

# WIDEX ZEN THERAPY (WZT): AN OVERVIEW

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# WHY TREAT TINNITUS PATIENTS?

- These patients are already in your practice
  - Approximately 15% of the world's population has tinnitus.
  - More than 70% of hearing impaired individuals have had tinnitus at some point
  - ~ 90% of tinnitus patients have some evidence of hearing loss
  - 10 - 20% of tinnitus sufferers seek medical attention
- Reaffirms your expertise
- Additional source of new patients
- It's the ethical thing to do
- It doesn't have to be complicated!
  - (though it's not for everyone)



# LEVELS OF WIDEX ZEN THERAPY

- Widex Zen Therapy is really a protocol, a series of steps to follow to address the problems faced by tinnitus patients
- 2 levels - Basic and Expert



# TINNIERE = TO RING

- Ringing
  - Clicking
  - Chirping
  - Humming
  - Pounding
  - Crickets
  - Hissing
  - Grating
- 
- And now, of course.....

**TWEETING**



# MOST COMMON DIFFICULTIES ATTRIBUTED TO TINNITUS

- Sleep
- Persistence
- Speech understanding
- Despair, frustration, depression
- Annoyance, irritation, stress
- Concentration, confusion
- Drug dependence
- Pain/headaches

*Tyler and Baker, 1983*

# POPULAR THEORIES OF TINNITUS ORIGIN

## *(APOLOGIES TO THOSE I'M OMITTING)*

- Disruption of auditory input (e.g., hearing loss) and resultant increased gain (activity) within the central auditory system (including the dorsal cochlear nucleus and auditory cortex)
- Homeostasis: Neurons that have lost sensory input become more excitable and fire spontaneously, primarily because they have “homeostatic” mechanisms to maintain their overall firing rate constant (Bao, et al 2011)
- Decrease in inhibitory (efferent) function
- Over-representation of edge-frequencies (cortical plasticity)
- Correlated activity across nerves by phase locking - ephaptic transmission; extralemniscal neurons, particularly in dorsal cochlear nucleus and All area, receiving input from somatosensory system
- Association with fear and threat (limbic system) and increased attention related to reticular activating system involvement
- Dysfunctional gating in basal ganglia; thalamic reticular nucleus



# RESEARCH SUPPORTING CENTRAL LOCATION

- Dandy, 1940
- Heller and Bergman, 1953
- Andersson, et al 1997; Baguley et al, 1992 (translabyrinthine surgery)...
- Lockwood and Salvi, 1998; Burkard, 2001 (PET)

Tinnitus is associated with abnormal EEG-patterns, showing enhanced activity in the alpha band (8-12 Hz) and reduced activity in the delta band (1.5 – 4 Hz)

(Weisz, Moratti, Meinzer, Dohrmann, & Elbert, 2005)

MEG data indicating that subjects with tinnitus < 4 years have gamma network predominantly in the temporal cortex; but subjects with tinnitus of a longer duration show a widely distributed gamma network into the frontal and parietal regions

(deRidder, 2011)

# FUNCTIONAL CONNECTIVITY

- Humans with tinnitus showed increased connectivity in the brainstem, basal ganglia, cerebellum, parahippocampal, right prefrontal, parietal, and sensorimotor areas and decreased connectivity in the right primary auditory cortex, left prefrontal, left fusiform gyrus, and bilateral occipital regions.
- The presence of tinnitus was able to modify functional connectivity in networks which encompass memory, attention, and emotion.

*Maudoux et al, 2012*

# Tinnitus Therapies

**Reduce Contrast**  
**Mask Phantom Percept**  
**Suppress Hyperactivity**

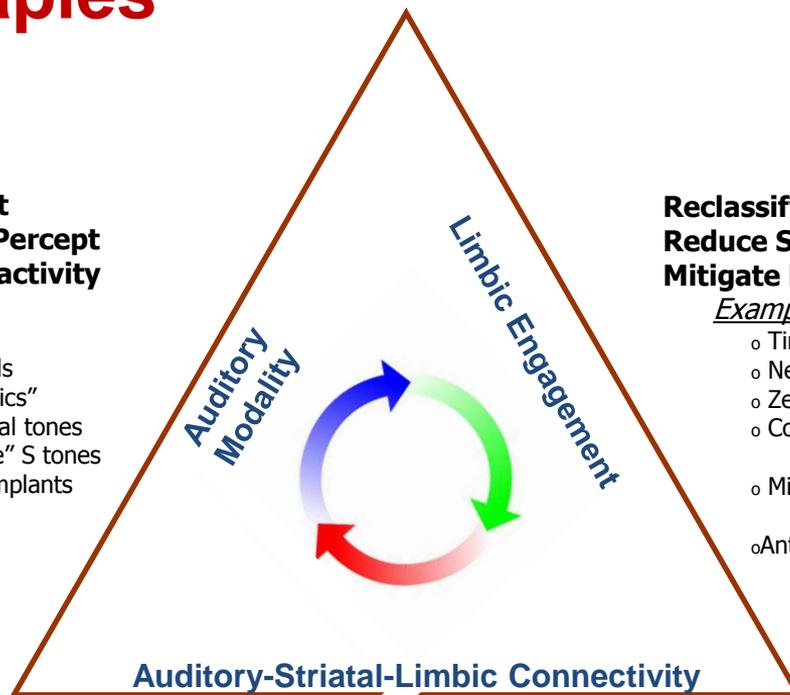
Examples

- o Maskers
- o Hearing Aids
- o "Neuromonics"
- o "Zen" Fractal tones
- o "Sound Cure" S tones
- o "Cochlear Implants"

**Reclassify Phantom Percept**  
**Reduce Saliency**  
**Mitigate Emotional Distress**

Examples

- o Tinnitus Retraining Therapy
- o Neuromonics
- o Zen Therapy
- o Cognitive-behavioral intervention
- o Mindfulness Based Stress Reduction
- o Antidepressants



**Disrupt Information Conveyance**  
**Avoid Interference with Audition**

Examples

- o Striatal Neuromodulation
- o Vagal nerve stimulation
- o Cortical Stimulation (rTMS) for long-term potentiation of cortical excitability
- o Drug therapies (i.e. DCN potassium channel alteration with retigabine)

# LIMITATIONS OF CURRENT TREATMENTS

- Sound therapy
  - Masking
  - White noise
  - Neuromonics, Sound Cure, Desynchro
- TRT
- Cognitive-Behavioral Therapy
- Neuromodulation



# WIDEX ZEN THERAPY

- Unique because it is an integrated program addressing all three major components of tinnitus distress; auditory, attention, and emotion, and the main issues facing tinnitus patients; stress, fear, sleep difficulties, and hearing loss.
- Many patients will be adequately served by counseling and sound therapy (hearing aids with the fractal tone and noise options).....
- But those patients who have increasingly significant negative reactions to their tinnitus will be best treated with a comprehensive program that integrates cognitive-behavioral concepts and relaxation exercises along with the counseling and acoustic tools.



# COMPONENTS OF WIDEX ZEN THERAPY

1. *Counseling* to educate the patient and assist the limbic system to alter its negative interpretation of the tinnitus via cognitive and behavioral intervention;
2. *Amplification* (binaurally, when appropriate) to stimulate the ears and brain in order to discourage increased in central activity (overcompensation) and maladaptive cortical reorganization;
3. *Fractal tones* binaurally delivered to the patient in a discreet, inconspicuous and convenient manner, designed to both relax and provide acoustic stimulation;
4. *Relaxation strategy program* highlighted by behavioral exercises and sleep management strategies (when indicated).



# SUBJECTIVE ASSESSMENT SCALES

- Tinnitus Severity Scale - Sweetow and Levy
- Tinnitus Handicap Inventory - Newman et al
- Tinnitus Handicap Questionnaire - Kuk, et al
- Tinnitus Effects Questionnaire - Hallam, et al
- Tinnitus Reaction Questionnaire - Wilson, et al
- Tinnitus Cognitive Questionnaire (TCQ) - Wilson and Henry
- Tinnitus Primary Function Questionnaire - Tyler
- Tinnitus Functional Index (2012) Meikle, et al

[http://www.ohsu.edu/xd/health/services/ent/services/  
tinnitus-clinic/tinnitus-functional-index.cfm](http://www.ohsu.edu/xd/health/services/ent/services/tinnitus-clinic/tinnitus-functional-index.cfm)



# INTAKE QUESTIONNAIRE AND INITIAL INTERVIEW

Once the intake has been completed, the initial interview is performed in order to:

- review the findings,
- educate the patient regarding the probable cause and course of the tinnitus,
- provide appropriate reassurance that the tinnitus does not represent a grave illness or a progressive condition (established based on the previously conducted medical examination,
- Discuss results of subjective assessment scale (TFI)

Suggestion:

whenever possible, try to involve a patient's family member. Like hearing loss, tinnitus can have a profound effect not only on the patient, but on the entire family. Bringing in a family member or friend can not only provide emotional support but can help motivate the patient to comply with your recommendations.



# COUNSELING

- Instructional
- Adjustment-based



# COUNSELING

- **Instructional** counseling helps educate the patient about aspects of the tinnitus itself. For example, it addresses.....
  - the basic anatomy and physiology of the auditory (and central nervous) system,
  - *Why* the tinnitus is present (particularly when it is a normal consequence of having a hearing loss),
  - *What* the logical course of the tinnitus might be,
  - *How* the limbic system affects the tinnitus perception and *how* the patient's reaction impacts the ability to cope with or habituate to the tinnitus.

