



## PROOF OF ZEN: A REVIEW OF RESEARCH ARTICLES

Nancy Heflin Bridges, Au.D., CCC-A, FAAA  
Product and Software Support Audiologist  
Widex USA

---

---

---

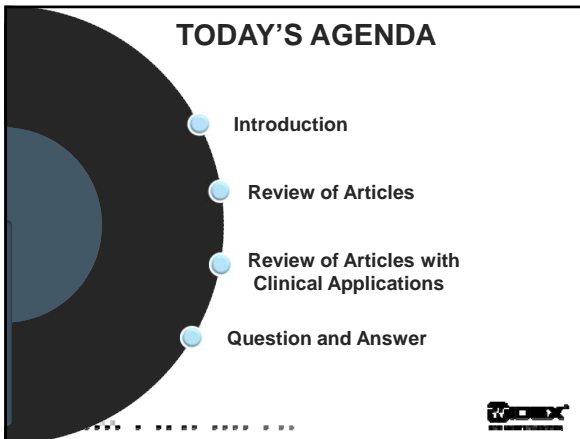
---

---

---

---

---



## TODAY'S AGENDA

- Introduction
- Review of Articles
- Review of Articles with Clinical Applications
- Question and Answer

---

---

---

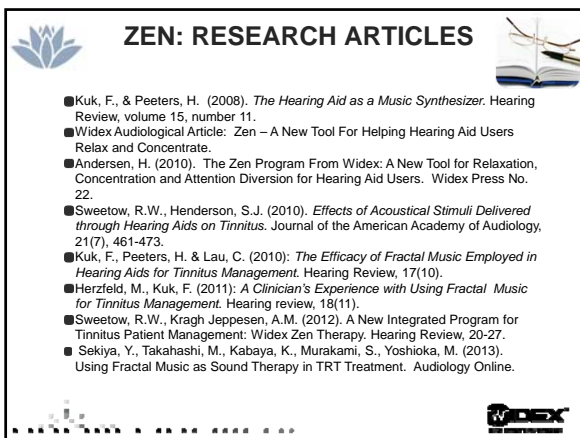
---

---

---

---

---



## ZEN: RESEARCH ARTICLES

- Kuk, F., & Peeters, H. (2008). *The Hearing Aid as a Music Synthesizer*. Hearing Review, volume 15, number 11.
- Widex Audiological Article: Zen – A New Tool For Helping Hearing Aid Users Relax and Concentrate.
- Andersen, H. (2010). The Zen Program From Widex: A New Tool for Relaxation, Concentration and Attention Diversion for Hearing Aid Users. Widex Press No. 22.
- 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.
- Kuk, F., Peeters, H. & Lau, C. (2010): *The Efficacy of Fractal Music Employed in Hearing Aids for Tinnitus Management*. Hearing Review, 17(10).
- Herzfeld, M., Kuk, F. (2011): *A Clinician's Experience with Using Fractal Music for Tinnitus Management*. Hearing review, 18(11).
- Sweetow, R.W., Kragh Jeppesen, A.M. (2012). *A New Integrated Program for Tinnitus Patient Management: Widex Zen Therapy*. Hearing Review, 20-27.
- Sekiya, Y., Takahashi, M., Kabaya, K., Murakami, S., Yoshioka, M. (2013). *Using Fractal Music as Sound Therapy in TRT Treatment*. Audiology Online.

---

---

---


---

---

---

---

---



**KUK, F., & PEETERS, H. (2008). THE HEARING AID AS A MUSIC SYNTHESIZER. HEARING REVIEW, VOLUME 15 NUMBER 11.**

**PRACTICE MANAGEMENT**


**The Hearing Aid as a Music Synthesizer**

PRODUCED ON OCTOBER 1, 2008

This article was submitted to HRT by **Francis Kuk, PhD**, director of audiology, and **Heidi Peeters, MA**, research audiologist, at the Widex Office of Research in Clinical Amplification (ORCA), Lisle, IL. Correspondence can be addressed to [hearingreview@widex.com](mailto:hearingreview@widex.com) or Francis Kuk at [hearingreview@widex.com](mailto:hearingreview@widex.com).

