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continued<sup>®</sup>

# Tinnitus Activities Treatment

Richard S. Tyler, PhD

Audiologist and Professor

The Department of Otolaryngology - Head and Neck Surgery

Department of Communication Sciences and Disorders

The University of Iowa

continued<sup>®</sup>

## Learning Outcomes

1. Measure and evaluate the consequences of tinnitus.
2. Provide counseling for difficulties in Thoughts and Emotions, Hearing, Sleep and Concentration.
3. Provide Sound Therapy and fit hearings to tinnitus patients.

# Tinnitus Activities Treatment

## Overview

- 4 Topics
  1. Thoughts & Emotions
  2. Hearing
  3. Sleep
  4. Concentration
  - Chosen based in individual needs
- One Topic per counseling session
- Homework activities assigned, practiced in clinic, & reviewed next visit

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# Tinnitus Activities Treatment

Introduction

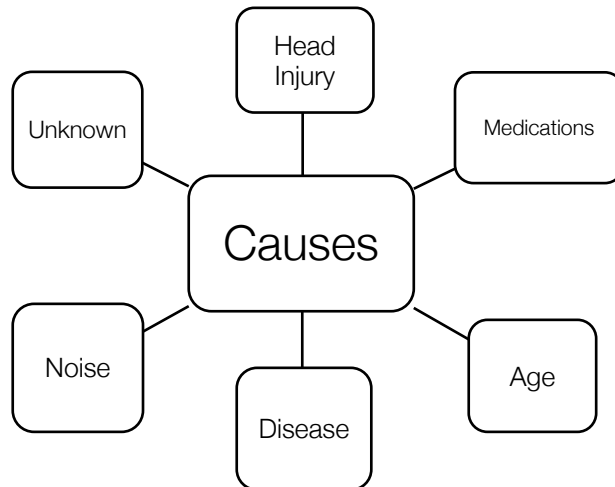
continued<sup>®</sup>

Where do  
YOU want to  
start?

continued<sup>®</sup>

continued

What do you think caused your tinnitus?



continued

When your tinnitus began, what was your life like (home, work, etc.)?

continued

continued<sup>®</sup>

How has tinnitus influenced  
your life?

continued<sup>®</sup>

How do **YOU**  
think we might  
be able to  
help?

continued<sup>®</sup>

continued

- How would you describe yourself?
  - E.g., curious?  
concerned?  
distressed?
- What are some things you are doing to help your tinnitus?

continued

Four Topic  
Areas  
Considered  
in our  
Treatment

1. Thoughts and Emotions
2. Hearing and Communication
3. Sleep
4. Concentration

continued



## 1. Thoughts and Emotions

- Hearing, hearing loss, and tinnitus
- Attention, behavior, and emotions
- Changing your reactions to tinnitus

## 2. Hearing and Communication

- Hearing and communication difficulties
- How tinnitus can affect hearing
- How to improve your hearing

### 3. Sleep

- Normal sleep patterns
- Tinnitus and sleep
- Activities to facilitate sleep
- Waking up at night

### 4. Concentration

- Things that affect concentration
- How tinnitus affects concentration
- Strategies to improve concentration

continued

Your  
sessions...

- Include the sessions relevant for you
- Review and discuss our materials
- Answer your questions
- Practice activities
- Provide homework

