WHITEPAPER – ULTIMO 2014

The Oticon Approach to Care of the Tinnitus Patient

ABSTRACT

Tinnitus remains a challenge to patients and hearing care professionals alike and there are continuously new frontiers to explore in the area of tinnitus management and treatment. Effective tinnitus management is a reality today and, in particular, the combination of sound therapy and counselling to manage patients with tinnitus has been shown to provide relief for many.

Oticon has developed an ear-level combination device consisting of a sound generator, the Tinnitus SoundSupport, which is built into three hearing instrument styles. The combination device provides the professional and the patient with a wide array of options for sound therapy in the form of four broadband sound options, three nature-like sound options, and the ability to shape sounds to suit individual patient needs. This white paper provides the background clinical evidence to show that a wide variety of sound options for tinnitus management is crucial for a patient population where the perception of the tinnitus varies immensely.

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PEOPLE FIRST

"There's nothing you can do about your tinnitus".

"You will just have to go home and live with it".

These are examples of statements that patients with tinnitus hear from their physicians and other health care professionals when they turn to help for their tinnitus, according to the American Tinnitus Association. It is disheartening that after more than 40 years of dedicated research in the area of tinnitus, this is still the take-home message for the majority of patients. To put things into perspective, Kochkin, Tyler & Born (2011) report that about 10% of the US population, or about 30 million people suffer from tinnitus. Nearly four in 10 of these people experience their tinnitus more than 80% of the time during a typical day and about one in five individuals in this group describe their tinnitus as disabling or nearly disabling. Learning to live with it has never been and will never be an acceptable option for these patients. Seen in the light of the massive amount of research done in the area of tinnitus, it is difficult to comprehend why patients still receive such inaccurate advice.

Where are we now?

In current research, tinnitus is now widely recognized as a disorder involving the brain (Reavis et al 2012). The reason is that hearing loss in the auditory periphery is likely a prerequisite, but not sufficient in itself, for tinnitus to occur. The lack of auditory input due to hearing loss leads to hyperactivity in the central auditory pathway and this may just be the neural correlate of tinnitus (Reavis et al, 2012). In a review of experimental, controversial, and potential treatments for chronic tinnitus, Folmer, Theodoroff, Martin & Shi (2014) have concluded that there is little evidence to support invasive treatments for tinnitus, such as middle ear implants, microvascular decompression, or implantable electrodes that stimulate the brain. Safe, effective, and non-invasive treatments and management strategies for tinnitus include *sound therapy,* including the use of hearing instruments and sound enrichment strategies, *cognitive behavioral therapy* and *psychological counselling, hypnosis, biofeedback,* and *relaxation training*. *Over-the-counter medication* can be used to reduce anxiety, depression, and sleep disorder associated with tinnitus. However, treatments such as Transcranial Magnetic Stimulation (TMS), soft laser, optogenetics, and genetic therapy are currently not considered viable treatment options for tinnitus since research is still in the early stages.

There is clear lack of a "one-size-fits-all" tinnitus treatment and/or management approach and there is, as of yet, no cure for tinnitus. With this somewhat discouraging fact in mind, the thought behind creating the Tinnitus SoundSupport sound generator was to create a flexible product, within the scope of sound therapy, which could accommodate all well-respected and well-documented approaches to sound therapy and give the patients and the clinicians a higher likelihood of success in management due to its ease and flexibility. Patients' reactions to tinnitus can be perplexing to the professionals who treat them, but the challenges associated with tinnitus also offer a great opportunity to provide life-changing benefit (Fagelson, 2014). The lack of one simple solution should not dissuade professionals in the field of audiology from treating patients (Hoare et al, 2014). Instead, this sound generator coupled with good counselling practices may serve as an effective option for patients and clinicians alike.

Tinnitus SoundSupport – our sound generator and the evidence behind it

When you are working with the Oticon Tinnitus SoundSupport sound generator in a clinical situation, you will find that it has a wealth of sound therapy options from which to choose. In this section, we delve deeper into the question of what these options are and why they were chosen for inclusion.

