

This unedited transcript of a live webinar is provided in order to facilitate communication accessibility for the viewer and may not be a totally verbatim record of the proceedings. This transcript may contain errors. Copying or distributing this transcript without the express written consent of continued is strictly prohibited.

Tinnitus, Hyperacusis, Misophonia: Where Are We Now?

Presenter: Pawel Jastreboff, PhD, ScD, MBA

It is my honor to introduce our webinar today titled Tinnitus Hyperacusis Misophonia. Where Are We Now? Today's course is presented in partnership with the American Academy of Audiology. Our presenter today is Dr. Pavel Yasterboff, professor Emeritus of Otolaryngology, Head and Neck Surgery at Emory University School of Medicine in Atlanta, Georgia. He is the founder of Jastreboff Hearing Disorders Foundation, Inc. Where he continues his research on tinnitus and decreased sound tolerance and provides clinical services to patients with a variety of hearing disorders.

He continues to be involved in teaching professionals, including providing intensive courses on the management of tinnitus and decreased sound tolerance with tinnitus, Tinnitus Retraining Therapy and has offered more than 50 courses in the US and over 90 internationally. Please read more about our presenter in the handout and at this time I am honored to turn it over to Dr. Jasterboth.

Well, thank you very much for inviting me and creating opportunity to sharing some of my thoughts. I understand that first of all we need to hear from American Academy audiologists, so let me switch it on.

Welcome. I'm Tish Gaffney, the President of the American Academy of Audiology and I'm here to share important information about the organization. The Academy is dedicated to achieving recognition of audiologists as the experts in hearing and balance care and the field of audiology as an independent clinical specialty that is integral to the healthcare team. Through our partnership with Audiology Online, we're excited to offer courses like this one to help you broaden your knowledge and skills. We also offer the latest resources in practice management and evidence based clinical practice so you can grow professionally and improve patient care.

We advocate for our members in Washington and across the country to ensure that the voices of audiologists are heard and we help connect audiologists to one another through our valuable networking opportunities like our annual convention. To learn more about the Academy, make sure to visit audiology.org thank you.

Welcome. I'm Tish Great so some standard disclosure which you can have at I'm showing the materials and standard mutation risk so we not dwelling on this learning outcomes as well you have a senior notes but mainly is just assessing current status of field of 1087 degrees center and as well offering some thoughts for future. So first of all a little bit about the this presentation. This presentation is aimed to be expert opinion that means it's focusing or not. Not only using whatever is in literature but it's for my experience which I accumulate since working since 97 and Internet is feeling since 1983.

But I can be wrong. So I'm not claiming that everything I'm saying is right. I hope that it is. And I will not tell anything which I do not believe is. But if you have any doubts, ask my wife Margaret and she will tell you that I'm wrong nearly all the time.

And another point is I think which is characteristic for all my activities for my life, that I like to provoke changes chairman status quo and proposing things which are contrary to common beliefs and consensus. Because I believe it's the only way we can make really progress if we argue and disagree with things which are considered to be absolutely true. And as well, I would like to suggest discuss some challenges which you know very well, but some challenges which are specific to decrease Santorance particularly and some suggestion how to improve clinical work in the field of audiology. So as I mentioned, I entered Trinity's field in 1983. And until then I was absolutely playing basic neuroscientist who wasn't interested in at all in anything which has any kind of a clinical implication.

And I know only about tinnitus, that my grandmother had it and complained bitterly about this. So when I was challenged by Dr. Sasaki to create animal model of tinnitus at Yale I start formative literature whatever I could. And all information was very conflicting. It just was not a common agreement. And all models all think he was focusing exclusively on peripheral auditory system, cochlear and eventual auditory nerve.

Nothing about this and was absolutely assumption which nobody was even questioning. But audiological characterization is determining factor in Trinity's problem and Trinity severity. We focus on tinnitus loudness and all audiological marching. Each loudness match and so on. It was dogma.

Nobody was arguing that it is not true. And you can still see some element of this even now. So treatments were aiming at decreasing loudness. And as a criteria that treatment is effective. Was just checking if a loudness of tinnitus decreased.

And through this was again getting to the masking total suppression tinnitus perception. And at this time it was a lack of effective treatments. We have a lot of things including not healthy. Because please remember at this time if I hearing something well, it's suspicious. That means you have schizophrenia.

