> I have a good slide to show you that may better explain it. And videos.

I think we kind of covered how cochlear implant works. Anyone have any questions about natural hearing versus how a cochlear implant works?

So, let's talk about pitch. The cochlear implant delivers pitch. Anyone remember what I mean by pitch?

>> Hi and low.

>> Yep. I want to make sure you understand the concepts. Pitch is a very important concept. Think about kitchen think of keys on the piano. High pitch versus low pitch.

Anyone play an instrument? Nobody? What do you play?

>> Piano.

>> I used to play trumpet.



>> Used to play violin.

>> Great. There is low pitch and high pitch. It is the same scenario when we are mapping a cochlear implant. We want to know which pitches you are hearing and what pitches you are hearing well and how we can adjust. We want to make sure you are hearing pitch differences.

They deliver pitch in 2 ways.

Remember I said the cochlea is organized like a piano. High pitch to low pitch as you go inside the snail shell.

>> I don't understand, when I have to go in for mine and why the pitches I have, they vary over a period of time. I have to go back and have my cochlear implant mapped over again.

>> The volume or pitch?

>> Sometimes I can set the volume -- too loud from originally set and I have to go back and map it again.

>> Does it get louder in certain situations?

>> I would say yeah. Then my volume rate, I have it all the way down to the bottom because it is too strong for me. Does that mean that something is going wrong with my nerve function or --

>> Sometimes what happens is in the quiet environment of testing, everything sounds great because it is quiet and no one talking. Then you go home and everything sounds good. Then you are in a restaurant and all of a sudden there is a lot of noise and it is loud and you can't understand. It can be very uncomfortable. I have heard that recipients will leave a situation and have the discomfort and feel the need to turn down the volume. That is okay. It doesn't necessarily mean something is wrong but we

want to make sure it is comfortable in every situation. Whether it is quiet or loud environment, we want to make sure you have a program for all of that. Whether it is an automatic program or a program that you change. We will talk about some settings you can change like volume and sensitivity to optimize hearing in those situations instead of just taking it off. We want to make sure you are hearing those things but don't want it to be too loud.

>> She had my high pitch so so high if you grabbed a bag or my husband did something in the kitchen, I couldn't stand it. I had such a headache. She had to come down on the high pitch for me a little bit. If I did the volume, that was not good it just made it worse. It was just the high pitch that was better. Right now it is great. She just brought the high pitch down. I can bring up the volume when I need it.

>> That is a great point. Many times when patients are implanted it is the high pitches they have been missing 20 plus years. If you haven't heard those in so long, even the plastic bag moving can be so uncomfortable. As audiologist we want you to hear those sounds but you won't get used to them if it is not comfortable. The goal is to make it comfortable and get you the sound you need.

>> We have to go every 6 months, I am sure everyone does. They reprogram and she listens for the beeps and if that has changed. If it changes over time, does that mean your brain is adapting over this and you hear more sounds and more range. So it has to be changed every 6 months?

>> Not every is seen every 6 months. It depends on your history and how much your maps change. People with health conditions, the fluid in your bone is -- if you have auto immune disorders it will affect that. Sometimes they will bring back those patients on a more frequent basis. Or if the settings are not quite right. They can't get feedback they will have patients come in more often. There are sometimes reasons for

that.

Absolutely your brain adapt over time. Many times with adults, after a couple years, really, unless there is a health change, things can be pretty stable.

So, the cochlear implant delivers the pitch information in 2 ways.

The first way is location. When we talk about pitch. What was my analogy for pitch?

>> Piano.

>> I just wanted to make sure we got that concept.

If you think about the electrode and where it is going. It is 22 electrode contacts all around the snail shell design. We are going high pitch inside all the way to low pitch. It is organized like piano keys just in a circular shape.

We put the electrode in and we know certain are allocated for low pitches and certain ones for high pitches. In the software we know which is which.

The other way we can deliver pitch is by stimulation rate. Sometimes when we trouble shoot complaints with cochlear implants we change rate. We can change rate for different reasons but it can also change the pitch. If you think about our typical rate is 900 hertz. We change that to 250 hertz. Think about the piano. If 900 is the higher or middle end and 250 is low. Do you think changing the rate from 900 to 250 is going to make the sound higher or lower pitch?

>> Lower.

>> Exactly.

So we sometimes will change rate but then the patient says it sounds completely different. Of course. It will sound different but we are doing it to alleviate a complaint typically.

2 ways to deliver pitch information is the location of the implant electrode and also the rate of stimulation.

This is a picture (Indicating) of what the programming software looks like.

You can see from the picture that this is a right ear because the tab is red. In audiology we have color codes for each ear. Red is right and blue is left. From this screen I can tell it is a right ear.

The name is also in the tab and it looks like this patient has a freedom implant contour advance.

Like I mentioned there is the organization like keys on a piano and it is like this in the software as well. So when we program we can see where the differences are and where the behavioral responses are going to be.

So, in the software you see there are 22 bars in the middle of the screen. Do you see the 22 bars? What do you think those are?

>> Pitch

>> Exactly.

Do you know how many electrodes there are in the implant you have? 22.

Each bar represents one of those electrode contacts and the frequencies it aligns with.

So, we know that electrode 22 from this graph, which I know you can't see, but say electrode 22 has the pitch representation of one88 hertz to 3one3 hertz. So, is 22 a low pitch or a high pitch electrode?

>> Low.

>> Exactly. That is how we know how you are hearing low and high pitches because we see the information in the software.

Any questions about the layout of the software from low pitch to high pitch?

>> one of the first things that is done when you are seen is we run impedance.

