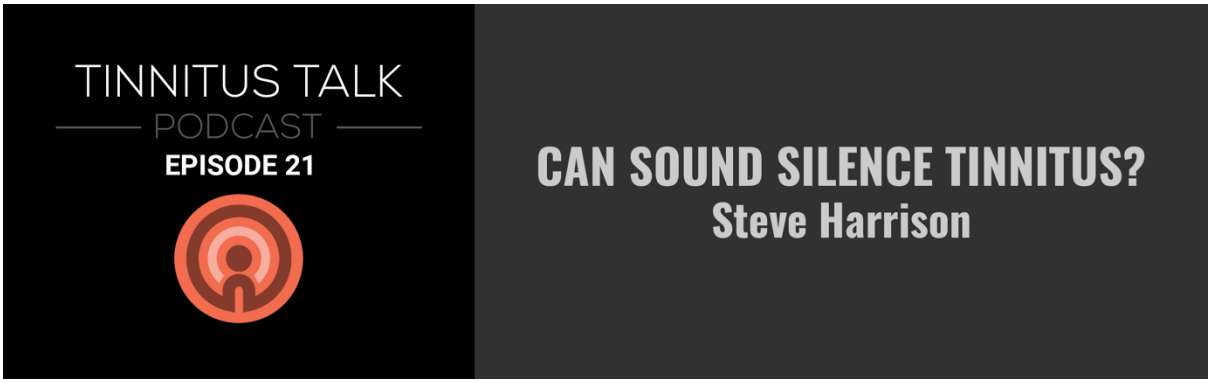

0:00:00 Steve's tinnitus and audio work

Hazel: This is the Tinnitus Talk Podcast and I'm your host Hazel. Today's episode is all about sound therapy and our guest today is Steve, who's been on the podcast before. Welcome back, Steve.

Steve: Thank you very much for having us back.

Hazel: So, Steve was actually on a previous episode called **Tinnitus Realities – Steve and Sean**. And it was really just three people suffering from tinnitus talking about their experiences and I have to say, Steve, we've never gotten as many emails and messages as in response to that episode; I think it really resonated with people. And they seem to take solace from just that recognition of "oh I've been through that, I know what that's like." Were you aware that we had gotten such a good response?

Steve: I did see initially but I didn't keep up on it. I suppose it's one of those things because if you look at me or talk to me, like with any of us, you look at a normal functioning human being and you see a normal functioning human being, but to understand what's going on behind… whether you call it a mask or whatever. I guess it's really helpful to people because if you look at somebody who's coping and getting on, but you realize it's not really that easy, I suppose it's a really helpful thing to kind of get.

Hazel: Yeah, I think so too, and it was interesting to see that people seem to kind of get hope from it even though we weren't sugar coating things, so it wasn't like this Hallelujah story of "we're all happily habituated now", but at the same time people did get hope and solace from it. Because they saw that we were, in each in our own ways, kind of coping with it.

Steve: That's really nice to hear.

Hazel: Yeah, I think it's really in the end it's what this podcast is all about, we want to give people hope right? Whether it's hope that you know you can learn to cope or hope that a cure is on the horizon, or whatever the case may be.

Hazel: So, Steve, some listeners may already be familiar with your back story if they had listened to that episode, but would you mind just kind of summarizing briefly who you are and also your tinnitus story.

Steve: Yes, I'm Steve Harrison. I was one of the co-founders of Tinnitus Hub and involved with the forum for a number of years and I've been kind of in and around tinnitus with researchers and things like that and in the background with the support side of it for a long time. I've had tinnitus since, I always forget, 2002-2003 I think it was. I got it initially from the flu and pretty much lost all of my hearing. And then I went to get seen because I have a noise in one ear that didn't go and when I went to the doctors they said you've got a slight hearing loss and kind of just told us to go away. More pleasantly than that of course but not very nice of course hearing that when you've got tinnitus. I never realized until years later that I've got three different causes; so there was that flu and there was the slight hearing loss and then also I had an accident where I got hit by an RSJ in the jaw – which is a rolled steel joist or a girder as it would otherwise be called.

Steve: So I've got a strong connection with the jaw and the neck which really modulate the intensity of my tinnitus quite severely sometimes. So if I'm at its worst I feel like I'm standing on the tarmac next to a jet engine. And it can change so much and I can't necessarily correlate it directly; I can feel a little bit stiff in the neck or a little bit stiff in the jaw but it doesn't correlate perfectly so it's a mystery still after all this time.

Hazel: Yeah how are you doing today with your tinnitus? I mean not literally today, although you can talk about today if you want.

Steve: Yeah it's settled a little bit. I had a really loud period. We've been away and I had a nice relaxing break and it was really loud so I had this thing in my head whether I caught something. I don't know if I did because when I had my COVID jab I had the most ridiculously insanely loud tinnitus, the loudest of my entire life. And I half wondered whether I'd caught a dose of COVID when we were away because it just sort of seemed to really ramp up and I couldn't really correlate it with anything particularly. Although I did start a new workout plan so that might well correlate with it.

Hazel: Oh right, but you said you got an increase after the vaccine or because you caught COVID? Oh, it was the vaccine.

Steve: After the vaccine yeah. So the second dose of it sent my tinnitus through the roof for two days, a solid two days, it was absolute hell. I mean I probably don't need to describe for a lot of people who listen to this what it's like, but it was incredibly loud, the loudest I've ever had. Consequently, I refused to go for the booster jab because after you experience that I thought there's no way I'm doing that again. And I've still managed to kind of avoid it and I've probably caught COVID three or four times like we probably all have without realizing it since …

Hazel: Yeah, you may have, yeah. Okay, but did it go back to baseline?

Steve: Yeah, it went back down again. It was an initial strong reaction that went, just came straight back down after a couple of days thankfully.

Hazel: Oh great. We have heard a number of stories like that and most of them do seem to go back to baseline luckily. Of course, the tricky balance there is that we know that COVID itself can also damage your hearing and increase your tinnitus so if you're balancing that against the potential risk of the vaccine I would personally say still go for the vaccine, but it's a personal choice obviously.

Steve: Yeah, I mean I was still pleased that I went and got the two jabs but like I said when it came to the third one I just thought the variants around didn't seem that scary and I thought balancing the risk versus having that again with my tinnitus and personal risk of "what if it doesn't go down this time", you know I just kind of stopped where I was.

Hazel: Alright let's dive into the topic of the day: sound therapy. So, first of all, Steve, it's a very broad and nebulous term 'sound therapy'. Do you have some kind of description or definition for us?

Steve: No, because it is so broad. Effectively, sound therapy, sound treatment, you're looking at … it's just the use of sound to try and change something. I mean, it's very, there's so many different things that you can do because you're trying to trick the brain or you're just trying to mask it. You've got a broad range of things you can do, but I guess the difference between therapy and treatment, or self-treatment, is the clinical trial side of it where things have been properly tested in a clinical environment.

Hazel: Yeah got it. And I think there is a significant difference between some of the treatments or therapies in terms of whether they are just masking or taking the attention away from tinnitus versus some of the others that theoretically at least could actually tackle the tinnitus itself.

Steve: Yeah absolutely, yeah, they're two different sides of the same coin.

Hazel: Right, and so how did you get into this topic in the first place? How did your fascination with using sound and music for tinnitus relief start?

Steve: I think it was when I first saw the, I believe it was the Neuromonics device, which was the first audio thing I've seen for treating tinnitus, when I first got tinnitus and did my research. Which was about a centimeter thick when printed out because that's how much there was around at the time, it was very very limited. I kind of latched onto the idea of using sound for helping tinnitus and at the time all I did was create things with white noise, with water, with rain, just soothing things. So in 2012 I did a sabbatical from work for two months to make an album and in 2012 I released an album called **Sounds to Soothe**, the idea being that it was just a full album of things that will cover your tinnitus and just be soothing to listen to, effectively working from the idea that it's reduced alpha brainwave frequency in people with tinnitus and that you're trying to get that alpha back by relaxing the person.