WZT Flipchart & Worksheets



# DEFINING THE TINNITUS PROBLEM

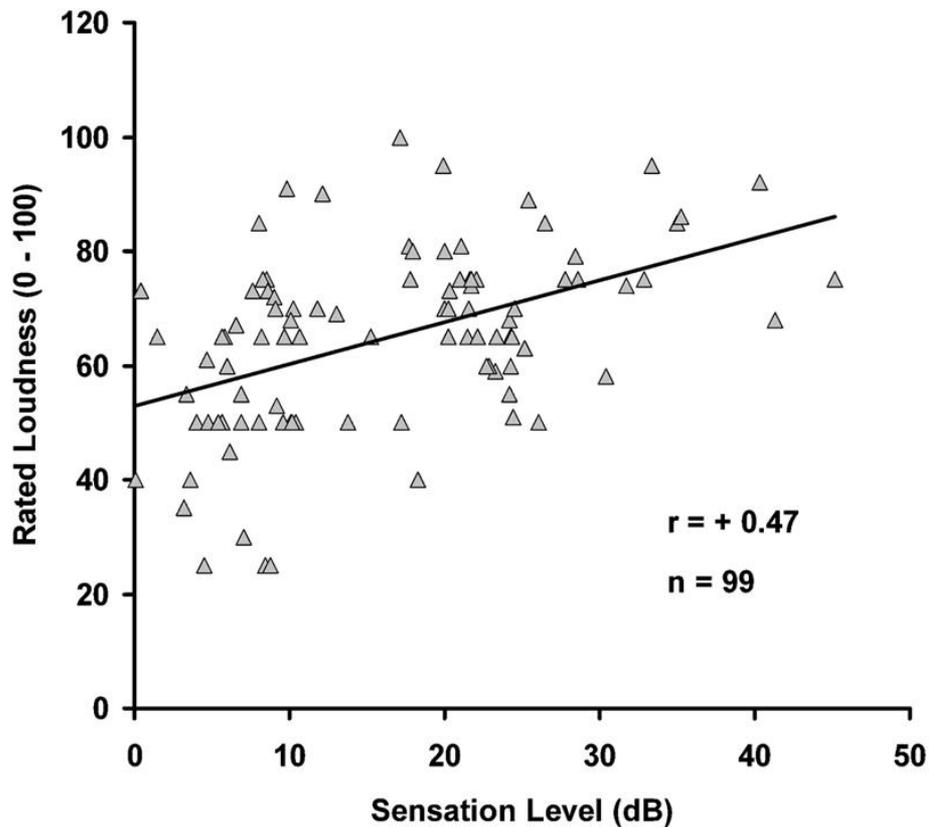
- time
- behaviors affected
- attitudes and thoughts
- what affects the tinnitus?



# TINNITUS TRIGGERS

- Physical (viral, medication, hearing loss (imbalance between excitatory and inhibitory neurons), neurotoxicity from noise, somatic influences)
- psychological
- retirement syndrome
- stress related

## CORRELATION BETWEEN TINNITUS MATCH (SL) AND SUBJECTIVE LOUDNESS



Bauer, 2009

# HABITUATION

- the process of "ignoring" (or becoming accustomed to) a stimulus without exerting any conscious effort.
- from a psychological perspective, it is defined as the adaptation, or decline of a conditioned response, to a stimulus following repeated exposure to that stimulus.



# EXAMPLES OF NORMAL HABITUATION

- Ring on your finger
- Clothing
- Refrigerator humming
- and my personal favorite.....

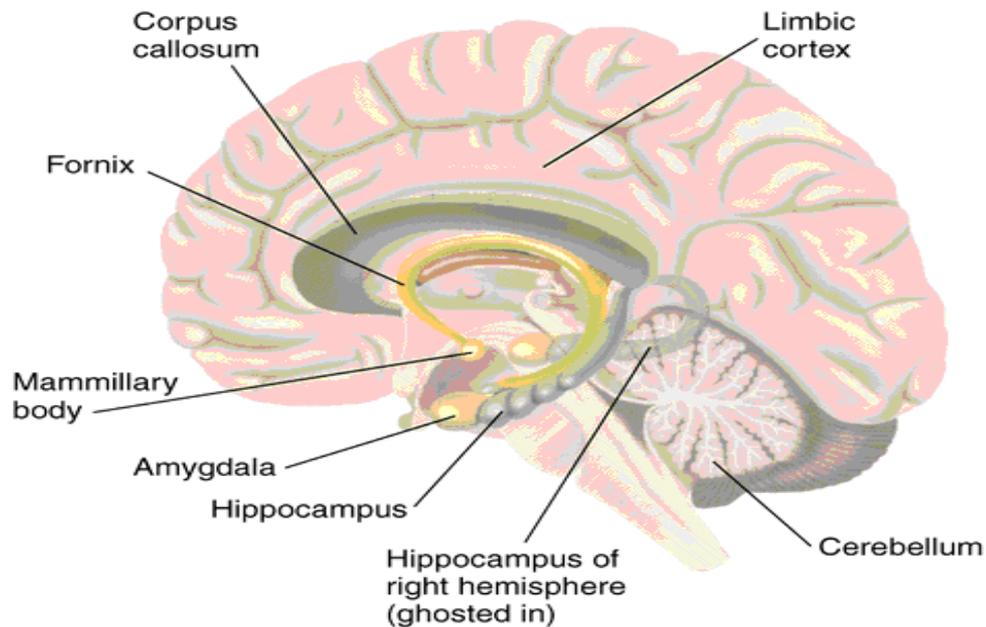


# HOW SENSORY SYSTEMS SUPPRESS STIMULI

- Somatosensory
- Auditory
- How brain (limbic system) determines importance of external stimuli
  - Thunder versus soft, unexpected sound

# THE LIMBIC SYSTEM

## ► Major Components of the Limbic System



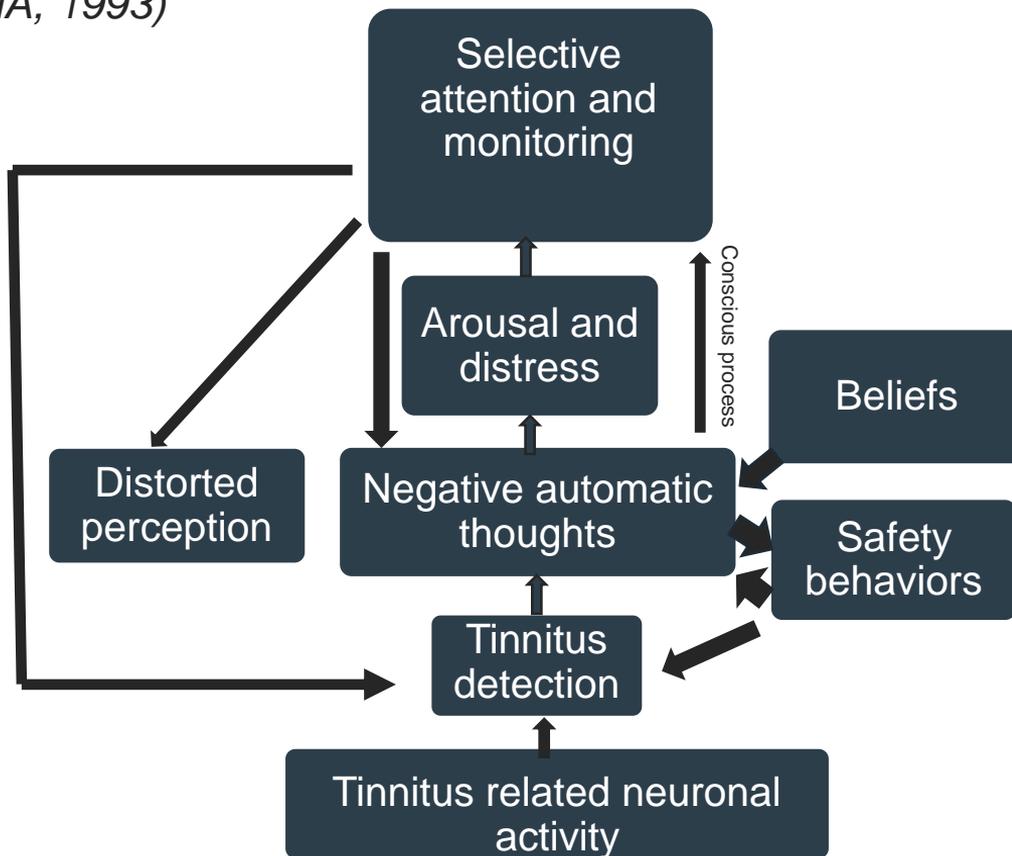
# ADJUSTMENT BASED COUNSELING...

- Helps the patient recognize aspects about how the tinnitus is affecting him or her, and the cognitive and behavioral implications.
- *Address* the emotional sequelae of tinnitus, including fear, anxiety and depression;
- *Identify* and correct maladaptive thoughts and behaviors;
- *Understand* the relationship between tinnitus, stress, fear, behaviors, thoughts, and quality of life.