continued

## Tinnitus Activities Treatment Thoughts and Emotions Session

continued

continued

## Overall Plan

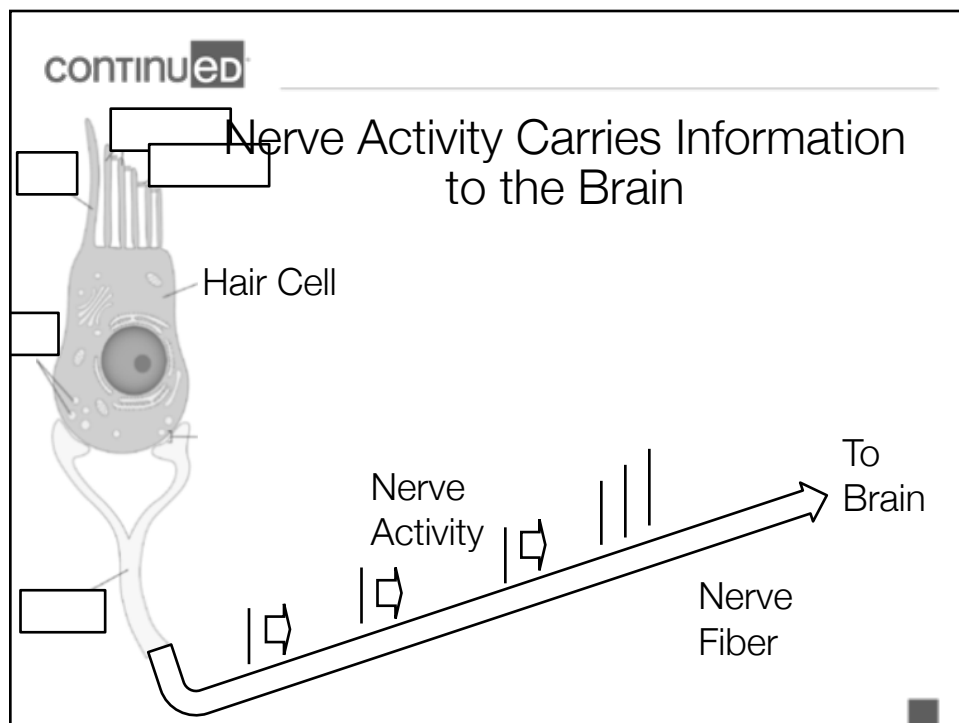
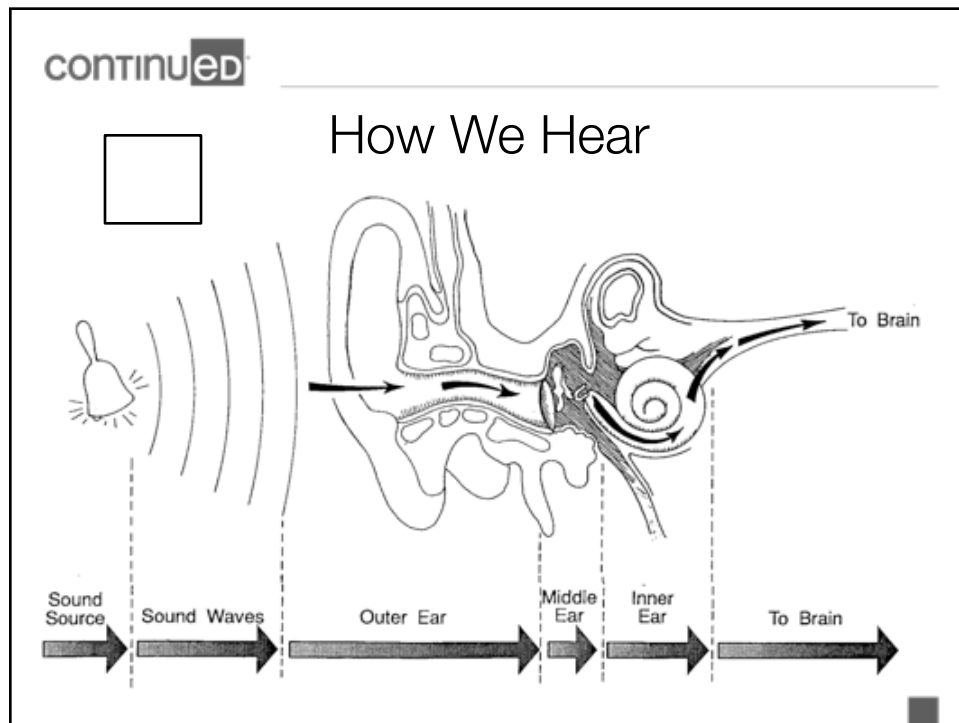
1. Hearing and hearing loss
2. Tinnitus
3. Attention, behavior, and emotions
4. Changing your reactions
5. Activities for home

continued

## Part 1: Hearing & Hearing Loss

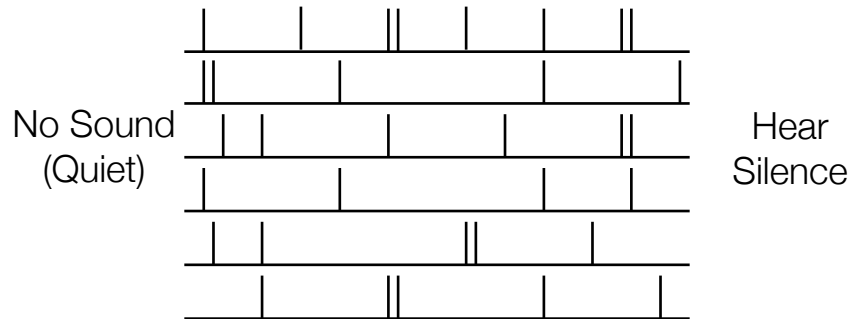
1. How we hear, and what is hearing loss
2. Causes of hearing loss