Remember if you get sick, flu, auto immune disorder, all of these affect the body systemically. When we run an impedance it tells us if there is open or shorts with each

electrode. That is important to know because we would want to take that out of the map.

Open and short happens. Open means a wire is broken. A short means 2 wires are touching. We don't always know why it happens but open and shorts happen occasionally. We take them out of the map and the frequencies or pitches are reallocated. You don't lose information from an open or short, we reallocate all of those to make sure you heard everything you heard before.

Not only do impedances tell us about open and shorts but how things are going with the surrounding tissue environment.

If we see the impedance went really really high, we may ask if you are wearing the device as much? Have you been sick? Anything change with medications? Health? That is why we are asking those questions because we want to better understand. It looks like the fluid in your cochlea is changing. We will have to make mapping changes and we want to understand if it is temporary and how we can best program around those differences.

That is the first thing that happens.

Typically, in adults, the second thing that is done is we measure T levels. -- let me back up a second.

Many times if you had lots of experience with your implant and this is a routine important. We want to know how you are hearing when you walk in the door. We will listen to the device. We want to know how you are hearing. If you are hearing well, we are not going to make a lot of changes. That make sense?

Okay.

So, that is the progression of things.

Back to programming:

When we measure T level and C level. T level is the green dots you see on each bar. That indicates the softest sound you are able to hear. So when we measure T level, there are a couple ways that can be done.

one way is we will have you count how many beeps you hear. They will be very very soft, but if you are not sure guess. Much like a hearing test where it gets softer and softer. You may hear 2, 3, 4 beeps. We won't show you the screen. We want to know how many you hear so it is accurate representation of how many you hear.

There are 22 electrodes here. It is not always necessary to measure each one every appointment.

We can extrapolate some of this data. Sometimes they will choose to measure 5 or 7 electrodes across the spectrum and sweep at the same level to make sure everything is the same loudness.

So, one way that the audiologist may measure T level is counting how many beeps you hear.

The other way maybe giving you a loudness scale where it says very soft to very loud and you point to where it is on the scale.

Anyone have any thoughts or experiences about having their T levels measured or questions about T level. Again, this is the softest sound you hear in your map.

>> What you are saying is making sense from what I have experienced. Now I know what is going on in the mapping. This is helpful.

>> Good.

>> I am brand new and it will be 2 weeks Monday. When I went for my second mapping, T level at low pitch. I don't really hear them but I feel them. They say there is no vibration there, that is how I interpret it. Can you explain why -- we know why -- it is sensation of vibration instead of sound and is that something that changes

as my nerve gets more and more stimulated and used to it.

>> Did you have that at the C level too or just T level?

>> A little bit at both, at the low pitch.

>> Many times we hear that complaint when a patient had a long duration of deafness.

>> Yes.

>> It is hard to predict what will happen but typically over time that will resolve.

Sometimes it doesn't. That is typically what we hear for pay she wants that have a long duration of deafness. I think it is worthwhile to -- I don't know, are the electrodes still in the map?

>> They are in.

>> Do you feel the sensation every time people talk?

>> It is lessening.

>> Perfect.

>> At first I was -- I could take it off but especially low pitch sounds I would be -- my neighbors thought I was drunk for a week. It got better, but you are still just vibrating. There is nothing vibrating. I can't comprehend what is going on -- if you go zzzz, how that feels, that is how it feels inside. Although she says there is absolutely no movement.

>> That is true. Typically when there is a long duration of deafness. That part of their brain isn't allocated for sound and the brain is changing the mapping of what it is processing.

The best way to know if it is getting better is your report and it sounds like things are slowly changing. I think that is the best predictor of will this actually go away or not. It sounds like things will progress and maybe one day you will hear pitch information from

that instead of the vibration. That is a common complaint for the duration of deafness that is extremely long.

>> I have a question too, my mom only has -- she is deaf in both ears but has cochlear in one. About 6 months ago she was hearing like a bug zapper. The doctor said it was the vibration of the tube in there and how can that be if she is deaf in that ear?

>> Is there a pressurization tube?

>> No. He said it was the vibrating but she is totally deaf in that ear.

>> I don't know if I know what that means.

>> We didn't either.

>> She said it was keep her up at night.

>> Was there an ear infection at all?

>> It could be the change of hearing in that ear and maybe she has sound now. I don't know. I am not a physician but it may be that the hearing maybe changed in that ear and it gave her the perception of something vibrating.

>> He said it was like a trimmer in that ear.

>> Do you still have that?

>> I don't.

>> It went away. It was for several months.

>> Maybe some type of neuritis.

>> She went to regular doctor and ear doctor and he said it was a trimmer in the ear.

>> I will have to deter medical questions. I am an audiologist and I wouldn't want to give you wrong information. I don't know the answer and I would refer to a physician.

>> Mine is about hearing pitch. I am wondering if the processor has effect on my brain.

I have been noticing the last year when I am driving and park, without conscious awareness my turned slightly to the right. I have the cochlear in the left. Is my brain



trying to compensate. It is questionable to me.

Secondly, I wonder how often, I haven't seen a doctor since I had it put in in 2005.

Sometimes I get soreness in the scalp. I don't know if arthritis or -- I was wondering if I should have it checked out.

>> I would say anytime you experience any pain, soreness, redness, inflammation.

Anytime you suspect pain around the implant I would recommend you seeing your physician. It sounds like you have not been seen since 2005, is that right.

>> I have not seen anyone except my audiologist.

>> If you experience pain you should see physician if you think it is implant related.

>> Are you saying family practice or --

>> ENT surgeon. Gosh, I think you bring up interesting point. You are turning your wheel to the right but you have a left cochlear implant, I don't know the answer to that question, but I do know that the sound gets to your ear but the brain is what really hears. What happens to the sound after it hits your brain we don't know. It is different for everyone. That could be something unique for you that your brain is doing.