Hazel: What are alpha brainwaves? For those who don't know.

Steve: Between eight and twelve hertz, eight and twelve oscillations per second, and that's associated with wakeful relaxation. So the theory being that when you've got tinnitus you don't really get that wakeful relaxation so much.

Hazel: Right, and I think you were already into music though before you got tinnitus, so I am assuming that's how this whole sound therapy thing came about as well?

Steve: Yeah absolutely so I went to music college between 1996 and 2000. And then I did the opposite of a year out, where I was gonna be like I'll do a bit of a job for a year and then I'll get in the industry, because the industry jobs are really low paid, and then I had a career and that just kind of carried on through, but I always kept up the music in the background. And then when I got tinnitus it just became the sole focus of the music that I made was "what can I do to try and affect tinnitus?". So I think first I stumbled across amplitude modulation by mistake when I was cutting some sound files down of birds and I was looping them to try and find where the sound stopped and the sound ended. And that looping is actually a form of amplitude modulation I was doing on myself and that's one of the first things I found that actually knocked my tinnitus out.

Hazel: Alright, we'll get into that in a moment because not everyone might know what amplitude modulation means but we will explain all of that in a minute. Maybe you can just briefly tell our audience what it is you're doing today in terms of your YouTube channel and things like that?

Steve: Yes, so I set off… and I should say actually that Tinnitus Talk was one of the things that drove me on to working with audio for tinnitus. I went on the trial for the acoustic neuromodulation device and I found Tinnitus Talk and I was trying to find a bit more information on it. And I sort of shared the story on there, and then I got in, there was a group of people that are interested in the treatment, so I actually recreated a form of it; I recreated the acoustic neuromodulation and I did my own sort of musical take on it. And that's what kind of centers on the YouTube channel for tinnitus which is **Tinnitus Works**. And then I uploaded a few things there, sounds to sort of help and soothe tinnitus and try and interfere with it. And then over the last year I've been part of the great resignation, left my career and I'm now doing music. So I've got a YouTube channel called **Music Prod Stuff** where I do music production things with Ableton Live and ambient music and just general music production stuff around ambient.

Hazel: Alright, so people can check that out and your other YouTube channel **Tinnitus Works** specifically for the tinnitus focused stuff.

0:11:26 Sound therapy – no one-size-fits-all solutions

Hazel: Alright, so we had prepared this episode together I would say quite diligently and we have a list of different types of sound therapies and treatments that we will cover, but I think we had also discussed, before we get into the nitty gritty of that, to kind of put out a bit of a disclaimer and it's really one that applies I would say to any kind of tinnitus treatment and that's in relation to **heterogeneity**. Meaning everyone's tinnitus is different, at minimum people have different causes for their tinnitus, maybe also different mechanisms, and certainly it manifests differently in different people; and that means that likely there is no one size fits all solution for tinnitus and I think that certainly also applies to sound therapy. So can you say a few more words about that and what we know from the research, if anything, about that?

Steve: We don't know enough about it from the research unfortunately because they don't tend to break it down in the way I would like to see it broken down anyway. I can say from a personal point of view that because I've got a very strong physical link to tinnitus and it's only a certain frequency, certain sounds of the tinnitus, that the one that's related to the jaw and neck. If I have a bad tinnitus day, sound does absolutely nothing for the jaw and neck related stuff. So in terms of sound therapy, I think this is the reason we have non-responders to sound therapy because parts of the tinnitus or all of the tinnitus are related to something that sound is not actually going to address. So for me personally that's, I believe that the physical side of it, you're probably not going to get much benefit from sound therapy if that's your main cause of it's a TMJ or something like that for example.

0:13:37 **Hazel:** That's at least your sort of working theory, but you're saying that hasn't really been tested.

Steve: No. I would like to see a breakdown but they don't really, I mean until **Sarah Michiels** started doing her research you didn't really have anybody looking at the physical causes of tinnitus so it's a very under researched area so we just don't know enough about it.

Hazel: Yeah absolutely, and we intend to dedicate a whole episode to somatosensory tinnitus and certainly **Sarah Michiels** will be part of that. Okay, so the different types of sound therapy … Steve

and I made a list, but there are quite a few so we also tried to kind of categorize and cluster them and provide a bit of structure but it's quite a lot so might get hard to follow so this is perhaps also a good time to remind our listeners that we do always provide transcripts of all our podcast episodes and the transcript could help you follow the conversation and the terminology a bit better. You can find the transcript on our podcast site **tinnitustalk.com/podcast** where you'll see for each episode there's a play button and to the right-hand side of that there's the CC button and if you click that you can download the transcript. The transcripts are created through many hours of volunteer labor so if you want to support our efforts there's also a big donate button on the same website **tinnitustalk.com/podcast**. Again, we really appreciate donations of any size to cover costs and help grow the podcast.

Hazel: Alright, now maybe one more thing before we dive into the sound therapies, Steve, we should probably clarify that none of these, for now at least, are cures and only some of them have some real scientific evidence behind them that they might reduce the tinnitus somewhat, and even then often it's not clear whether the positive effects are short term or long term. So that's a lot of disclaimers I'm putting out right there. Steve do you want to say something about what people can realistically expect?

Steve: Yeah I think, if you want to be realist about … We're calling it sound therapy but it's a sort of sound treatment, if you like. To use the word therapy would mean something administered by a medical professional. We're doing a sort of recommendation and a chat around them, you have to be realistic with what you're going to get out of it and expect some relief but don't expect miracles from it, just expect that it's going to help you. And equally you have people at the far end of the spectrum – you might actually get somebody who's tinnitus totally goes away from using sound therapy and then on the other end you get somebody who's got absolutely nothing and says it's a load of rubbish and does nothing. But the likelihood is you're going to be in that middle ground and it's going to help you in some way but there's so many different forms and people respond in very different ways to these different sounds. It's a case of just trying all of these things and seeing what works for you. Like every tinnitus treatment I think.

Hazel: Yeah, and it's worth trying and experimenting with it a bit because these things are I would say generally fairly safe, apart from obviously having to be careful with just not using too loud a volume, but apart from that I would say it's fairly safe and also cheap generally; although we'll get into that a bit because there are some companies out there actually charging quite a bit of money, but you really don't need to spend that money, so I think it's just worth trying out different things.

Steve: And I think you've also got a natural inbuilt mechanism if you listen to something and you think "I don't actually like that" just stop it. You know it's your natural reaction to something, trust it.

0:16:55 White noise

Hazel: Yeah yeah. Alright, so let's dive into it. I think we wanted to start with what we were calling the more traditional sound therapies maybe. So these are things that have been around for quite a few decades, in some cases forever almost, when you talk about masking. You can imagine an ancient Egyptian standing beside a fountain to relieve his tinnitus or something. The first one we wanted to talk about was **white noise** and I think this has been prescribed by audiologists for quite a long time. Sometimes it's part of **Tinnitus Retraining Therapy**, which is more of a counseling approach. But I guess it can also be prescribed independently of that. My understanding is that it's typically administered through some kind of in-ear white noise generator but I guess you could also do it with speakers or headphones, I don't know. So can you tell us a bit more about white noise?

Steve: Yeah, so a lot of it came about … Now, I'm hoping I'm getting my history right here … that this is from **Jack Vernon** sitting by a fountain in Portland, Oregon and getting his tinnitus drowned out by the fountain and thinking "whoa what's that?!". And that led to the in-ear white noise generator development broadly – like I said, I'm not going deep into the history. So that kind of then that got partnered with TRT, tinnitus training therapy, which takes anywhere from one to two years, but that's the idea behind the white noise generators. And I was actually given these without any sort of other therapeutic intervention when I first got tinnitus on the NHS in the UK. And you put them in your ear you can still hear, they don't block the ear canal, and you play the white noise at a level where you can still hear your tinnitus. So the theory is that gets you to learn to ignore the tinnitus you hear in that your focus is taken away from the tinnitus and onto the white noise. It's a nice idea and it will work for some people, but I actually got worse from overusing them, I realized that I did too much with them. And I ended up developing a sensitivity to white noise, so when I hear white noise now I get a tinnitus spike, that's reactive tinnitus.