One of the negative consequences with a higher standard of living in modern societies is the increased level of stress that their citizens experience. According to the American Institute of Stress, the number one health problem in the United States is stress. "Many of the chronic health issues such as insomnia, heart diseases, etc. can be partially attributed to the increased stress of modern living. The incidence of increased stress is reportedly higher in people with a hearing loss than the normal hearing population." In addition, the incidence of stress in those with an untreated hearing loss is reportedly higher than in those with a treated hearing loss (2-17% versus 7-12%), according to the US National Council on Aging (NCA).

One of the reasons for increased stress in individuals with hearing loss is likely related to the increased incidence of communication barriers experienced by these people. This discussion highlights the experience of amplification and the quality of the improvement reported by many hearing-impaired people with the use of hearing aids.<sup>1,2</sup>




---

---

---

---


---

---

---

---



**PURPOSE AND DESIGN**



- Is music useful in a hearing aid for a person with tinnitus?
- Does music through hearing aids improve relaxation?
- Does music through hearing aids improve concentration?

**BACKGROUND INFORMATION**

- STRESS**
  - Common health problem in US
  - More prevalent in hearing impaired population
  - Music used to relax and prevent stress


---

---

---

---


---

---

---

---

**MUSIC AND NEUROLOGICAL REPRESENTATION**

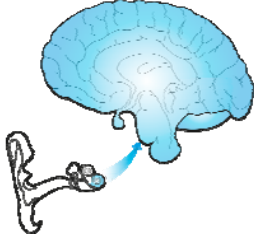



How is music processed?

- Auditory System
- Limbic System

Music Discussion

- Tempo: Slow Music
- Tonality: Major vs Minor
- Intensity: Soft vs loud
- Relaxation Characteristics


---

---

---

---

---

---

---

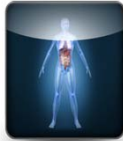
---

## USING MUSIC FOR SOUND THERAPY



### Music can affect physiological responses:

- heart rate
- blood pressure
- respiration rate
- muscle tension
- skin temperature
- skin conductance
- tears
- chills
- release of hormones




---

---

---

---

---

---

---

---

## WHY NOT TRADITIONAL MUSIC?



### Active listening

- Tendency to arouse

### Previously recorded music may:

- Evoke memories
- Create unwanted distraction



### Passive listening preferable

- Capitalize on brains natural ability to habituate




---

---

---

---

---

---

---

---

## FRACTALS



### Definition

Fragmented geometric shape capable of being split into parts, each of which is a reduced-size copy of the whole – self-similarity.

### Can it be used in a hearing aid?

YES – through mathematical equations and a digital signal processing hearing aid.

### What did Widex do?

Created ZEN styles and patterns: a unique combination of pitch, tempo and intensity.