And first patient I've seen with a plain tinnitus. Dr. Zesaki introduced me. It was just tinnitus, nothing else. But he got a very heavy treatment for schizophrenia very unhealthy, which did not help of his tinnitus. But this was something which was happening 50 years ago.

Were no animal models. So it's a possibility of research at this time without imaging which you have now. Research was very, very restrictive. So mechanism of tinnitus was based on the mechanism of a hearing clothes. So if you have a hearing clause or a hearing clause.

Well, that means you have attentives and methods of presentation. Data analysis. Data were really very inappropriate, to put it mildly. And statistics which were used was such that it would not really was accepted in for example cancer or any kind of a clinical research in audiological textbooks. Tinnitus was just mentioned in associated with a Meniere and decrease entrance was not mentioned at all.

Brain imaging was very early stage. And it was basically not applied used to the tenetus. So what were my changes since 1990, first of all?

Well, I develop this animal model of tinnitus first model which was recognized as a valid by NIH. And in the field using crazy idea of using silence as a conditioned stimulus in behavioral training of animals. And majority of models were even now are using this concept. Not all of the model one or nice other approaches. What was very different was introducing concept of tinnitus phantom auditory perception and neurophysiological model of tinnitus and decryperones and tinnitus retaining therapy which was based on.

On introducing habituation of tinnitus. Habituation of tinnitus was discussed by Hallam and Havre. But as something which simply is not happening. And because of its tinnitus a problem. And what TRT is doing is proposing how to induce habituation of tinnitus.

And moving away from audiological evaluation of tinnitus. Decrease of tinnitus loudness secretarial improvement. And this is now becoming dominant. Featured such a famous audiologist, Dr. Jim Henry is saying that all of his measurements are irrelevant. Except perhaps subjective loudness of tinnitus judgment.

Rapid propagation of human imaging studies open totally new field. And unfortunately, until now we have a lot of disagreement. And basically there is no coherent image. But hopefully something finally will emerge. And certain things are interesting.

I should correct myself and really helpful now advancing technology of hearing aids cause that we have a sound generator spark practically in all hearing aids. Which made tinnitus treatment easier and more effective. And last but not least was introducing more stringent criteria in methodology of studies and analysis of results. Was extremely important. Because the initial at this time initial method of analyzing data and proposing clinical study or any kind of study were really not particularly good.

Another thing is that number of republication increased dramatically. He was tinnitus hyperacusis, misophonia as this exponential increase of the papers at this moment is basically impossible for single person to read all of those papers. It's close to 1,000 new papers in tinnitus field per year currently. When I was in telling it was much easier. I was able to read practically all papers.

Now it's no way but what is very good that it's not only more publication, but the academic rigor improved. So papers are more valid that previously wasn't as good. At the same time, psychologists get involved and interested in audiological disorder with a good and not so good results too. I would like to mention one thing. Effect of a treatment on tinnitus loudness much.

We did the study with Dr. Hazel Jonathan Hazel from England on 382 patients before and after treatment. And what we found there's no difference whatsoever in loudness much audiological loudness much of tinnitus before and after treatment. And if a patient who improve show very nice improvement. So it doesn't matter improved or not improved. Simply no effect of the of the loudness much.

And definitely not improvement when you have is not changing loudness much whenever improvement. So what was the new concept was paradigm shift from peripheral in auditory to central brain based. And proposing tinnitus as a phantom auditory perception. Which was in 1990, which was published was created as absolutely crazy and not even worth of discussing. And at this moment I have to brag about this.

But this paper is still most quoted paper in tinnitus field, which I think is. I don't think that people are reading. This is so boring that sometimes I'm referring to a patient. But it's just, you know, few paragraphs on this paper and you fall asleep at once you have a problem because it's so boring condensed information. But it was interesting paper from this point of view that introduced phantom auditory perception as a tinnitus concept of tinnitus.

And pointing out the variant of a brain system and involved in tinnitus with the auditory system plays a secondary role and not primary. Still involved. But it's not as crucial. It's really physical. We actually had a proof.

Professor Feldman from Munster did a very nice study and published in the end of 60s and beginning 70. This is a classical paper in which he basically proved without realizing perhaps this, that tinnitus is factomilitary perception. What was the study he was suppressing tinnitus perception, which he was calling masking by variety of sounds. And now to put in perspective, if you are suppressing perception of one sound, let's say 4khz tone by other sounds and change frequency 2, 1 and 5, 6 and so on. We get characteristic V shape of a mask.