Sounds mean different things to different people. Jastreboff and Hazell (2004) explain that a sound heard as neutral for one person, might be judged pleasant or even negative for someone else. Research gives us no clear answer about what is the correct sound for sound therapy, simply because one singular answer cannot be found. According to Jastreboff & Hazell, a sound used in a Tinnitus Retraining Therapy (TRT) protocol must not induce any negative reactions or annoyance, either by its loudness or by its quality. Furthermore, in TRT a sound should not attract attention or interfere with everyday communication and activities. Offering the patient more than one type of sound to listen to increases the likelihood that an acceptable sound choice is found.

Another example of an approach to tinnitus management that requires diversity of sounds is Progressive Tinnitus Management (PTM), first described by James Henry and colleagues at the Veterans Affairs National Center for Rehabilitative Audiology Research (NCRAR) in 2005. The authors advocate for the use of various sounds to alleviate tinnitus symptoms. Sounds are divided into three categories: soothing/relaxing sounds (to relieve stress and anxiety), background sounds (to reduce the contrast between the tinnitus and the surrounding environment) and interesting sounds (to divert attention actively away from tinnitus). A traditional ear-level white noise generator is not sufficient to accommodate this need, which is why the authors give additional examples of how to use sound in the environment for management purposes. The Tinnitus SoundSupport sound generator described in this document provides a way to bring more treatment sounds directly into an ear-level device and thereby make it easier for the patient to access these sounds in their everyday life. The PTM protocol calls for counselling of patients on how to use sounds for different purposes and situations (Henry, Zaugg, Myers & Schechter, 2008).

Based on what we now know about the need for variety in sound selection, it is appropriate to go more in depth with the sound generator itself and its features in the following sections.

Our Ear-level Combination Device

Hearing loss and tinnitus are closely linked. 90% of people with tinnitus also have hearing loss to some degree. Often times, a patient will complain about tinnitus long before they complain about a hearing loss even if it is significant. This illustrates how bothersome and all-consuming tinnitus can be. In the next section, the role of the hearing instrument in tinnitus management and the hearing instrument characteristics important for tinnitus management are described.

Evidence for amplification

Tinnitus is considered a disorder involving the brain. One theory is that hearing loss, through lack of stimulation in the brain, causes an increase in neural activity in the central nervous system and in particular, the central auditory pathway. This means that many different networks in the brain are associated with tinnitus and one goal of tinnitus treatment is to normalize that maladapted neural activity (Fagelson, 2014). One of the ways to achieve this goal is to restore audibility by using hearing instruments.

Hearing instruments have been used as part of tinnitus treatment and management protocols for a long time (Kochkin & Tyler, 2008). Hearing instrument amplification provides a method through which sound is delivered therapeutically in two ways: they amplify environmental sounds and thus reduce the contrast between the tinnitus and the environment, and they restore audibility in frequency regions associated with deprivation-related changes in auditory pathway activity (Fagelson, 2014). Furthermore, the amplification of external sound can provide sufficient activation of the auditory nervous system to reduce tinnitus perception and possibly, in part, restore neural function due to neuroplastic changes occurring with increased sound stimulation. This means amplification can have a long-term beneficial effect on the tinnitus (Del Bo & Ambrosetti, 2007).

Several other studies cement the validity of using hearing instruments as part of a tinnitus treatment and management protocol. In their 2006 study, Folmer and Carroll concluded that ear-level devices can help a significant number of patients who experience chronic tinnitus because they reduce patients' perception of tinnitus and can facilitate habituation to the symptom. Additionally, amplification provides benefits of improved hearing and communication. McNeill et al (2010) showed that the general masking-effect of hearing instruments on tinnitus perception was key in the reduction of Tinnitus Reaction Questionnaire (TRQ) scores for a group of hearing impaired listeners.

Searchfield et al (2010) compared counselling alone to counselling alongside the use of hearing instruments. Improvements in Tinnitus Handicap Questionnaire (THQ) scores were only significant for the group that received hearing instruments and they concluded that patients with hearing loss and tinnitus should trial amplification.