---

---

---

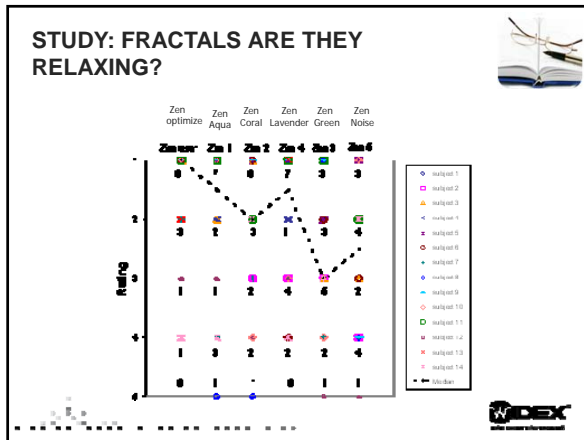
---

---

---

---

---




---

---

---

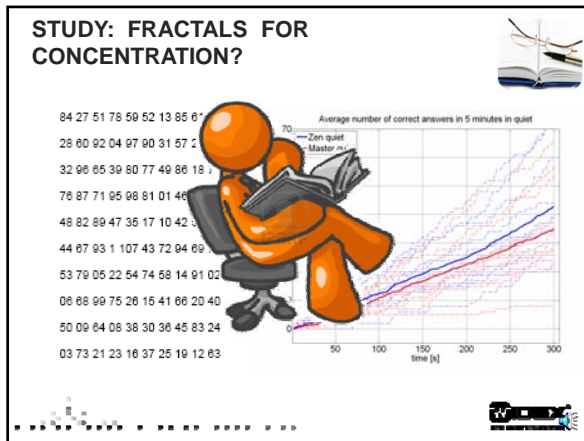
---

---

---

---

---




---

---

---

---

---

---

---

---

### CONCLUSION

- Hearing-impaired patients found Zen fractal tones to be relaxing
- MUSIC and ZEN can provide a relaxing listening background for wearers
- MUSIC and ZEN can improve concentration
- MUSIC and ZEN may improve quality of life for hearing aid wearers who practice relaxation

WEX

---

---

---

---

---

---

---

---



## ZEN – A NEW TOOL FOR HELPING HEARING AID USERS RELAX AND CONCENTRATE. (WIDEX AUDIOLOGICAL ARTICLE)





---

---

---


---

---

---

---


---



## PURPOSE AND DESIGN

- Short review of music being used to reduce stress and enhance concentration.
- Short review of stress often being associated with hearing loss.
- Study results to support the ongoing theory that ZEN can help hearing aid users relax.

- BACKGROUND INFORMATION
  - Stress
  - Music
  - Concentration
  - ZEN




---

---

---


---

---

---

---

---



## STUDY – IS IT RELAXING OR TENSING?

- Widex looked at 32-hearing impaired persons with mild to profound hearing loss and tested Zen Styles.

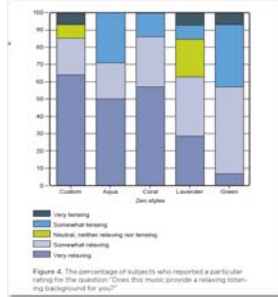



Figure 4. The percentage of subjects who reported a particular rating for the question "Does this music provide a relaxing listening background for you?"




---

---

---

---

---

---

---

---

## CONCLUSION



Zen styles can be relaxing to many hearing aid users

To reduce stress and enhance concentration music should be:

- ✓ Simple
- ✓ Instrumental
- ✓ Non-repetitive
- ✓ Without lyrics.

Zen styles' ability to help people with hearing loss relax may be helpful to a large portion of hearing aid users.




---

---

---

---

---

---

---

---



**ANDERSEN (2010). THE ZEN PROGRAM FROM WIDEX: A NEW TOOL FOR RELAXATION, CONCENTRATION AND ATTENTION DIVERSION FOR HEARING AID USERS. WIDEXPRESS 22.**




---

---

---

---

---

---

---

---

## DISCUSSION: TINNITUS NEGATIVELY IMPACTS QUALITY OF LIFE



- Sleeping problems
- Annoyance & irritation
- Difficulty relaxing
- Despair and frustration
- Problems focusing on speech
- Concentration difficulties
- Stress




---

---

---

---

---

---

---

---

## DISCUSSION: MUSIC AS TINNITUS MANAGEMENT



### • Tinnitus management involves:

- Stress reduction
- Counseling
- Sound therapy
  - Produce a sense of relief
  - Passively divert attention away from tinnitus
  - Choice of sound (music or noise)

Although we cannot cure tinnitus, we can address the negative reactions to tinnitus




---

---

---

---

---

---

---

---



**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.**




---

---

---

---

---

---

---

---

## PURPOSE AND DESIGN



PURPOSE: USE HEARING AIDS AS SOUND THERAPY?

### • Design:

- N = 20
- Hearing loss: Mild to Moderately-Severe
- 14 with tinnitus, 6 non-tinnitus
- THI; TRQ
- Measuring
  - Stress
  - Annoyance
  - Relaxation




---

---

---

---

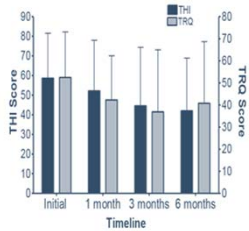
---

---

---

---

## STUDY: WZT RESEARCH



- Tinnitus annoyance was reduced
- Majority reported it was easier to relax while listening to Zen
- Most preferred Zen tones for daily use.