Interesting observation.

>> Seeing all the patients, she is one with the implant, I am not. She says I am deaf but -- if you see so many people and everything, it seems like just in the short time she had it, her brain is really firing and learning all kinds of things.

Do you see different situations where you can tell the mind is playing tricks. It sounds like it is coming from an ear when it is coming from the other side. She is able to do things with the ear even when the implant is out. She thinks it is coming from that side when it is obviously not. Hold the phone up to the deaf ear when the implant is not in and it sounded like it was there. It seems like it is playing tricks on her from side to side.

The bug zapping sound could be a trick the brain is playing because the some fluid difference or something.

>> There is a lot of new information that happens when someone gets a cochlear implant. I don't know if there is any research that says this happens but I think -- when the brain is overcome with all of this sound a lot of is happening.

>> There may not be research in a book but you see a lot of people.

>> I have not heard of that. Lisa, maybe you have.

>> You have a different scenario because you have hearing in your other ear. It could be localization. A cochlear implant is fantastic but it is not as good as normal God given hearing.

That could be the case. Or there is cross over hearing. You have good hearing in one ear and if it is loud enough it could go to the better ear.

>> She was back and forth and plugging and unplugging the ear. It seemed like it was coming from the deaf side.

>> I notice with my Baha on my left side that I have no sense of direction if someone comes up behind me. I have people that deliberately do that to me.

>> That is not nice.

>> It is frightening. Even like a -- not even knowing I am wearing this device, come up behind me, I don't think intentionally. They are talking loudly and all of a sudden it is extremely loud and it is like the noise that you make when you pop a bag. That quick sensation. Your brain can't tell you where it is coming from and you look around and that is the frightening kind of -- I think that will ever go away. It is something I have to kind of learn to live with.

Last night I put some stuff down getting ready for this morning. I have handheld radio and I put my baseball cap there and I turned around and all of a sudden that sort of slid

off the table. It took me 5 minutes with my back turned to figure out what caused that sliding noise.

I went all through the house. Backyard and everything. I came back in and the cap and keys and everything slid off the table. It is a new experience. I have been wearing mine since 2009. You think you have heard everything but it is always new.

>> Yeah. To Lisa's point, if you have a lot of hearing in your other ear, my hypothesis maybe that you have been localizing with your other ear so long, you have been using that side and that part of your brain so long and now you have an implant and all of this stimulation and maybe your brain is trying to integrate those signals. It can be confusing for a while because the brain is trying to switch over but hadn't quite made the switch yet.

>> I think when I don't have my good ear blocked I can hear almost perfectly with my -- this implant is fantastic. When I go just to the implant can't understand anything. I think my brain is meshing president 2 sounds.

>> You are making progress.

>> I know it will get better but your mind does play tricks on you. You are hearing 2 completely different things.

>> That is a good point.

>> When my mom first had hers she was hearing double. Lisa said she was reading lips for so long and the implant hearing but also reading lips so it was like repeating. It took a while for that to go but it is I guess the brain trying to adjust.

>> There are so many complaints when people are just activated. We see all of these great videos. In reality the activation day is the worst hearing day. No one shows that in the video. I love the videos and they make me cry. But activation day you should have very low expectations for. There are people that hear speech on activation day

but that is the significant minority. Have appropriate expectations. You will hear bells, noise, whistles. It will be Mickey Mouse speech. It will not be how you remember it. If you have the appropriate expectations. That is what we struggle with all the time. It can be a really great thing but know it takes works. Brian and all the volunteers always talk about how much their rehabilitation process is key to success with a cochlear implant.

>> Pertaining to speech. I don't know what it is about my speech but people say I have an accent. They think I am a foreigner. I don't know if it is due to my hearing. A lot of people will ask me where I am from. I went to look at a house and a realtor said you have the most beautiful accent where are you from. I said I am American -- I always wonder why cochlear America, when you buy -- you get your upgrade. They request you send back the one you have. Why?

>> Did you do a trade in or just buy?

>> Buy. If something goes wrong with one they will send another but they want you to send the one you have back to them. Why?

>> If you have a problem with your processor and you send it in and they will send you back. It is an exchange. If you upgrade, you can usually either get a discount by turning in your sound processor or you don't get the discount if you keep it.

>> Mine was paid for. I kept it. I have a spare and upgrade too. But I wonder why they are so --

>> Like if she needed a BTE controller -- you are talking about your old one.

>> Right.

>> Like if it is under warranty.

>> If she goes through insurance. I don't know.

>> I will have to answer that off line. I am not sure of the scenario. If you are in

warranty and have a broken processor or component. Cochlear will send you a new or refurbished component.

>> They probably want the inventory so they can refurbish it.

>> The few times I had a problem with my Baha or perceived there was a problem. I took it back and they have a spare and they give it to me right away. Now, obviously, you cannot do that with all of these other types that are done.

Mine is very simple. They have another one there and give this one and mail it and I keep theirs for a few days and it comes back.

It has worked well for me.

>> Let's go back to mapping. We talked about measuring T level. Do you remember what T level is? Soft sounds. The softest sound you can hear. We can measure that a couple ways. We will ask you to count how many soft sounds you hear. Even if you guess that is okay, we will know how many we present.

We may give you a chart and say point to the level of sound you hear. Soft, medium, loud, too loud? Those are the ways we typically assess your T level or the softest sound you can hear.

As a side note the T level is very very important because when we measure your tones in the booth, remember we will measure this again after your cochlear implant is placed.

