

AAMHL 2016 Web Conference Transcript on Making Music with Hearing Aids

WENDY CHENG: Okay. I'm back online. And I want to make sure that -- we have a lot of people joining, so that's wonderful. It's not quite 3:00 yet, but I want to thank everybody who has been able to make it in here. It's just great. Right now, I've been asked whether people can see each other's faces. Eventually that will come later, but in the mean time, I'm just going to... Bring up another PowerPoint for now. Okay. Basically this is the PowerPoint that's going to welcome everybody. But hopefully... Hopefully you won't have any problems hearing. I just put out something on the screen here that says if you cannot hear via computer audio, you can call in. If calling in, please put your phone on mute. And there's a chat box on the lower left corner. So if you have questions before the Q and A session, put your questions there, and I'll try to answer them. And I don't know what's going to happen during the Q and A session. Because I originally -- I was going to have people typing the questions. But it looks like there might be people who might want to answer the question using... They want to use their voice to ask questions. So... I'm just going to play it by ear when it gets to that point. I'll just have to wait and see how that plays out. But in the mean time, I want everybody who is joining in -- putting this together has been a little bit nerve-wracking, because we were dealing with technical problems for the last half hour. But it looks like most people are... Joining and hopefully able to hear everybody. Hear me talk. Okay. So my computer clock says it's 3:00 right now. So at this point, what I'm going to do is... I'm going to go ahead and welcome... I'm going to go ahead and welcome everybody here. I also would like to thank two wonderful audiologists, Dr. Marshall Chasin and Dr. Brian Fligor.

DR. BRIAN FLIGOR: Most people say "FLY-GER", but I've answered to so many different abbreviations of my name and whatnot. So just Brian would be just fine.

WENDY: So Brian would be fine. Okay. So in the mean time, what I'm going to do right now is... I'm going to go ahead and put Brian... Put Marshall's slide up right now. So it is a pleasure for me to welcome Dr. Marshall Chasin, who has so graciously and enthusiastically consented to participate in today's web conference. So Dr. Chasin is the audiologist at the Musician's Clinic of Canada, and he has a very long and distinguished career in discussing hearing aids as it relates to music performance and music listening. And he has written countless articles and done so many presentations around the world. We're delighted to have him today. Okay, Dr. Chasin. I'm going to turn this over to you. Thank you so much for being here. Marshall?

DR. CHASIN: How about now? Can you hear me okay?

WENDY: Yeah.

DR. CHASIN: It looks like I'm going to have to use my phone, rather than my headset. But that's okay.

WENDY: We can hear you now.

DR. CHASIN: Okay. There. Happy Guy Fawkes' Day to everyone. I don't know if you people in the United States know this, but to us United Empire Loyalists over here in Canada, this is a very important day, because Guy Fawkes unsuccessfully tried to blow up the parliament building in Britain, many years ago. Before I was born. And we burn him in effigy every November 5th, to show our allegiance to -- I guess it was the king at the time - - in England. To those that are not British or Canadian or part of the Commonwealth, you have no idea what I'm talking about. Now, hearing aids and music is a really interesting topic, for a number of reasons. One of which is that it's not a software issue. You can have a hearing aid and you can program your hearing aids until the cows come home, and it won't make any difference at all. The issue has to do with technological limitations in the hearing aid itself. So it's not inconceivable to have one hearing aid for music and another for speech. In fact, we used to do that in the olden days. So this is why the topic can also be called music and hearing aids, or more importantly, hearing aids is not a software issue. Not a programming issue. This is a slide I like to put up. It has nothing to do with today's topic, but it certainly shows you the infatuation auditory scientists had with music in the olden days. This is from the 1880s, and Helmholtz himself was in the audience, and he thought this was a viable explanation of how the ear filtered out and changed sounds into different frequencies. I personally have tried it, and it doesn't work. And I've rubbed erasers on different parts of my pinna, my ear, to listen to different sounds and played it part to people who had perfect pitch, and they couldn't hear it. So even though it's cute, it has nothing to do with reality. Music and speech are different. And very similar in some other ways. One area that they're different -- waiting until the computer comes around here. I think the computer is having a little bit of a slow point here. Let me just check that.

WENDY: Are you trying to... Oh, here it is.

DR. CHASIN: It was just a limitation on the screen. I've got it up and running now. But there are four differences between speech and music. One is that there are differences in the shapes of speech, versus the music spectra. They have something different -- which I refer to as phonemic versus phonetic requirements. And in fact, the license plate of my car says PHONETIC. I drove up to a fast food place, and the lady asked what phone-tick means. And I said you should never use a cell phone, because the phone ticks burrow into your brain.

The third difference is differing sound levels, and the fourth is something called crest factors. I'll deal with all of these. Talking about the first one, speech understandably is coming from the human vocal tract. Whether someone is speaking Portuguese in Portugal, English in England, or Chinese in China, it's coming from a vocal tract that's 17 centimeters long, has a nose in parallel to the mouth, oral cavity, has lips and tongue. It's no surprise that the long-term speech spectrum is pretty consistent from language to language.

However, in contrast, music has many sources. It can come from a violin, which is not all that dissimilar to speech, but it can also come from a percussive instrument, which is quite a bit different. So you can use a long-term average speech spectrum as a goal, but in a hearing aid, I think it's a little bit misleading. This slide shows you a spectrum comparison between what we call the long-term speech spectrum, LSS, and violin. They have the same intensity, but have lower frequency at the lower pitches and higher at the higher pitches. Now all of a sudden, it looks nothing like speech. So the goal of a long-term music spectrum that we use for hearing aids is a little bit misleading. Another difference, rather, has to do with what is important. So phonetic is what the -- the musical instrument actually generates. So my clarinet and a violin can actually generate a pretty broadband signal, going right up beyond the top end of the piano keyboard. The lower frequencies as well. But what's important to me as a clarinet player is the lower frequency interresonant recognition. When I say something sounds great, I'm going to (inaudible) 1,000 hertz on the left of the piano keyboard. Whereas when a violinist says it's a great sound, they are referring to the whole range of sounds. Specifically the amplitude or the fundamental higher pitch harmonics. If you change that in any way, it's going to sound pretty lousy. So a violin and clarinet player generate the same phonetic output, but their importance, their phonemic requirement is a little bit misleading.

Here I have a picture of my license plate. You kind of have to wonder what's more nerdy. Having these license plates or perhaps being so surprised that nobody has taken them before you. Another difference that we have... Is differing sound levels. This is the major one. Speech at its most intense is about 80dB. Maybe with the peaks of the vowels, ah. The average is about 65 decibels. But that's speech. You can definitely yell loud, but it's really unusual. Normal conversational speech peaks in the mid-80s. Whereas music, even quiet music, can be well in excess of 100 decibels, with peaks in excess of 120 decibels. So music is just louder than speech. And finally, the crest factor, having nothing to do with toothpaste, but it's how peaky are the peaks, coming from the musical instrument, versus how peaky are the peaks, relative to the human vocal tract. And that difference is called the crest factor. For speech, the peaks are about 12 decibels higher than the average. Whereas music can be 18 to 20 decibels, and that's because a clarinet or a violin or a drum set has less dampening that's inherent to the human vocal tract. Here's a picture of the crest factor. Difference between the peak and the average RMS signal in decibels. So in summary, speech is about 65 db, whereas music -- not just can be, but usually is greater than 100. It has a 12 decibel crest factor, versus music being 6 decibels higher. Speech falls about 6 decibels for every octave, whereas music can be anything. For those audiologists online, we have a well defined speech intelligibility index, which is a measure of what frequency of speech contributes to clarity. Whereas the goal of having a music intelligibility index is very ill defined. So we're not too sure how we would handle that. My screen keeps doing something. I don't know about your screen. Context in conversation -- we can miss out a lot of speech. Even with background noise, we can fill in the blanks. Linguists talk about this as top-down. Where we can fill in the blanks, using our brain. But with music, if we miss a note, we're out of it. If we can't hear it, we don't appreciate it.

WENDY: Let me interrupt you for a minute. I'm going to ask everybody to not try to enlarge the size. I would like the slide to be set at 75%. If you are having trouble seeing it at that level, please download the slide from the link that you received yesterday about today's webinar. Because there should be a link for you to download the slides. Thank you so much. Okay. And Dr. Chasin, you can go on now.