## CONCLUSION



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.



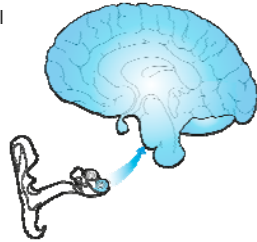
**KUK, F., PEETERS, H. & LAU, C. (2010): THE EFFICACY OF FRACTAL MUSIC EMPLOYED IN HEARING AIDS FOR TINNITUS MANAGEMENT. HEARING REVIEW, 17(10).**





## PURPOSE AND DESIGN

- Explain why Zen may be useful in tinnitus management
- Determine if hearing health professionals would find the Zen program useful for their tinnitus patients.




---

---

---

---

---

---

---

---

## STUDY: RESULTS

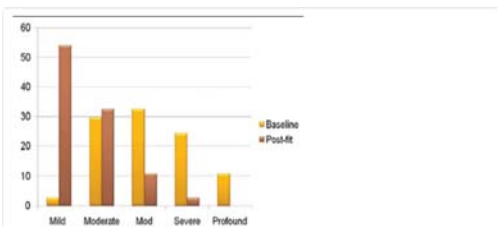


FIGURE 2. Rated severity of tinnitus (percentage of respondents) at pre- (baseline) and post-fitting of Zen.




---

---

---

---

---

---

---

---

## STUDY: HEARING AID PROGRAM

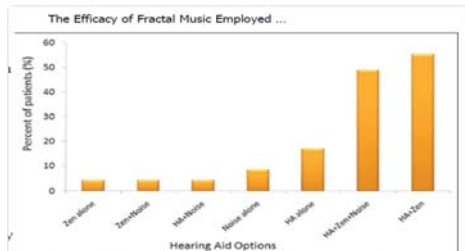


FIGURE 3. Percentage of patients who had access to each program type.




---

---

---

---

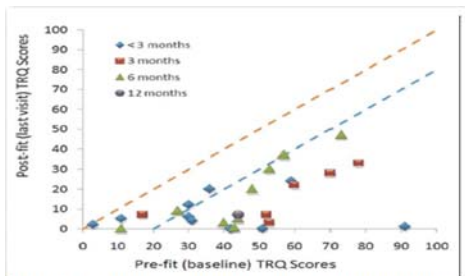
---

---

---

---

## STUDY: TRQ RESULTS



## CONCLUSIONS

100% of the patients who completed the pre/post TRQ questionnaire reported a reduction in tinnitus.

85.7% of the results suggest that Zen could be an effective sound therapy tool for clinicians.

The HA+Zen was most frequently provided to address tinnitus.

The duration of the tinnitus did NOT correlate with the amount of tinnitus improvement.

HERZFELD, M, AUD AND KUK, F, PHD. (2011) A CLINICIAN'S EXPERIENCE WITH USING FRACTAL MUSIC FOR TINNITUS MANAGEMENT. THE HEARING REVIEW, 18(11).

**PRACTICE MANAGEMENT**

**A Clinician's Experience with Using Fractal Music for Tinnitus Management**

FRANK HERZFELD, M.D., M.P.H.

How one clinic uses the Zen sound therapy tool within a tinnitus management protocol of HA, Zen, and HA+Zen, as well as observations relative to implementing the Zen protocol management – are also offered.

A tinnitus management clinic (Zen) was introduced by HerZFeld as a sound therapy tool for tinnitus management in 2008 in Stony Brook, New York. The clinic used Zen for hearing-impaired patients who also reported tinnitus. While the majority use with the use of this tool is only for tinnitus, it is used in combination with counseling, education, and behavioral change.

In this report, the successes and failures in using Zen for tinnitus patients are shared. Highlights of the protocol adopted at this clinic, and cases where a judgment of Zen success/failure is not as straightforward will be provided.