The T level shows the softest sound you can hear at each pitch. If we see problems there we will go back to T level and make adjustments.

How do we measure the loud or more comfortable sounds you should hear.

The red dots you see on each bar are the C levels or most comfortable levels.

Those are typically done -- measured with a loudness chart or your behavioral information. We will ask if it sounds comfortable on each electrode. We don't necessarily have to measure each electrode, all 22, we can typically measure 5 or 7

and sweep across all electrodes to make sure they are all the same volume.

There are instances we will measure each electrode but it can be done either way.

I also wanted to comment that every mapping appointment for every individual is very very different.

So, just keep that in mind. If you are talking about someone else about their mapping appointment and they say we did this first or made these changes. Remember every patient will have the same changes or same programming appointment as another. So we have taken into consideration your overall health, past history. Impedances and how you are responding to sound and a lot of different variables on how those mapping changes are done. Keep that in mind.

>> My daughter works with special-needs children and she has a child there with cochlear implant. How do you check children that are very small and can't tell you.

>> The best way to test a cochlear implant and get information is by behavioral feedback. We want to know what you say, how are you hearing? That is the gold standard. There are times patients can't tell us. We have a tool that is called neural response telemetry. This doesn't rely on behavioral feedback and sometimes kids even with developmental delays can respond in global ways so we can use NRT in addition to their behavior. If we increase loudness they may blink more or vocalize more. We use those cues as well.

>> Their tone and pitch is based sole on their testing? They cannot tell you if something is too loud or anything like that?

>> What do you do with a brand new baby. Do you start very low and gradually build up.

>> Yeah. Start low and use NRT. A baby at one2 months can give you some feedback. We are seeing those babies typical Leon monthly intervals and those babies

as they grow give you more and more feedback the older they get.

The audiologist will try to get behavioral feedback every appointment and still use NRT.

It is like building a case for more and more information, the more you see that kid.

Typically we can get some type of information. If we can't we rely on the automatic response from the software.

>> I have respiratory problems I have been taking antibiotics and steroids for about a month. It really affects my hearings. I have CD books that I am supposed to listen to. I can't keep up. I lose where they are reading. I am hoping that when some of this infection gets out of me I will be able to do better.

>> I commend you for doing all of that work despite how sick you have been and with all of those changes. Congratulations for working so hard even though you are going through a lot.

Your overall health is important.

If you find the books are too much. I don't know what books you are using but don't take offense to this. But sometimes if you even use --

>> It is books I get from the library. At first I had my niece, she would come and read to me and then I would repeat.

>> That is fantastic.

>> That wasn't so bad. That was better.

>> That is a great idea.

>> Now I am doing these CD's with the books.

>> If you are by yourself you can also choose children's books. If you feel like some of those --

>> They are children's books.

>> You are doing everything right. I don't have any more recommendations for you.

You are doing everything right.

>> I hope it gets better.

>> The more you work the better it will get. But you have to take care of your health first, that is the most important thing. Don't beat yourself up if you don't get all the things done you want to get done in one day.

>> Is everyone comfortable with T level and C level. These are 2 things typically measured at most appointments. We want to know if they changed over time and if they are still comfortable? If you are seen routinely every year and there have not been many changes, the audiologist may not change those. Sometimes there is a need to make changes because the patient came in. If you are performing well there is no need to make changes. You can talk about rehabilitation and new accessories and other ways to help you hear better. Don't think there is something wrong if no major changes are done.

What is the purpose of mapping appointments? There are a lot of things we want to get done in a mapping appointment. You may not realize all the things the audiologist is thinking about while you are in the room.

They want to make sure the status of your equipment is good. You may come in with a complaint and it is up to them to make sure the processor, cable, coil, magnet, battery, remote, how often you are using the device. They are thinking about all of these things when you come in. Remember, you probably come in and start saying, I did this and this and this and blah blah blah blah. They are taking in all of that information and they are also thinking I need to make sure that as I hear a complaint I need to make sure this is working, this is working, this is working. Not only are they taking in the information you are giving them, they are trouble shooting and trying to think of things at the same



time. Keep that in the back of your mind. They will check the status of your equipment. Typically you would know if it is working I guess.

If there is an issue, they can use back up equipment to trouble shoot that.

Determine the optimal level of your stimulation. We talked about the comfortable levels for you. Maybe you will come in and say it was comfortable when I left but in noise it seems too loud. Adjustments need to be made at that point.

Review the care and use of your device. At the initial activation appointment you get this big suit case with a million things in it. It is overwhelming. I would not check all of that information is talked about at the initial activation appointment. Whether you have an upgrade or initial activation. Don't feel slighted if not everything is discussed. Not everything is talked about because it is just too much. Whether it is upgrade or initial activation we will focus on how you are hearing and then we will get to everything that comes with it.

Evaluating your performance is one of key things done at most appointments. This is so important because things can change. Whether your health is changing or whether the device is changing or the processor is changing and would he need to know what is going on and evaluate your performance. Listening to words helps us determine what is going on.

A lot of times patients will come in and say I am not hearing as well as I used to. What does that tell us about what we can do next? It doesn't tell us much. We need to know what it means exactly. You are not hearing well in a quiet situation? A noisy situation? On the phone? Is it sometimes? Do you feel like your hearing is fluctuating?

When patients present with that complaint we have a million questions to have after that.

When a patient says I am not hearing well we have to go back to data. I will be the first to admit data doesn't tell the whole story but it is what we have to gauge your performance over time.

If you were getting let's say, 76% on sentences last time and you come in and say I am not hearing well. We test you and you are getting 86% this time. We have other questions to ask.

What situations do you feel like you are not hearing it.