That means if you are trying to mask 4kHz tone by 1kHz tone, you have to use higher level. But if you are using let's say 3khz tone and this is characteristic and this reflects the auditory masking is interaction of the two traveling waves on basilar membrane cochlear. As another side effect of this, there is a critical band that means if you move too far away from pitch of its original frequency of its original cell, you cannot mask, you cannot suppress perception with whatever intensity of sound using. And again, this very simple explanation, that if you are moving too far away from the portal basilarial membrane, which are affecting by second sound, you cannot affect this first sound. And what happened that none of this existed for tinnitus.

In his study it was just basically flat and not critical bend. And sometimes was even easier to to mask to suppress tinnitus perception by presenting some to contralateral ear. So definitely was no interaction of a travelling wave. So it was not masking auditory masking, but neuronal suppression happening at the higher level than auditory nerve. It has to be at least cochlear nuclear complex dorsal.

And therefore there is no vibratory activity like cochlear corresponding to tinnitus perception. And thus tinnitus is a phantom auditory perception.

We had a proof since 70s, but we did not realize this. And I did not realize initially, I found this paper later. So the implication normal rules of interaction between physical sound do not apply to tinnitus. For example, it's impossible to use the phase based cancellation of tinnitus perception. As you know, it was one of the methods which was proposed.

And since we do not have a lack of mechanical vibration of activity, therefore auditory imagery, musical hallucination, a phantom perception and represent central form of tinnitus. You can have a tinnitus after cutting of auditory nerve is actually effective method for inducing tinnitus. And you don't have a cochlear or nerve involved. But in the same. In this same somatosound should not should not be classified as certainties.

Because by real sound generating inside of a body which I perceive. And it is possible to actually diagnose somatosound by performing suppression study like this, thus using fiscal sounds. So what is this? The neurophysiological model of tinnitus. And this the is purposefully put.

Jonathan Hazel taught me that it should be like this because a Specific model is not just a neurophysiological model, but specific model. And main postulate of this is that processing of tinnitus related signal within various part of central nervous system have to be included in the analysis of phenomenon of clinically significant tinnitus in this time. In this paper, 1990, I introduce concept that we have to separate mechanism responsible for perception of tinnitus from mechanics responsible for potential negative reaction by tinnitus. 80% of the people with tinnitus have no problem with this. But mechanism why they have a problem is different from perception.

And it was again different because previously on the study of tinnitus. But we it's a problem. And well, this is my picture from Yale when I was working at this time. So while moving from peripheral auditory system to not only central part of auditory system, but to outside to all the brain practically. But which particular part of the brain are specifically interested Analysis of what patient complain and so on suggests that many parts of this but definitely we have to have an emotional limbic system and autonomy nervous system involved.

So part we talk amygdala. So this is a picture of a patient, not patient, but person who is perceiving tinnitus. You have a source of tinnitus somewhere in your nervous system is perceived and so on. But there is no spreading of the signal to other part. And patient has the person is experiencing tinnitus, but it's not patient.

There's no problem. It's 80% of the cases. And now while getting very strong connection. Very well work out all the details practically from medial geniculate body to lateral ventral nucleus of amygdala, which is one of the main structure of limbic system. And this is causing that at subconscious level sound can induce emotion, can change mood of a person.

It's another connection very nice. From a different part of amygdala to inferior colliculus which is causing that mood. How we are feeling our emotion are changing way in which sound information and tenets is processed within auditory system. So this was, you know, theory when I was proposing based on my knowledge of neuroscience and as well whatever I was able to find literature. And first confirmation of this came in 98 when local Salvi published paper showing that in case of tinnitus they did the study.

The very big surprise was nothing in auditory system but limbic system like a Christmas tree. And since then there were many, many studies. And basically all imaging study are consistent that whatever we are finding, the limbic system is practically always activated. So now we have a model. So I cannot stop

thinking what to do.

Because Clarence really sucky. Really trigger in me understanding. But helping people, helping patient can be very rewarding and worth of doing. So I was thinking what to do, how to use this knowledge, this model. So idea was treat tinnitus by removing negative reaction by tinnitus.