DR. CHASIN: Thank you, Wendy. One big element in a hearing aid that makes it good for speech -- I'm sorry. My apologies. Good for music, as opposed to just speech -- is something called the peak input limiting level. Audiologists will not find this on a hearing aid specification sheet. You can ask the representatives from the various hearing aid manufacturers, and more often than not, they won't know what you're talking about. It's not something like gain or frequency response, some of the more technical measures. But it's still very, very important. And it has to do with the hearing aid's capability to handle sounds over about 85 and 90 decibels. Now, keep in mind what I said before. The loudest component of speech would be on the ordinary of 82 or 85 decibels. The quietest component of many forms of music is far in excess of 100. So what happens is the front end -- you have the microphone. You have this peak input limiting leveler, and then you have the digitization process, the analog to digital computer, that does -- converter, rather, that does all the calculations and allows sounds to have these great digital algorithms applied to them. That's more characteristic of a digital system than the old style analog system. Music, though, can be extremely intense. There we go. So it just occurs after the front end -- we sometimes refer to this as front end distortion. But once you distort music at that very early stage, even before, the computer in the hearing aid can be programmed or adjusted. Once it's distorted, that's it. For those of you over the age of 40, you will remember this gentleman. He is Max Headroom, and sometimes this is referred to as limited front end headroom. I like the analogy of a plane flying towards a bridge. If that plane doesn't duck down pretty soon or it's not a drawbridge that goes up, we're going to have a major problem here. So think of it as a low hanging bridge. There are strategies where you can duck under the bridge and have the bridge go up, but unless you go under the bridge, you're in a bit of difficulty. Same thing with low hanging highway or a bridge that you go to on a car. If you don't have enough headroom, you run into severe distortion. So I did an experiment. And I had a hearing aid built where I could leave everything the same. Same gain, same output, same frequency response, same -- all the stuff that we care about. But I changed the peak input limiting levels. And what I would like to do now is play for you some audio files of speech. Now, keep in mind that the loudest components of speech are about 80 or 85 decibels. And now I'm going to set the peak input limiting level to 115, 105, 96, down to 92, and back to 115. The reason for 115 is that modern hearing aid microphones can transduce 115 decibels without any distortion, and they could since the late 1980s. So this is the paradigm. First speech.

VOICE RECORDING: Reddish yellow vegetable which has several thin leaves on a long stem and which belongs to the parsley family.

VOICE RECORDING: A carrot is a long reddish yellow vegetable which has several thin leaves on a long stem and which belongs to the parsley family.

VOICE RECORDING: A carrot is a long reddish yellow vegetable which has several thin leaves on a long stem and which belongs to the parsley family.

VOICE RECORDING: A carrot is a long reddish yellow vegetable which has several thin leaves on a long stem and which belongs to the parsley family.

DR. CHASIN: Not a big difference, of course, between them, because speech is so quiet compared to music. Now I'm going to do music at 100 decibels, average, which is close to live music. It's not the music you would listen to in your car radio or your home, but certainly live music. Same idea. Let's see if I can play this.

VOICE RECORDING: >> A decent melody, a song that I can sing.

DR. CHASIN: A little bit of distortion.

VOICE RECORDING: >> A decent melody (more distorted)

VOICE RECORDING: >> A song that I can sing. My own company. (much more distorted)

VOICE RECORDING >> A decent melody. A song that I can sing. My own company. Just trying to find...(very distorted)

WENDY: I'm curious. Is anybody hearing those audio files? I'm just wondering. (no distortion)

VOICE RECORDING >> A decent melody. (no distortion)

WENDY: Let me try something. Okay.

DR. CHASIN: You know what? Let me get back to the slide. Because if you cannot hear them, this is something that's available on the website, for those that couldn't listen for technical reasons. Otherwise just go to my website, at

http://www.chasin.ca/distorted_music.

So distorted_music. And those audio files with the description will be there.

WENDY: Okay, thank you.

DR. CHASIN: You're welcome. So you could argue that the peak input limiting level shouldn't be in the 90s, but a little bit higher. So how have we, as audiologists, tried to resolve this problem? So somebody comes in, they have a wonderful hearing aid, they love it for speech. They've had it for a couple of years. They don't want to buy a new hearing aid. But it just doesn't work for music.

So what have we as audiologists done to try to solve that problem? And there are four tricks and strategies we can do. The first one is that we can suggest that when they listen to music, they turn down the volume of the stereo or turn down the volume of the car radio, and if necessary, turn up the volume of the hearing aid. The volume control on the hearing aid is very late in the hearing aid circuitry, relatively speaking, so this is like ducking under the bridge. Reduce the input and turn up the output.

You can also use an assistive listening device such as an FM system that has their own volume control to reduce the input.

You can use scotch tape. This is a biggie. I use this a lot. 5 or 6 layers of scotch tape over the hearing aid microphone deludes the hearing aid into thinking what it's receiving is actually much quieter than it really is.

And four, you can simply take off the hearing aids. So the first one... When in doubt, just turn down the volume of the input and turn up the volume of the hearing aid, if you need to. Not the other way around. That will significantly increase the enjoyment and intelligibility of the music.

The second one is that there are a number of different technologies where you can bypass the microphone of the hearing aid, have an input with a reduced volume control -- for those audiologists, every manufacturer has a guy in the back office that you don't let out because he smells, but he's technically brilliant.

Every hearing aid manufacturer has one of these guys. And you say -- a little wire hooked into my hearing aid that has a 1 kilohm resistor in series to a 10 kilohm resistor in ground. And that's the sexiest thing this guy can hear. So using scotch tape really is a good idea. You go to a live concert, you put several layers of scotch tape over your hearing aid microphones, and it really makes it sound a lot better. It deludes the front end into thinking it's receiving a quieter sound. And finally, take off the hearing aids. So this is a chart here. You might not be able to see the entire chart. But this is the amount of hearing loss at 1,000 hertz you might have or the listener might have.

Take a 65 decibel moderate hearing loss. For speech, they might need 25 decibels to boost the application. For loud speech, maybe 10. But for quiet music, they might require 0 or 1. Almost nothing. So even for those with up to a moderate loss, it may be an effective strategy. Now let's talk about four ways the hearing aid manufacturers have responded to this. One is that they use microphones that are less sensitive in the lower pitches. That's where music has a lot of its loudness or intensity. And if they can reduce the amount getting into the hearing aid, getting to the peak input limiting level, or what is sent to the analog to digital converter at the front part of the hearing aid, if they can reduce that by 6 decibels, say 500 hertz, and 12 decibels at middle C, around 250 hertz. I know it's 252. But the audiologists tend to round things off. That's a good idea.

Another strategy is to shift that bridge level up, the drawbridge that goes up, and shift that range upwards. Another company has used a little bit of a compressor to go under the bridge prior to the digital to analog converter and digitally reexpand it at the end, and there are some hearing aids, especially in the last two years, that have more than 16 bits in their system, which can handle higher levels of inputs. So if you look at the first one again, many people with a high frequency hearing loss have good hearing still in the lower frequencies, lower bass notes or the middle range of the piano keyboard. But if they're still using them, unfortunately the microphone they use, which is a broadband microphone, which is equally sensitive for the left hand of the piano keyboard as the right, you're going to get some high level lower frequency sounds overdriving the system, causing the distortion.

So we can use a desensitized microphone, one that has less gain in the lower frequencies. Any hearing aid company can do this. To date, to my knowledge, only (inaudible) has done this. And one of the reasons a lot of the manufacturers don't want to do this is that when you use a microphone that's not broadband, and it's only cutting into the low frequencies a little bit, the internal noise, the noisyness of the microphone itself, degrades. So if you look on the screen, the orange is a broadband microphone with relatively low internal noise. Whereas the magenta or purple has increased internal noise.

However, if you were to use expansion, which is a circuit that many hearing aids have nowadays, you can actually reduce that higher internal noise to the lower frequency black line that you see there, which is almost the same, and on the top right, you see a gentleman who is a superhero, and that's expansion coming to the rescue. So all hearing aids have this. It's not an issue that people should be concerned about. Any hearing aid manufacturer really could offer this. The distortion at the very top with the broadband microphone -- I'll show you what it looks like with the narrow band microphone again. I'll go back here.

There's again the high distortion and the low distortion. Once you use this specialized microphone. So it does work. It's a nice little trick. Another system that was first used by Bernafon, now been used by several other companies, is that the input level of 96 decibels isn't really 96 decibels. It's the top end of what we call the dynamic range. The softest sound the hearing aid can transmit, and the loudest sound the hearing aid can transduce. If the difference is 96 decibels, not the absolute 0-96 decibels, why can't we take that same 96 decibels range and shift it up by 10 or 15 decibels? That's exactly what they've done. They have a program called a live music program that instead of going from 0-96 goes from 15 to 111, a range that's much more suited to music, and it's still the same 96 decibels. 96 decibels is an artifact of having a 16-bit system. And until recently, that's all that was available in the marketplace.