It is not that you are not believed. We have to figure out what environment exactly that is bothering you. In quiet you are doing well. Let's test you in noise. Performance is about the same in noise but maybe since you are doing better in quiet and doing exercises. Maybe you are feeling you should do better than this. How can we optimize your hearing in noise. The mini mic, phone clip. How are things with accessories. It leads us down a different path.

Know, when we evaluate your performance it is usually in quiet. Know it is noise. It can help us identify where you are having difficulty and helps us over time. We can say this patient has a history of 76% every time and now it is 20%. Something is going on. Something has changed. Or maybe the quiet environment has been the same but the noise score has changed significantly. Why would that be? That is where the audiologist will do trouble shooting and try and figure out why that is. We are looking for the greater why behind the complaint and the evaluation of your performance really helps with that. I know it is probably not the best thing to do when you go into an appointment but it is so valuable for us with complex cases and trying to figure out why things are happening. It is also good for cochlear because it helps us to get better from documenting this information.

We want to make sure you are making the most of your I am planned and that is

rehabilitation and what you are doing at home, are you getting sound? Are you in quiet environment.

We have data -- how you are using the implant and environments you are in. It helps us to guide the conversation. More counseling tools are available in the software.

>> Not been determined but long range use of this implant, what are the risks?

>> If you have an implant your whole life, you mean?

>> one0 years, maybe one5 -- it is giving electrical impulses next to your brain and body. What affect does it have on your body.

>> Good question. Cochlear implants have been around since the eighties and some still have the same implant. We don't anticipate there being any long term ear related issues. Medically there has been no known issues

>> Physically? Mental and physical? You have electrical impulse -- not that I would give it up. I like hearing again. That is often in my mind, you know.

>> That is a good question. Because implants have only been around X number of years. We don't have hundreds of years of history on cochlear implants. We can't say for all certainty there is 0 risk. But what we know about electrical stimulation and how it works we don't anticipate physical or mental global effects over time. I hope that eases your mind a little. We are looking to the future and making the electrodes better and there is nothing within our research hub or cochlear implant research that points to long term effects physically, or related to the ear.

>> They are not keeping bookkeeping on it anyway, how would they know?

>> If anything we are trying to work on surgical techniques and ways to preserve more hearing and be less traumatic and -- I think there is definitely research moving toward the direction of the betterment of sound quality but nothing that has supported long term detriment.

- >> In research, you are at 22 electrodes, in the 80's I think there were fewer.
- >> There was always 22 but the first house implant had one change.
- >> I am curious about the 22 electrodes, that number. Is that because that is how many fit on the wire or did they go through ranges --
- >> Over time, all electronics get smaller. Is there a point in time the electrodes get smaller and you could end up with one28 or 256.
- >> That is a great question. I think it would be cool to see if patients would do better with one28 channels versus 22. We are not there yet.
- >> The cochlea size doesn't change.
- >> Are not those 22 electrodes based on normal hearing? What we have with none of these devices, that is the normal hearing.
- >> There are hundreds of thousands of hair cells. The hair cell function, there are hundreds of thousands of hair cells and we are asking 22 electrodes to replace that. While cochlear implants are really good it is not the same.
- >> I wonder the physical limitations of all of this. Look what has been accomplished in the last 8 to one0 years with blue tooth. The little devices you wear. That is a fantastic technology that one0 years ago we wouldn't even have thought about that.
- >> I can say that -- as far as I know and I am not at global headquarters where all the research is done. It may be on the horizon. They may be testing smaller electrodes in a smaller space. We are also making the array smaller and thinner. The smaller and thinner we make the array the less room we have for electrodes. Research those that patients do about the same with 8 electrodes. Theoretically, we don't know if 40 electrodes would make a big different over 22.
- >> There has to be a reason they settled on 22. I am just curious what that reason is? Like I said things get smaller. Gates said in the 90's. 20 megabytes is all anyone

would every use. Now we have thousands.

>> I don't know why 22 is the number picked. I am sure there is a good reason. I would say 22 is the most electrode contacts of any other cochlear implant on the market. Research says you only need 8. If it was my family member I would want the most.

>> At least the best. The right one.

>> Yes.

>> Do you have samples of the wire that goes into the cochlea?

>> I do in my car -- I don't have the actual -- I have a demo of the internal receiver stimulator.

>> How thick is the wire that goes in?

>> About 4 millimeters.

>> Is that about like a hair strand.

>> I can run to my car.

>> When Dr. Samy was here a few months ago. He told how quickly he can implant that wire or that cable down in the cochlear. It was minutes. Like one minute or something like that.

>> What he was saying is, when he actually, he drills and the operation can take one to 2 hours. There is drilling involved but when he places the cochlear implant electrode array, the cochlea is a -- kind of like a tube with sections. We want the array to go in the bottom section but there is a layer of tissue that is about 5 cells thick we are trying not to puncture. When he says he takes a minute, he tries to insert in a minute so the fluid doesn't get displaced and break that tissue. He inserts something this long in a minute. So the fluid doesn't displace and cause structural damage.

>> To him that is a long time. That is like watching paint dry. When you are thinking

about something this long -- it is a long time.

How do you prepare for your appointment? You probably didn't think you need to prepare anything but it is good we talk about this.

I can't tell how many times I have seen recipients and they said I have had this complaint probably 6 months. Back up. As soon as you have a problem, don't hesitate to call the clinic or cochlear directly. We don't want you to wait because it can be something else going on. Maybe with your overall health. Be proactive about your implant and everything. Call if you have a problem. Don't wait. If something changes, you don't to bear with it until it gets better. We want to know about it.

If things happen over the course of the time that you have not seen your audiologist.