Habituation of reaction achieved by blocking subconscious connection between auditors and have a single brain. And then habituation of tinnitus perception occurs automatically due to fundamental principle of the brain function. And this in my paper, in my teaching. And there is no goal or need to modify. At any rate, remove tinnitus source.

And therefore etiology of tinnitus is irrelevant. You can treat with TRT tinnitus disregarding of its origin. Why it created. Was created by noise, by chemotherapy or whatever else doesn't matter. Or even central tinnitus like musical hallucination.

And you have a described in the book which publish Jonathan and a number of publications now. TRT conserve two parts cancelling. But it's a very specific counseling based on the model and some therapy. And primary goal of canceling. Not the only one, but primary is to reclassify perception of tinnitus or misophonic triggers to neutral category.

As having to patient is difficult or even impossible to stimuli with negative connotation. And primary role of sound therapy is again not only one, but primary. Decreased strength of neuronal activity per CPU stenitis and above by external sounds. Or in case of hypersensophonia, by increasing background neural activity achieved by increasing background sound. And from this the advice was created, which was again not generally recognized or used.

Avoid silence and listen to sound 247. Now it's a partner of standard of care. But was revolution at this time. So what's the goal? If we remember this diagram, auditory system and so on.

While trying to block spreading of tinnitus activity to limbic and autonomic nervous system. Habituation of reaction. And if you have this, we are getting automatically, if you like or not habituation perception. That means people start perceiving tinnitus smaller and smaller perception over time typically is getting to 10, 20% or even less. And what's the difference between principles of other treatment and TRT in case of all other treatment.

Or you are trying to suppress a modified source, make them it is weaker or disappear or act on reaction. Psychotropic medication, psychological treatment. What TRP is trying to do is not trying to do anything with any cells. Is not trying to do anything by reaction. It's trying to remove reaction by Blocking of connection.

So whereas tinnitus. Tinnitus is still perceived even but in paranormal reaction.

So if it's correct and all our experience from treating I'm treating tinnitus patient personality since 1990. The TRT can be used to treat any type of tinnitus and somatosan and method which I'm using is extinguish subconscious condition reflexes linking auditory system other part of the brain. Plasticity of the brain is crucial. And because of benzodiazepines which are decreasing brain plasticity should be avoided. In addition to other problems we are creating.

And please notice that our brain system accepts may function normally. Not necessarily, but may. And still you have a problem vatinnitus because you have an incorrect activation but in a dissimilar proper reaction. But to wrong stimulus reacting to plastic gun which looks like a normal gun. And all you have overreaction could be a real gun.

Now what's the dominant treatment for tendencies in DSDs? Some therapies, variety of sound therapies Cognitive behavioral therapy and trt. And during recent years you are observing trend to CBT based treatment for tinnitus and misophonia by audiologists which creates some issue and practical issue. And we'll be discussing a little bit more. And goal of CBT is to alter maladaptive emotional and cognitive responses to benefits and by means of Albert techniques which psychologists are really expert in doing.

But if you look what is in literature on CBT done by psychologists high level psychologists it's not as clear as it might appear. We have a Cochrane database of systematic reviews very famous and very powerful. Some paper not recent paper published by a really expert Fuller Sima is super expert in CBT for taste. One of his expert alternatives Mazurik and so on. And they published assessment of CBT for Tinnitus.

And this is a offers direct quotes from this Cochrane review and please notice things which I will be not going forward. Details about CBT may be effective on the quality of life Absence of evidence for longer time CBT may have small additional benefit depression but concern about a quality of evidence limited evidence of CBT for tinnitus improving anxiety and so on. Now comparing the audiological care tinnitus training therapy in herbal CBT probably reduced quality of life. Certain evidence moderate to low for depression were mixed and evidence less certain. So even worse, moderate evidence CBT may reduce negative interpretation of tinnitus but and now it's a very important part but compare the audiological curve and tentacle telephone.

The evidence is less certain in plain English language. We do not have results showing that CBT is better than audiological care. TRT sound therapies contrary to what you are hearing and which is proposed. And we can compare two randomized trials because both trials use the same outcome THI Tinnitus Handicapped Inventory. One, it was Henry which was two groups TRT randomized and some

TRT and some therapy, which Henry his student of merrymaker Jack Bernard was a little bit masking, but actually it was sound really therapy because goal not was to suppress tinnitus perception, but just use the sound which was making patient feeling better.