continued



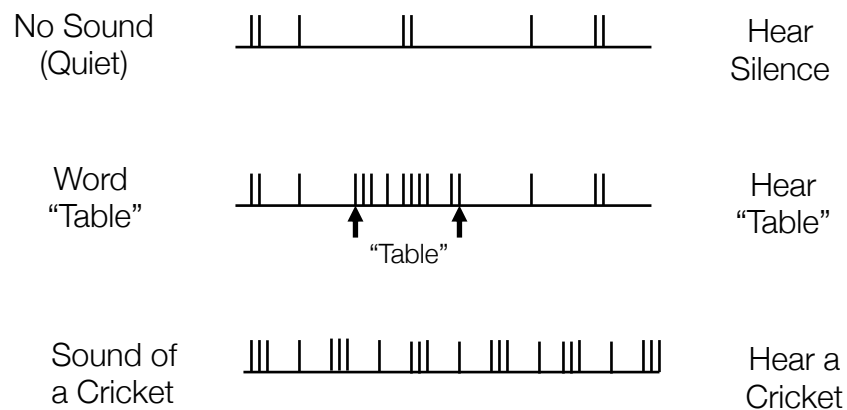
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## Spontaneous Activity on Hearing Nerves



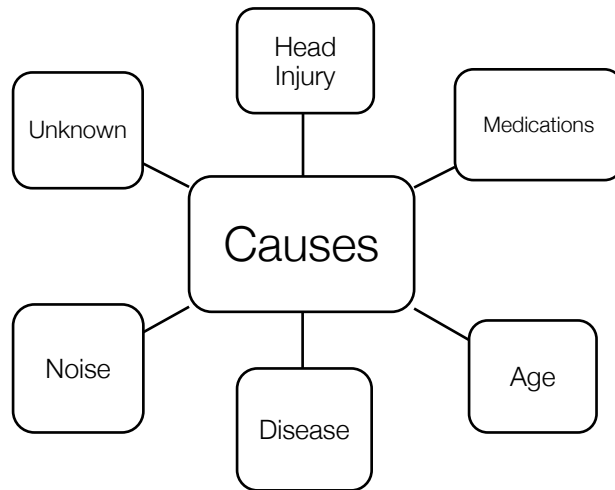
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## Different Nerve Responses Result in the Perception of Different Sounds