Hazel: I have to say I also find white noise kind of, I don't know, harsh or something? Aggravating. I don't like it. For those of you don't know what white noise is, I think it's often described as the sound that you used to hear in the old days when your television couldn't find the channel. Actually, the radio is maybe a better analogy these days; when you're trying to find the radio channel and you're in between the channels and it just gives this static hiss or crackle or something.

Steve: That's right, yeah. The other quirk with white noise generators is that they don't actually give you white noise because white noise should be equal across the audible spectrum but because of the limitations of the device they actually tail off at the high frequencies so they drop down, so you kind of almost getting a pink noise curve which is where the power reduces the frequency is. So you don't get pure white noise in the way that you would if you played it on a high end system that's capable of good quality headphones that can reproduce the full frequency spectrum.

Hazel: Ah, why is that important? Do we need those high frequencies?

Steve: That's just me being a pedant. Yeah. I'm just saying that it's not actually really white noise. But I in terms of tinnitus there is a theoretical side of it that if you're listening to something which is supposed to give you all of the frequencies and yet you've got a drop off in the top end of the frequencies then you're not getting equality across the frequency range, so is it doing what it should be doing? If it's just for pure distraction then I guess it's fine. But like I said I'm a bit of a pedant when it comes to noise and sound.

0:21:00 Masking your tinnitus

Hazel: Let's move on to **masking**. Although I guess white noise is also a form of masking, I don't know, but there's all kinds of other sounds that people use, right? Which is really just about covering the tinnitus noise, but it's not really … it's not a therapy as such, but there's nature sounds, lots of different water sounds, that people like to use, like a babbling brook, ocean sounds, but there's also crickets, fire … I don't know. Can you tell us a bit more about the options there?

Steve: Yeah, and I think is tinnitus treatment with sound in its most basic form: finding something which gets rid of your tinnitus when you listen to it, masks it, takes it away so you're not having to listen to it. I think for me the best sounds are bells, and certainly on the Spotify tracks that I've got the bells sounds that I've uploaded are really popular. I think they seem to work really well because

they're high frequency and they also, as we'll get onto later, they've got their own inbuilt amplitude modulation because they're sort of a tingling sound. So they seem very helpful for people.

Hazel: I like the bells too. Let's just briefly listen to one of our listeners who sent in an audio clip. **Jack Straw** talks about his use of masking.

Jack: Hey everyone, it's Jack Straw. I just wanted to weigh in on my sound therapy experience. Initially when I got tinnitus, when it was worsened, I was using a lot of sound therapy and sound enrichment to help me kind of deal with it and and curb it and try and mask it. Unfortunately, I was never able to fully mask it due to how loud it was. But I did use certain types of sounds which I felt helped me blend it in, in a sense. So I was using things like cricket noises, various white noises, white noises with similar types of things to cricket noises, sometimes ocean sounds would work. I was mainly using these when I was going to sleep because they really help me kind of relax and just unwind without only hearing my tinnitus. I like the sound of crickets or whatever; I actually love the summertime because of that fact. There's so many bugs and stuff outside, the natural sounds of cricket crickets and bugs and everything outside my window is kind of like a natural sound therapy; so it's nice, I kind of prefer the summertime to be honest because of that. But eventually I stopped using sound therapy inside every night during the winter and even during the summertime and whatnot because of the fact that I wanted to try something different after doing some research. And I found that at first it was kind of difficult for myself to stop sound therapy. But as time went on I noticed that my habituation started to go a little faster and started to speed up the process in a sense. I do wonder whether the habituation process would have gone better and faster in the beginning if I didn't use sound therapy but I don't think it would have been helpful for myself to not have used sound therapy in those early stages just to kind of get a grip on it and take the edge off a little bit.

Hazel: So Steve, Jack talked about how he couldn't fully mask his tinnitus sound but he did like to use cricket noises and ocean sounds mostly to get to sleep which is exactly what I did in the beginning and I think it's very common, and then he just felt like over time he needed it less but it helped him cope in the beginning. That's definitely also my experience, probably a very typical experience.

Steve: Yeah absolutely and I think the big thing about masking is that when you first get tinnitus, it is such a shock to the system. Being able to listen to something that drowns out something, that just pushes it away from your mind, is an amazing thing to be able to do because it takes away that anxiety, that worry. As long as you don't do silly things – and I say this because I did them; like plug in your ears to see “is it still there?” and then trying to listen for it, and all that. You have to use masking in the best way, which is just to relax and just be able to switch off for a moment from the sound.

Hazel: Exactly and find what works for you yeah. I like the bells too and I like the crickets, but I don't really use it anymore today.

0:25:39 Distraction through randomized tones

Hazel: Anyway, let's talk about using sound for distraction which is kind of like masking but we're talking about a difference in nuance here, because we're talking about randomized tones that don't have any clear pattern, in the way that a lot of music and audio that we listen to has some pattern, but specifically using those randomized tones can apparently be quite helpful. Can you explain why?

Steve: Yes, so one thing that this is similar to is the **Widex Zen**, which is in the ear and which has got an inbuilt sort of tone thing. I got to talk to one of the Widex engineers at one of the conferences I went to and I said "but it doesn't have high frequencies" and he said "no it's not meant to". The whole point is that it's using just random tones to take your attention away and distract you from the tinnitus. So I quite liked that idea and then of course I went and did my own thing and I do quite a lot with randomized tones because I like the way that it works and that it confuses the brain. So the brain is geared to understand and predict patterns, the brain hears something and it goes "oh, that's the same". For example, talking about music, that's the first chord in the sequence, it goes to the fourth, so you're going to go to the fifth now. And if you throw that out and start playing different notes it's like "oh what's going on there" and it sort of engages the brain in a different way.

So I find that the randomization, it just keeps the brain on its toes, it's confusing, it's not knowing what to expect next. I think that really works well in terms of pulling away from the tinnitus because if you get set on something and you know what's coming you're not really paying attention to it as much. You're getting the satisfaction from it following the patterns. And then that allows the tinnitus to come back in. I have a distraction thing; there was a, and I can't remember what it's called now, but it was basically like a strobe light thing I saw, it was one of these chandeliers that spins around and it's got a different scene on each one. And it … I realized after I finished watching it, it was just like "wow that's great!" After about a few minutes of that, after it finished, I was like "I didn't hear my tinnitus all the way through that", because it just totally captured the attention. If I saw it two or three times I would lose that. But that distraction and being able to take it away just kind of throws your brain off and it means you're not listening to the tinnitus in the same way that you focus on it otherwise.

Hazel: So to illustrate what we're talking about let's listen to a sample that you created called **Randomized Bells**.

[playing 'randomized bells']

Hazel: Okay so I really like that, I find it very soothing, can you tell us how that was created?

Steve: Yeah so this, you wouldn't call it pure randomization but basically you're keeping it in a scale, so you don't want it to be musically unpleasant because people want harmony often with these things, because you don't want to upset somebody with tinnitus. So it's just dragging a load of things around. I've created a pattern and then all it was, I was using **Reason** software for that, and I actually clicked on the 'randomize' and it just randomized all the notes in that pattern. I created several bell patterns and just kept on randomizing the sequences. The odd thing that didn't quite work I'd pull a note out here and pull a note out there, but it was just completely … so there was little to no human interaction with the patterns. I load the machine to randomize it.

Hazel: That's interesting, so it's actually a result of artificial intelligence?