# COGNITIVE-BEHAVIORAL MODEL

(AFTER MCKENNA, 1993)



# COGNITIVE-BEHAVIOR THERAPY

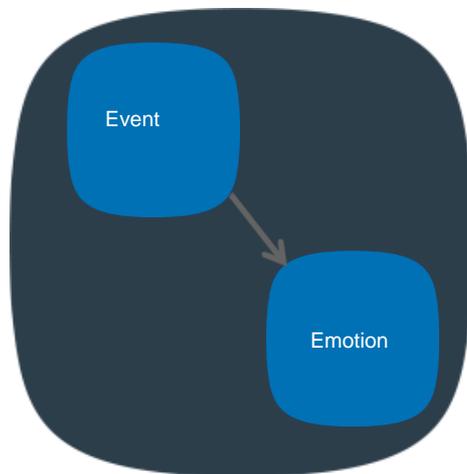
(A. BECK; D. MEICHENBAUM)

- The therapeutic effort to modify maladaptive thoughts and behaviors by applying systematic, measurable implementation of strategies designed to alter unproductive actions
- CBT gives patients hypotheses that can be self-tested
- focuses on using a wide range of strategies to help clients overcome maladaptive thoughts and behaviors
  - cognitive restructuring, dissociation of negative emotional association, attention control, modification of avoidance behavior, journaling, role-playing, thought stopping, relaxation techniques, and mental distractions, coping strategies



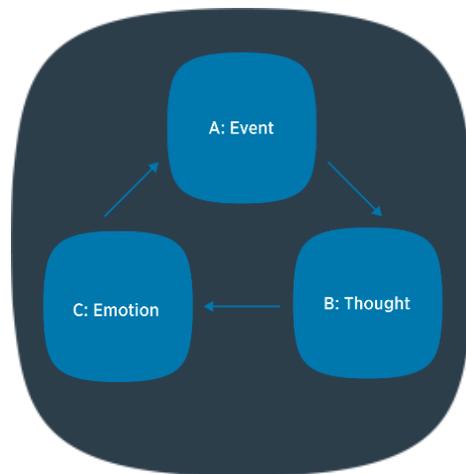
# COGNITIVE THEORY *(ALBERT ELLIS)*

Common Misunderstanding



**Common misunderstanding:**  
An event causes an emotion

Cognitive Theory



**The CBI model:**  
Event-Thought-Emotion

# AUDIOLOGISTS ARE NOT TRAINED TO DO CBT

- But can we use portions of it?????

Henry and Wilson, 2001; page 249) encourage audiologists to adopt CBT by “*applying the approach in some circumstances or to consider referring patients who seem to be suitable for this approach*” and have written a book for audiologists promoting this effort

*Henry J. and Wilson P. (2001) The Psychological Management of Chronic Tinnitus: A Cognitive-Behavioral Approach. Boston: Allyn and Bacon*

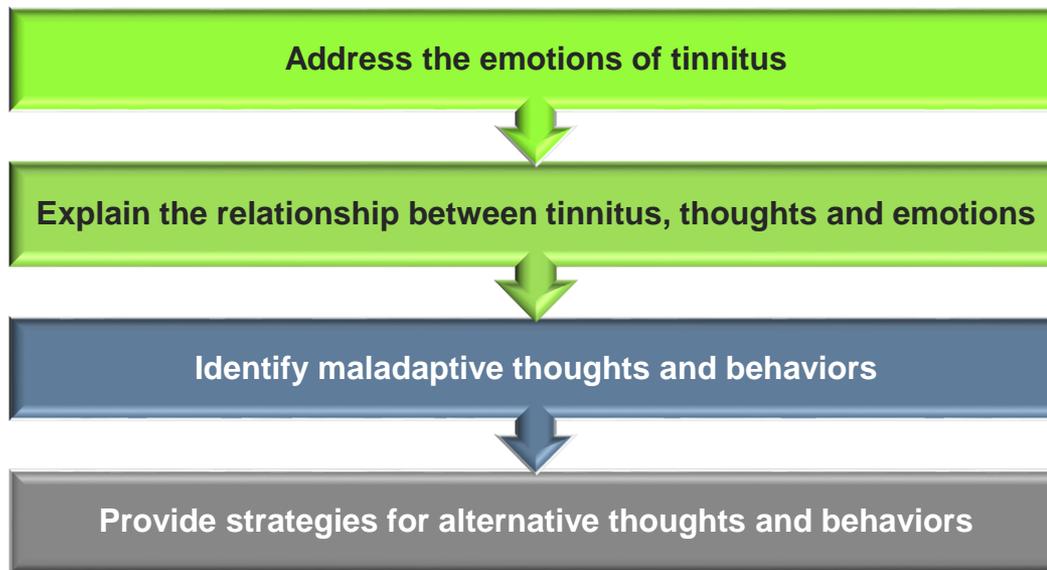


## COGNITIVE BEHAVIORAL INTERVENTION....

- is designed to identify the unwanted thoughts and behaviors hindering natural habituation, challenge their validity, and replace them with alternative and logical thoughts and behaviors.
- the objective is to remove inappropriate beliefs, anxieties and fears and to help the patient recognize that it is not the tinnitus itself that is producing these beliefs, it is the patient's reaction (and all reactions are subject to modification).



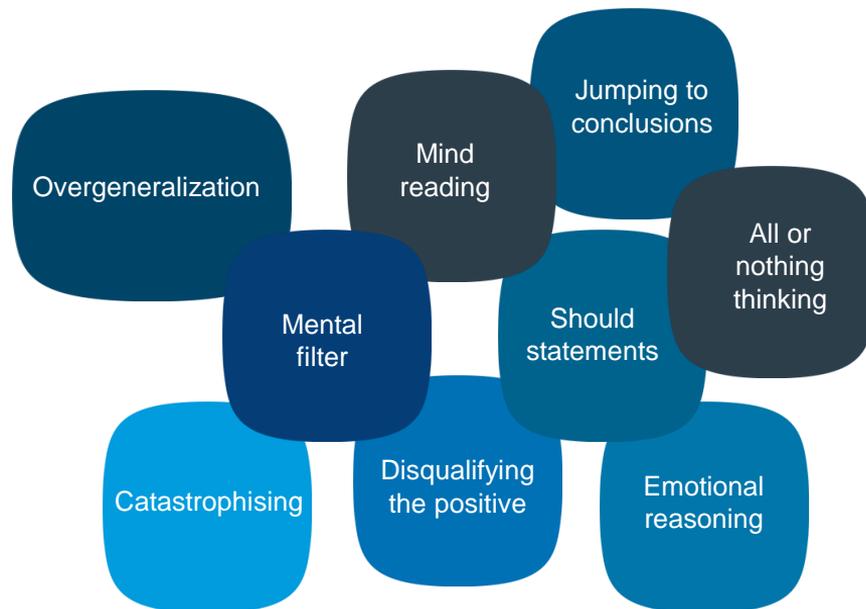
# THE BASIC PROCESS OF CBI



**Disclaimer:** The suggested CBI activities are not intended to replace the services of a mental health professional.

Flipchart & CBI Worksheets

# EXAMPLES OF THOUGHT ERRORS (COGNITIVE DISTORTION)



## ALL OR NOTHING THINKING

- If a situation falls short of perfection, it is seen as a total failure.
- You eat one spoon of ice cream, and believe, “I have just completely blown my diet”.
- Pattern of seeing only one “truth” as valid; no room for two sides of the story; no moderation or grey area; context is made irrelevant.
- “I don’t think about my tinnitus as much anymore, but I can still hear it, so this therapy obviously isn’t working.”

# OVERGENERALIZATION

- Drawing broad and general conclusions from a limited amount of information.
- You see a simple negative event as a never ending pattern of defeat by using words such as “always” or “never” when you think about it.
- “Because of my tinnitus I am awake all night. Every night is the same.”



# DISCOUNTING THE POSITIVE

- You reject positive experiences by insisting they don't count.
- If you do a good job, you may tell yourself it wasn't good enough or "anyone could do it".
- "I was having a good time at the party, but my tinnitus ruined everything for everybody".



# MIND READING AND LABELING

- Mind Reading: assuming other's thoughts without evidence
- Labeling: attaching a global label to oneself rather than to specific events or actions
- “If I wear a hearing aid, my boss will think I'm stupid”



# JUMPING TO CONCLUSIONS

- A pattern of making premature conclusions based on incomplete or ambiguous information; assuming negative expectations about future events are established facts
- “I will have a lousy day when my tinnitus is the first thing I hear in the morning”
- “My tinnitus is louder, I must be going deaf”



# CHALLENGING ONE'S THOUGHTS

- What is the evidence that this is true?
- Are there any facts that I am forgetting?
- Has this ever happened before and what was the outcome?
- Are there any alternative ways of thinking about this?
- What is the worst that can happen? How likely is this? What is most likely to happen?
  
- The “Columbo” technique

# STEP BY STEP

1. Listen
2. Assess
3. Convince patient (referral source) of your competence
4. Teach
5. Tie each component to science of tinnitus
6. Carefully delineate what you know as a fact vs. what is speculation.
7. Challenge
8. Remind reluctant patient that status quo is not an option
9. Remind patient to not get too high or too low.



## WHAT TO SAY DURING SILENCE.....

- I can only imagine that must be very difficult.
- What do you think about at those times?
- Has ANYTHING ever helped you, even for a short time?
- Why do (or what makes) you think that?



## COUNSEL ABOUT THE FOLLOWING:

- Tinnitus is not unique to that one patient.
- Tinnitus is not a sign of insanity or grave illness.
- Tinnitus may be a “normal” consequence of hearing loss
- Tinnitus probably is not a sign of impending deafness.
- There is no evidence to suggest the tinnitus will get worse.
- Tinnitus does not have to result in a lack of control.
- Patients who can sleep can best manage their tinnitus.