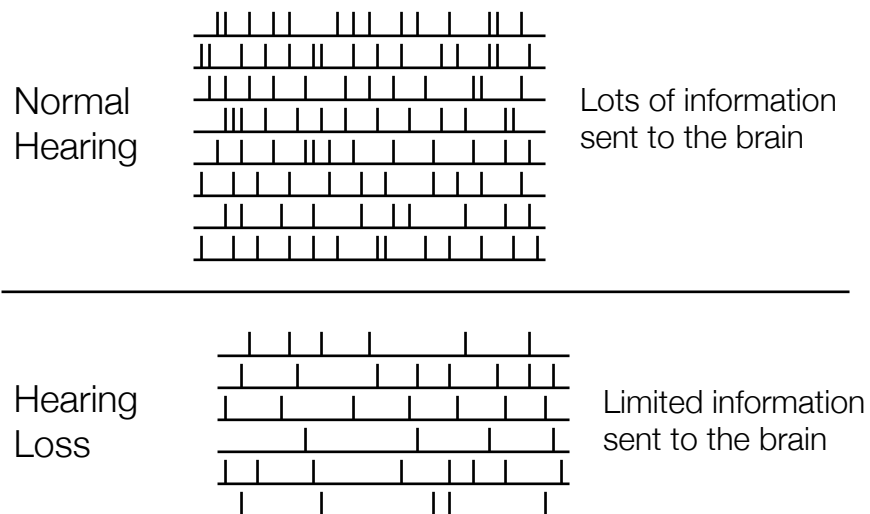


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## Causes of hearing loss

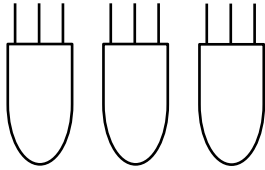


## Nerve Activity



continued

## Solutions for Hearing Loss



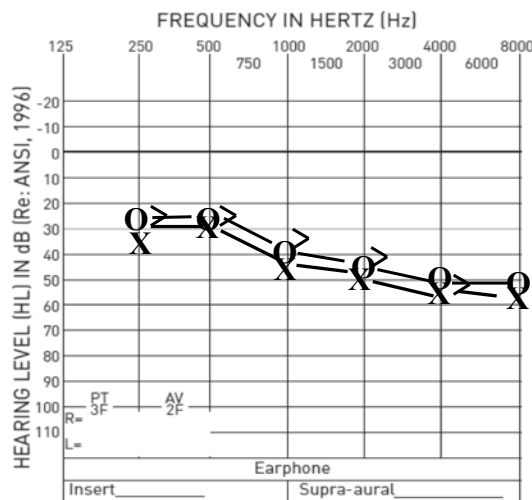
Cannot Replace Hair Cells

Hearing aids can help make sounds:

- Louder
- Easier to understand
- Do not restore normal hearing

continued

## Your Audiogram



continued



continued

## Your Hearing?

- Do you have a significant hearing loss?
- What difficulties does your hearing loss create?
- What steps have you taken to improve your hearing?

continued

## Part 2: Tinnitus

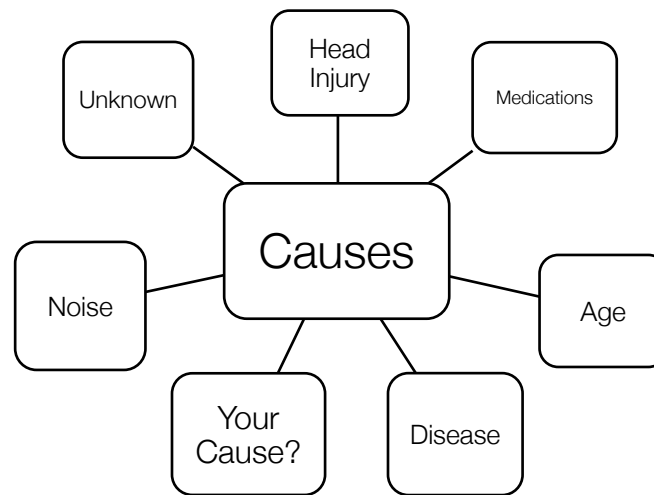
- A sound in ear(s) or head
- Heard differently by different people
  - (e.g. ringing, buzzing, hissing, etc.)

continued

## Tinnitus and Hearing

- Tinnitus results from damage to the hearing system
  - May be associated with hearing loss
- Tinnitus will not damage your hearing
- Hearing may continue to decrease, but not because of tinnitus

## There Are Many Different Causes of Tinnitus



## Tinnitus is Common

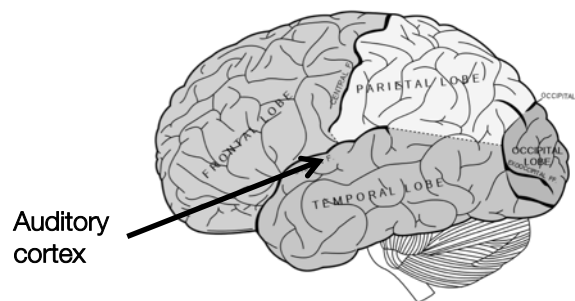
- 15 in 100 (15%) people have tinnitus
- 1 in 100 (1%) people have troublesome tinnitus
- 30 in 100 (30%) people over 60 years old have tinnitus

## Expectations for Relief

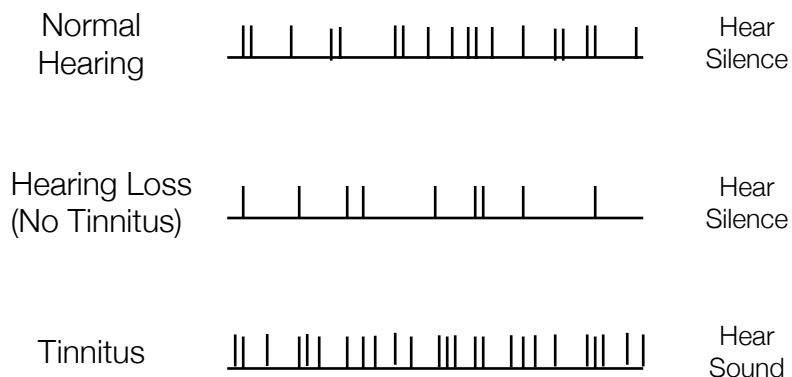
- Currently no drug or surgery can reliably eliminate the source of tinnitus
- However, **YOU** can change your reaction to tinnitus and how it affects you