The third strategy -- actually, this is the same idea. Widex, in their Dream, and now their Unique series, has done much the same thing, where they're able to change the dynamic range functioning to give you high level inputs without distortion. So it's the input to the hearing aid that's the issue. This is an example from a study that I did with the Widex Dream series. The red or the orange is the old style, and the blue is the new style of

hearing aid. On the left, high stimulus levels, very loud ones like music -- you can see the preference level is much, much greater than the olden days. Keeping everything else the same. And even with lower levels, it's slightly better as well. And lower levels are human speech. And so this is an area that music has taught us about speech, and that many hearing aid people are being fit now -- are fitting their clients, that is -- with applications that are optimized for music, because the hard of hearing person's own voice sounds better to them. It's not that they're speaking from a meter or two meters away, or if you're listening in the States, 3 or 4 feet away, but their own voice at the level of their own microphone is much more clear when you optimize the hearing aid for music.

This is an example from Resound. And they simply say -- let's duck under the bridge. They have an analog compressor that runs off the hearing aid lead. It reduces the input. It presents it to the analog to digital converter in the front end, and then once in there, they reestablish the gain after. So it's like ducking under the bridge. And the digitized version is no different than what the real life version would have been, without this ducking. And it's quite reasonable. And the fourth area -- many manufacturers have responded by going to post-16-bit architecture. And many hearing aids now have an 18 or 19-bit system.

For every bit that you have, it adds about 6 decibels in head room. For every bit, you can take up to 6 decibels louder sound in the hearing aid before it will distort. There are many third party manufacturers, for those that like to do calculations, it's 20 times the number of bits times \log_2 , and that's about 6 decibels for every additional bit. This is an actual untouched perfect slide of me dancing with my wife. And I said to her -- $20n\log_2$. And she thought that was so sexy. Oh, Marshall Chasin, you're wonderful. This is actually what really happened. Believe it or not. Some new 24 bit systems.

Their engine might be 24, but they function more like 18 or 19 bit systems. But still much better than the 16 bit systems of yesteryear. Unitron North, Phonak Venture, Oticon Opn. This is just a sampling. But this is the way of the future. It's the way of the present, actually, now. And everything else. I have one more minute. And it's not that I misjudged this. I think that unless you take care of that front end problem, everything else doesn't matter at all. And the everything else is that hearing aids should be less sophisticated than for speech. You should turn off the noise reduction, you should turn off the feedback reduction.

Fewer channels is better than more channels, because you don't want to alter the dynamic range and the amplitude of the various harmonics of the music. That may not be important for speech. It is important for music. You also don't want to have a frequency transposer. In hearing aids with speech, we can take the very high pitched sounds in presumably an area of damage, and shift it into a healthier region of your ear so you hear better. It's great for speech, but it does not follow for music. The moment you alter the harmonic relationships, you're dead. So that's the everything else part of it.

And one more thing... If we can't change the hearing aids, maybe we can change the music. There are some composers, including my son -- check out <http://www.chasin.ca>. But he actually created some music for children, nursery rhymes and melodies, for hard of

hearing children with fundamentals in the first several harmonics below 500 hertz, in the left hand side of the piano keyboard. So that's another strategy we can implement. So here's my email, if anybody does wanna get ahold of me. It's Marshall Chasin@chasin.ca. And my musiciansclinics.com website has a lot of good information on it. And for those who are interested, I have a weekly blog of hearinghealthmatters.org. And my section of course is called hearthemusic. Enjoy the VIP panel session. Brian, it's over to you.

WENDY CHENG: Thank you very much, Dr. Chasin, for your very wonderful, informative presentation. At this point, we're going to bring up Dr. Brian Fligor's slides, and let me see if I can do this properly. There's Dr. Fligor's slide. It means I can bring up his audio files too. Okay. So Dr. Fligor has his slide, and I'm going to go ahead and enlarge it a little bit, to 75. Great. Dr. Brian Fligor is the chief audiology officer -- I had the pleasure of meeting him at the Berklee School of Music last year, where we were both presenters. And Dr. Fligor, I believe, has some extensive experience in hearing aids. Especially for music performance. And music listening. And he, I believe, also developed a line of ear buds that are also -- it's called Uvero. And I'll mention it later. But in the mean time, please help me welcome Dr. Fligor, who is here today to talk to us about optimizing your experience with audiologists. Okay. Dr. Fligor. The floor is yours.

DR. FLIGOR: Okay. Wendy, are you able to hear me?

WENDY: Yes.

DR. FLIGOR: Okay. Very good. Thank you all so very much. Wendy, thank you very much for having me on. Before we go any further, Wendy, the one slide that's up right now -- that is a video that I'll play for folks. It's very brief. But I have four other sound files that are .mp3s. They're also very brief, but I'll just ask people to adjust the volume of their speakers so that they're able to hear a quick little hissing noise, just to make sure that it's nice and audible for you.

WENDY: I'm going to see if I can find where I put them. I had them yesterday. But you can go ahead.

DR. FLIGOR: We don't need them right away, at all. If you need me to resend those to you, Wendy, that's no problem for me. So... Without further ado, thank you all so very much. I really do appreciate this. Appreciate Wendy asking me, and I appreciate Marshall Chasin going first. I certainly do get his Canadian sense of humor. I've heard many of his jokes time and again. I can tell you that his wife is an absolutely lovely person who tolerates his jokes exceptionally well. So he's a delight.

A quick disclaimer for all of you, just to be very much up front. I'm going to be showing a number of brands of hearing aids and hearing aid manufacturers. I do not have financial or non-financial interests in those companies. I don't promote these brands. Some of them I use for my own -- because I think that they do good work. They do a good job. But these are for teaching purposes only.

I am the owner of my own private practice, called Boston Audiology Consultants, and my descriptions here in my presentation are my own opinions, and not those of Lantos Technologies. Lantos Technologies is a company that's developing a direct ear scanner, and as Wendy mentioned, we've developed our own headphone line called the Ubero. You're welcome to go take a look at it. So apologies on the words cutting off of this. I'll just make mention of them.

And in the handout, you'll have all of the verbiage, so that you can read along with it. You'll notice that there's a fair amount of overlap between Dr. Chasin's presentation and mine. This is mostly because I've spent a lot of time learning from Marshall Chasin. And I've found much of what he's described to be absolutely true. One of the pieces that I want to highlight from this is... Marshall Chasin raised the question... Do you need to wear your hearing aids while you're making music? Quite possibly, you do not.

However... If you do need to use hearing aids when making music, how do we make them not sound godawful? The simulations that Marshall Chasin played, of a YouTube song -- sorry, YouTube? A U2 song, the band, U2, with varying headroom that was available in the hearing aid -- it's just a striking simulation, if you're able to play it or play it for friends or loved ones. So to some extent, we're going to talk just to touch on -- if you do end up using hearing aids, how do we make them not sound godawful? This has to do with optimizing your time with the audiologist.

We're going to talk a little bit about choosing an audiologist. We're going to talk a little bit about how to not terrify that audiologist when you're coming in to see them. And we're going to talk about getting the most out of your time that you spend with them. So this is just a fantastic primer on hearing aids for musicians with hearing loss. I would actually say... It's a fantastic primer for audiologists. I've found that when I... You give this to audiology students, and we read it, I learn something new in it each time. Richard Einhorn is a member of this association. He's a composer with a hearing loss, and he gave just a wonderful point of view from the composer with hearing loss.

And Brian Moore is a professor, hearing scientist, in the UK. And he just gave some wonderful points that I have since, myself, found to be true. But that's for your own reference, for after the fact. I have about eight points here that I want to start out with, talking about optimizing your experience.

It's really important for us as audiologists and as musicians to understand that we have some rather significant cultural differences between an audiologist and a musician. Something that I think should be pointed out. Just as an example. The audiology clinic is very quiet. Typically. We have sound booths for the sake of being able to test the threshold of audibility in people who don't have hearing loss. You have to have a very, very quiet environment. Well, that very, very quiet environment may not necessarily be conducive to you bringing in your drum kit and banging away at it, so that you can work with your audiologist to tune hearing aids. It may not be conducive to the trombonist bringing their instrument in, and the audiologist doing an ear mold impression while they are playing, so that you can be assured that the shape of the ear canal matches the shape

when you actually will be using the ear plugs or monitors or hearing aids.