# RECOGNIZING CLINICAL BOUNDARIES

## Within boundaries

- Rehabilitative counseling
- Dealing with feelings and attitudes related to communication
- Mutual respect
- Active patient participation and empowerment

## Outside of boundaries

- Psychotherapy
- Changing basic ways of relating
- Overly dependent patient
- Unstable patient
- Emotional personal relationship

*(Stone and Olswang, 1989)*

## AFRAID OF PERFORMING CBI?

- Don't do it if you have no confidence in your communication skills
- Remember, nearly all successful audiologists are good counselors
- Try it, you will see how natural it is
- Your advantage is, you know counseling AND tinnitus
- Basically, you are just telling the truth!
- AAO-HNS 2015 guidelines call for this approach



## WHY HEARING AIDS MAY HELP TINNITUS PATIENTS

- Greater neural activity allows brain to correct for abnormal reduced inhibition
- Enriched sound environment may prevent maladaptive cortical reorganization
- Alter production peripherally and/or centrally
- Reduce contrast to quiet
- Partially mask tinnitus
- Fatigue and stress is reduced allowing more resources to be allocated to tinnitus fight
- All of the above may facilitate habituation
- The majority of tinnitus sufferers have at least some degree of hearing loss

# AMPLIFICATION

- While most well fitted, high quality hearing aids can help tinnitus patients with hearing loss, hearing aids containing low compression thresholds, broad bandwidth, precision in fitting procedure (Sensogram), and in situ verification (Sound Tracker) are particularly effective.



# INFLUENCE OF NOISE AND STRESS ON PROBABILITY OF HAVING TINNITUS

- N = 12, 166 ; N with tinnitus) = 2,024 (16%)
- Each year of age increased the odds ratio of tinnitus by about 3%.
- Men generally showed a higher risk for tinnitus compared with women.
- Exposure to noise and stress were important for the probability and level of discomfort from tinnitus. However, **for the transition from mild to severe tinnitus, stress turned out to be more important.**
- Reduction of likelihood of tinnitus if noise is removed = 27%, if stress is removed =19%), if both removed = 42%.
- Conclusions: Stress management strategies should be included in hearing conservation programs, especially for individuals with mild tinnitus who report a high stress load.

*Baigi A, Oden A, Almlid-Larsen V, Barrenas ML, Holgers KM. Tinnitus in the General Population With a Focus on Noise and Stress - A Public Health Study. Ear & Hearing 2011: 32(6):787-789.*



## WHY MUSIC?

- Music has been shown to activate the limbic system and other brain structures (including the frontal lobe and cerebellum) and has been shown to produce physiologic changes associated with relaxation and stress relief.



# HOW IS MUSIC USED?

- Home
- Work
- Celebrations
- Advertising
- Romance
- Movies
- Athletic locker rooms
- Shopping malls
- Hospitals
- Therapies
- Relaxation



# MUSIC SUGGESTIONS

- evokes positive feelings
- without vocals
- no pronounced bass beat
- pleasant, but not too interesting or compelling (though for short term relief attention capturing music can be beneficial)
- induces relaxation while reducing tinnitus audibility (best for long term relief)
- Play at low levels where music blends with tinnitus

*Hann D, Searchfield G, Sanders M, Wise K (2008) Strategies for the selection of music in the short-term management of mild tinnitus.*

# FRACTAL TONES

- dynamically varying signals with semi-random temporal modulations
- fractal tones create a melodic chain of tones that repeat enough to sound familiar and follow appropriate rules, but vary enough to not be predictable.
- fractal technology ensures that no sudden changes appear in tonality or tempo



# ZEN

- An optional listening program in most Widex hearing aids that plays adjustable, continuous, chime-like tone complexes using fractal algorithms.
- The chimes are generated based on an understanding of the properties of music that would be most relaxing (Robb et al., 1995):
  - Ability to self select music.
  - Tempo near or below resting heart rate (60-72 bpm).
  - Fluid melodic movement.
  - Variety of pitches
  - No rapid amplitude changes
  - Element of uncertainty (Beauvoux 2007)
  - Passive listening

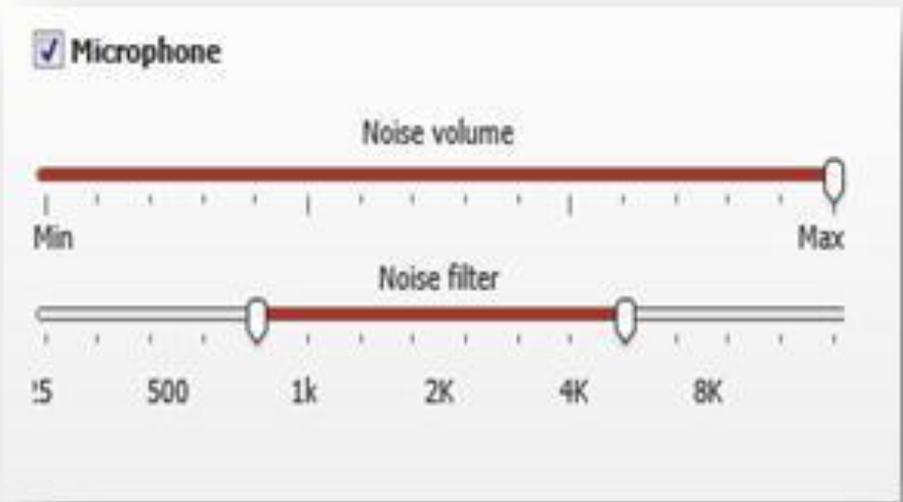


Fractal styles	Default pitch				Tonality		Dynamic Range		Default tempo		
	Low	Medium low	Medium high	High & reverberant	Major	Minor	Restricted	Broad	Slow	Medium	Fast
Aqua	■				■		■		■		
Coral			■			■		■	■		
Lavender			■		■			■			■
Green				■	■		■			■	
Sand			■		■			■			■

Frequency response and amplitude settings are based on in-situ audiogram.

A filtered broad band noise can be used as a separate program or in combination with the fractal tones.

Signals are dichotic.

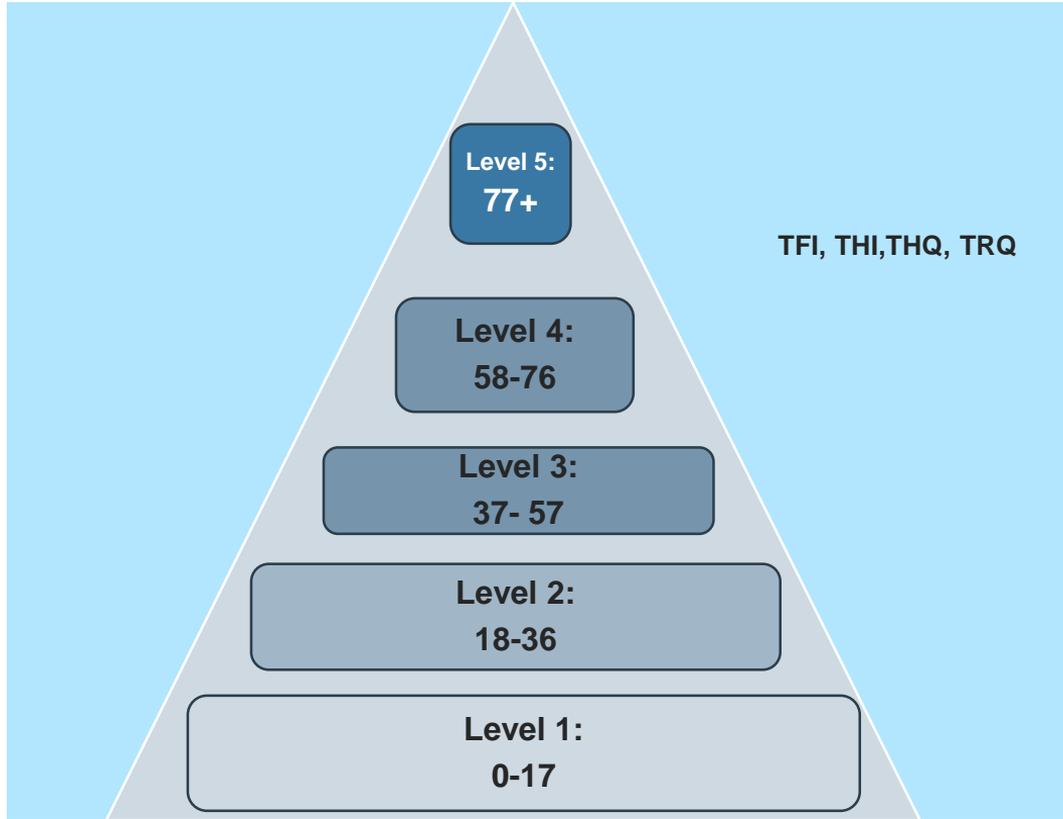


# RELAXATION EXERCISES

- Progressive Muscle Relaxation
- Deep breathing
- Guided imagery

# PERSONALIZING WZT





**Level I: Minimal or no negative tinnitus reaction.**

- Instructional Counseling
- Amplification (when hearing loss exists)
- (Zen might be useful for quiet environments)

**Level II: mild negative tinnitus reaction**

- Level I components PLUS.....
- Zen for quiet environments

**Level III: Moderate negative tinnitus reaction**

- Level I and II components PLUS.....
- Cognitive behavioral Intervention
- Amplification/avoidance of silence
- Zen all day
- (Relaxation exercises might be useful)

**Level IV: Severe negative tinnitus reaction**

- Level I, II, and III components PLUS,,,,,
- Cognitive behavioral intervention
- Relaxation exercises

**Level V: Catastrophic tinnitus reaction with or without hearing loss**

- Level I, II, III, and IV components PLUS.....
- Relaxation exercises 2-3 times a day