Write down your questions. Sometimes I will see patients and they will come with a log or diary of everything that has happened. That is so helpful because we know you were at the restaurant and it was 2 o'clock and this happened. The next day it happened again but didn't the third day. It helps us put the story together. Especially when you have a limited amount of time. It helps us gather that information and sometimes the audiologist will hold onto it for more information.

The other thing, if you check with spouse or friends and family, it is nice to know if they have noticed any changes. Sometimes you are everything is great. But your family will say something has changed. It may be simple, like your mic covers need to be replaced but you wouldn't think of that. Tell your audiologist, I think everything is fine but my family seems to think I am not hearing as well.

When you say general things like that, we are going to ask more questions. In what environments and how often does it happen and which family members and how often you see them?

Make sure you come with as many details as you can.

>> Just as a side. I have only lived here 2 years and I moved here to be closer to my daughter. All of a sudden she says you don't hear what I am saying and I say I am hearing fine. She came with me the first meeting here and that is where I heard I should be checked periodically. I hadn't seen an audiologist. I had the freedom put in in 2008. So right away I went and they said I needed adjusting and I lost hearing in the left side so now I needed another implant. I was like, what do you mean, I hear fine. I lived alone and wasn't working anymore. I wasn't realizing I was really missing so much. She was constantly saying to me -- her phrase is you don't pay attention.

>> Sometimes I think we should have you guys stay home and have your friends and family come so we can talk to them about how they should remember to talk to you.

>> It was good that she heard other people's views too. But it was the big one to know I was not hearing as well as I thought I was hearing.

>> I am never amazed how changing the microphone protectors makes such a big difference. It is like a whole new mapping or replacing battery on a hearing aid.

>> How often do you find yourself changing them?

>> 3 to 6 months.

>> I agree with Brian. It is one of the first things you may notice if hearing is decreased. There are 2 black dots on the spine of the processors. It is like a little sponge. If you are in dust or dirt it can change the way you hear. A lot of that goes in the microphones and muffles the sounds. When you replace those it is like a whole new listening situation. Great point. Thanks Brian.

>> How often should that be done?

>> You can do it every 3 to 6 months. It depends on your situation. If you work in a dusty or dirty environment you may want to do it more than that but typically every 6 months.

>> People that live in the south and a lot of moisture, maybe change them more often. Farmers need to change theirs more often.

>> Pollen in the air makes a difference I have found.

>> He said pollen makes a big difference too. I never thought about that.

>> I live with my sister and she has never sort of caught on that -- by device is worn behind my ear. She will carry on long conversations looking at me never realizing I don't have my device on. If I told her once or a hundred times, I say you have to wait for me in the morning. I read the paper before I put it on. That is where all the scientist in the world can't resolve that issue. We are all much more alike than we are different. We all have families and friends and diversify one friend that always when I go to lunch with me, deliberately talks low. Any other time I have to tell him to tone it down a little bit. I think it does it on purpose. That is the humor in life.

>> I've had doctors I have said, if I go to a new doctor and say I have a cochlear implant. The doctor is at the chart and I am back here. I say excuse me I have a cochlear implant can you look towards me. Then he proceeds to (talking slowly) I wanted to say something but it was the first time. Subsequent appointments he got better he realized he didn't need to talk so slow he just needed to talk to me.

>> I don't know if I could hold my tongue in that situation.

>> I was with a girlfriend and in the waiting room she said she wanted to slap them.

>> They specifically ask you that, they will ask you if you have an issue they need to know. Invariable never seem to look at that tab. That you have a hearing issue.

>> What should you bring with you to your mapping appointment? Obviously you want to bring your equipment. Not only the equipment you are wearing, any back up equipment that you have, old processors. Any extra things that you have. Make sure you bring all of that equipment because the audiologist can program your maps on back



up equipment if you have an older processor if you use that.

Make sure you know preferred program number.

Now with the nucleus 6 a lot of people are using scan. It is an automatic program.

The idea is you don't have to switch programs. If you are in scan you don't have to bring your preferred program because it is probably scanned. If you don't have N 6 or don't scan make sure you know number and volume and sensitivity and where you are wearing your settings at. That helps the audiologist know your programs. If you say I am always on volume of one, that tells them. Or volume one0, etc.

Bring a description of your complaints. Having a journal or writing things down when they occur is very helpful. Any information that you can provide is so helpful. It is like if you brought in any device to have repaired. If you set it down they have to start from scratch. But if you give them information they know where to go and can solve the problem more quickly.

Then, describe equipment problems you are having. We want to know any odd things. I can't get remote to pair with processor or I hear bells at different times. We want to know all equipment problems.

How many hours your batteries are lasting. Of the software tells us but we like to know how often you change batteries.

We recommend rechargeable batteries because the power level is a bit better.

Does anyone use disposables?

>> Yes.

>> Once in a while. Like this weekend I had my rechargeable one yesterday but I didn't want to bring all the stuff to recharge so I bring the disposables.

>> That makes sense. There is a time and place. In general, if the impedance is going up and down the power level for rechargeable is a bit better.

>> I know this is a hard question, but, I was going to ask you to give a quick description of all the available programs in terms of volume, how they use the microphones. Also, which of those programs can use -- if you have 3 programs on your remote does scan use those 3 or something else?

>> We can do that. When we go into software it will be easier.

>> Sensitivity versus volume. Sensitivity is circle of sound. How sensitive the microphones are going to be soft sounds. If you are in noisy environment and sensitivity is up you will hear every soft sound it will it will drive you crazy. You want to make sure sensitivity is lower in a noisy environment. If I am talking one-on-one to you in noisy environment. I will turn sensitivity down and volume up.