## Auditory System

- Tinnitus, whatever the cause, must be represented in the brain in the auditory area. It is represented there like any other sound. It can be measured.



## Tinnitus is an Increase in Spontaneous Nerve Activity



continued

What does your tinnitus sound like?



Whistle



Cricket



Another sound?

continued

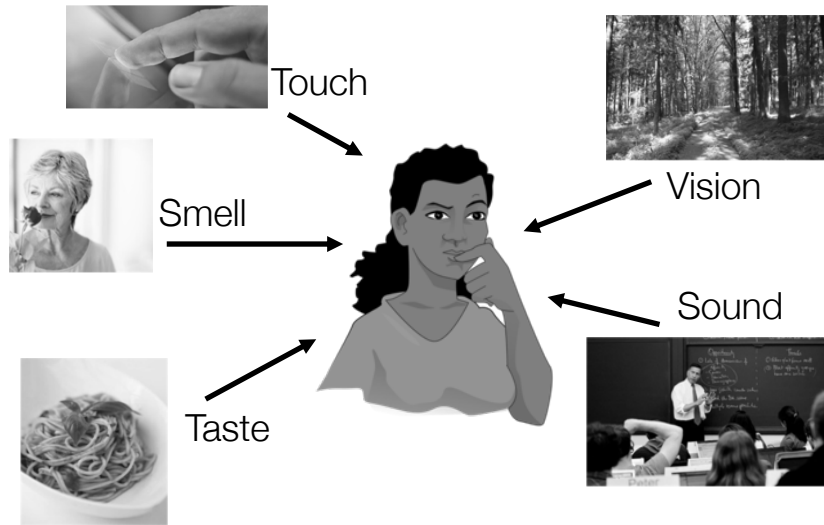
## PART 3: ATTENTION

1. Types of attention
2. How things capture our attention
3. Emotional state has an effect on attention

continued

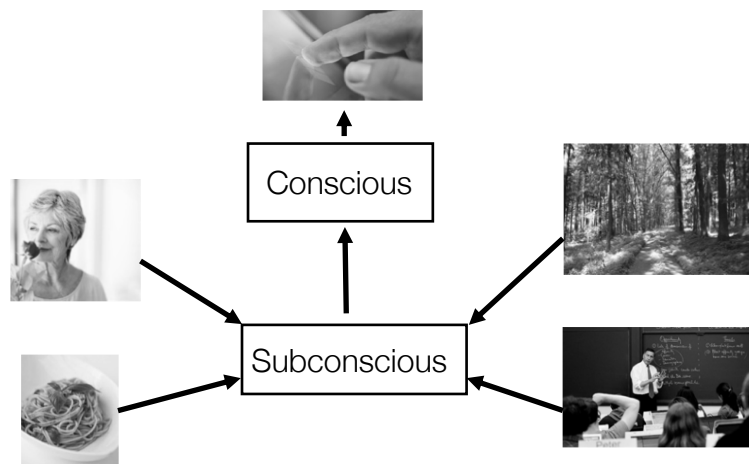
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## Many Stimuli Compete for Our Attention



continued

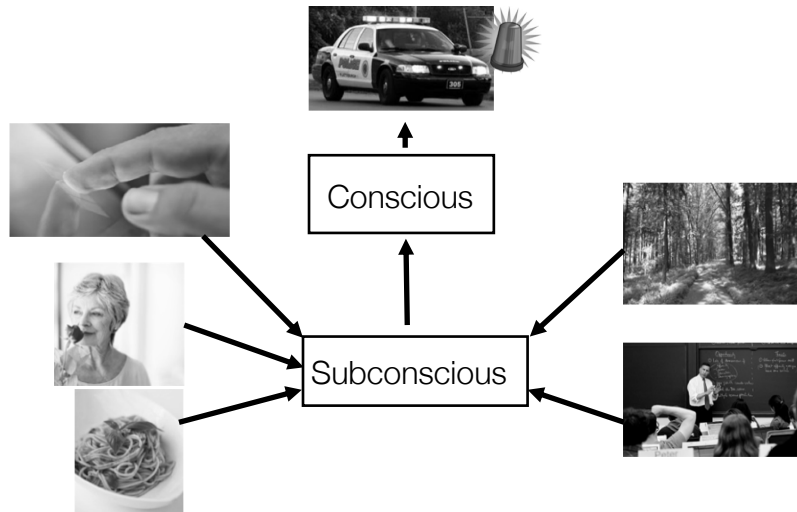
## We can direct our conscious attention to different smells, sounds, or things we feel