# WIDEX ZEN THERAPY EVALUATION AND TREATMENT PLAN CHECKLIST

Patient Name: \_\_\_\_\_ Date: \_\_\_/\_\_\_/\_\_\_

## ASSESSMENT

- |  |                   |
|--|-------------------|
| <input type="checkbox"/> Audiological Evaluation                               | Date: ___/___/___ |
| <input type="checkbox"/> Questionnaire/Intake Forms                            | Date: ___/___/___ |
| <input type="checkbox"/> Subjective scale scores TFI _____ TRQ _____ THI _____ | Date: ___/___/___ |
| <input type="checkbox"/> Medical Clearance                                     | Date: ___/___/___ |
| <input type="checkbox"/> Tinnitus Disturbance Level (select) ① ② ③ ④ ⑤         | Date: ___/___/___ |

## TREATMENT PLAN

- |   |                   |
|---|-------------------|
| <input type="checkbox"/> Reassurance and Basic Counseling (Flipchart, DVD 20)                     | Date: ___/___/___ |
| <input type="checkbox"/> Instructional Counseling (Flipchart)                                     | Date: ___/___/___ |
| <input type="checkbox"/> Adjustment Based Counseling (WZT Overview)                               | Date: ___/___/___ |
| <input type="checkbox"/> Lifestyle Modifications (Flipchart)                                      | Date: ___/___/___ |
| <input type="checkbox"/> Amplification ( <a href="http://www.widexpro.com">www.widexpro.com</a> ) | Date: ___/___/___ |
| <input type="checkbox"/> ZEN Tones and/or ZEN Noise (Programming Guide)                           | Date: ___/___/___ |
| <input type="checkbox"/> Relaxation Exercises (Patient Brochure - Tinnitus Relief CBRI55)         | Date: ___/___/___ |
| <input type="checkbox"/> CBI (CBI Worksheets)   | Date: ___/___/___ |

## FOLLOW UP VISITS



# IMPROVEMENT

- Reduction in the number of episodes of awareness
- Increase in the intervals between episodes of awareness
- Increase in quality of life
- Not necessarily a reduction in perceived loudness
- Effect may NOT be immediate
- Establish realistic, time-based expectations



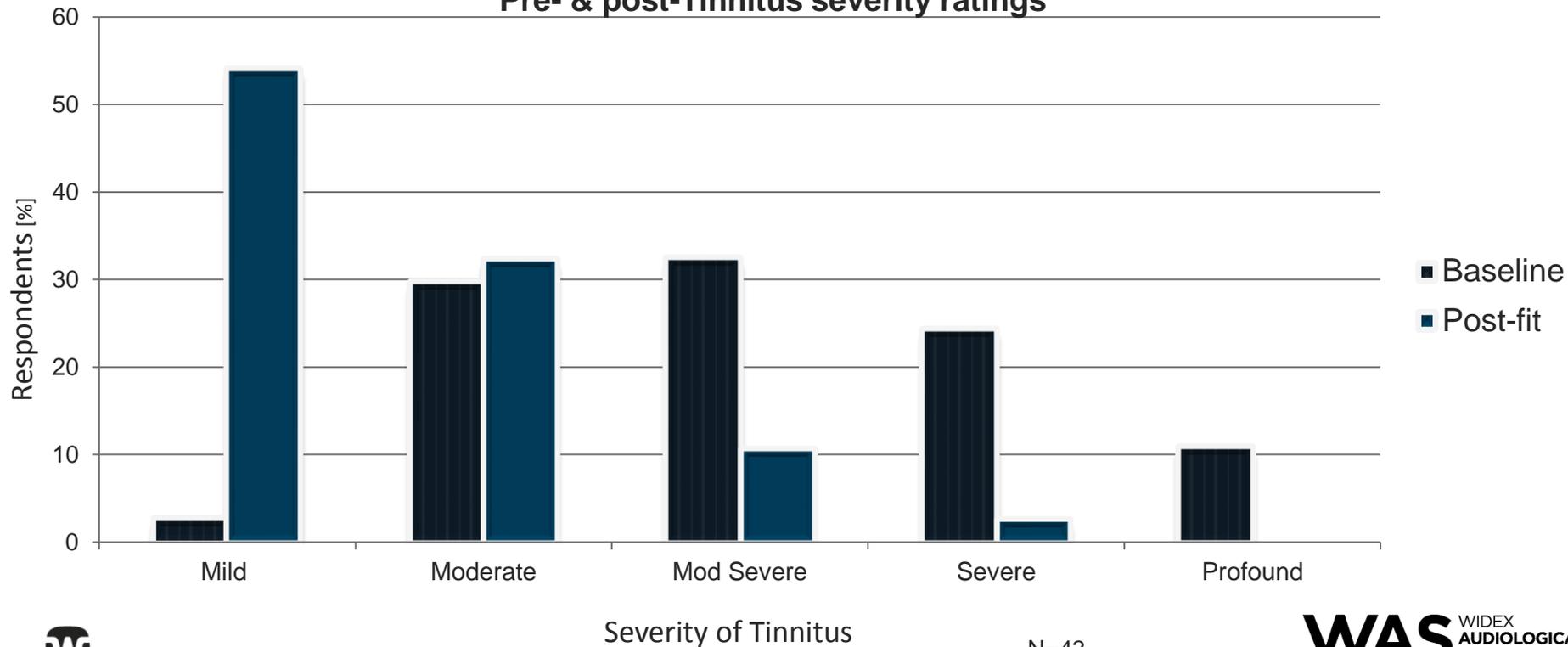
# EVIDENCE BASED RESEARCH ON WZT

- Kuk, F., Peeters, H. & Lau, C. (2010): The efficacy of fractal music employed in hearing aids for tinnitus management. *Hearing review*, 17(10).
- Sweetow, R.W., Henderson, S.J. (2010). Effects of acoustical stimuli delivered through hearing aids on tinnitus. *Journal of the American Academy of Audiology*, 21(7), 461-473.
- Herzfeld, M., Kuk, F. (2011): A Clinician's Experience with Using Fractal Music for Tinnitus Management. *Hearing review*, 18(11).
- Sekiya et al.: Using fractal music as sound therapy in TRT treatment. *Audiology Online*, 2013.
- Herzfeld M, Enza C, Sweetow R. Clinical Trial on the Effectiveness of Widex Zen Therapy for Tinnitus. *Hear Rev.* 21(11); 24-29; 2014.
- Sweetow R., Fehl M., Ramos, P. Do Tinnitus Patients Continue to Use Amplification and Sound Therapy Post Habituation? *Hear Rev.* 21(11); 24-29; 2014 22(3); 34-39; 2015.
- Sweetow R, Kuk F, Caporali S. A controlled study on the effectiveness of fractal tones on subjects with minimal need for amplification (2015). *Hearing Review*, 22(9), pp. 30.



**KUK, F., PEETERS, H. & LAU, C. (2010): THE EFFICACY OF FRACTAL MUSIC EMPLOYED IN HEARING AIDS FOR TINNITUS MANAGEMENT. HEARING REVIEW, 17(10).**

**Pre- & post-Tinnitus severity ratings**



## **KUK ET AL CONCLUSIONS**

**Two-thirds ( $\frac{2}{3}$ ) of patients used more than 1 Zen style.**

**Zen Aqua is typically used; others with equal preference.**

**Majority used HA + Zen and/or HA + Zen + Noise.**

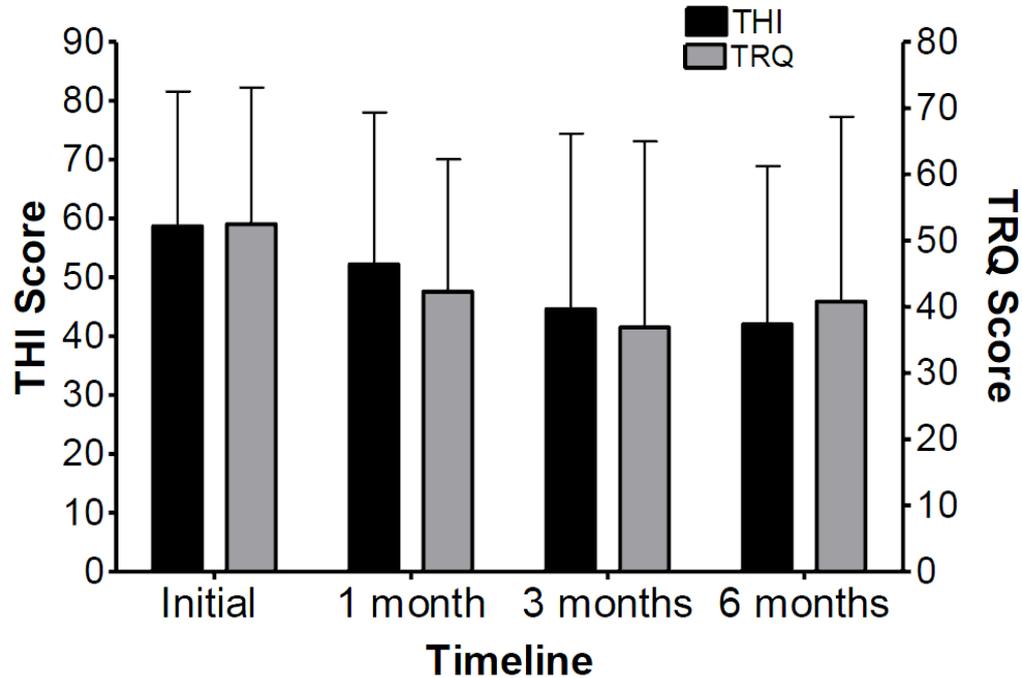
**Default settings work; however, majority of fittings used individual adjustments**