Style of hearing instrument

The Tinnitus SoundSupport sound generator is implemented in Oticon's receiver-in-the-ear and behind-the-ear hearing instrument models only ***(figure 1).*** In this section, available research illustrates why the use of an open-fit hearing instrument configuration is preferable for ear-level sound generators.

Many hearing impaired patients have normal or near-normal hearing in the low frequencies (Henry et al, 2005, Jastreboff & Hazell, 2004). Common environmental sounds contain significant energy below 200 Hz and this sound helps to constantly stimulate the auditory system that is coping with tinnitus. Jastreboff & Hazell (2004) argue that keeping environmental sounds available is important for reducing the perception of tinnitus and therefore, devices that keep the ear canal open are recommended. As shown earlier, Del Bo & Ambrosetti (2007) recommend the use of hearing instruments as an important element in tinnitus therapy, in particular the use of open-ear binaural amplification in order to allow access to environmental sounds and provide symmetrical stimulation to the auditory system. Similarly, Parazzini et al (2011) advocate the use of open-ear hearing instruments for the same reason. This is especially important for patients with normal or near-normal low frequency hearing.

Lastly, Jastreboff & Hazell (2004) report that many patients experience significant enhancement of their tinnitus if the ear canals are completely or partially blocked by any means, including hearing instruments.

Figure 1.Tinnitus SoundSupport is available in three hearing instrument models from Oticon, RITE, miniRITE, and BTE 13.

Hearing instrument bandwidth

There are indications in recent research that a hearing instrument with a high bandwidth may be preferable for use in tinnitus sound therapy. Thus, flexibility is required because the evidence is mixed as to where the spectral emphasis of the masking sound should be placed.

On one hand, Jastreboff & Hazell (2004) state that the spectral characteristics of the therapeutic sound do not have to match the perceived pitch of the tinnitus. Penner & Zhang (1996) confirm that sound therapy such as masking does not have to contain sounds encompassing the tinnitus pitch. On the other hand, recent findings suggest otherwise. Some studies show that greater relief from tinnitus is achieved when the therapeutic sound and the perceived tinnitus pitch are in the same area of the frequency spectrum. McNeill et all (2012) showed that TRQ scores were better if the tinnitus pitch fell into the frequency range of the hearing instruments, meaning that high-frequency amplification might be the most effective strategy for reducing the perception of high-pitch tinnitus.

According to one school of thought, the mechanisms underlying tinnitus in the auditory system suggest that hearing instruments with a broader frequency bandwidth can be useful in tinnitus treatment. Schaette & Kempter (2006), Del Bo & Ambrosetti (2007), Eggermont & Roberts (2014) and Schaette et al (2010) have investigated different aspects of a theory stating that to reverse the pathological neuronal hyperactivity in the auditory system due to hearing loss, we need to acoustically stimulate the frequency regions associated with the tinnitus pitch as an important part of tinnitus treatment. Effective stimulation is considered to be hearing instrument amplification within the same frequency range as the tinnitus pitch. This theory supports using a hearing instrument with the broadest available frequency bandwidth.

Regardless of which theory the professional subscribes to, it is relevant to be aware that bandwidths of the Oticon sound generators differ: the Alta2 Pro Ti sound generator has a nominal bandwidth of 10 kHz. For the Nera2 Pro Ti and Ria2 Pro Ti hearing instruments, the sound generator has a bandwidth of 8 kHz.