Steve: Well not not quite, no. I had to push the button. *[laughter]*

0:29:37 Survey results on self-administered sound therapy

Hazel: So we should talk about, kind of summarizing all of this in terms of masking, the white noise, the masking, the distraction. Something really interesting to know is that just using and trying out these different things and combining these different things – which you could call 'self administered sound therapy' – we know actually from a survey we did that this can be really effective for people.

So we did a big survey to which over five thousand people responded, showing first of all that self administered sound therapy is the most tried out treatment or therapy. Over fifty percent of people we surveyed had tried that. But also, people reported the best effects from it. So over sixty percent reported some kind of improvement from it, which is better than all the counseling approaches, the medications, the supplements, the acupuncture, you name it. But interestingly, also better than the seemingly more sophisticated sound approaches like notched music and acoustic neuromodulation, which we're gonna talk about in a moment. But, Steve, how would you describe this self administered sound therapy and why do you think people have reported such good results with it?

Steve: I mean I was surprised as you, to be honest, when we got that through. That was just like "what?!". Because I didn't expect it. You know, I thought it helps people, we know it likes the distraction and things like that, but I didn't actually think that that many people, above all of the other things out there, would report a positive outcome of it. I genuinely, I don't know why, but it's great to see because you're talking about the cheapest form of treating tinnitus is the most effective. Add to that all of the other approaches – like you say, you can spend thousands and thousands, and some people have – it's great to see that you're able to just help yourself to as much effect as some of these things.

0:31:49 Hearing aids for tinnitus suppression

Hazel: Yeah absolutely. So moving on, because we still have quite a lot to cover and we're still within the realm of sort of the traditional approaches, and we did want to mention **hearing aids** here, even though they're not technically sound therapy. But in a way you could argue it kind of is, because it increases the input of sound that you hear from the outside which then kind of drowns out the noise inside your head. And also it's often prescribed in combination with audio based therapies. So how would you say that the mechanism here works?

Steve: Yes, it's really interesting. Obviously, we always used to think that tinnitus was because of hearing loss and that was it, you know, that was the main thing. In recent years, not that much recent years, there has been a hell of a lot of research showing the multitude of causes and reasons behind tinnitus. But hearing aids, there's a lot of research being done on it as well and I think it was **Magdalena Sereda** who did quite a few bits of research on it and found that a lot of people get real good benefit from it. But I think there's a correlation, I don't know what the research was on people with mild to moderate hearing loss, but with larger hearing loss hearing aids are incredibly helpful for people with tinnitus. And of course when it is related to the hearing it's a no brainer. You know you're replacing the sounds which would be taken away by the hearing loss, which theoretically the tinnitus was rising up inside the brain to compensate for.

Hazel: Yeah exactly, so when the brain is deprived of noise it's gonna compensate for that, I mean that's kind of the very basic mechanism of tinnitus. Either just increasing that input from the outside will reduce that tinnitus signal, or even if it doesn't, at least that the noise from outside will kind of mask the tinnitus signal.

Steve: Well the other thing as well, I think a lot of the researchers find that people when they take the hearing aid out the tinnitus comes back, or it comes back after a short time. So that is a very major thing that people report, so it isn't an amazing thing that works, it's only whilst you're actually using them. For the majority.

Hazel: Yeah that seems to be the case for most people. But you also talked about some more recent quite sophisticated advances in hearing aid technology. You mentioned some earbuds that can do

different things, essentially, I think they also provide noise cancellation and you can tailor them to your hearing profile, and you can probably listen to sound. I think you mentioned one example, the **IQ buds** from **Nuheara**. By the way, we're not promoting any products here, we're just mentioning an example.

Steve: No, and I can't say I have actually tried them. I have tried the bone conduction things but they didn't really work for me, because again the sound quality is just … I'm too audiophile for that. But yeah, they're really interesting as well with all the hearing aids advancing all the time where they've got Bluetooth integration, so you can directly incorporate your self-administered sound therapy or programs and most of the hearing aids come with a tinnitus program now or it's an optional extra. But the idea is that you've got a set of earbuds that will actually adjust to your hearing profile and when you listen to music or your masking tracks you don't need to have a hearing aid. You can effectively replace all of those frequencies that you're missing by using something which is personalized to your hearing profile.

0:35:32 Advanced methods: acoustic neuromodulation (e.g. Desyncra)

Hazel: So let's move on beyond the more traditional approaches and take the audience through some more recent advances, I'd say in the past five to ten years or so, in sound therapy with some techniques being developed that you know at least in theory could do more than just mask your tinnitus but actually reduce it. So we will focus mostly on therapies that are somewhat evidence based, meaning at least there's some scientific theory behind the mechanism and why it might work and people have conducted clinical trials to test it. Even though the results of many of those trials aren't always as good as you might want them to be, people again shouldn't expect magical results. But we wanted to highlight some of these more recent techniques where there is some evidence behind it and also, since there is some evidence behind it, they could be developed further in future and become more effective and maybe also offered in tandem with other kinds of treatments like pharmaceutical treatment for instance. So some of this stuff could be promising. And then at the end will also cover some sound therapies that are marketed as something very sophisticated and advanced but actually virtually have no evidence behind them. Because we also want to warn people against the potential scams out there. I don't know if I should use that word. *[laughs]*

Steve: No, no, I would avoid that word. I've had too much experience of not avoiding that word in the past.

Hazel: Right right, we want to warn people against devices that might be over promising or something.

Steve: Yes, pseudo-science.

Hazel: Pseudo-science, yeah. But anyway, we'll start with the ones that have some evidence behind it. So the first one we wanted to touch on is **acoustic neuromodulation** and I think the first paper that describes this in quite some detail for tinnitus was from Tass and some other researchers that's T-A-S-S. I'm just gonna quote a little bit from that article where he or the group describes what it is. They say: "Acoustic coordinated reset neuromodulation is a pattern stimulation with tones adjusted to the patient's dominant tinnitus frequency which aims at counteracting pathological neuronal synchronization. Phase reset is proposed to be achieved by repetitive stimulus delivery of tones with different frequencies gathered around the dominant tinnitus pitch." Steve, can you put this into layman's terms for us?

Steve: Aye, quite easily yeah. You get your tinnitus sound and then you play two sounds underneath it and two sounds above it and you keep on randomizing them over and over and over again.

Hazel: That sounds a bit more easy to understand, okay.

Steve: It's incredibly simple.

Hazel: Yeah okay, and actually let's listen to a sample that you provided so people can hear what we're talking about.

Steve: So this is not actually the acoustic neuromodulation treatment. We may even get sued if we play the actual one, I'm not too sure. But this is my reworking of it as musical neuromodulation. So I took the principles of acoustic neuromodulation and applied it to try and do something more universal, so you don't actually have to identify a tinnitus frequency. So we have a listen and I'll explain what I do with it.

[playing Steve's version of acoustic neuromodulation]

Hazel: Okay so to me it's me it sounds like a lot of beep beep beep boop boop beep beep.

Steve: And that's exactly what it is. It's an unbelievably simple sequence, but it took ages of trial and error to get to. I tried to do something similar to the device and then what I actually settled on was using the musical scale because it's a logarithmic scale and they're using a logarithmic scale for the device, which means that it increases, it doubles. So where you have a musical tune and you always work on A is 440 hertz and you go down or up to get different pitches from there, so the next A up is 880 hertz. And the next A up is a doubling of that, and a doubling of that, and a double of that, so it's an exponential scale. So it works perfectly for this. The actual end sequence, if anybody wants to do this at home themselves, is just a series of perfect fifths, which works really well with music theory with a circle of fifths. It actually works all really nicely.

So I just started off around about 100 hertz, that note around there, and went up to around about 10,000 hertz, so just those perfect fifth musical intervals. And then I randomized the delivery of them. So I got 16 notes in total. And I just randomized them every time for the sequence and the idea behind the acoustic modulation treatment is the tonotopic map; the idea that in your ear it's almost like a keyboard from the low frequencies to the high frequencies. So they talk about deafferented regions of the brain. So we're just sort of stimulating tones across that whole thing and it seems to do something.