So it's important for us to consider those cultural differences and respect those differences, but try to come to common ground. Such as... Bringing up the point: Could I bring my instrument to the appointment? Now, certainly, if you play piano, you may have a bit of a limitation, as far as being able to bring your instrument. But perhaps you have a keyboard that you could bring. That you find is a reasonable proxy for the instrument that you will be using when using your hearing aids.

And I mentioned wind instruments. If we're doing any kind of custom fitted ear mold, whether it's a custom fit tip on your hearing aid, or it's ear plugs or some other monitoring device, having a very good fit in the ear is important. And we're going to talk a little about how things are -- how things matter. Questions you might have up front, and address -- is the appointment length appropriate? For instance, if you're coming in for a hearing aid programming session, and you want to bring your instrument with you, that appointment is going to need to be longer than 30 minutes.

Unless... This is about your fourth or fifth visit to the audiologist. At which point, hopefully you all have understood that you really do need to set aside appropriate time. And you need to have an audiologist that has a structure that allows for that duration of time to work. You may think that the audiologist is -- this person who may or may not have the patience to understand what your needs are, may or may not be open to your input.

I would argue that audiologists are terrified of musicians. Musicians know so much about your craft. In fact, I would argue you are probably better at your profession than the audiologist is at his or her profession. We, the audiologists, work very, very hard to understand what these mini-computers do in our ears. We work very hard to understand how to diagnose hearing loss. We work very hard to help people to hear better.

But we don't often practice 10,000 hours just to be able to start to be a master at our profession. Very senior audiologists have probably gotten 10,000 hours in, after their first five years out of their graduate program. So... bear in mind: You know a lot. You work in a very, very highly competitive environment. Trying to get first chair violin means that you have been perfecting your skill, and it is a measurable performance difference in one setting. Audiologists tend to not have that experience. So you're very intimidating.

If you go in knowing that, you may help to put the audiologist's nerves at ease, and you may find a better experience. I would advise understanding what your priorities are, and then communicate those priorities in advance. What I mean by that is... I have a patient who is a concert pianist, and is just absolutely amazing at his instrument, at his craft. And he also likes to listen to recorded music, his CDs, on a home Bang and Olafsson stereo system. He listens very, very often to string quartets on his home stereo system, and he plays in a chamber group.

The string instruments, versus his piano, is actually a very different signal. It's a very different sound. And live versus recorded is a very different environment. If your most important piece is being able to play your instrument while using your hearing aids, because you feel you need to hear your instrument or the instrument of people near you, then that is the priority.

Whereas if you want to listen to others, or listen to a recording, that's an important priority. Because we don't have unlimited time. We don't have unlimited resources. Therefore we want to understand what is most important and invest our time in that. So I certainly don't mean to belittle audiologists. I am one myself. I'm very comfortable with what my own limitations are. I understand them well.

I'm also very familiar with the limitations of hearing aids. They are amazing little mini-computers, but they maximize your residual hearing. They do not correct the underlying hearing loss. And so understanding both the audiologist as well as the devices have limitations -- that doesn't mean they're not valuable. But it does mean that we need to understand: Where are those limitations? And decide -- is that acceptable?

I would advise that we focus on whether or not the device settings make me feel confident as a musician. Am I more confident that I am able to play on time, in tune? Remember than saying... Well, it just doesn't sound as good as I want it to. I can argue: That's a limitation of the hearing aid. And an analogy that I've used with people is... When you talk to another person on a telephone, you are getting a limited range of pitches. The frequency spectrum. It is limited. Because going over the telephone, it only gives you a certain range. It's historically, back when Alexander Graham Bell first invented the telephone, the focus was on 300 hertz to 3,300 hertz. It was in that 3,000 hertz range. Because that was very important for being able to understand speech. That range.

Well, human hearing is from 20 hertz to 20,000 hertz, when we're born, and the hearing system is working quite well. So if we were to listen to our favorite song over a telephone, that was only 300 to 3,300 hertz, that would not be satisfying. You can hear and you can identify the melody, but nobody would choose to listen to it through that. Hearing aids are glorified telephones, in large part. So that is something we need to understand. Part of that limitation. Now, do you feel more confident using your devices? Great. If not, then... You're going to find -- maybe I need to not use them. But this is where we want to keep a sense of humor in all of this. It's okay to not be perfect.

Okay. So I'm going to show you this. I talked a little bit about being able to bring your instrument to the audiologist's clinic, and some reasons why that might be very important. I'm a huge, huge proponent of having a custom-fitted ear mold for the hearing aid, regardless of what kind of hearing aid it is. Whether it's a receiver in the canal or an external device. You're more likely to have sound going into your eardrum if you have a custom mold. However, ears are weird. The ear canal changes shape rather dramatically. I'm going to bring up a video... And this video -- it's going to show an ear canal. It's actually a scan of an ear canal, where the person is opening and closing their mouth. Now, we might think of an ear canal as just a hole inside of our head. That's a tube. And maybe

it's just static. It stays put. Well, it's not static. It's dynamic. So the eardrum would be up at the top. Of the screen. And the outside of the ear is the bottom. And you'll see actually the front... On the right hand side of that... That front movement... That is the movement of the wall of the ear canal. And so it's no wonder that sometimes -- I'm going to play that again. It's no wonder that sometimes devices that we put in our ear have a tendency to migrate out of the ear or get pushed. There. Go back over to my slides. So Wendy Cheng, one note, when you have a chance would be -- very good. I'm going to get rid of this particular slide. I'm sorry. The video. And if you have a chance to bring up those sound files, the mp3s...

WENDY CHENG: I'm trying to. But I'm having a lot of problems. So I'll try to bring them up. I've been trying for the last half hour.

DR. FLIGOR: If we don't have them, that is perfectly okay.

WENDY CHENG: All right.

DR. FLIGOR: Okay. Just for everyone's benefit, though, I'm actually... I love doing these webinars, because it actually gives me a chance to pop over to an email and send... So that is, of course, if I don't crash my own system. So we'll see how we go. Apologies, everybody. I thought I was going to be cute here and send something, but I'm going to just continue along. In the next slide, if you do have the handout, you'll see I talk about ear mold impression technique. Sometimes audiologists think about -- well, do you take the impression with the person's jaw open?

Meaning their mouth is open when you do the ear mold impression? Or jaw closed? There. Move it over. Well, I would argue -- and I have argued, and this has been fairly successful for me -- that you do the ear mold impression -- that's what I mean by that abbreviation, EMI, while the person is playing their instrument. On the left hand side of this video, sorry, of this slide, is an ear mold impression with another ear mold impression overlaid. It's the same ear, taken two different times. And this is a heat map. Meaning... Warmer colors, like red and yellow and orange show larger differences from one impression to the other, and cooler colors, blue, green, dark blue -- that shows as the surface gets closer and closer -- more similar from one impression to the next.

On the left side, this is where the person's jaw was closed both times. And I point out just inside the ear canal to past the first bend in the ear canal, going toward the second bend down in the ear canal -- the two ear mold impressions are nearly identical. If I take that same ear, and I have the person... I take an ear mold impression with the jaw closed, and I take the impression again with the jaw open, there's a very large difference, relatively speaking.

On one of the walls. It happens to be the front wall. Around the first bend through to the second. And that is where you see that yellow and orange. There's a fairly large change when the mouth is in a different position. So we somewhat end up chasing what is the right position for a person's mouth to be in. If you're a reed instrument player, you're going to have your embouchure around that reed and you're going to be playing. I would argue that is the position that it should be in.

Okay. How do we choose an audiologist? First and foremost, referral from another musician. No harm, no foul, if the audiologist you have worked with does the best they can, and you feel like you want to try something else. That's okay. I would advise you figure out if you've got a person who approaches challenges with a sense of curiosity and a stick-with-it-ness. It's important to be right up front and understand the finances.

Hearing aids themselves are not covered under insurance. Almost ever. The hearing aid technology itself is very expensive to develop for the company. And so they pass that cost on to the audiologist and the consumer. Some audiologists bundle together all of their services, the time that they will spend with you, into the up front fees, which in large part we think of as buying the hearing aid. Other services, like my own, I unbundle. And that's where it costs you whatever it costs me from the manufacturer, and I bill an hourly rate.

And so if a musician needs to spend three hours with me to really get things nailed down, and we work very carefully and efficiently with each other's time, then that person owes me for that three hours of effort. But if they don't need more than 15, 20 minutes -- which, well, let's be honest. When you're working with hearing aids, it's a process. But the big difference between a person needing five hours with me and a person needing 20 hours with me -- and so the way my practice works and the way a lot of audiologists' practices work is -- the time you spend is very much like an attorney. They bill you -- my attorney bills me by the minute. Hopefully there's a little more flexibility on the part of the audiologist, if you do find one that does not lump together the cost of the device with the services.