Broadband Sounds

Ear-level devices are generally thought of as either a hearing instrument plus a sound generator (combination device) or a stand-alone sound generator. Traditionally, ear-level devices have focused mainly on using broadband or narrowband sounds as stimuli, both of which have been widely used in sound therapy. As part of the neurophysiological model of tinnitus therapy, Jastreboff & Hazell (1996, 2004) have been especially strong advocates for using continuous, low-level and emotionally neutral background sounds. Patients are given neutral and close to random enhancement of the auditory environment. In other words, patients are fitted binaurally with traditional sound generators with broad-band noise because of its stable and neutral sound characteristics. Jastreboff and Hazell are the developers of Tinnitus Retraining Therapy (TRT), a widespread habituation therapy approach where one of the cornerstones is that therapy sounds must not be annoying, attract attention, or induce a negative reaction. Broadband sounds have the advantage of being stationary and neutral. They have historically been used for complete masking (Vernon, 1976) as well as partial masking approaches (Jastreboff & Hazell, 2004, Vernon, 1990) to treating tinnitus.

Broadband sound options in Tinnitus SoundSupport

Our sound generator has four built-in stationary broadband sound options from which to choose: "white sound", "pink sound", "red sound" and "Shaped to Audiogram". These sounds are by definition noise types but are referred to as *sound* in our literature and fitting software. Many people have negative associations with the word *noise* due to the prevalence of hearing loss in the tinnitus population. In a tinnitus management situation, it should be seen as something positive. In this section, the sounds are referred to as noise because it is the more specific term.

White noise has a flat power spectral density, meaning it has the same amount of energy at all frequencies. White noise is a standard stimulus and it corresponds to the output of a random noise generator. Therefore, the filter that shapes this signal is set to a broadband configuration.

Pink noise has a spectral slope of -3 dB/octave and it is assumed to sound more comfortable than white noise, at least to people with mild hearing losses. Because human auditory filters widen with increasing frequency input, pink noise is perceptually flat, meaning we perceive a balance between low and high frequencies. In comparison, white noise is perceived to have a more high frequency emphasis. Therefore, pink noise can be more pleasant to listen to. Furthermore, the spectrum of pink noise is closer characteristically to sounds found in nature because it has more energy at low frequencies.

The third noise type is red noise, also known as Brownian noise, named after Robert Brown, the man who discovered Brownian motion. Its spectral slope is twice as steep as pink noise at -6 dB/octave and it is spectrally similar to some nature sounds such as waves, heavy rainfall or a windstorm. ***Figure 2*** shows the spectral characteristics of the three noise types.

The initial level of white, pink and red noise in the fitting software is defined as the average of the patient's three best audiometric thresholds. This lower starting point was chosen to ensure that the patient is not initially overwhelmed by the therapy sound.

Shaped to Audiogram

There is growing evidence to show that a patient with tinnitus may benefit from sound stimulation that is within the frequency range of their perceived tinnitus pitch (see below). In addition to the wide bandwidth of our sound generator, the broadband noise called "Shaped to Audiogram" gives close to equal audibility across the entire frequency range regardless of the hearing loss configuration. The patient's tinnitus frequency will not always be within the sound generator bandwidth, but having the broad bandwidth and ensuring audibility across the frequency range allows a higher number of tinnitus patients' needs to be met. A carefully calculated sound level also serves as a starting point for the clinician to fit the sound generator.

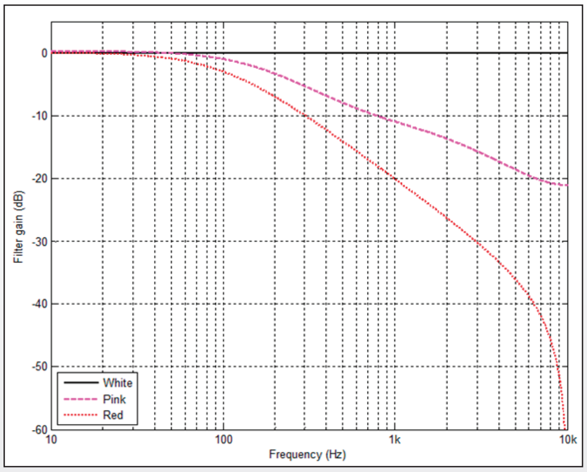

Figure 2. Magnitude transfer function of the filters used for white, pink and red noise.