**A Sound Therapy Tool inside a Hearing Aid**

**HerZFeld, M.D., M.P.H.** is an audiologist and owner of the Hearing and Tinnitus Center, Stony Brook, NY, and a past chair of the American Society of Audiology (ASA), FRANK KUK, PH.D., is VP of Audiology at Stony Brook and Director of the Stony Brook Office of Research in Clinical Amplification (SCICA USA) located in Long Island. Correspondence can be addressed to Dr. HerZFeld at or Dr. Kuk at

## PURPOSE AND DESIGN

### Purpose:

1. Describe how one clinic uses a Widex Zen sound therapy.
2. Provide patient outcomes at one clinic for Widex Zen as a tinnitus sound therapy tool.
3. Relay observations for implementing this tool specific to tinnitus patient management.

### Design:

- Reviewed Data from 48 patients
- Looked at TRQ data
- Provide helpful observations




---

---

---

---

---

---

---

---

## RESULTS

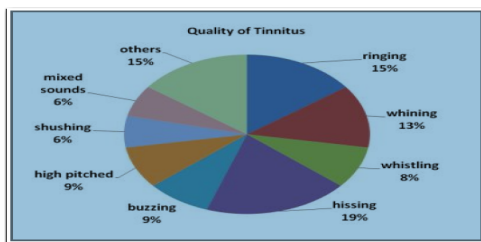


Figure 1. Tinnitus quality reported by patients (n = 48).




---

---

---

---

---

---

---

---

## RESULTS

Actual counts	$\Delta$ TRQ >40		Total
	Yes	No	
Success	43	2	45
Failure	0	3	3
Total	43	5	48

Table 1. Contingency table showing the number of patients who reported greater than 40% improvement on their TRQ scores and those who were rated as successful/failure by the first author (MH).




---

---

---

---

---

---

---

---

## CONCLUSION

The effectiveness of the Zen program is independent of the nature of the patient's hearing loss or tinnitus characteristics.

Approach taken by clinician appears to be effective.

- At least two Zen programs should be used

The more severe the tinnitus, the more likely one observes a large change in tinnitus rating.

Teaching patients how to manage stress is an important component of a tinnitus program.

Set appropriate expectations




---

---

---

---

---

---

---

---

## JEPPESEN, A. AND ANDERSEN, H. (2011). TINNITUS AND THE WIDEX ZEN PROGRAM. WIDEX PRESS NO. 27.




---

---

---

---

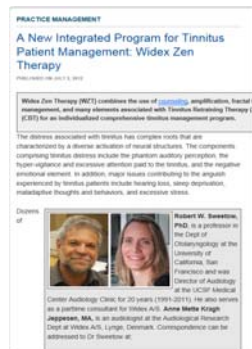
---

---

---

---

## SWEETOW, R AND KRAGH JEPPESEN, A. (2012). A NEW INTEGRATED PROGRAM FOR TINNITUS PATIENT MANAGEMENT: WIDEX ZEN THERAPY. HEARING REVIEW, 20-27




---

---

---

---

---

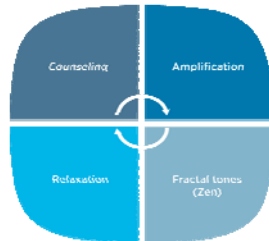
---

---

---

## PURPOSE AND DESIGN

- Purpose: To introduce Widex Zen Therapy and its components.
- Design: Reviews the 4 key areas for Widex Zen Therapy




---

---

---

---

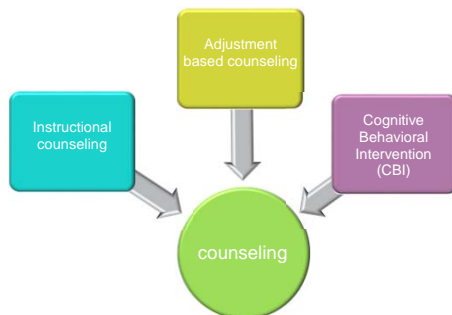
---

---

---

---

## TYPES OF COUNSELING AND RELAXATION STRATEGIES




---

---

---

---

---

---

---

---

## AMPLIFICATION AND FRACTALS

- Zen tones are based on musical properties that promote relaxation and concentration.
  - KUK and Peeters 2008
- Zen tones have been proven to be effective in reducing the negative and disturbing effects of tinnitus.
  - Sweetow and Sabes Henderson 2010
  - Kuk, Peeter and Lau 2010
  - Herzfeld and Kuk 2011
- The goal of using Zen tones is to promote habituation to tinnitus. And when combined with effective counseling along with hearing aids can provide tinnitus relief for your patient.
  - Herzfeld and Kuk 2011