My reaction is that the tinnitus gets knocked right down and then I get a sort of white noise thing going on the back of my head. And I've had an awful lot of YouTube views on that one and that is the dominant reaction from people. They all seem to get the same sort of thing. Whether that would work in the long term I don't know because I haven't tested it.

Hazel: Right, but what do people typically report, that they get short term relief from it basically?

Steve: Yeah that the tinnitus disappears for anything, maybe for a few minutes. Obviously I'm only going by what people have commented but I don't think I've had any negative comments on it. And if I go by the like-to-dislike ratio I've found the cure for tinnitus. *[laughter]*

Hazel: So there was actually a device that came to market, I don't know when it was, five or ten years ago, sometime in that time range, called **Desyncra**. Can you tell us about that?

Steve: Maybe 2013, I think it might have been. Actually they might have had the device at the time of the trial, which was 2012, because that was when I first came onto Tinnitus Talk and got talking with Markku. And I think the device was out at that time and they were just doing the clinical trials around it. So that has been out. So that basically involved a large box which helped find your tinnitus pitch and then a proprietary device which effectively just played four tones. It was just a noise generator presumably, and the tones are all sine waves, pure tones and it would find that tinnitus frequency and play the two tones under, two tones above. And then the therapist could change the center frequency if your tinnitus changed. So one thing they did say was that your tinnitus would probably change pitch during the treatment and certainly I did have to get it calibrated a few times when I was on the trial.

Hazel: So I remember the Desyncra device actually from when I first got tinnitus in 2017 and in the Netherlands it was being offered by a major chain of audiology shops. And I think they were charging two-and-a-half thousand euros for it. But then I did a bit of reading and I found that the trial results were maybe questionable. What do you know about that?

Steve: I think that there were a number of factors on it. I mean, I think one important thing to say about every tinnitus trial is the 30/30/30/10 principle of 30% will get worse, 30% will have no change, 30% will get better/improve, and 10% will drop out. There's not really anything that we can point to now that hasn't broadly followed that pattern. So I think with such a high profile device that probably followed broadly that pattern, I think there was sort of, I don't know the inner workings or the ins and outs of it, but I think it was questions about different parts of the trial. Was this done right? Was that done right? And the paper kind of took a lot longer to come out than it should have done.

Hazel: Yeah, and I think the problem with these things is always how it's marketed. Or not always, but often the way it's marketed is kind of, even if it's not technically false what they're stating, it can be kind of misleading.

Steve: Yeah, because of that middle group, that middle 30, you could say that they got a mild improvement. So they may have had a plus seven point increase, whatever on the tinnitus measuring scales. So you could technically say 55% of people got better when, yeah, they did get better, but how much better did they get? You know, it's marginal or … So it's the marketing, because it's not very good marketing to say "our tinnitus device performs the same as everything else." You want to kind of talk the marketing up a little bit. Not that I know how it was done then.

0:45:03 Advanced methods: amplitude modulation (e.g. SoundCure)

Hazel: Yeah. All right, let's move on to **amplitude modulation**. So this is one where there has been a fair bit of research with, I guess, kind of small scale trials, nothing really big, probably. But there's a researcher called **Patrick Neff** who's done a lot of research in this area. Do you want to tell us generally what is amplitude modulation and how is it supposed to affect tinnitus?

Steve: Yeah, in its basic form, amplitude modulation is just turning off the sound and turning it back on again, but at different rates. So the Patrick Neff work was done on 10 Hertz amplitude modulation. So 10 times every second. The way I do it is using a low frequency oscillator, which is a

sound that you can't actually hear, but you use it to turn the sound off/on/off/on 10 times every second. And that creates a vibrating sound.

Hazel: Ah, so it's literally just switching a sound off and on, or the volume goes up and down.

Steve: Yeah, off and on, off and on 10 times a second for that. And they had some reasonably positive results. I wouldn't be surprised if it was around about 30/30/30/10, but they had some reasonably positive results from it. And also this kind of fits nicely with the idea of brainwave entrainment, which is playing binaural beats. So the idea that you've got a sound which changes 10 times a second, it oscillates 10 times a second, and that's around the alpha brainwave frequency, which is your wakeful relaxation. So it kind of fits into that. You could also call it isochronic beats if you wanted to, because that's effectively what's happening there. So binaural beats, you're actually getting two frequencies, one in each ear. And the difference between the two frequencies, if one's 100 Hz and one's 110 Hz, the brain then perceives that as 10 Hz. That's the idea behind binaural beats. So it's kind of a similar sort of thing to that. And then you gravitate onto, I say backwards, actually, to the SoundCure device.

Hazel: Yeah, but maybe first let's listen to an example so people can kind of get an idea of what we're talking about.

Steve: So this example is actually using three different rates. So each of the sounds in it, I'm using randomization of the sound and using different amplitude modulated frequencies on each of the sounds.

[playing Steve's amplitude modulation sound]

Hazel: All right, it sounds kind of mysterious to me, and there's kind of this vibration effect going on. What are we hearing here?

Steve: Yeah, effectively the vibration.

Hazel: That's the on/off to the ear, it sounds like an opera singer doing the vibrato or something.

Steve: Yeah, effectively that's the on/off.

Hazel: Yeah, interesting. Yeah, you were leading into the **SoundCure** device, so this is something that was on the market, again I don't remember exactly when, and I don't know if it is still on the market. But anyway, maybe you can tell us about the background of that device.

Steve: Yeah, again, I'm not sure it is on the market either, but I believe the SoundCure device was 40 Hz amplitude modulation. And I know there's some researchers that have done work on different rates of amplitude modulation. So when you get to 40 Hz, you get a little bit more interesting because the actual modulation of the amplitude creates overtones. Actually, I'm not going to go there because I'm just going to start confusing a lot of people if I do. But you create a lot of different things happening and you start getting into different territory. But the 40 Hz amplitude modulation actually was tried and tested through an **American Tinnitus Association** grant with, was it UCL? I think, I can't remember now. And then it became a commercial company and they started very much like Dysyncra. It was a proprietary device, a little box that would play these sounds for you.

Hazel: So they got FDA approval and, even though it was developed with a grant from a nonprofit, they commercialized it and they charged about $2,000, I think. It's always around that price range, it seems for all these devices.

Steve: Indeed, probably the perceived value range.

Hazel: But do you remember how that was received at all?

Steve: You know, you forget how far technology advances in a very short period of time. So you don't really have an awful lot from this era of devices. So you can't really find them on the internet now. Whereas now, if this device had come out, we would know all about it and there'd be a huge amount of talk about it. So I think it was received alright, but again, you're probably talking about very similar types of help for people. And I think the other thing as well, any of these devices that have been medically created, they are absolutely stuck to what the research says. So if they find out a little bit later on down the line "you know what" another patient said, "if you change the sound like this, that really helps me." They can't do it.

Hazel: Because the way they got FDA approval, it was for that specific protocol. So then they can't just go and change it.

Steve: No. So I think a lot of these things are completely stuck in their own box where you really want to be able to develop them and say, well, do you know what, this 40 Hertz, we can actually change it. And we could offer a 10 Hertz or a 20 Hertz. But then you've got to go through the whole approval process again. It costs an awful lot of money. So yeah, they end up being like a one trick pony. And even though you want to do more with it, you can't because …

Hazel: And then it just quietly died or we don't really know what happened?

Steve: I think it just quietly faded away because I've not seen anything from it for years and I couldn't really find it on a search unless you go back.

Hazel: We don't have a sample of what the SoundCure device sounded or sounds like, but we do have a sample from you, Steve, of 40 Hertz amplitude modulation. So let's listen to that.

[playing Steve's 40 Hz amplitude modulation sound]

Hazel: So, Steve, to me, this sounds like a dying robot. I don't know. It's not super pleasant.