This might be especially useful to the clinician who is new to tinnitus patient management and who would like a suggestion on a sound starting level. With this prescribed noise type, it is still possible to stimulate the area of the audiogram where the hearing is the worst. Often, there is a connection between hearing loss frequencies and perceived tinnitus pitch (König et al 2006, Schaette et al, 2010).

Schaette et al (2010) argue that the effective delivery of sound in sound therapy approaches to tinnitus management is dependent on the output characteristics of the sound generator as well as the type and degree of hearing loss. This suggests that if we can make our therapy sound acoustically available to the patient, it may increase the likelihood of appropriate acoustic stimulation of the individual auditory system. Davis & Távora-Vieira (In Møller et al 2011) point out the growing acceptance of the theory that sound stimulation incites a neuroplastic change in the auditory pathways. This neuroplastic change means that sounds should be spectrally shaped to individually correct for each person's hearing loss configuration. Sound stimulation should provide the broadest possible stimulation of the auditory pathways to minimize auditory deprivation.

The "Shaped to Audiogram" broadband noise is designed with two goals in mind for the patient. 1) The sound should be audible or just below threshold when

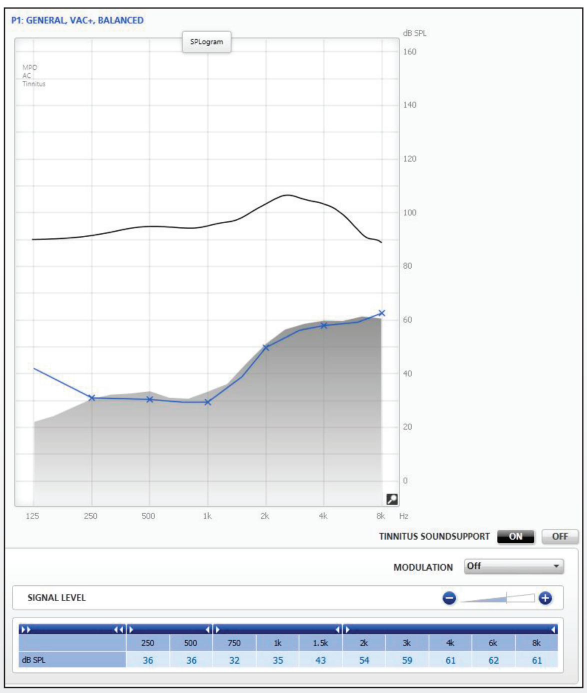

Figure 3. Shaped to Audiogram as seen in Genie fitting software.

initially activated and 2) The sound should be at a comfortable level for the patient. This ensures a safe and reliable starting point for both the patient and the clinician. In the fitting software, "Shaped to Audiogram" is the default sound chosen when beginning the fitting with the sound generator ***(figure 3).***

In addition to being able to adjust the overall loudness level, the clinician can apply frequency shaping to the four broadband sound options. The clinician can either change the overall level of the entire signal, i.e. acting on all frequency bands at the same time, or modify the level in one or more frequency bands. In both cases, a step size of 1 dB is available. In the case of only one or several frequency bands, the overall level will change depending on how many frequency bands are selected and how much they are altered from the surrounding bands. It is not possible to create a notch filter or a strict narrowband noise as surrounding frequency bands will be affected by the change to a degree.

Ocean Sounds

With the introduction of ocean sounds, Oticon has developed a sound generator with a feature not previously seen on the market. Up until this point, a person with tinnitus has had the option of using a bedside sound generator or a similar non-ear-level sound enrichment device to play relaxing sounds, such as ocean waves (Piskosz, 2012). In this section, a case is made for why it is beneficial to implement ocean sounds into an ear-level device, alongside the four adjustable broadband sound options.

Tinnitus causes stress and anxiety that can, in turn, worsen tinnitus further. This is known as the cycle of distress. Managing stress is therefore of high importance in the management of tinnitus. According to Baigi et al (2011), stress is almost as important as occupational noise exposure for the amount of discomfort felt by the patient with tinnitus. Møller (2000) draws a comparison between severe tinnitus and chronic pain and finds many similarities. One approach to treatment of chronic pain is using music and nature sounds to significantly decrease the perception of pain and increase relaxation, as shown in studies by Cutshall et al (2011) and Diette et al, (2003). Arguably, the same approach can be used to decrease stress and promote relaxation in tinnitus patients.