**More severe the tinnitus = the greater the benefit.**

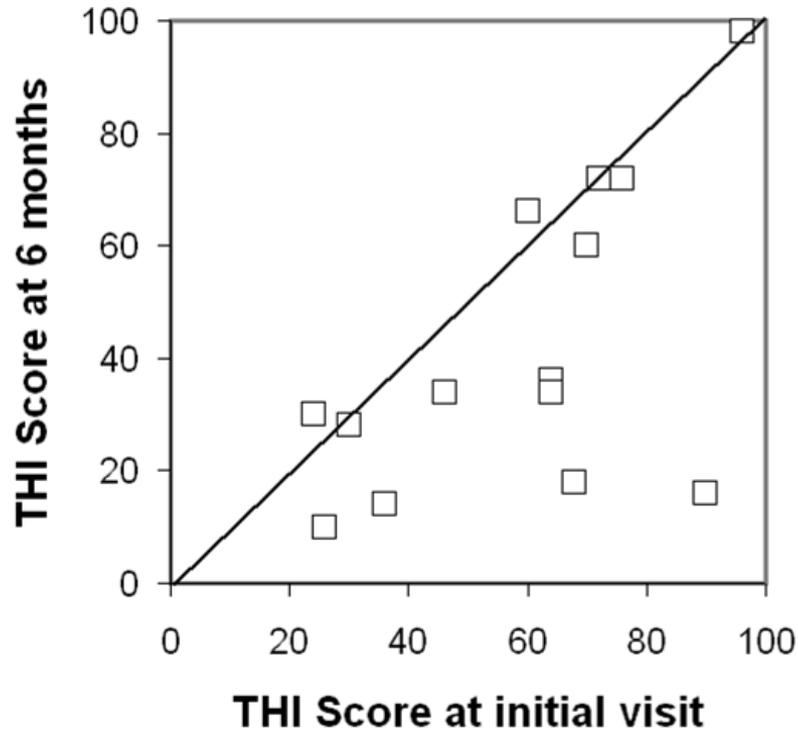
**SWEETOW, R.W., HENDERSON, S.J. (2010). EFFECTS OF ACOUSTICAL STIMULI DELIVERED THROUGH HEARING AIDS ON TINNITUS. JOURNAL OF THE AMERICAN ACADEMY OF AUDIOLOGY, 21(7), 461-473.**

- 14 subjects with “severe” tinnitus
- All tinnitus subjects had been seen at UCSF for tinnitus treatment at least 3 months prior to the study – completed tinnitus counseling but were still significantly bothered.
  - All subjects had tinnitus for at least one year and had received no active treatments for at least three months prior to the start of the experiment.
  - Battery of questionnaires = THI, TRQ, Stress, Annoyance, Relaxation.

# ZEN (FRACTAL TONE) EFFECTIVENESS



# ZEN (FRACTAL TONE) EFFECTIVENESS



## SWEETOW AND HENDERSON-SABES CONCLUSIONS

Zen was effective as a tool for promoting relaxation.

86% of the participants indicated it was easier to relax while listening to the fractal signals

Zen was an effective tool for promoting tinnitus reduction in patients with long-standing tinnitus

Both Zen tones and noise were effective for tinnitus reduction –but patients preferred Zen tones for daily use.

## SEKIYA ET AL.: USING FRACTAL MUSIC AS SOUND THERAPY IN TRT TREATMENT. AUDIOLOGY ONLINE, 2013.

- Kasugai City Hospital and Sekiya ENT clinic., Nagoya City, Japan
- Used TRT with hearing aids and/or broadband noise as sound stimulation
  - Subjects were clinical cases who previously hadn't received desired effect
- Trial with 91 tinnitus patients
  - Standard TRT counseling
  - Patients tried a sound therapy combination device for 1-3 months (24 with Zen)
  - 33 purchased the combination device as part of their TRT therapy

## SEKIYA, ET AL CONCLUSIONS

Good effect was obtained when using fractal music within a TRT treatment

Improvements in THI scores were observed after 6 months in 92% of patients who used fractal music as sound therapy

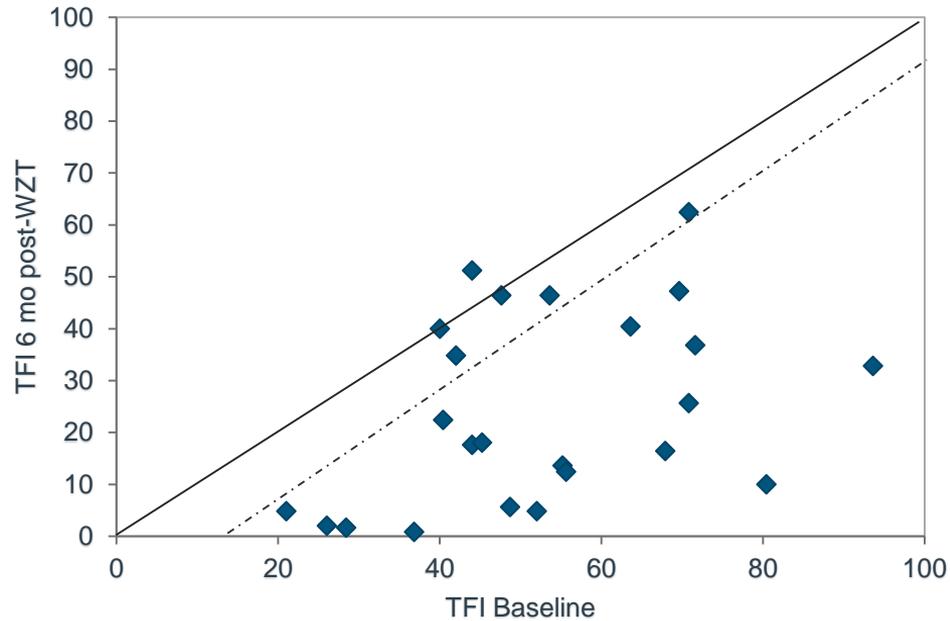
A flexible combination of sound stimuli is particularly useful in difficult cases where TRT with conventional sound therapy does not produce the desired effect

Combination devices are sometimes an effective way of introducing amplification to reluctant hearing aid candidates.



**“CLINICAL TRIAL ON THE EFFECTIVENESS OF WIDEX ZEN THERAPY FOR TINNITUS”. HERZFELD M, ENZA C, SWEETOW R. HEAR REV. 21(11); 24-29; 2014.**

<u>WZT elements:</u>	<u>Yes (N)</u>	<u>No (N)</u>
Instructional counseling	24	0
Amplification	20	0
Zen programs	24	0
Cognitive behavioral intervention	15	9
Relaxation exercises	15	9



Individual subject Tinnitus Functional Index (TFI) baseline and 6 months post Widex Zen Therapy scores for the 24 subjects. The solid line represents equivalent baseline vs. final (post treatment) scores while the dashed line represents the 13 point benefit score required for clinical efforts to be considered clinically significant.

## HERZFELD, ET AL 2014 WZT CONCLUSIONS

The data revealed significant, positive adjustment to tinnitus within the first two months of treatment, with further (albeit not statistically significant) changes occurring through 6 months.

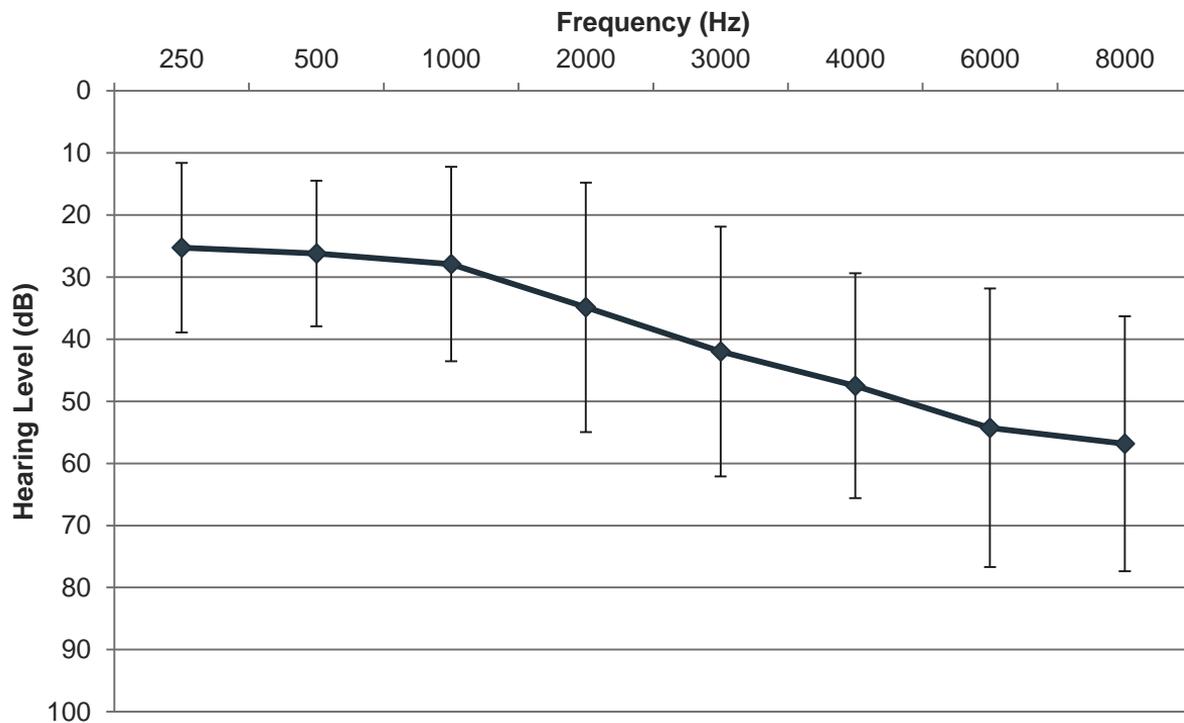
The average (mean) reduction in THI scores was 30 points (23 points after two months) and was 28 points in TFI scores (25.5 points after two months). All of these differences are both statistically and clinically significant.