Steve: No, I mean, it's a difficult thing because it creates a certain sound, you know, the amplitude modulation that when you get faster, it does create … you can't get away from the dying robot sound. Yeah. So I've also combined this particular one with, I've changed the sound because otherwise it would just be one of those tones playing all the time. And you have to try and embed it in something or whatever, but it works a lot better almost doing it the same as I did the acoustic modulation. So having randomized tones there, it makes it sound a little bit less unpleasant. But ultimately, yeah, you have to listen to it and see if it affects you in a positive way. And if it does, great. Then you kind of end up enjoying it. Well, maybe not enjoying it, but benefiting, tolerating it.

Hazel: Yeah. Yeah. Yeah. So you mentioned an interesting fact to me the other day about amplitude modulation, which is that there are examples of amplitude modulation in nature like cricket sounds.

Steve: Yeah. And I think this is why crickets help a lot of people. Very rarely I've ever come across anybody who doesn't like the sounds of crickets. And it's because they make the sound by is it rubbing the wings? I think it's the wings. Grasshoppers use the legs and crickets use the wings or something. And that can happen, bizarrely, I couldn't really find any good data on this, but up to 200 times per second. But at lower rates, you'll hear the constant chirping sound of that. That's amplitude modulation. It's on/off/on/off/on/off as they're rubbing their wings.

0:53:19 Advanced methods: notched audio

Hazel: Yeah. Awesome. So let's move on to **notched music** or **notch filtering**. There's different terms around. Can you explain the mechanism there?

Steve: So again, working around the tinnitus frequency and we're using that as a center point. And then generally there's different ways of doing it. They notch out one octave of sound. So if your tinnitus was middle C, you'd be notching out down to the, oh God, I'm going to have to count on my keyboard to find out what the notes are here. But you're notching down halfway, notching up halfway and you're blocking out a whole octave from that range of sound. So it works on, you need to have a broad sound, so rain or water, ideally something which is equal across the frequency spectrum. So that when you notch that out, you can do it with music, but you do need to either have a lower frequency tinnitus or be selective with the music with the frequency content it's got high up. So the idea again is that it just takes that out and then it's training your brain to either… In fact, what is it doing? I may need to think about that and say that again.

Hazel: So my understanding was that you remove the tinnitus frequency from whatever the sound is that you're playing and, you know, how that exactly would reduce the tinnitus I'm not sure.

Steve: No, I think it's probably on the same sort of level as acoustic neuromodulation.

Hazel: Right, because you're stimulating the frequencies right next to where the tinnitus is.

Steve: It encourages your brain to stop producing the tinnitus frequency.

Hazel: Yeah, that's that's the theory. It has to do with **deafferentation**, which I always forget exactly what that is and how it works. But you can look it up, deafferentation. Indeed. All right. Let's listen to the experience of one of our listeners who has been using notched music. That's Christiaan.

Christiaan: Hi, everyone. This is Christiaan. I've been using notched sound therapy for about a year or so. And for those of you who aren't familiar with this concept, notched sound therapy means that you only emit an octave of frequencies in a song that corresponds with your tinnitus. By exposing yourself to notched sound, you will not excite a set of auditory neurons that correspond to your tinnitus frequency, but only those neurons that correspond to neighboring frequencies of your tinnitus. And what is the rationale of using notched sound therapy? Well, some researchers have hypothesized that notched sound therapy could help reorganize the brain by strengthening the network of auditory neurons that are functioning as they should be and by weakening the connection of auditory neurons that are not working as one might expect. This mechanism might explain why some people experience a reduction of the tinnitus in a notched sound therapy trial. Anyway, in my personal experience, and I say this with some reservations, notched sound therapy might have played a role in the reduction of my tinnitus. My tinnitus is now about 30% of the original volume. But again, I don't know if this can be attributed entirely to notched sound therapy as I tried a wide array of things that help boost neurogenesis and neuroplasticity like adhering to an organic

vegan diet, high intensity interval training, and experimenting with psilocybin mushrooms. So these things may have also played a part in the reduction of my tinnitus. So, well, that's my story and thank you for listening.

Hazel: All right, so Christiaan feels that notched music has helped somewhat with reducing his tinnitus, but he actually can't be really sure whether it was due to that or some other lifestyle changes that he made at the same time. So it's kind of, you know, if we talk about the 30/30/30 he's in the 'it helped him somewhat' category.

Steve: Absolutely. And I think the other thing as well about any audio therapy that people are doing, they're generally doing other things at the same time.

Hazel: Yeah. So it's quite hard to distinguish what exactly affected the tinnitus. And then there might be just the normal habituation going on at the same time. We should mention, Steve, at this point, the TinnitusPlay app, which is an app that we worked on together a few years ago, which was funded by a philanthropist who wishes to remain anonymous. But he funded the development of the app and we provided the content, Steve, you provided the sounds. We also worked with **Patrick Neff**, who did kind of the scientific validation of it. And in the TinnitusPlay app, which is completely free, but unfortunately only available for iPhone, not for Android – that's really a pity, but there wasn't any more funding to do the Android version, but if you have an iPhone, you can download TinnitusPlay completely for free. And it allows you to try out both acoustic neuromodulation, amplitude modulation and notched music. And you can tailor all of those, I think, to your hearing profile. Maybe you could talk a little bit more about that.

Steve: Yeah, absolutely. So we spent quite a while with the development team on that and just putting all three of those things into one package. And it's, again, not a medical device, but you're able to try out each of those things completely for free, which would cost you potentially an awful lot of money if you were going to try and do them through other means. So it's a great app. Plus, it's got the distraction, like a noise mixer for the different sounds that we've got in there that you can use to kind of balance things out and customize to your own liking. So it's a massively, massively helpful app. And even if you just download it to get an experience of what the different noise therapies are like, I think it'll help you out an awful lot in terms of figuring out your own tinnitus.

Hazel: Yeah, we got quite positive feedback on it as well. So worth trying out.

0:59:34 Advanced methods: multi-modal devices (e.g. Lenire)

Hazel: Now, we wanted to mention some of the recent and upcoming what we could call multimodal devices, meaning there's an element of sound stimulation, but also an element of electrical stimulation, typically. We have, already on the market, the Lenire – I always struggle to pronounce it – **Lenire** device from **Neuromod**. And **Dr. Susan Shore**, through her company or the company that she co-founded, **Auricle**, will be bringing also a similar type of device to the market. What's the theory here? Because there's the sound element and electrical stimulation development. We won't go into a lot of detail on the specific devices because we have actually a separate podcast episode on the Lenire device. I wrote a whole blog post about it and why we felt the clinical trial results weren't that great, which you can find on the Tinnitus Hub website under the blog section. It's called Why the Jury is Still Out on Lenire. So we don't need to go too much into the detail. And Susan Shore has promised to come onto the podcast when her device is ready for market. So, but yeah, maybe if you can just talk about the general theory behind these devices.

Steve: First off, I'll definitely be tuning in for the Susan Shore podcast because that device is really interesting. So the idea behind them is that you're stimulating, I believe, with Lenire it's the trigeminal nerve and it's going to the brain and it's helping with the neuroplasticity. So I did visit Ireland and did an interview with them years ago for Tinnitus Talk.

Hazel: Yeah, we published that on our YouTube and Vimeo channels.