Minimal cancelling, but inducing including recommendation to avoid silence, which was proposed by Intrt but became standard of Caribou's days. Sounds at a comfortable level, aiming at immediate perception of some relief masking if possible. So it's basically as simple use of a sound for sound therapy as you can imagine. You cannot imagine anything less intrusive in SIMA. And as I told you, she did the PhD based on the study publishing Lancet and had a CBT eight months but have auditory rehabilitation as bicolon including hearing aids, sound generators, tendency evaluation session and so on, so forth.

And second group usual care which was very similar to mask in King Henry's study but with enhanced use of the sound plus some cancelling social work trajectory cancer. And what are results? It looks a little bit complex. I published this in HNO in 2015. But what's interesting this is Henry some therapy masking or relief group.

So it means use sound, listen to some sound and that's it. No cancelling, nothing else. And he got 12 about 12 point decrease on thi. And by the way, from new on paper, we know that practically we need 20 point to claim clinical assistance significant. So it was definitely something wasn't that great, but something but not a CBT group of SIMA was practically the same at the same time in TRT group.

Henry group with a improvement down to 30 points and 20 something after one year. Our data just the same as Henry, just faster because of some reason. At the same time, this group which was controlled for SIMA for CBT using some but using this social trajectory and so forth was worse was 5 points. So it was from practical point of view, it's absolutely nothing. So it was worse, but just using some.

So conclusion masking, it's as simple as basic sound therapy and it's just use the sound, nothing else. And result were identical to CBT group with SIMA tri. In SIMA group in addition to CBT they get auditory rehabilitation more extensive Henry masking group Actually we get more sound so and the results are identical. So if you're using Occam razor principle, similar results could be explained just by effect of some use. And without LCBT and usual curve group was actually worse than masking grouping tinnitus which indicates that whatever kancenic were doing was actually making stuition worse.

We have a lot of different version of CBT is different than what SEMA is using. And the result of treatment might depend what we are using. Some result which is CBT is definitely doing something. The best trial on 54 patient show clinical signal improvement. 37% of the patients just for comparison in case of TRT reported effectiveness between 7 and 90% on average is 80 something in our case is 82%.

So it seems to be much higher with a more stringent criteria. Now in all of this model and all of this which I'm talking. I'm returning to this to the issue of subconscious versus subconscious production. And it's a crucial from point of view of both studying mechanics of technical that my kinds of a treatment so well how to. How to decide what is more important.

Both definitely play some role. And particularly the initial stage of tinnitus conscious part is definitely very important, if not dominant. So what I did, I took consecutive 303 patients which were treated in the same method and so on. And I was trying to. I created mathematical model prediction of tinnitus severity which was measured by thi, which is standard recognized validated questionnaire using different things from this no visual analog scale impact on life.

Then it's a problem, blah blah, blah, hearing class, DST.

Which we're recording as well and subjective loudness of tinnitus.

It turned out if I run all of this, that model allow prediction of tinnitus relatives for extremely high statistical significant accuracy. What does it mean? You have all of these factors and effect on life is most important factor. But what is important that the constant in this model. So in plain English this show that we did not miss anything important that we have a accuracy of a prediction extremely high.

As high as in biological science or medical science, as you can imagine. So it was one interesting thing. We did not miss anything. And basically having this we can predict THI were extremely high accuracy. But what was even more exciting, very exciting.

The percentage of the time when people were awareness aware of tinnitus and subjectively judge loudness of tinnitus was not significant at all.

And if conscious pathway were dominant, then those two factors should be one of the most important. Longer you are perceiving tinnitus you are aware of tinnitus. Worse, tinnitus is not true. So what is the conclusion from this? Since neither allowedness nor time when patients were significantly contribute to tha were not contributing basically at all.

Statistically speaking, dominant role of subconscious pathway for tendency. And therefore even when patients are not aware of tinnitus present, they still can be affected by it. It's like if you're dehydrated, you don't know what's happening, but you're feeling uneasy, vestibular problem and so on so forth. Because dehydration in this case you have the tinnitus has a negative impact even if you are not aware of tinnitus at given presence. But in this case, if it's true as it seems to be tinnitus treatment should incorporate extension of subconscious condition.

Reflexes were consequence both for some therapy and then for cancer. And this might explain why CBT is affected but is limited effective. Because CBT is not really working on the subconscious, but

work on conscious processing information.