74% and 75% of subjects achieved clinically significant changes in their THI and TFI scores, respectively.

While other tinnitus treatments have reported similar success, the speed in which the WZT treatment achieved these changes is particularly impressive and vital, considering the importance of early success in maintaining motivation for tinnitus patients.

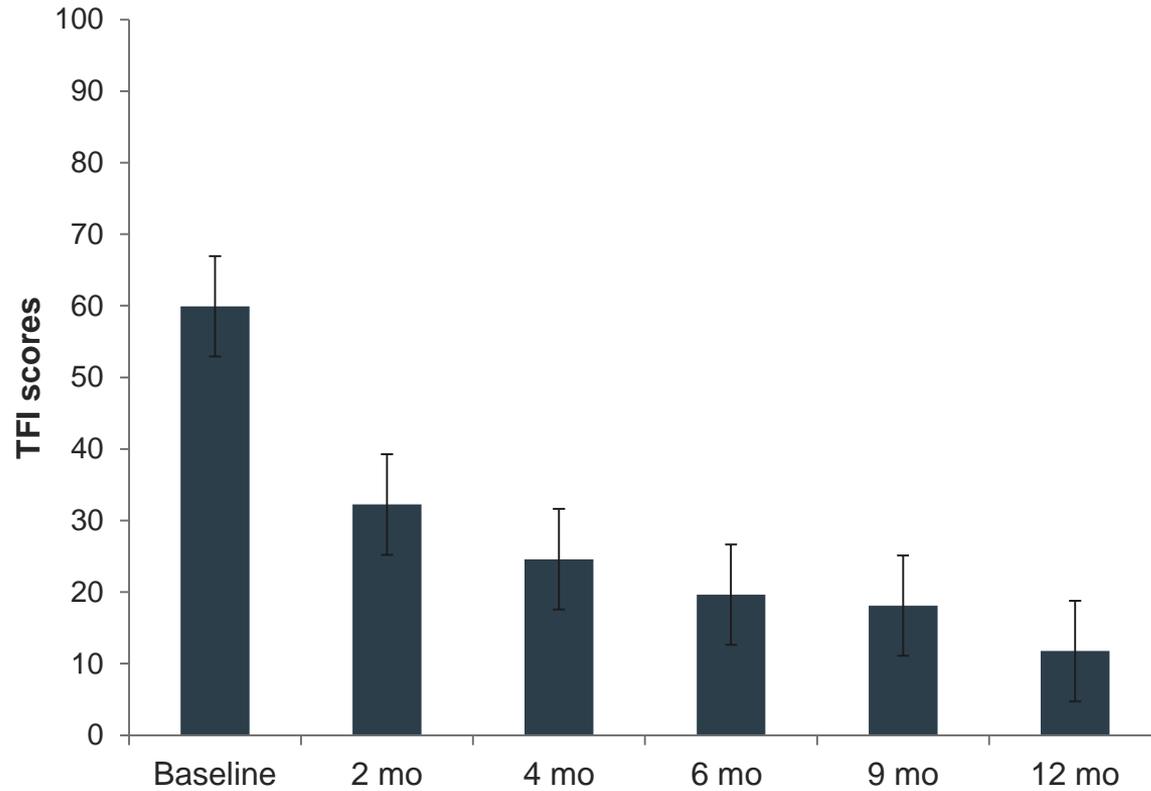


# “DO TINNITUS PATIENTS CONTINUE TO USE AMPLIFICATION AND SOUND THERAPY POST HABITUATION?” SWEETOW R., FEHL M., RAMOS, P. HEAR REV. 21(11); 24-29; 201422(3); 34-39; 2015.



N = 19; All indicated tinnitus as primary complaint





Mean Tinnitus Functional Index scores at baseline, 2, 4, 6, 9 and 12 months. Bars represent standard error.

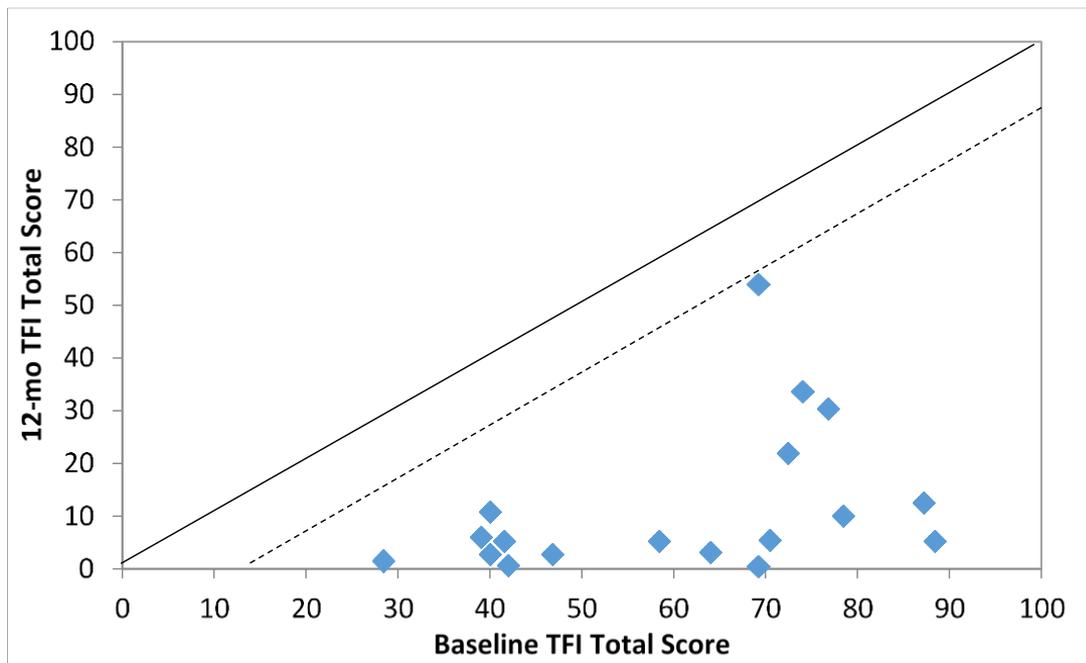
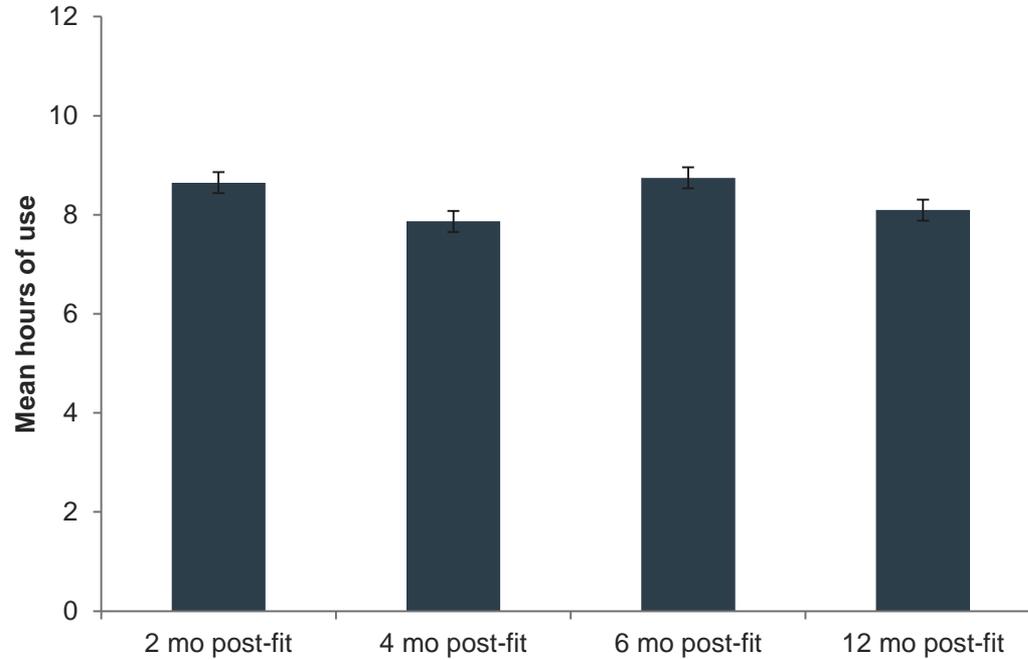
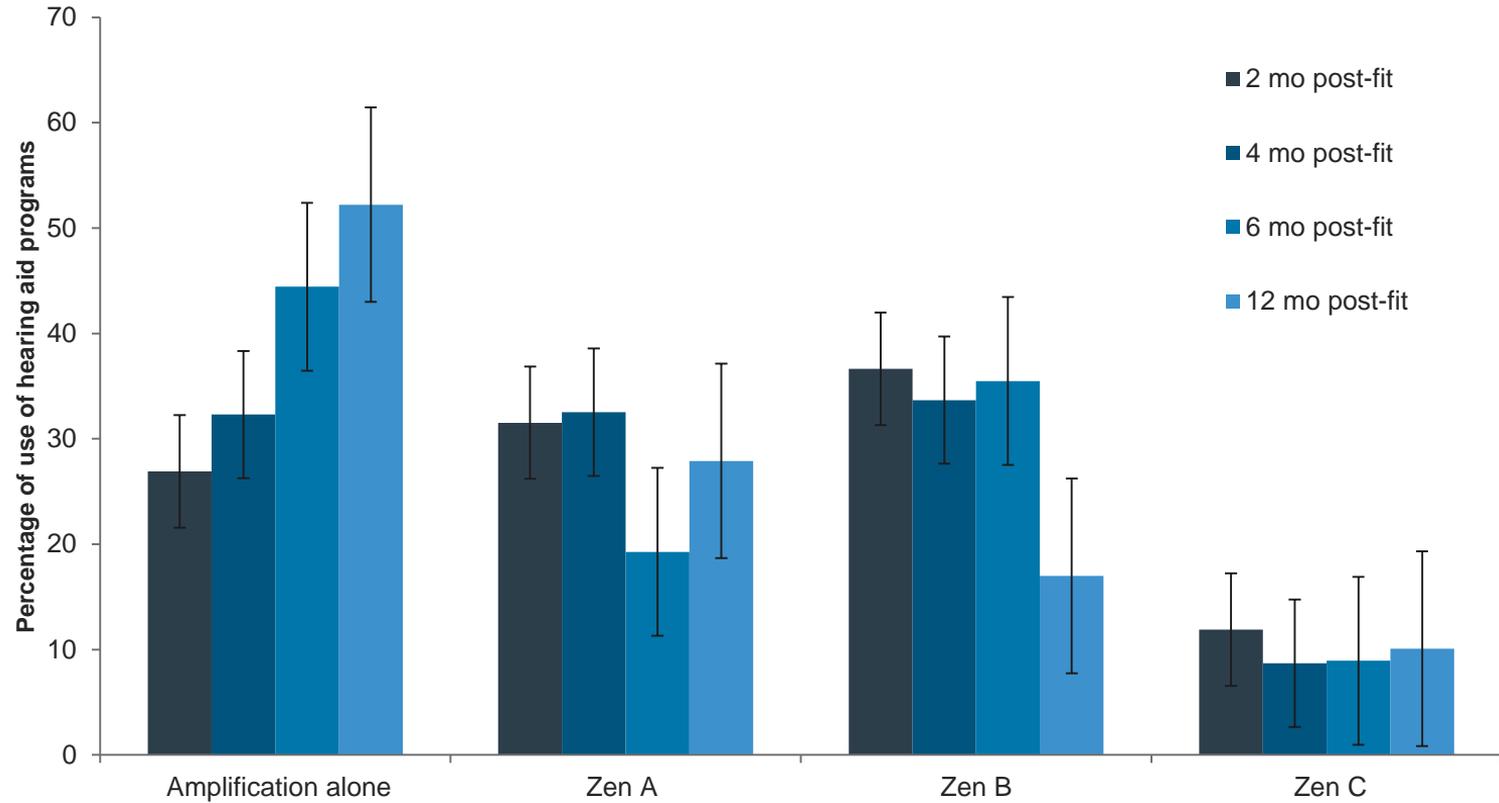