Steve: Yeah. So it was a very interesting visit. Great to meet the guys and talk through the device. I didn't get to do too much on the audio. I think they were a bit nervous about me, with me having an audio background, hearing too much or learning too much. Because I did also, when we went to Germany for the TRI conference, I tried to quiz them when they were drunk and I still couldn't get anything out of them. I was gutted. Yeah. I'm thinking "this is the perfect time, I'm going to ask a little bit more." I just got this sort of tight-lipped "no, not saying anymore." Damn it. But so they've got different musical things. Again, they are trapped within what they've done the research on, because I would love to get hold of it. If you're listening, lads out there, I would love to get a hold of the Lenire and start experimenting with different audio on it because I do think that multi mode is an incredibly interesting idea because the idea of enforcing the brain plasticity, because listening to sound is great, but if you can do something else through a stimulation to get the brain to kind of speed up that neuroplasticity, then I think you're onto a real winner. I think, like you said, the research is not amazing, unfortunately, there's some good things there. And I think with any of these devices, I think you need to be able to really hone in on what the individual wants from audio rather than provide the same six or eight or however many tracks for each person. But I think it's a very promising approach. Definitely.

Hazel: Yeah. So if someone wants to send Steve their unused Lenire device, he can try to hack it. I don't know if that's legal, by the way. So maybe …

Steve: I don't think it is. No, no. I would love to get a hold of people who didn't actually respond, who didn't get anything from it and just say: "How about this sound? What about that sound?" But then you've got to tailor the device to the individual. So you might have to change the electrical stimulation. I don't know. But it'd be really interesting to be able to take people who got nothing and say, what can we do to see if they do get something? Also, again, with this sort of research on these things is how many of them had a physical cause and did that affect it? What were the actual comorbidities and was the lack of response to the sound part of the comorbidities?

Hazel: I don't know if they collected that data. I mean, they did have some interesting results in terms of people with hyperacusis responding better, but not in terms of their hyperacusis, but in terms of their tinnitus. It was kind of interesting. And I don't know, that's an interesting result that should maybe be explored more.

Steve: Absolutely. Not that I want to blow our own trumpet, but the Tinnitus Hub surveys are far more in-depth than the clinical ones that you actually get. But that's because we spent time going and asking people with tinnitus: What gets your tinnitus worse? What makes it better? And asking them about the causes and all that sort of thing. So we were able to, as patients, cast the net far wider when we're asking questions.

Hazel: I think so. And we always in all of our surveys, we ask things like, what does your tinnitus sound like? And people can pick from different options. Or does your tinnitus fluctuate throughout the day or stay the same? These are typical questions that somehow the researchers don't think to ask.

Steve: No. And because they're not tinnitus patients, most of them, that's why. And we with tinnitus, we kind of know what the important things are. Some of them might not be clinically important, but …

Hazel: They might, or they might not. But if you don't gather the data, you wouldn't know.

1:05:02 Advanced methods: tinnitus matching and residual inhibition (e.g. Neuromonics)

Hazel: Let's move on to **tinnitus matching** and **residual inhibition**. So this term, I remember hearing this when I got tinnitus, residual inhibition. And I think, still the only thing I understand about it is that you play a sound and then for a while after your tinnitus stops and then it comes back. I've never experienced it myself, though. I've never actually had my tinnitus stop completely just from listening to a sound. So I guess I'm in the nonresponder category there. But could you explain what residual inhibition means?

Steve: Yeah. So the best way to outline it is if you go somewhere and they're trying to match your tinnitus tone, they'll play the sound and see if your tinnitus is higher or lower, higher or lower. And then when you get honed in on the tinnitus sound, it's very, very common for people to not be able to match it because when they get played a tone which is pretty much close to the tinnitus or on it, the tinnitus drops out. Even just very for a tiny little bit.

Hazel: I've tried to match it and I couldn't.

Steve: Yeah. And that's it. So that'll be down to the residual inhibition because it does, all of a sudden you're like "oh, where is it now?" And then you kind of go back to that and you can't quite match it. It's very, very confusing. So that's the best illustration of what residual inhibition does.

Hazel: Okay. Yeah. I'm still confused. So you hear a tone played that is the same frequency as your tinnitus, assuming anyway that you have a pure tone tinnitus, which not everyone does – people could hear typewriters or music or whatnot – but assuming you have a pure tone tinnitus and then you hear a sound that is the same frequency, then your tinnitus drops away for a moment?

Steve: Yeah. So ... For some people at least. And this was the earliest form of tinnitus treatment outside of masking that I came across, which is the **Neuromonics** device. The idea with that was that it was – I mean, I'm going back because I think it's been defunct for years, I don't think it's been around for a long time – was that it matched your tinnitus tone and it played that tinnitus tone in the background, kind of using this idea of residual inhibition, but more training. And then because you're hearing the same tone as your tinnitus, it would stop your brain from listening to the tinnitus tone and hopefully knock it down in volume. They played classical music behind it as a sort of relaxation thing.

Hazel: Right. Yeah. So that was Neuromonics. And, yeah, I think we looked at that website and we really couldn't make sense of it. Like, was that Neuromonics? I remember we looked at different websites where we're like, I can't, I don't understand what they're describing here.

Steve: I think Neuromonics still did have a website, didn't it? It was a very old, it was one of the original outside of masking and CRT, one of the original treatments. And again, I think it did help some people, but it's so easy to do yourself. You know, all you've got to do is find a way to match your tinnitus tone, play that in the background and listen to any music. It's incredibly easy to try. And

then we've got the **Levo** system. I believe it does pretty much the same thing. Again, you know, they are deliberately cryptic on the websites because they don't really want to tell you how simple the treatment is. You know, it's like the stuff that you read from **Desyncra** about acoustic neuromodulation, you read that out and it's just like, what? That sounds really complicated. And then you look at it and you're like, it's not. So I think that you get a lot of scientific information around and you know, there's no problem with it because they spend an awful lot of money researching these things. So they kind of obviously want to make it sound more complex than it actually is.

Hazel: Yeah, that makes sense. Yeah. So let's listen again to the experience of one of our listeners, Sentinel, who sent in an audio clip and he experiences residual inhibition sometimes.

Sentinel Hi, Hazel. I hope you're well. My name is Sentinel on the Tinnitus Talk forums. I thought I'd share a little bit of my experiences with sound therapy. As far as electronic internet based music related sound therapy, there's a couple different tracks on YouTube that are listed as neuromodulation tracks that I've actually made use of in the past. Some of these are extraordinarily harsh sounding and I wouldn't recommend for anyone with noxacusis, hyperacusis or anything like that. If your ears are a little bit hardier, some of the more on the edge sounding ones that are much more high frequency that actually sound like tinnitus, despite the fact that when I've listened to them in the past, they've been pretty effective at reducing mine to essentially silence. Those have been helpful to me, although generally I prefer to use ones that are less pure tone and are ones that use nature sounds like crickets or water. So I have two on my phone, one's water and one's crickets, and then it's those two sounds. And then immersed within that is the rhythmic set of tones that alternate and provide that residual inhibition. That's essentially the extent of my usage.

Hazel: Okay, so listening to that, it sounds like he was just trying out different sounds and sometimes he would experience residual inhibition. Do you actually know how common it is that people do experience that? Because again, I've never experienced it.

Steve: It's a known effect in research when they're trying to match the tinnitus tone, but I don't know the figures on it, if I'm honest with you. But then again, it's probably very similar to if you're a non responder to audiotherapy, the likelihood is you're not going to get residual inhibition.

Hazel: Right, yeah. And to be clear, the effect usually lasts only for seconds or minutes, right?

Steve: Yeah, very short duration.

1:11:01 Beware of pseudo-science

Hazel: I think we wanted to cover and we've already sort of, you know, cast some doubts on some of the treatments and therapies we discussed, but there are some others that I would say go even further into that dubious domain. We looked at a website of something called **Sound Therapy International**. And I think it's related to, I'd never heard of this, but you told me there's the Tomatis method. Tomatis? Not tomato, but Tomatis.

Steve: Yeah. And I still can't really tell you what it does or why. It's a very confusing one. This one's been on the market for so many years. And again, when I first got tinnitus, this was marketed with “come and buy our CD set” for about $700, I think it was. I can't remember now. Or even more than that. It was an instant thing for me when I first looked at it of “okay, so this seems to cure lots of

things." And you get your fair share of devices like that that just seem to claim we've got the cure for this, the cure for that, the cure for this. That you kind of step back and go, yeah, I'm not sure.