Nature sounds are soothing and relaxing

Research tells us that nature sounds tend to have a positive emotional effect on us. Alvarsson, Wiens & Nilsson (2010) exposed patients to nature sounds or noisy environments after a stressful arithmetic task. Their results suggested that after psychological stress, a patient has a quicker physiological recovery when exposed to nature sounds over noise. Handscomb (2006) concluded that sound enrichment from sound such as babbling brook, or chirping birds plays an important role in improving sleep amongst tinnitus patients. Most patients chose their sound preference because it had a pleasant emotional effect, not because of its perceived effect on tinnitus, however, positive emotional state tends to affect the perception of tinnitus.

In a study from 2002, Weber, Arck, Mazurek & Klapp investigated whether improving stress-managing capabilities would influence psychological and stress-related immunological parameters in chronic tinnitus sufferers. Relaxation training was shown to improve the stress-managing capabilities in chronic tinnitus sufferers. In the light of this study and the fact that nature sounds have shown to have a relaxing effect, it is a logical step to incorporate nature sounds in the management of patients with tinnitus.

Using ocean sounds in sound therapy

Searchfield et al (2010) conducted a pilot study to determine sound preferences in sound therapy of tinnitus. Rain was the most preferred therapeutic sound stimulus and stimuli that vary over time were preferred over constant noise. Henry, Rheinsburg & Zaugg (2004) had patients listen to white noise and dynamic custom sounds. The two sounds that were judged significantly more effective in reducing tinnitus annoyance had water and nature characteristics. Henry et al (2008) advocated for the use of soothing moving water sounds and other nature sounds to provide relief from tinnitus and calm anxiety and nervousness associated with it.

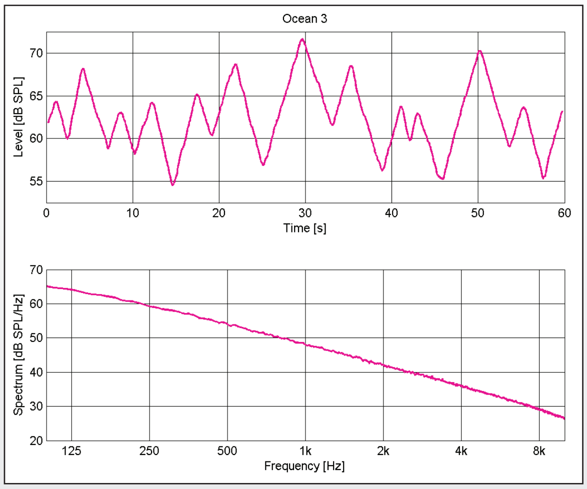

Figure 4. One of the three ocean sound options, Ocean 3.

Jastreboff and Hazell (2004) also recommend the use of water sounds for their calming effect and as natural sound enrichment. Finally, Hoare et al (2014) argue that the acceptability of a sound therapy sound is essential and that different sounds can be soothing for different patients, water being amongst the sounds that are deemed acceptable.

Ocean sounds in Tinnitus SoundSupport

Based on this research, ocean sounds are a strong choice when determining what sounds patients prefer listening to as part of their sound therapy treatment and management plan. For the first time, the choice to demonstrate and use ocean sounds with a patient can be made by the clinician fitting an ear-level combined sound generator and hearing instrument. In the fitting software for the sound generator, there are three ocean sound choices, differing in the underlying noise spectrum (white, pink and red). These sounds are based on a proprietary variation of modulation patterns and they are meant to mimic the rhythm of the ocean ***(figure 4).***