If you'd like to read more, it's one of the best book. It's 2004 but still probably 80, 90% of information in this book is still correct. I'm pushed to create a second edition of this, but I'm of my age. I'm not sure if I'm up to challenge now. So what are current problems in the tennis industry?

In my opinion, one of the problems is still lack of consensus of definition of auditory disorder, push toward classification tinnitus and misophonia as a mental disorder, issue of a hearing overprotection, auditory toughening which is not appreciate lack of consensus for standard evaluation of treatment outcome, clinical improvement ignoring issue of a collet of a sound useful therapy and need for publication including series of cases and including negative results. And I will be briefly addressing those points definition and I think it's important to distinguish between behavioral definition which are not implying or not bias but any mechanics prism mechanics, but based on observation like for example let's say decrease sound tolerance which are proposing present when a subject exhibit negative reaction following exposure to sound that would not evolve the same response in average listener. And we have a hyperacularisis misophonia gain. All of these definitions you are proposing are not suggesting mechanics. And I would like to mention tensor tympani syndrome which is ignored or misinterpreted interpreted.

It's a sound induced or spontaneously occurring ear pain, painfulness and so on. But it is known to be induced by abnormal activity of tensor tympanic Mass in the middle ear and ear pain which is part of this and is frequently occurring cause this issue in the field of particle misophonia. Now we propose mechanism based definition which are very helpful for proposing treatment and so on which I believe are correct that if not we'll change it. Tennis of an perception hyperacusis strong activity of auditory pathways to sound. It's a just dysfunction of an automatic gain control urinary system Misophonia It's a reaction but due to the abnormal strong connection and tensor tympanic syndrome as I mentioned.

I'm not dwelling on this because it's too long now there's a big problem now proposal to clarify classify tinnitus and misophonious mental disorder. It's not joking manner. In 2001 group of a super expert long list of experts in tinnitus theory propose definition of tinnitus and they recognize finally this distinction because tinnitus a perception and tenet is a problem. But they propose to include pentas in diagnosis DSM that means classified as a psychiatric disorder and often recognize that it's a really problem. And this direct quote from the paper major criticism and so on is would become psychiatric disorder and that psychiatrist would become the main health care providers for the disorder.

So in some country for example audiologists or even ENT will be forbidden to deal with tinnitus because it will be only in psychiatrists. And this promiscuous most misophonia which has been proposed in 2013 and is still discussion and fight about this misophonia a new psychiatric disorder.

So I think it's important to watch it clearer. By the way, I was initially in the group of this expert was working on this paper. But due to a disagreement on on this point and some other points I took my name out always myself and some other people too. Now sharing protection versus overprotection well, providing optimal level of sound is underappreciated in audiology. This attendance over just avoid sound.

There is no recognized danger of overprotection can be really bad. And another thing is it's not recognized that commonly at least in practice. But it's not only just sound level but duration and according to norms. For example, you can be exposed to 105 db 30 minutes a day every day and without any problem for hearing loss. It's an issue of duration but multiple by time and sound deprivation.

It was shown very nice in the study for me mainly promotes hyperacusis and result of enhancement of tinnitus. Just ask patient with tinnitus to go to a very quiet room and spend 15 minutes and basically practically everybody will report increase of tinnitus. And patients with misophonia particularly

susceptible to this negative consequence as they avoid sound and use extensive protection. And just using here protection just in case of Chitania worsenberry problems. So digging their own grave.

Auditory toughening is very well recognized in the field of auditory neuroscience, but not as much in the clinical field. Auditory toughening is a phenomenon when a benefit effect of a pre exposure to sound which protect the inner and outer hair cells and from the damaging effect of a high level of the sun. So what they are doing you're exposing subject and the study was on animals and on humans as well to some sound for a week, 8 hours a day or 20 hours a day to low level of a sound. And then you're exposing to very loud sound and finding well, what's the damage. And we shown actually my lab we're doing some work as well.

But even such a low sound level like 53dB HL have a protective effect. And that effect protective effect depends on the level of sound used for this pre training. So what are implications but protection against excessive level sound is needed. Question about that. But it should be taken into account duration of exposure, not only sound level.