Figure 3: Individual subject Tinnitus Functional Index (TFI) baseline and 12 month post Widex Zen Therapy scores for the 19 subjects. The solid line represents equivalent scores. The dashed line represents the 13-point benefit score considered clinically significant.

## Average use of Hearing Aids



Mean hours of hearing aid use at 2, 4, 6 and 12 months. Bars represent standard error.



Percentage of use of amplification (Master), Zen A (fractals only), B (Zen + noise) and C (noise only) at 2, 4, 6 and 12 months.

## SWEETOW, ET AL, 2015 CONCLUSIONS

WZT produces a significant decrease in tinnitus distress;

The duration of this decrease persists at least out through 12 months;

The majority of the reduction occurs within the first two months of the treatment;

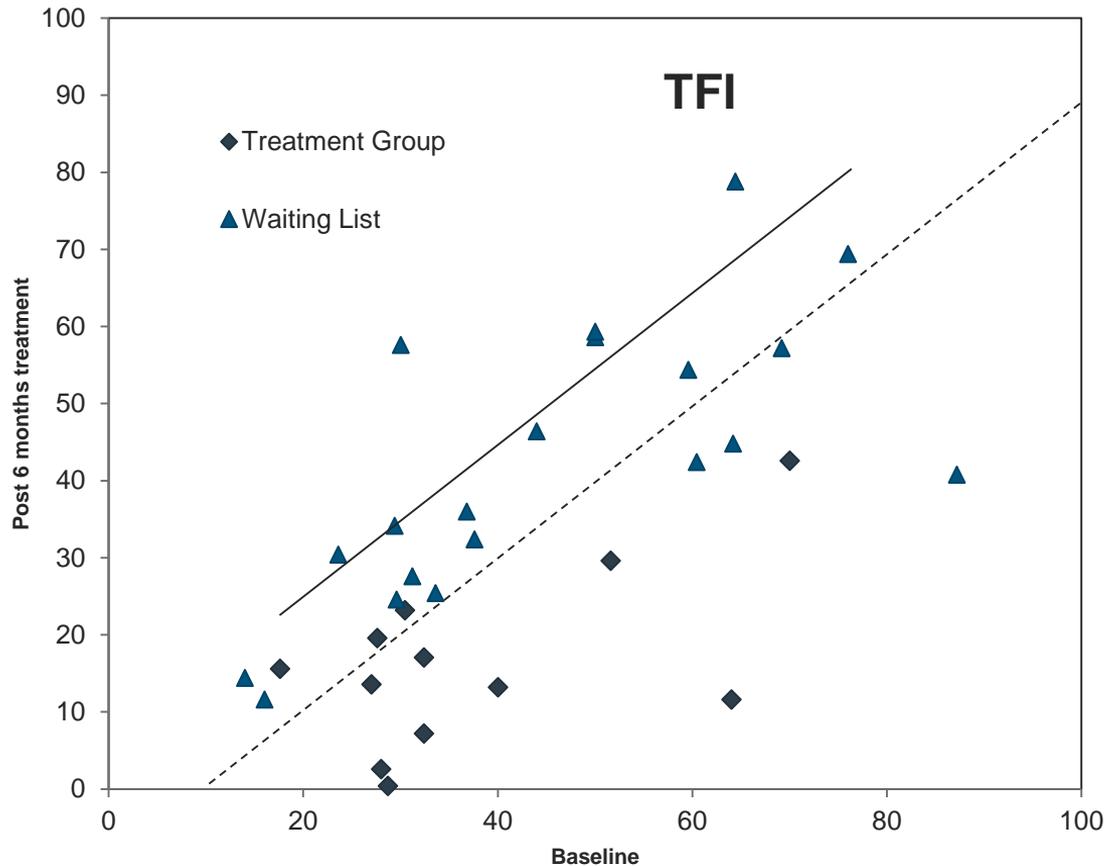
The relative use of the Zen programs containing noise decreases over time while the use of amplification alone and/or amplification plus fractal tones increases even after a successful resolution of the tinnitus distress has been achieved.

The inverse relationship between the use of Zen programs versus amplification alone over time suggests that patients perceive a continued benefit for using amplification for improving their hearing, and possibly for tinnitus relief, even post habituation or successful resolution. This, despite the fact that all subjects reported tinnitus, rather than hearing loss, as their primary complaint.



## A RANDOMIZED CONTROLLED STUDY ON THE EFFECTS OF INTEGRATED TINNITUS THERAPY WITH FRACTAL TONES ON SUBJECTS WITH NORMAL HEARING OR MINIMAL LOSS

- Sweetow R, Kuk F, Caporali S. A controlled study on the effectiveness of fractal tones on subjects with minimal need for amplification (2015). Hearing Review, 22(9), pp. 30.
- Zen2Go
- Matched Treatment and Waiting groups
- N = 40



Individual subject Tinnitus Handicap Inventory (TFI) baseline and 6 mo post-fitting scores. The solid line represents identical scores while the dashed line represents the 13-point benefit score required for clinical and statistical significance (Meikle et al., 2011).

# CONCLUSIONS OF SWEETOW, KUK, AND CAPAROLI, 2015 STUDY

Analysis of the data shows a significant difference between the treatment and waiting groups ( $p < 0.001$ ).

The waiting list group obtains a slight reduction in THI at 2 months compared to baseline, but no significant difference ( $p > 0.5$ ) is seen.

Mean THI scores from the treatment group indicates a significant improvement in tinnitus reduction after two months ( $p < 0.001$ ) and scores continue to decrease over the 6 months.

The duration of this decrease persists at least out through 12 months;



# OVERALL CONCLUSIONS

- Tinnitus patients with hearing loss may best be served by amplification that incorporates low compression thresholds, a broad frequency response, and flexible options for acoustic stimuli
- Tailor the therapy to the patient's functional and financial needs
- Sound therapy without counseling is not likely to work



# ATTITUDE OF THE PROFESSIONAL

- Patients will not regard therapeutic programs to be viable unless the clinician appears to believe it is
  
- “Passion” is the key
- Use your “Mind”
- “Clear” your previous beliefs
- Dare to “Dream”
- Our solution is “Unique”
- Go “Beyond” your competition



# USING COMPASS FOR TINNITUS PATIENTS

- Andrée Boissonneault



# PANEL DISCUSSION

(SUELI CAPAROLI, JAKOB NIELSEN AND ANDRÉE BOISONNEAULT)

- Technical issues and future designs
- Why fractal tones?
- What if someone doesn't like fractal tones?
- Are fractal tones easier to produce than white noise?
- How did you decide the proper parameters?
- Which is better, correlated or uncorrelated?
- What about nature sounds?
- Will there be apps coming?
- What about misophonia and hyperacusis?



QUESTIONS?????



**THANKS FOR LISTENING**

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# APPLAUSE