And it is very important that the audiologist has the necessary equipment to test and verify your hearing and your hearing aids. Not always a given. So it's important to consider -- do they have an audiometer? Do they have a hearing aid verification system? These can be very necessary components for the work that you're going to do with them. Some of these slides are duplicates of Marshall Chasin's. That is on purpose. Because, one, he taught me. Two, it's important for us to walk in to our appointment with the audiologist understanding some of these pieces, and that most audiologists who have been trained in wonderful audiology training programs have had 90%, 95% of their time spent understanding speech signals and how an ear with a neurosensory hearing loss does not hear speech the same way as an ear that does not have hearing loss.

Music and speech are very different. So Marshall Chasin talked some about these different pieces. I add a fifth component to it, called the intent of it. And I think of that as... Are you communicating content? Information? Or are you communicating emotion? And I would argue that when we talk to one another, oftentimes it's communicating information. Whereas music is about communicating emotion. So just very briefly...

There's a couple of resources here -- particularly the full complement of instrument and voice -- the spectral structure. The range of human voice, showing down around 80 to 87 hertz, up to the fundamental frequency being around 1,000 hertz. And that really only occupies about a little over 3 octaves on the piano. The piano has eight octaves. No, seven octaves. I'm so sorry. I'm not a pianist. But the range is just so much greater. Talk about the peak input limiting -- really, he's right.

Unless the hearing aid isn't able to tolerate the decibels that you would encounter in live music performance, live music listening -- unless you have devices that can manage that, then the rest of it just doesn't really matter quite so much. But let's say -- and there are many instruments that do in fact have appropriate input levels, do accept levels that are up at appropriately high levels -- I've found that giving the musician the option of self-tuning is very important. And that's been very helpful in people getting through this. So just to show, very briefly -- here's an example of a hearing loss that almost certainly would not need to use hearing aids.

Despite they have what would be considered a moderate degree of hearing loss in the mid to high frequencies. Average level live music would sound the same to them as a person with normal hearing. And that's because sensorineural hearing loss changes your access to soft sound, but once a sound is adequately above your threshold of audibility, it sounds just as loud to you as it does to the person with normal hearing. I'm going to jump past these slides.

I'll let you take a look at them, especially because they're so very small. But what I pointed out is in this one particular manufacturer's programming, I have in here an all-around program, which is the default programming. And there's a lot of really advanced options related to directionality, and how fast the compression works. And I contrast that with the music program, where basically everything -- all of the advanced signal processing is shut off, and the compression on this device, the time constants, are set to as slow as they can.

Because that is something I have found to matter. Is that if you're trying to understand speech, having very fast compression helps you to hear that speech. Hear the difference in speech cues. Whereas music, being so very different from speech, benefits from having slower compression. And I know I'm running out of time here, Wendy.

Thank you so much for being patient with me. When thinking about maximizing the time with the audiologist, some of this is understanding what makes one hearing aid better than another. Lots of them are fantastic. Some of these -- and I just show an app that allows for a little bit of self-tuning -- where you can do some adjustment to bass and treble. Where it pops up, and it's very rough. It's a very rough adjustment. But it's a linear adjustment for both soft as well as loud sounds.

But you could change the relative balance between bass and treble, and then save that particular change in your own program. Just to mention, as I wrap up here, that there's... I'm not using any of my patients who are musicians, in this case example. Just in case one of my patients happens to be watching, and I don't want them to feel uncomfortable. But this particular individual is not a musician, but goes to live shows at least once a week. If not more. And he needs to use his hearing aids for work purposes. He needs to hear people from a distance, and communicate very effectively.

And he uses invisible in the canal hearing aids. And just to show you very briefly -- here's his audiogram. He has very good hearing in the low frequencies, and he has a moderate degree of hearing loss -- it starts sloping off at about 2,000 hertz. And so he has the normal program, he has the music program, yadda-yadda. That's all great. The default programs for any of the hearing aid technology -- or hearing aid companies -- were found to not be all that satisfying. What helped him is this particular manufacturer has an app that you can run on your iPad or on the computer during the hearing aid fitting session, where we played his favorite recorded music. He's a live music fan.

At the sound levels of normal live music. About 90 to 95 decibels. And he made adjustments, tracking along on his finger, in this space. Just literally, you see this -- it looks like a wandering through the desert kind of back and forth -- this space is changing relative levels between bass and treble, as well as compression ratios. And we found something that he thought... Yeah, between these different changes that I'm making, sounds pretty good. And so the final end result is that he loved his music program. Despite the fact that he had such good hearing in the low frequencies, and probably would be able to hear most music just fine without hearing aids, because of self-tuning, we were able to tweak it just right, where he in fact preferred listening to live music with his hearing aids in. Wasn't totally satisfied with other programs, but after a little bit of practice and work, we got there just fine. So this is the end of my presentation, despite -- there are six more slides. These are for your benefit. You in the audience. For you to read through and share with your audiologist. Just know -- please credit me with that. Because I may be wrong or right. And they should know who to blame. So with that, I just want to say -- thank you very much. And I'll turn it right back over to Wendy.

WENDY CHENG: Hi. Thank you very much, Dr. Fligor, for doing such a wonderful presentation. I'm going to -- we're going to start our panel discussion right now. And let me bring up the panel. Yep! So I have Nancy Williams and Adam Schwalje online and Charles. Charles Mokotoff should be online too. I don't know where Charles Mokotoff is. Charles, are you online? There you are. Awesome. I'm going to ask everybody except for Adam, Nancy, and Charles to turn off their webcams, so we can focus on our panelists. Great. Thank you so much. I think I'm going to go ahead and start by welcoming Adam and Charles and Nancy here, and thank you so much for taking the time out of your very busy weekend to join us, to talk a little bit about your experience with music and hearing aids. My question for each one of you is: Can you please discuss a little about your audiological history and also your musical history? I know it's different for everyone. They're familiar with musicians losing hearing later in life, but they're often not aware of people who have hearing loss first, before learning about music. And I believe everyone... Every member of this panel, except for Charles -- I'll just say Nancy and Adam, I think, have a slightly different history than Charles. But I'm going to go ahead and let you all speak for yourselves. So I'm going to have Nancy start. Can you tell us a little bit about your audiological history and your music experience? We can't hear you. Are you using your phone now?

NANCY: Can you hear me now?

WENDY: Excellent. Yes.

NANCY: Okay, great. I would be happy to answer the question. I wanted to start out by saying... How happy I am to be on this panel. I scrolled through the participants and saw some familiar names there. So it's good to be part of this conference. Anything that Wendy puts together is always so much worth the time. So thanks for having me, Wendy. My audiological history and musical history are very much intertwined.

Although, as Wendy pointed out, my family found out about my hearing loss before I actually began studying the piano. My hearing loss is genetic. I have the connection20 gene mutation. And I was first diagnosed with my hearing loss at age 6, although I was probably born with it, in some form or fashion. And at that time, my hearing loss was mild, in the high frequencies only. But nonetheless, the audiologist who diagnosed me at the University where my father taught recommended that I get hearing aids, and my parents, understandably, especially given the time that they were in, were worried about the social impact of their daughter wearing hearing aids, so they declined the audiologist's recommendation.

And meanwhile, at age 11, I started playing the piano. I was immediately smitten by it. I loved it. And when I was on my way to run an errand or do something else, even as an 11-year-old, I would just dash off a few bars on the piano. Practicing was never a problem for me. I always really enjoyed it. But then when I got into junior high school, I had some social difficulties. Ironically, the thing my parents worried about had happened anyway, because I couldn't hear. I wasn't able to hear girls whispering in the lunchroom.

My friends. Whispering is a staple of middle school experience. So I was actually asked to leave a group -- still haven't forgotten this -- because I couldn't hear secrets. And at that point, my parents realized that I needed to be fit with hearing aids. And I only received one. I was 12 years old. And I was very self-conscious. I remember kind of pushing down on the tubes. The behind-the-ear model. I remember pushing down on that tubing, trying to disguise it when I was in school. But it really helped on the piano. Definitely.

Because as Dr. Fligor was pointing out, the range of the piano was much broader than speech. And by the time I got up into the upper two or three octaves, even then I was having trouble hearing without the aids. So I studied the piano very seriously, until I was 16, and at that point, unfortunately, my hearing loss in the piano became intertwined in a way that was very unproductive. And I was asked to quit the piano by my parents, partly for financial reasons, but also because with my hearing loss, I would never be a concert pianist. So one of the things that was most dear to me left my life. And at the same time, I became very ashamed of my hearing loss. Because it was one of those... I felt as though it was the force that had caused me to lose an activity that was most dear to me in life. And I didn't touch the piano for years.