I encourage you to play around with volume and sensitivity and different listening situations. It is not always the program that can make a difference. Keep that in mind. We don't want you to have your sensitivity all the way down to the bottom and volume down to the bottom. You can probably guess why.

You are not hearing very much.

Play with those settings and remember the sensitivity is the soft sounds coming to the microphone and volume is the overall loudness of the signal.

If I am in a quiet environment maybe I want sensitivity increased because I am trying to hear you in the back of the room. Maybe my volume is sort of at an average level.

Keep that in mind and as long as you know what they do you can utilize them in different situations.

We talked a little --

>> I don't have -- just having it a few weeks. All I have is a volume, but I have a scan, hold and 3 which is for volume out here and background noise. I don't have a sensitivity. Is that coming?

>> Good point. A lot of times with initial activation. We don't want to overwhelm you. We also don't want you to turn it all the way down and not get too much soft sound --

>> I am better off going slow.

>> As you progress and are more comfortable I encourage you to play around with it if you have difficulties in certain situations.

>> It is like here, I was playing with which one I could hear the best.

>> Perfect. I encourage you to play with your settings and what everyone has is different. Play around and find what is right for you.

Sound thresholds are important that your T levels are correct. That is what we are doing when we measure soft sounds.

This is kind of what it would look like. The circles indicate your hearing without the cochlear implant. We have to make the sound very very loud for you to hear it. With the implant you see it is in the normal range and we considering 20 normal. We are measuring the threshold the, the softest sound you hear with implant at every pitch and they look normal. That is great outcome.

We talked about why we evaluate speech perception. We want to compare over time and know if it is an expected outcome. If we don't feel like you are doing as well as we thought. We will try other things. In general it helps us evaluate your overall performance. Keep that in mind at your appointments.

What if I am not doing as well as I should? If you have not been evaluated make sure you do that. A lot of times people don't think they are doing well but we ask their pre-op score. They say I am getting 34% and pre-op it was 0%. As much as it seems like you are not doing well. We do see an improvement with performance typically.

You want to compare your results to over time. This slide compare your results to

other patients and I would say please do not do that. I don't know why that says that.

Don't compare your results to someone else. Someone else has a different etiology of hearing loss.

Don't get discouraged if you are not performing the same way as someone else.

Everyone has their own journey and story.

Why come back if I am doing well? You gave a great example why to come back.

It is easy to think you are hearing the same way you did a year ago or 5 years ago. But a lot of things changes in the cochlear world. We want to let you know what is new. A mini mic, phone clip, TV streamer. What situations are you having difficulties. It is about being proactive and going to these annual appointments is what you can do to be proactive.

You may not realize there is a software update or may not realize your external equipment is malfunctioning in some way. I will see patients that say I have had this problem for 6 months. We don't want that to be the case. Even if you don't think there is a problem come in on a regular basis to see your audiologist.

That is my review.

Let's go into the software so I can show you the different programs that you can have and what they mean.

This is the screen the audiologist will use to save the programs into your implant processor.

This patient has scan as their first program. What does scan do? You will see here that scan is on. When scan is on it will change the directionality features of the microphone.

So, this is something that is present in hearing aids too. You had this with your hearing aid technology as well.

What research found is when you have 2 microphones, sound comes in and there is either a program delay or physical delay. When you have 2 microphones you can use that delay to your benefit to reduce noise. You will have a signal and one right after and it can cancel and give you the more clean speech signal. That is why microphone directionality is so important.

Now that we have scan, you don't have to change and decide which microphone directionality you want. The environment will be assessed and switch on its own.

What are the options? The standard option. That is almost 360 degrees of sound. If I am in a noisy environment I will hear most of the noise from the back, sides, front. I am not going to be able to discern speech as well in a noisy environment. That is standard directionality.

As a side note this is what babies are fitted with. We want them to have the incidental learning. We don't want to cancel out noise in the back because they might need it. They need to learn those sounds.

Zoom or fixed directionality is basically cancelling all the noise behind you.

For adult patients, if you are in a noisy environment. You don't need the noise behind you. You are focusing on the person in front of you. It is helpful if you can have a reduction of that noise behind you. That is what fixed is. Cancelling the noise behind you no matter where you are.

Then there is adapting directionality. Sometimes a fire truck that goes by. It is not just behind you, it is changing.

You are at a party and people are talking around you and the noise is -- the noise source is roaming. The adapting is the noise source. We call them null, that is when the attenuation is the highest. The volume of the noise is lowest. In standard the null is in the back. It is not doing much. Not getting a lot of noise.

Fixed it is just the back.

For adaptive it will be roaming. They are changing where the attenuation is going to occur based on noise source.

When you have scan active, it will choose between all these of those microphone directionality.

You can see the feather in a quiet environment -- probably be in standard.

In a party you will see a different icon, one with noise bars on it because it will be in a more adaptive scenario. It will adapt to the noise around you. It doesn't change directionality quickly. There is a time difference between changing from a standard to a fixed to adaptive. We want to make sure it is in the right microphone directionality for that situation.

In scan, it will choose between all these of those microphone options.

Like I mentioned there are different steps to the signal pathway. The directionality is at the beginning. But then background noise which is the signal to noise, noise reduction and wind noise reduction are at the end of that signal pathway. Right before the coding strategy. That will happen on per channel basis. You can take that off or keep it on.

The wind noise and background noise reduction are 2 additional things that will help with noise because they are not related to scan. I can turn this off and still have scan in one program. Then maybe have another program and have wind noise reduction on. There are different ways to play with programs. Typically we recommend patients use all the defaults.