Modulation

In addition to offering traditional broadband sounds and ocean sounds to the patient, broadband sounds can be adjusted in terms of level and frequency content, and also in terms of amplitude modulation.
Reavis et al (2012) showed that low-rate amplitude modulated tones were more likely to suppress tinnitus than a broadband stimulus. In this context, suppression refers to the temporary suppression of tinnitus following the termination of an external masking noise. This phenomenon is also known as residual inhibition. Some researchers believe residual inhibition can counteract the hyperactivity in the auditory system, which causes tinnitus perception. The sounds in the study were slightly below the level of the patients' perceived tinnitus. Although the amplitude-modulated sound options in our sound generator are not directly comparable to Reavis et al.'s, they represent novel sound options, which have the potential to either suppress tinnitus or provide relief from tinnitus while activated.
The long-term effects of the modulated sounds on tinnitus and the underlying mechanisms remain to be investigated, however, modulated sounds (pure-tone or broadband) have a place in sound therapy and it is the reason modulated broadband sounds are included as options in our sound generator.

Modulated sounds in Tinnitus SoundSupport

Our tinnitus sound generator uses a deterministic modulation series that may be repeated endlessly.

The series is pre-programmed in our hearing instruments. In our fitting software there are four modulation packages available. One goal has been to make the modulation options easy to understand and use. The four choices are:

Tranquil - A very mild modulation option. For the patient who wants only a slight level variation at a very slow speed instead of stationary broadband noise.

Mild – A bit faster modulation, but still on the calm side. For the patient who prefers modulation but does not want too much to happen with the signal.

Spirited – A clearly audible modulation, but not too aggressive. For the patient who likes modulation and wants to clearly hear that something is happening with the signal.

Bustling - A clearly audible modulation on the more lively side. For the patient who really wants to hear the modulation and who enjoys the changes in the signal.

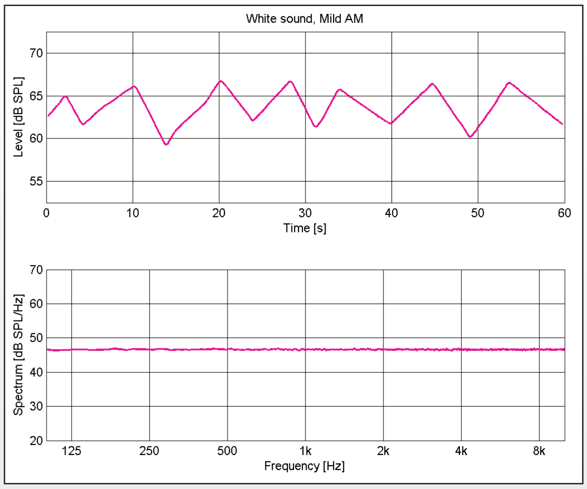

Figure 5. An example of modulation in Tinnitus SoundSupport. White sound, mild modulation.

Volume control functionality

Patients with tinnitus have widely varying needs when it comes to level preferences by environment, by ear, and by sound type, to name a few factors.

For TRT, Jastreboff and Hazell (2004) explain that the sound level needs to be at the so called *mixing point* where the external sound and the tinnitus start to interfere with each other. In addition to this, the ability to control the volume of sound in each ear individually is essential, especially for those patients also suffering from hyperacusis.

For traditional masking therapy (Vernon, 1978), the broadband sound needs to mask the tinnitus completely. Vernon later modified his approach to include partial masking of the tinnitus because the level of the noise was perceived as very loud for many patients. Regardless, a clinician using a masking or partial masking approach will need to be able to adjust the level of the sound accordingly, but will most likely also need to give the patient the option of adjusting the sound level on their own, all the while staying within safe levels that eliminate the risk of excessive noise exposure.