And instead, I pursued a business career. And I still am in business today. And meanwhile, my hearing loss, as I've written about -- it started sliding down the audiological chart. I now have moderate loss, sloping to severe in the high frequencies. And all this time, I was progressively better hearing aids. And then in my early 40s, a miraculous thing happened. My son, who has an amazing sense of musicality, started piano lessons, and my husband went with him. And that was the catalyst that drew me back to the piano. It was like falling in love all over again. And I started taking things, and I haven't quit since. I've been taking a weekly lesson, ever since. Performing, and my website, grandpianopassion -- because I felt that for me, in some ways, the piano has saved my life.

And I wanted to communicate all of the joy that I get playing and practicing to others. And I also... I didn't really go public about my hearing loss until after I started publishing Grand Piano Passion for a couple of years. And then I started writing about that too. And now I speak frequently on hearing loss and what it means to be a mother. And a wife hearing loss. To be a musician with hearing loss. And also what it means to be an executive with hearing loss. It's part of all of those worlds. And so I think the music and the hearing loss are very much interweaved, because a lot of times when I speak, I play the piano for people. So that's my story.

WENDY: Thank you, Nancy. Adam, can you share your story with us, please?

ADAM: Of course. Like Nancy -- first of all, I want to start off also by thanking you, Wendy. These are always wonderful events that you put together. And I really appreciate being a part of it. Like Nancy, my hearing loss is probably congenital. Although I didn't actually discover that until recently. I was diagnosed around 3 years old. 4 years old with hearing loss. And aided quite soon thereafter.

So from about... Until now... At that time, hearing aids were still analog aids. For me, the music started off when I was around 8 years old or so. I had been involved in the music classes, in elementary school, before then, as well. For some reason, and I don't know why -- but I went to my parents and told them that I wanted to play music -- and they agreed to let me go to an event that was happening that night at my school, and I picked cello to start off on. I have no idea why I was attracted to that. I have some idea now, which probably fits in with my hearing loss.

So my hearing loss is a cookie bite loss, which is sort of a cut-out in the middle of the frequency ranges. It's very common for a genetic type of hearing loss to have that picture. So I have some low frequency hearing still, and so probably low instruments like cello were attractive to me for that reason. Soon thereafter, though, the next year, my elementary school choir teacher approached my parents and asked if I would try out for a choir. I can't have been that good of a singer. Apparently she told my parents that she wanted me in the choir. But that sort of started me towards making music a very important part of my early life. In the summers, I would go to music camp, and it became a very important part of my growing up.

Social outlet, in addition to, obviously, a musical one. So in terms of how the hearing loss fit in with that, I wasn't particularly aware of any difficulties that I should have had. At that time. And I asked my parents actually -- what could I do to help to be able to hear music and participate in that way? And they told me that really all I did was to wear the hearing aids and just make little changes, I guess, to the volume, is what I was doing. And I was able to make it through in that way. But music continued to be a huge part of my life, all the way through high school, and then I studied in college the bassoon, went on to be a professional bassoonist, and played in China for about three years, in an orchestra there. But the hearing loss itself, as I sort of progressed up the chain of becoming a professional musician, the hearing loss itself really became more of... More important. And I think... As it became apparent that I really needed to hear a little bit better than I was hearing. So I switched hearing aids, and did a lot of tweaking, and worked with a lot of audiologists, and things like that. In order to make that process work. And that's been a much... Sort of longer process for me. In order to make sure that all that was working.

WENDY: Let me cut in for a minute. We're going to talk a little bit about your experience with hearing aids in a little minute. In a little while. But right now, I'd like Charles to share his story. So Charles, thank you for popping back up on video. I was wondering where you had gone to. But I want you to share a little bit about your hearing loss, and how you ended up playing guitar. Thank you.

CHARLES: Hi, everybody. I watched myself disappear too. And I've been struggling with this. I'm not sure exactly why. But I'm hoping you can hear me now. My story is... Oh, good, good. My story is similar to Nancy and Adam's. The difference... I was about 15 when I had a sudden overnight loss. And my audiogram today in 2016 looks pretty much the same as it did when I was 15. So it was terrible then, and it's terrible now, but it hasn't gotten any worse. I say terrible. It's basically a severe loss. As bad as 90 in some frequencies. But when I was 12 or 13, I was playing guitar. I grew up in a town where there wasn't much else to do, but play in some terrible rock band or another. That's just about what everybody did, with or without hearing loss. The interesting thing about it -- I think back, I had one analog aid. There wasn't any experience of me going to an audiologist and making the guitar sound better. It just was louder or softer. When I got digital aids, I got obsessed about getting this right. I think as a classical guitarist, no question -- on the panel here, I have the quietest instrument. It's probably the easiest of the three, compared with bassoon and piano, to get things right. But I don't know. I'm a very persnickety kind of guy. Very fussy. It goes with the territory, being a guitarist. If you know any classical guitarists, that's how we are. Not only do I mess around with hearing aids, but I drive audiologists crazy. Basically I've been playing guitar well before, and I didn't let it stop me. That's in a thumbnail where I am now.

WENDY: Okay. All right. Thank you, Charles. Getting back to Nancy, here's the second set of questions which is: Can you kind of briefly describe your experiences getting at the hearing aid that was right for you when playing piano? Nancy?

NANCY: Okay. That is a very good question, Wendy, and I'm not sure whether I still have got this completely right. And while Dr. Brian Fligor was speaking, I was calculating in my mind how feasible it might be to periodically drive up from central Connecticut to get treated by him. Because I think it really is an ongoing process. I currently wear Phonak hearing aids, and I do have a music setting programmed in there. But I actually have three versions of the music setting programmed in my hearing aids. And the first one is the regular music setting. Dampened by 3 decibels. Second one is dampened by 6 decibels, third by 8. And I actually almost always use the third music setting option. Which is the manufacturer's suggested music setting. With compression removed. I'll say more about that in a minute. Dampened by 8 decibels.

And I didn't come up with this idea myself. To dampen the music setting. But I was actually -- I remember reading in the first book that Wendy Cheng edited and produced through the Association -- some recommendations by Dr. Marshall Chasin. Typically the music setting for the manufacturer's music setting is really designed more for listening than playing. And it's often too loud.

So I started experimenting and playing around with that, and it's true what Dr. Brian Fligor says is that most audiologists are not really trained to work with musicians. I had to leave my audiologist, and it took several sessions to convince her that she had to be trying out some of these ideas that I had been reading about from people who specialize in hearing loss. But once we did that, I kind of arrived at those settings that I use.

The other thing is -- and I believe this is unique to Phonak, although I would defer to some of the experts who have already spoken -- is that the music setting for Phonak does use compression. Which makes absolutely no sense at all. So, for example, they may be taking a Bb in a very high octave, and compressing it down to D in another octave. Completely garbling the music. I actually have had some interaction with Phonak, and I'm in touch with one of their top executives.

So I emailed them on this and said -- I'm really concerned. Can you do something about this? And I really haven't heard a definitive answer. But I think as a community, we need to talk about some of these oddities of the music settings that are really quite incompatible with the act of making music. Having said all this, I am now about five years into this pair of hearing aids that I have currently. They're behind-the-ear models. They're the Naida. I believe that's how they pronounce it. So I'm thinking about what my next model should be. And I'm probably going to get a couple of them. And hence... My calculations about whether I go to Boston every couple of weeks to get fitted. So those are the experiences that I've had.

WENDY: The hearing aid you're talking about is the Phonak Naida. Phonak works with Advanced Bionics for some portion of their technology for cochlear implants. So I am familiar with the Naida. Adam, what kind of hearing aid do you have?

ADAM: Right now I'm using the (inaudible). That was after long periods of trying lots of different manufacturers' aids. With an audiologist who was very, very kind to me.

WENDY: Adam, can you say the model and the make of your hearing aid? Because I don't think our captioner got it.

ADAM: Yeah. I'll actually put it in the message here. It's the Oticon Agil P.

WENDY: The Oticon Agil Pro?