**BOTH AUDITORY STIMULATION AND  
STRESS MANAGEMENT  
CAN BE ADDRESSED**




---

---

---

---

---

---

---

---

## MORE ON ZEN FRACTALS



Fractal region	Default pitch				Tinnitus		Dynamic Range		Default tempo		
	Low	Medium Low	Medium High	High & overlapped	Major	Minor	Restricted	Broad	Slow	Medium	Fast
Aqua	•				•		•		•		
Coral			•			•		•		•	
Lavender			•		•			•			•
Green				•	•		•			•	
Sand			•		•			•			•




---

---

---

---

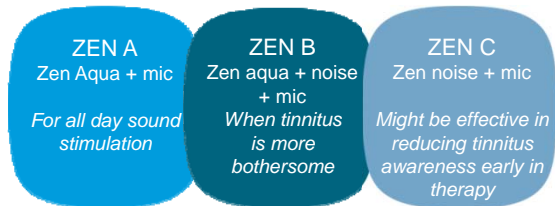
---

---

---

---

## HOW TO PROGRAM ZEN SETTINGS




---

---

---

---

---

---

---

---

## CONCLUSION



Widex Zen Therapy is designed to provide professionals with a comprehensive, evidence-based program

Widex Zen Therapy promotes a collaborative approach – not one therapy will work for all patient




---

---

---

---

---

---

---

---



**SEKIYA, Y., TAKAHASHI, M., KABAYA, K., MURAKAMI, S., YOSHIOKA, M. (2013). USING FRACTAL MUSIC AS SOUND THERAPY IN TRT TREATMENT. AUDIOLOGY ONLINE.**





---

---

---

---

---


---

---

---

---

---




**PURPOSE AND DESIGN**

■ **PURPOSE:**  
To obtain a first impression of the usability of fractal music.

■ **DESIGN:**

- 25 subjects
- THI used for assessment
- 3 month and 6 month intervals
- Used in combination with TRT.




---

---

---

---

---


---

---

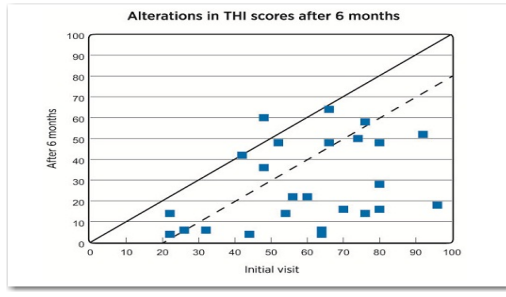
---

---

---




**STUDY RESULTS**



Alterations in THI scores after 6 months

After 6 months

Initial visit




---

---

---

---

---

---

---

---

---

---

## CONCLUSION



Improvement in THI scores were observed in 92% of the patients after 6 months.

The improvements were significant in 62% of the patients.

Fractal music can be used in combination with amplification, broadband noise and TRT.




---

---

---

---

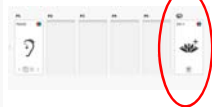
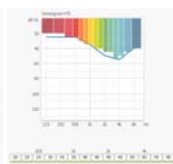
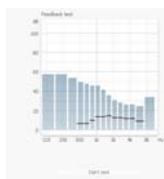
---

---

---

---

## INITIAL FITTING



1. Feedback Test

2. Sensogram

3. Zen Smart Toggle




---

---

---

---

---

---

---

---

## SUMMARY

- Fractal music is a viable option for tinnitus and relaxation improvement
- Zen can improve tinnitus perception for varying severities of tinnitus.
- A combination approach to tinnitus treatment can provide the best results.



For Additional Questions, please contact [AOinquiry@widex.com](mailto:AOinquiry@widex.com)  
or call Widex at 1-800-221-0188




---

---

---

---

---

---

---

---