And contrary to common belief, avoidance of sound exposure and overuse earplugs in Mars increases susceptibility to develop hearing loss and promote hyperacusis. Even low level of environmental Sonos offered sun protective hepatic. And again problem the patient with dsp. Extent of protection is proportional to the level of the grand sound. And in the using of the sound in the level of 70 something DB HL actually can prevent even permanent hearing loss induced by Parenthian closing through hepa.

Otherwise of course it depends on how bad this strong sound was. Another thing is evaluation of treatment outcome. And so big big problem solidarity. I love the statement. And I've seen this many, many times actually happening in publication.

If you torture the torture data long enough, it will conference to anything you like. As a British economist quote of his. By use of improper statistics you can show anything and everything from the data. And of course starting with the data weak garbage in, garbage out. You cannot do anything with this.

Except again, if you inappropriate significant proof whatever. It's a huge difference between statistically significant versus clinically significant outcome. As a classical example is tinnitus is magnetic stimulation. For tinnitus seems to be real, but very small. Like a 5.0 decrease on the THI scale.

But you have a 400 patients and all having this small decrease will be statistically highly significant in practice. Clinically, it's not important at all. This problem is recognized by very nice lectures in nothing one of the conversations not thinking about this. But again, it's not sufficiently recognized in general theory. Now questionnaires need to focus on separate of a problem on clinically significant improvement.

Some papers now what we are proposing. I disagree with using this number of the points decrease as a criterion of improvement. But I believe it should on the final score and not at extent of a change. Basically, patient should get the score. Whatever criteria you're using should be at or below the level which would cause that you will consider this patient to get any kind of a treatment.

Now, I would like to mention sharply that it's the issue of a cure for perception versus problem. There is no cure for tinnitus. Meaning notation of perception of tinnitus and to best of my knowledge is a neuroscientist is practically impossible. Well, anything may happen in science, but I think it's extremely unlikely that you have a cure on tinnitus in this the moving perception. But there is a cure for negative reaction about by tinnitus.

So basically we have cure for alternatives, but cure for tendencies problem not for tinnitus research. Quality of the sound plays more important role that is appreciated. And it's as well from a point of view

of both treating tinnitus and misophonia. And what's important that Professor Norena doing some stuff. Some research has found that hearing aids actually could decrease quality of the sound perceived.

So issue of a proper programming of hearing aids can change this and improve through this. Both use of acceptability of a hearing aids and use can be helpful in the treatment. Please Pleasantness of the sound plays a role in acceptance of hearing aids and as well as sound generator and the impact on the sound level participants would infuse. Now why audiologists are best prepared. In my opinion 80, 90% of the patient with tinnitus have hearing loss as well.

So obviously it's something we need to do. Another point is odoros have a sufficient gonadotroking cancer. They don't need to use the CBT or so just they need to use this and be properly compensate for this. I strongly believe it's necessary to diagnose and treat treat tinnitus hyperacusis, misophonia and tensor tympan syndrome concurrently. You cannot just treat one thing because then most probably you fail less than 1% of the patient with tinnitus require medical surgical treatment.

Psychologists are trained various versions of counseling, but they cannot provide hearing rehabilitation, which is essential part of the treatment.

Potential future direction instrument oriented to audiology center distinctive service and stress on unique procedure for audiologists. This is now nicely discussed. And now I strongly believe and I'm even surprised that we do not have a routine evaluation of a speech discrimination noise in three field, not the headphones, which should be basically in my belief obligatory. If you are using hearing case and are trying to see if it's doing anything good for patient as well as.

Sorry, first indication of potential central auditory processing. This interesting test developed by Norena, which can be very useful.

In evaluating hyperacusis metaphor and again stress of providing services to patients with type of a problem tinnitus and decrease entrance because it's definitely underserved and it's a big population of the patient which can be treated. Fitting hearing aids should be different for people with tinnitus. We propose some tinnitus fitting protocol which as well as papers of grants search field from Australia and our experts indicate fitting life for musicians. That means no compression is improving speech discrimination and pleasantness of the sound. Now diagnosis and treatment of dsp.

Sorry, I'm running out of the time. It's different.

It's different. And LDLs are not sufficient for diagnosed hyperacusis for misophonia. In addition to specific detail interview which is necessary. Audiology can be helpful, but in specific way use. So summary, Audiologists, I believe are best preparer need is for building consensus definition danger of a mental disorders.

What we consider the cure and focusing on tinnitus, hyperacusis, misophonia separately and not secondary pain.