ADAM: Yeah. So that was after a long period of trying. Before that, probably the most successful with music were older Oticons, the Focus II, and that's what I wore for most of my music career. I'm not really performing anymore. I've left the music profession now. I've been able to make the current aids work reasonably well. And I think that the resources that Dr. Chasin especially has -- that people like that have been giving us -- have been tremendously valuable. I've used the scotch tape thing. That really worked well for me. I put some cotton... Well, that worked well as well. Putting some cotton fluff or a piece of ball in the tubing. That really worked for me as well as an attenuator. For me, it's been a real process of trial and error. And also just a tremendous relationship with some audiologists, who were just extremely kind to me. And let me sit around their offices for like a week. Messing around with my settings. So it's been a long process.

WENDY: Charles, can you please tell us a little bit about the hearing aids now?

CHARLES: Sure. I'm wearing right now the Resound Linx Squared. It's just spelled Linx≤. This year alone, I've tried four hearing aids. I used to use the Phonak Naida, which was just great. I thought it was just great. It was an older one. In the canal. So I waited for the new one to come out, and I could not get this thing to work. I had a great audiologist. We worked together. I will admit that I would say I do about 80% of the work. I come in, I do the research, I bother Marshall Chasin, I bother Brian. They both know me well. I come in, sometimes even after -- I once had Marshall Chasin on the phone with me. It just never worked. And so I moved on to a Starkey aid. Didn't work for me. Then I moved on to a Widex. It's a good hearing aid. But then I got turned on to the Resound thing. Because it's no wires. I can't tell you how wonderful it is to listen to audiobooks and in the car and on the phone without any wires. Because for a while, I was putting in the old (inaudible). And putting these Resounds in for everything else. And I'm giving credit to Brian. He doesn't realize it, but he gave me a tip that made it work. But my process was working with a lot of audiologists, again. Most audiologists... If you want the gory details about what works for me, again, this is for me, my loss, and again, I'm a classical guitarist. Because that's what I care about the most. I'll be happy to share that with you.

WENDY: Okay. Thank you very much. All right. So... Okay. So I'm just going to throw it out to you, and anyone can choose to answer. In your experience, what has been the best strategy during your adventure in trying out hearing aids... How do you communicate... What do you do to tell your audiologist to keep working with me until we get it to work? Or are there any other... Is there anything you would like to tell people to use on their journeys with their audiologist?

CHARLES: You know what the problem is? It's vocabulary. You can't just say to the audiologist -- I don't know. That doesn't sound that good. Can you make it better? You have to get very specific. You can get specific about frequency. You can (inaudible). You can help them -- oftentimes, in the very beginning of this, I would say... You need more bass. So they brought the bass up. I went home and I realized that it just completely blew the top end up. I can't hear any of the notes on the top. So I go back, and I think a lot of it is... You need to be educated. I don't know... Very few audiologists... Two of them are probably on the phone here. Marshall Chasin and Brian. But other than them, most of them -- you're going to have to do the work. So that helps the most. Basically studying.

WENDY: Okay. Nancy, Adam, do you have anything to add?

NANCY: I do. I totally agree and underscore with what Charles has said. And I think once you've educated yourself, the question is: How do you use your audiologist as a partner in your journey to hear music better? Ideally, you would be able to set the expectation at the time you purchase your hearing aids to make sure that they understand that you are a musician, that you may be coming back frequently for tuning, and changes, as you explore how these aids sound, when you play the piano, or the classical guitar, or the bassoon, or whatever it might be. And I think, just like anything, you get what you pay for. So having an audiologist who may charge more for the hearing aids, but has unlimited visits, if that works for your particular financial picture, could be a way to go, because you're able then -- it works with their model and they're okay with you coming back frequently to make those changes.

WENDY: Okay. Thank you. Well... At this point, we're going to change the space of this conference. So that we can have question and answer. And I'm going to say anybody who wants can type in questions on the Q and A. And if anybody decides that they also want to show their faces, they're welcome to. So I'm going to turn on my webcam for now. Okay. So anybody who wants can see me... And if you have questions to ask, just type it in the Q and A box. And hopefully one of our panelists or our audiologists can answer. So while we're waiting for people to ask questions -- and I don't know if anybody has questions. But they're welcome to type in a question. Otherwise... Okay. Okay. So...

DR. FLIGOR: I was going to jump in and just say very quickly -- you three panelists -- absolutely fantastic. You are far too kind to me and Marshall Chasin. You are more than welcome to have Marshall Chasin on the phone with your audiologist any time you want.

DR. CHASIN: Thank you, Brian, for volunteering me. But it is true that it's a mutual situation. The musician can't just come in and say -- it doesn't sound right. Charles and everyone is quite right on that. The jargon has long kept us apart. And there's no reason it should. So I think conversations like this are excellent. Thank you.

CHARLES: It also helps to travel to Toronto and take Marshall Chasin out to lunch. That's something I did once as well.

NANCY: I was in Toronto for the CHAA conference a while ago. It was a wonderful fitting.

WENDY: People are having trouble with the Q and A pod, so I'm going to go ahead and pop up the chat box. And anybody who wants... I never tried the Q and A while I was in training, before using this platform. People can actually try typing in something. I hope this works. Although we might have to wait a little bit for people to type in questions. There was a question earlier about... Did anyone try using the iPhone compatible hearing aids? I don't know if these hearing aids are iPhone compatible. So can Marshall Chasin or Brian give us an idea of which are iPhone compatible?

DR. CHASIN: At this point in time, November 2016, there are three manufacturers. Oticon, Resound, and Starkey. There should be other ones coming down the pipeline. I'm sure they will be. We have a very large community called the American Academy of Audiology. And that's usually in the spring. And that's where... It's like the new thing. I see more manufacturers going that route. The only drawback I can see, and has been noticed in the literature, in the clinic -- when you use an iPhone or anything unconnected, Bluetooth is a very high energy system. They really try to dissuade people from using the smaller batteries. The battery life can degrade from over 100 hours to probably just over 10 hours, if you use it a lot. So there is that problem. They're also working on trying to improve Bluetooth with the low energy version, but even that is problematical. Brian? Any comments?

WENDY: Thank you, Marshall Chasin.

CHARLES: I think I'm the only one on the panel who's using it right now. I just plugged in because of the iPhone. The batteries have been fine. The experience has been fantastic.

WENDY: All right. Tom Webb -- I think this is for Marshall. He asked: Do you have any suggestions for my audiologist on setting up the Starkey Muse?

DR. FLIGOR: Talk to this guy. I just volunteered Marshall.

DR. CHASIN: Thank you, Brian. The check is in the mail. I've had some experience with the Starkey Muse. I can't find out anybody that can definitively tell me how the Starkey Muse functions. I could be wrong about this. But my suspicion is that it cannot handle the louder inputs characteristic of music. And that the ads going along with it, showing sexy musicians, are nothing more than advertising. That's my suspicion. I'm not sure. Nobody -- none of the engineers can give me a straight answer on how the Muse does work. I've personally never done any studies with the Muse. So it's one of the reasons that in my example I gave you earlier, Starkey was not among them. It could work, but nobody seems to know how to convey that to me.

DR. FLIGOR: I've trained on the Muse. The peak input level is about 107 decibels. You can call the manufacturer to get what the peak input levels are. Their self-adjustment is an option for that, and I would simply just recommend that you bring in your instrument, or even probably more likely... Bring in a recording of yourself. And play it back on a very high resolution stereo. At a level that approximates your normal performance level. Whatever level you're at in your own ear. And use them only.

WENDY: Okay. That's very helpful, Brian. Okay. So Janice wants to know... She has a question regarding tweaking the hearing aid to better hear the higher notes on the piano. I'm not getting the right vibration for the upper few notes. The hearing aids are fine otherwise. I need to know what to ask my audiologist to get it to sound better. She has a Widex Super440 Digital. So do you want to give Janice any suggestions?

DR. CHASIN: If it's the Dream or more recent Unique Widex model, it should be able to handle the higher levels at the front end. More is less. In other words, if you artificially create more amplification there, so that these sounds would be audible, it would be in the region of the ear that would take the higher frequencies and move them to lower frequencies. That would work, of course, for speech. But as I said earlier in my talk, if you use it for music, you destroy the entire structure. People get benefit from decreasing the amount of amplification in the damaged region. Brian, do you agree?

DR. FLIGOR: I'm giving a thumbs up to that, Marshall. Just giving the thumbs up to that. And this actually speaks to having the compression... The sound level compression and frequency compression... Some of the manufacturers, and Phonak is one of them, sets a frequency compression, because depending on how much hearing you have above 2,000 hertz, that frequency compression can be a fantastic help to understand what people are saying. And it is godawful for music.