Say you want to try the automatic program. We have scan there and maybe you want to try -- sometimes I don't want the processor to pick for me. I want to decide that I want just zoom. I want to cancel everything in the back. I know what it is doing and no question. I click zoom and notice scan is off. Then I will name it -- let's just say I

will name it groups. When I am in groups I want this program.

Now on my remote I can switch from scan to groups if I know I like this microphone directionality. Or at least I know what it is and I want to use it.

Does that answer your question.

>> Was that an arbitrary choice of groups?

>> Yes. Totally arbitrary.

>> I guess, my question, how do you know what you are, I thought it was fixed.

>> The fixed choice is typically cafe -- the default.

>> In the old.

>> Now it just picks directional program, scan and omni-directional.

>> Your question is, how do I know what directionality mode I have in other programs?

Usually just write it down would be the easiest. In the new software, the cafe, you can make cafe whatever you want it to be.

>> I have cafe and groups and every day. I understand every day is no difference in microphone in groups and traveling microphone.

>> So, in the previous version of software we had default and it was like every day, cafe, groups, and every day was omni and cafe fixed and groups adaptive. With new software it changed. We said you pick the directionality and name it what you want. It changed a little and that is why I am saying it is arbitrary now. It didn't used to. It used to be a default.

If you feel like a certain program and you want to name it something. I don't feel like these options are that helpful. Like distance. I don't know what that would mean. If you want it to be something special.

>> one thing is there were so many different names but you only described 3 different microphones.

>> Pay no attention to the icons in the names, they are meaningless.

We talked a lot about different signal processing and that is what is really important.

Don't get confused by the names of the program. It is really just meant to simplify things. Even though it doesn't.

When you know what the processor is doing it doesn't make it simpler but for recipients we don't want to say like scan -- we don't want to go into too much detail. You want it to be simple.

>> Like theoretically, she would go to church every day. She describe to the audiologist what she is hearing and what she would like to hear better. That is a situation she is in all the time and she can designate a program.

>> You can't name it church. You could name it groups or distance or something.

>> Different environment that you always find yourself in. You have more places to do it. You might as well try to play with it.

>> Do you find yourself getting out of scan?

>> I have used scan and my experience with scan is that I don't like the clamping it does on the noises around me.

>> Do you notice in your remote when program it is in when it does the clamping.

>> Is it a certain icon you don't like?

>> It is just a reduction in external stimulus that I don't care for. I have used can with the window open and radio on when I am driving and it is fabulous for that. That is one of the few situations that I have found that I like it.

>> one thing about the wind noise -- I am story background noise reduction. It is a good thing typically but some people say it is pretty aggressive sometimes. Not every patient wants that. one recipient said she couldn't hear the vacuum. You have to



decide what works best for you. There is no right or wrong. If you like not hearing noise then you might like the background noise reduction. If you want to hear the noises maybe you don't have it on. Same with scan. If you want to make the decisions you can. Or if you want it to be automatic, that is what scan is for. No right or wrong just what works best for you.

>> It is crazy there isn't one.

>> Yeah. We have wireless technology, that is kind of a new thing. It is definitely the next logical step. I just don't think we are there yet but it is coming soon. I have not heard anything formal.

>> The people that have nucleus. How do you know when your battery is going low?

>> You get a beep beep beep. one5 minutes later it goes dead.

>> When I first got my Intenso. I activated. one afternoon I heard this beeping sound and it took me a good hour to realize what in the world was the beeping sound. I knew it was close, I could hear it so well. Even though you read all of this stuff. I guess your mind is not programmed. You would probably, if I knew it was a fire alarm or smoke detector I would -- but it was a little soft sound. Every once in a while I catch myself and I will not come to an event that is important, I put a new battery in. I can get a year and a half supply for about \$one2. I buy them from Amazon. It is more important that I hear than disposable batteries.

>> Laurel went out to the car to get -- so you can see what goes into the ear.

Does anyone else have any other questions about anything or everything?

>> I am curious. Yesterday we ran into someone that had a baby and she was talking about the cochlear implant and she said after 5 years she had to get a new one. The

mother said the older peoples won't last as long.

>> The internal device. Did she have to have a surgery to get a new one, no. They are probably saying she may have it to get the new processor, external part. Most people don't have to have surgery to take advantage of the new technology. The implant is same for a child patient as it is for adult.

>> She was talking about surgery.

>> The technology is going to change for a child at one year of age versus a child at 65. Most kids will probably have surgery at some point in their lifetime.

>> Other questions or observations?

I had an experience this morning, I went over to the barn. I went into the office to work and one0 minutes later another sister came and she said I -- didn't turn the alarm on. I didn't know there was an alarm. The lady came into talk and Ann was outside the door and I heard the whole conversation. I didn't need to see them. I could follow the conversation well.

Laurel is back with some show and tell.

>> I brought the electrode for demo. This is the receiver stimulator portion and then the actual electrode that goes in the cochlear is this tiny thing at the bottom. It is not real but gives you an idea of how big it is.

That kind of perhaps up my presentation on mapping in general and how to prepare for your appointments and things like that. I appreciate all the questions. Does anyone have any other questions that come to mind.

>> Are you ready to have the baby?

>> Yes. October 5th. I don't think I will make it till then though. Maybe, but.

>> Our meeting is always the second Saturday of the month. We are trying to line up someone that does rehab. I am not having success but that is what we are hoping to

do. We have talked about what we will do but I want an actual person that does it and maybe have some volunteers and maybe show you the kind of things they would do if you went for auditory training.

Don't forget we have these flyers up here if you want the information. If you want more of these to give to friends.

>> The event at the zoo is free.

Thank you Laurel.

(Applause)