What is not appreciate, which I believe is extremely important is that we need to listen, hear and listen actively to patients. Misophonia has been discovered only only because of hearing what patient was saying and taking me seriously. And I like statement of Dalai Lama. When you talk, you're only repeating what you already know. But if you listen, you may learn something new.

So modification of TRT which was quite substantial doing this, you know, 30 years of its use were to large extent due to the comments from patient. And most interesting are finding which disagree with consensus in the field and which are contradictory to existing model. I'm always looking forward to see what is disagreeing with them. Proposing very briefly. Well, my mentors collaborators Konorsky, Professor Konorski, competitor of Pavlov.

I was his last graduate student and he really pushed me into the condition reflexes Professor Zhilinsky again reflexes Statistics biostatistics Basil Ito it's, you know, extremely bright neuroscientist. He definitely deserves to have a Nobel Prize. He first published data showing direct correlation of single neuroactivity behavior. I was lucky to be in this group who discovered this and published Professor Sasaki I mentioned already he convinced me that it's worth of doing and main collaborators Professor Brennan, Jonathan Jackie Sheldrake audiologists Susan Gold, first audiologist which we're working or were working on William Shatner Gabby looks William Gray Mattocks so And last but not least, Margaret who is keeping me reminding me that I'm always wrong, sometimes I'm right but there are frequently he's. She was very good.

He's very good in treating this thing patient auto spectrum disorder and organizer the courses but what's important she identified phenomenal misophonia convinced me let's say real I was very skeptical initially and helped to create and that's us I'm here, you know, shiny head Peter, Anya grandchildren Margaret and that's it. Thank you very much for listening to me and I'm one minute before the deadline. Anna, the floor is yours. Thank you so much. Dr. Gastrobaugh, we do have a question from the audience and if anyone else would like to ask a question please do so now someone wants to know what is your rationale for the quicksand?

Do you expect to find a poor SNR in these patients?

Yes, in some patient it is hypothesized and one of my colleague Carol Lau from Vancouver is claiming that practically all misophonic patients have a central ultra disorder and she's running big battery. Obviously I'm not totally convinced but her data looks definitely interesting to follow this and as you know the speech noise is not perfect but like a first easy indicator but it's another reason this quick sim and again free field is allowing for as objective as you can get judgment if hearing case which you are providing for the patient is really doing the job. I'm surprised because otherwise you don't know what

you are doing. So what two reason of these two main reasons I think the person who asked clarified a little bit and they said they were thinking about misophonia patients specifically that have hearing thresholds often in the negatives I would think that they would score very well but maybe not does that not necessarily because again it seems that patient with misophonia and again speculation evaluation have abnormal processing of sound so it might be showing on this and again it's a hypothesis but I think worth of considering and this is one of the reasons as I told you, it's an expert opinion, not something which I found that you know, the 2,000 patients will support this. But I think it's a word of investigation and definitely if using an instrument for example we're doing checking if introducing sound generators is decreasing speech in noise understanding and we initially were testing all patients with and without sound generators on this to see if sound generators are not worth any as you know, it's a borderline hearing loss.

You might use sound generator or hearing aids or combination instrument but in case of whatever we're using very light hearing loss sound generator. We're not making situation worse but were able to prove it by using coincident but again free field not on the one left ear right here but free field. Thank you so much. I'm sure that Yep. She said thank you very much for that and I just want to say we've got a ton of people commenting.

Thank you very much. Excellent presentation and they are super humbled and honored to be a part of this presentation and they wanted to thank you for all of your you've done for the profession. So on behalf of Audiology Online, we want to thank you as well. This was a wonderful presentation. And before I go ahead and close out for today, do want to thank everybody else for attending today and to remember to take your exam.

It will be available in the next 10 to 15 minutes. Log into your account, go to your pending courses. If you didn't get the handout here in zoom, it's available on Audiology online to try there as well take the

exam and get your live credit. And so thank you again, Dr. Yastreboff. We are so we were so happy to have you and I'm going to go ahead and end the session for today.

Thank you very much. Thank you very much for all positive comments. And I'm now seeing only extremely difficult cases. I'm not accepting I'm stupid and I'm still seeing some patient but very little and as well I'm responding if somebody has a really significant problem, the patient people are asking to me and I'm commenting if possible. So just trying to help.

Okay, thank you for that. Thank you. All right, we'll go ahead and end today.