As Marshall Chasin was saying. Because it just really messes up the harmonic structure. So for Nancy, I am not your audiologist. And I am not giving you audiological advice. This is for general teaching. But have a separate without frequency compression. They call it (inaudible). Recover. Turn off recover. In this particular individual, talking about those upper notes, I would, again, not knowing what her hearing loss is like... It may be better to reduce the amount of gain for those high frequencies, rather than increase the gain.

WENDY: Okay. Kathleen has a question.

DR. CHASIN: It might make it worse. We call that a dead region in the cochlea. A cochlear dead region. That was actually propagated by -- I know Brian had mentioned in his talk -- Brian Moore, another Brian, and Brian Moore has a special test called the TENS test. Clinically what I do in my clinic -- I have a piano in my office. And although quite frankly, any piano or even one of those Casio -- old electronic keyboards from the 1980s -- and what I have my clients do is they go up in semi-tone intervals, white, white, black, white, black, and on up... And they stop -- is the sound different? That's great. But if it's the same, that's an indication of a dead or severely damaged region of the ear. And the audiologist, when programming the instrument, should stay away from that area. This is something you can do at home on your own piano if you do have one. It's best to stay away from that region. That would be consistent with a dead region in your cochlea.

NANCY: Could I jump in with a follow-up question to what Marshall is talking about, Wendy? Would it make sense for those of us who are in big metropolitan areas...

(audio disconnected)

(reconnected)

WENDY [reading question from chat box]: I have tonal distortion without using hearing aids. I use a custom fit ear plug with a 9, 12, or 15dB filter, depending on the situation. Are there any hearing aids or settings that could help her? I don't understand the question, but I'm hoping one of you do.

DR. CHASIN: She just described what sounds a lot like a cochlear dead region. In many ears, that's a type of a syndrome many people have, that give them severe or moderate hearing loss but very poor discrimination, there's usually a lot of damage to the nerve endings in the cochlear, and any amplification there can be problematic. I've suggested that to my other clients. You just remove it from the equation. So you use an ear plug that takes it away completely. But that's most likely what that is, and there's not a lot you can do, other than to avoid that region of the ear. Or in her case, you can plug it up. She can also use what we call a crossover or bicross hearing aid, where you plug up the offending ear, but you can fool the ear into thinking it's hearing, by routing the sound to your slightly better ear, through a wireless signal. And that's called a CROSS or BICROS. It sounds for contralateral (inaudible) of signal. It was invented in 1966 by Earl Hartford, who just passed away in the last month. A brilliant idea. Brian, any suggestions?

DR. FLIGOR: Yeah, we were breaking up quite a lot. Are you all able to hear me any better?

WENDY: I can hear you. We're fine. We're fine.

BRIAN: Okay. So what I was understanding from Marshall Chasin's description with the individual who said that without hearing aids, when she hears certain tones, it actually has a distortion to it. I wonder if that actually has a loudness component to it as well, in that if it sounds cleaner, and it gets louder and louder and louder -- it actually starts to distort. That is something that does happen occasionally. What I'm thinking of is something called diplacusis. And this can have a loudness component to it, such that at some softer level, the tone is clearer, and as it gets louder, it starts to have more of a splatter, across the area of the cochlea that has the damage. And in that case, I would actually think about using...

WENDY: Actually think about using what?

DR. FLIGOR: Sorry about that. I got a little disconnection thing. I'm going to jump back in with you guys. But... Using a hearing aid called -- sorry. Not a hearing aid. It's... The Etimotic Research Music ProElectronic Hearing Protection Device. Etimotic.com, and look up MusicPro. Because that'll attenuate the higher sound levels, and it actually has a little bit of a boost for the softer sounds. So that might be a little bit of an option for some folks. It does have a -- it's an analog circuit. So it tends not to have some of these issues that we talked about with the distortions from digital signal processing.

DR. CHASIN: Quite right. The thing he just talked about is called a K-AMP. And it's a 1988 analog technology, and we're constantly playing catchup to that problem we had solved in 1988.

WENDY: Okay. We are running a little low on time, so I'm going to summarize a question that some of our singers have. Dawn Mollenkaupf was asking that... If you talk about playing an instrument while getting ear molds made. If I'm a vocalist, should I sing? So that's a very good question. You know? If you're having an ear mold made, what do you do?

DR. CHASIN: I'll let Brian answer, since he's working in that domain right now, but it was Bob Olivera, back in 1987, in a magazine called Ear and Hearing, and he was able to demonstrate that it's the front part, the anterior part, of the ear canal that moves as you open and close your mouth. And you can verify that by sticking your finger into your ear and opening and closing your mouth. You can see the back part, top, and bottom don't move, but the front part does move forward and back. So a singer should find the widest they open their mouth and keep it open for at least two or three minutes of an ear mold impression, and you'll get a very nice seal on the front part, the anterior part of the ear canal. Brian, that's your area now with Lantos. Maybe you can add something.

WENDY: I am going to... I'm scrolling through all of these... Yeah, one more question. It has to do with -- and this is not necessarily related to hearing aids, but someone asks -- do you have any suggestions for choir conductors who must listen to a choir, and then successfully field a question from the back row? And I thought that was a very interesting question. But I almost think... I actually conduct a very small bell choir at work. We have eight people. Fortunately my bell choir is very close to me, because we're all seated in a very crowded conference room at work. But I think when you are conducting an actual choir, at a church or somewhere where the distance between the conductor and the singer is farther away, I almost think the conductor is going to have to use an assistive listening device. But I would be willing to hear what Marshall Chasin and Brian think about that. Or anybody else.

DR. CHASIN: Do you want to go first, Brian?

DR. CHASIN: I think Brian had a wonderful suggestion last time. The MusicPro. From Etymotic Research. It gives a slight amplification for soft sounds and makes louder sounds softer. It's in your ear, and that will assist you with hearing. Brian, any input? I think we've lost Brian.

DR. FLIGOR: Yeah, no. Sorry about that, Marshall Chasin. I can hear through my computer audio. But I couldn't hear other people through my telephone audio. I was muting one to the other. So I apologize. I missed some of the previous questions around the shape change of the ear canal. You're welcome to email me after the fact. But then Marshall Chasin, you were talking about... Now I believe that being able to hear from the back row -- is that correct?

DR. CHASIN: Well, actually, the question was more of a comment.

BRIAN: One second.

DR. CHASIN: It was more of a comment. The woman thought that your talk was the best talk she had ever heard in her life, and she thinks you're pretty sexy. Something like that. And then she went on and asked specifically about the choir director who could hear the choir, but during a break would be able to address a question from far back in the back row. And I talked about the suggestion you had made, with the Music Pro Amplifier, from Etymotic Research. And now it's your turn.

DR. FLIGOR: Right. One of the things I like about that Etymotic Research ear plug is it has different settings. In one setting, it lets soft to average sound through without doing any attenuation, and for very loud sound, it attenuates. In another setting, it actually boosts soft sounds and then it still attenuates the very loud sounds in a very clean sort of way. I've had a couple of musicians who just found they had so much difficulty using hearing aids, but they could hear their own instrument very well, and the instruments around them, but their biggest challenge was hearing the conductor say -- okay, let's pick this up at measure 42. What? Forty two. What? And they just needed a little bit of a boost in order to hear the conductor. So that Etimotic Research ear plug gave only 6 decibels of boost for sound coming from the conductor's distance, and they were able to hear just well enough to pick up at the right measure. And so, again, it's very situational, as far as how much hearing loss you have. But that's one example of some technology that can sort of get you there, a little bit. If that particular 6 decibels is not enough, there is another -- you would think of it as a personal sound amplification product, or a PSAP, called the Etimotic Bean, that does more amplification, and it is also an analog device. These are relatively inexpensive, compared to your typical digital signal processing hearing aids.

WENDY: Okay. Well... It's getting... Okay. So we're about out of time. And I want to thank everybody who came. Everybody who presented. Everybody who listened in. And last but not least, I also would like to thank our CART reporter, Mirabai Knight. She is writing this two-hour session from New York City. And so, Mirabai, thank you so much for doing this. For providing the captions for this event. Before I stop this web conference, I want to thank everybody for being here. Have a great evening. And by the way, if you enjoyed this two-hour seminar, think about donating to us. Because we're always looking for funding to do things like this. I chose not to request registration this time, because I was curious to see how many people would sign up. But in the future, we're probably going to charge something. So I thank everybody for being here, and if you have suggestions for future topics, future talks, please go ahead and send them to me. I'm going to type in the email address, for those who don't know. So you can just go ahead and send your suggestions to us. Hang on. So that's our email address. So have a great evening, and maybe we'll do this again sometime next spring. Okay. Bye, everybody! Bye!