Volume control in Tinnitus SoundSupport

In Tinnitus SoundSupport, the clinician sets up a volume control either individually for each ear or binaurally. In programs where the sound generator is activated, the volume control affects only the level of the treatment sound chosen, not the microphone level. If the patient wants to adjust the microphone level in a tinnitus program, this is done using the volume control on the streamer accessory. In programs without the sound generator activated, the volume control affects the microphone signal. The step size is set to 1.5 dB per step to allow for finer adjustment of the sound level, especially at levels close to the patient's hearing threshold. The range of the volume control is up to 30 dB for BTE and RITE instruments and the range can be set anywhere from 0-15 dB above or below the default level to accommodate the patient's preferences in adjusting more up or down. The range of the volume control is 15 dB for miniRITE instruments because they have a single push button. A narrower volume control range requires fewer button pushes and is thus easier for the patient to use in this case. The default is -7.5 dB down and +7.5 dB up. The range of positive level steps is automatically limited by the fitting software to keep the patient's listening levels below the 90 dB (A) regulatory limit and/or within the limits of the chosen receiver.

The maximum overall level of the sound generator is set to 90 dB(A) SPL measured from 100 Hz to 10 kHz in a 2cc coupler. The warning level is set to 80 dB(A) SPL in free field. When this level is reached while adjusting in the fitting software, a warning window will appear telling the clinician to proceed with caution. Once a certain level is reached, the clinician will see that a maximum wearing time indicator for each ear becomes active ***(figure 6).*** For example, a clinician might see that increasing the level of the therapy sound results in a recommended maximum wearing time of 8 hours a day, as opposed to wearing it all day. This should be an indicator for the clinician to counsel the patient thoroughly on safe and appropriate use of their sound generator. The maximum wearing time is based on occupational health standards, which use sound levels in free field levels instead of sound levels at the eardrum. At 80 dB(A) SPL free field, the maximum wearing time becomes less than 24 hours/day, which is why this level is chosen as the warning level. If the clinician chooses to activate the volume control for the Tinnitus SoundSupport treatment sound, the fitting software will also caution the clinician on safe listening levels and maximum wearing time at different volume control settings. It is important that the clinician take the time to discuss wearing time with their patient to ensure safe listening levels and hearing conservation.

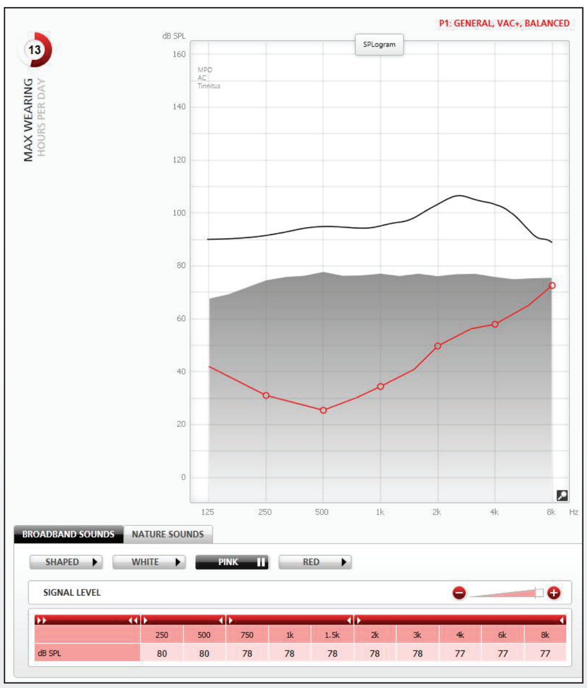

Figure 6. Maximum wearing time indicators for right and left ear in Oticon Genie fitting software.

Summary

Tinnitus treatment and management is an area in constant development. The Oticon Tinnitus SoundSupport sound generator is integrated into the Alta2 Pro Ti, Nera2 Pro Ti, and Ria2 Pro Ti hearing instruments. It is designed with flexibility in mind to support not only vast differences in patient needs in terms of sound, but also to support multiple approaches to sound therapy requiring inputs that vary in level, frequency content, and diversity. The sound generator has the flexibility of dual or single volume control adjustment and operates within safe limits of noise exposure as set by international standards. Coupled with counselling materials that support sound therapy and tinnitus management in general and the expertise of a caring hearing care professional, this package is arguably a novel and comprehensive solution for tinnitus care today.

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