Hazel: Yeah, that's, wait, I was just trying to look up an example from their website. Yeah, they do claim to treat or cure almost anything. Listen to this: "Sound therapy is a unique program to enhance the performance of the natural ear." There I'm already like, what, natural ear? "Unlike a hearing aid, which simply magnifies the volume of sound, sound therapy impacts the natural ear with sound waves that stimulate and enhance the responsiveness of the ear itself." I'm really like, what, the responsiveness of the ear itself? Okay. "In addition, sound stimulation is provided to the whole auditory pathways from the ear to the brain." But that's like any sound stimulation does that. It all goes through the auditory pathway from the ear to the brain. So that's just like saying, you know, gravity works downward or something. "Due to neuroplasticity, this enables the brain to become a more efficient processor of sound." So this is just word salad to me.

Steve: Yeah, it doesn't really mean anything at all. I mean, you could say that about any of the things that we've covered so far, any of the things and that includes listening to birdsong.

Hazel: It's just very generic. And they throw in a few scientific sounding words like plasticity and then hope that most people are like "oh, yeah, that sounds like it probably must work."

Steve: Yeah, unfortunately, I've got no idea what it actually is, because I would never spend that sort of money on something, which is quite a basic sounding set of sound.

Hazel: Exactly.

1:13:57 Problems with sound therapy research

Hazel: So Steve, I'm happy to report we actually reached the end of our list. We made it through that. I hope we were able to provide some kind of structure for the listener and explain these different approaches reasonably well. Let's move on to some general reflections. Like, why do you think there's such a small amount of research on sound therapy?

Steve: I think the thing with sound therapy is that it's potentially easy to copy anything that you do. And of course, the research is very, very expensive. If you're looking to research for a device, if you want to sell something and your device is just: "oh, here we go, we've got these seven or eight tones that play around a little bit." How do you put money behind that when I can come along and say, here you go, I've just done it for free? That's easy. So people are less likely to research it. And I think that in terms of what the research community are looking for, they look for things which are more guided by a therapist. Whereas a lot of the sound therapy, when you start getting into that thing like Desyncra or the other devices, you actually do have to have a program behind it. And it ends up becoming a private firm will do that because there's a device at the end of it, which is going to be commercialized. So all of the bits in between, the bits that we've shown from the Tinnitus Hub survey have the best effect for people, kind of don't get any research done on them. Other than just those of us with tinnitus trying them out and seeing what happens.

Hazel: Yeah, makes sense. I think there's also the fact that probably for this to really be effective, it has to in the end be combined with other treatments. It has to be something complimentary and not something that's expected to have a major impact alone. And I think that's generally a big challenge with finding effective tinnitus treatments is that very few people are taking that holistic approach at all because they're each looking at their own area.

Steve: Well, this is it. And you start adding in extra things like that. I mean, I've always been wanting people to look at combinations of treatments because if you have one treatment which has a 30% success rate and another two or three treatments, one of them being sound therapy, it's like, well, what happens when you combine them? Do you actually throw all of those things together and get greater than the individual parts? But nobody's doing it, unfortunately. I really wish they would. But then we've got that issue, the lack of an objective measure for tinnitus, which holds back an awful lot of tinnitus research because you're relying on the individual to say “yes, I feel better” or “no, I feel worse.” And that's just such a shaky model for understanding how well a treatment performs.

Hazel: Yeah, exactly. Well, the lack of objective measure is a major impediment to any kind of tinnitus research, unfortunately. And then there's the heterogeneity again that we mentioned before. So all of those are unfortunately obstacles. The good news is that people can try it for themselves.

Steve: Yeah, you can try it absolutely for free. With the heterogeneity, if you're going to do a research project to take into account the heterogeneity, you would almost need to do what we did with the Tinnitus Hub survey and have thousands of respondents. So you could cover all of the different tinnitus comorbidities. So nobody can usually afford to do a research project that big.

Hazel: No, no, that's it.

1:17:28 Tips and tricks for self-experimentation

Hazel: Hey, so let's give people some tips and tricks because we've been saying and repeating that, you know, you can try this for yourself. It's relatively safe and cheap. And so can you give us some tips and tricks on what to avoid and also how to find something that works for you?

Steve: I think the number one tip is when you're searching, do not use the word cure because you are going to find...

Hazel: When you type, don't type cure, tinnitus cure, into Google.

Steve: No, because you're going to find junk. Say, for example, I've got I don't know how many videos I've got on my YouTube. Not one of them has got the word cure in it or therapy or anything like that because I would be lying to people and misrepresenting myself. However, I have other people that will pop up the sidebar when I've got one of my videos on who say “amazing tinnitus cure, the best therapy treatment!” And they get like three million views, but they're lying to just basically get views. So you're not going to get a good quality if you search for cure. You're going to get people who are either trying to take your money for some pseudo-scientific nonsense or people who are just trying to get advertising revenue, so spam keywords like cure. And I think that feeds into the pseudo-science thing. If people are using pseudo-scientific language, take no notice of it. If you cannot explain to somebody in plain English what you're doing and why it works. Yeah, somebody like me might start using audio terms. But if you can't explain it in plain English, then it's probably a load of rubbish.

Hazel: Yeah, I think that's fair to say. Or at least you should be skeptical.

Steve: Absolutely. And you should always look for recommendations as well. So it's a bit like the choice paralysis that's involved in using TripAdvisor when you're trying to go somewhere these days.

Just find other people's opinions, reviews of something, because we, us with tinnitus, we do overshare quite a lot. Tinnitus Talk being a great place, obviously, to do this. You can find a huge amount of opinion and the experiences of trying out things on there because that's going to be one of your biggest things. You can get a feel for what happened when other people tried it. What did they use? What resources did they use? And you can also find out from them when something is a little bit scammy and you shouldn't be sending any money for it at all.

And I think different things, as we touched on before, trying out different techniques, different styles, go through the whole list that we've put here and just do everything. And that's the best piece of advice I think you can give anybody with tinnitus. Do everything. Try not to spend your money on it but try all these different things and know how you respond and hone in on the things that actually do you good. Keeping a sort of track of that. Not really a diary of how good or bad you feel. I've never really been a fan of that. But I think keeping track of all the different things you try and say, well, that actually helped a little bit. That helps a little bit. So in that case, use that and that together. Try these three or four things together and just see what more benefit you can get from it.

And I think with audio, you can pretty much get anything for free. It's all out there. I've put a lot of it out there for free and there's other people as well. I know I've come across other people who do a lot of stuff for free as well. You can go on Spotify, you can go on any of the streaming sites and you can find stuff for free. Don't part with your money. Try it out and see what it does to you before you do anything.

And then, like with any tinnitus treatment, if it helps you, then it works. Don't get too bogged down. Look for the recommendations, but don't get bogged down in other people's opinions. So if somebody says this did nothing, that just means it did nothing for them. If it works for you, it works. That's the most simplistic piece of advice I think you could possibly give.

Hazel: I think it's great advice, Steve. And we'd love to hear from our listeners as well. Do you have any experiences with sound therapy? What worked for you? What didn't? What else would you like to see in this field? You can respond through **tinnitustalk.com/podcast**. And I also want to call on our listeners to please, if you like the podcast, please give us a positive review or rating through whatever channel you're listening to this, whether it's Apple, Google, Spotify. Yeah, give us a positive rating. It really helps. So thank you, Steve.

Steve: Thank you. Also, just to add, if any of the listeners out there have got something that they don't think we've covered, I'd be really interested to hear about it. Especially if they say, have you tried to make this type of sound? I'm happy to give it a go if it's not here.

Hazel: Cool. We'll let you know if we get any such responses.

Steve: Excellent. Thank you.

Hazel: All right. I really enjoyed this, Steve. Thank you so much for being on.

Steve: Thank you very much.