continued

continued

An important sound can grab our attention



continued

Things That Capture Our Conscious Attention



continued

## Deciding to Pay Attention



?



Everything is OK  
(no longer attend)

Do something,  
then will be OK  
(and will no longer attend)

Uncertain, may be  
important?  
(continue to attend)

## Tinnitus does not...

- Make you deaf
- Lead to senility
- Imply a sign of mental illness
  
- When you worry about such things, you can become preoccupied with tinnitus



continued

## Activities

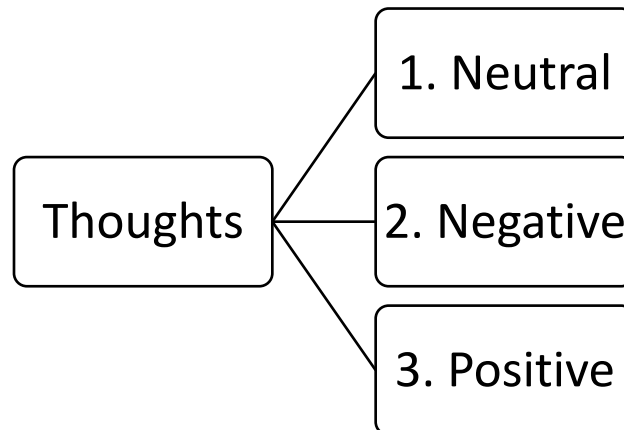
- Describe an image you like (e.g. a new car) and one you don't like (e.g. a snake)
- Describe a sound you like (e.g. music) and one you don't like (e.g. a siren)
- Describe your tinnitus

continued

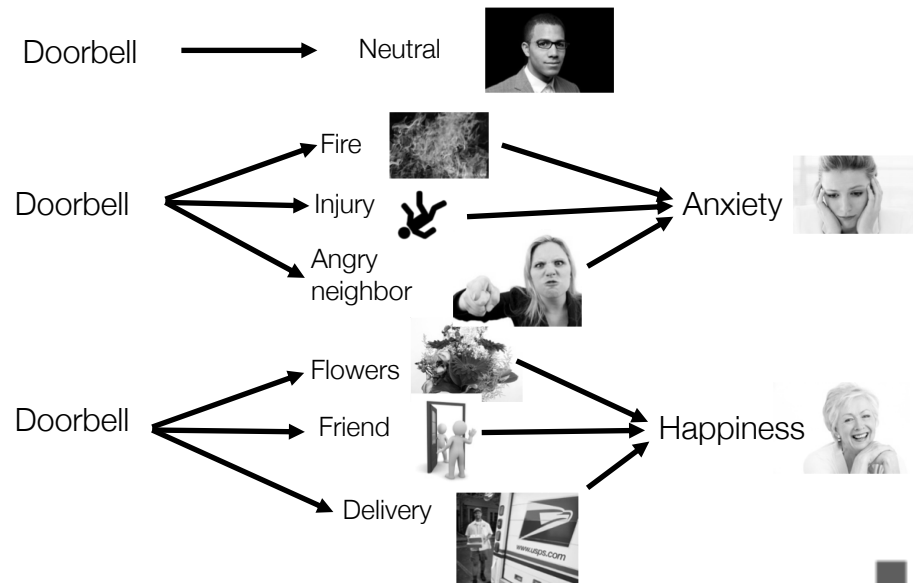
## PART 4: CHANGE THE EMOTIONAL REACTION TO TINNITUS

continued

## Understand the Connection Between our Thoughts and Emotions



## Our Thoughts and Emotions



## Change Negative Thoughts

- What kind of thoughts have you had about your tinnitus?
  - Situations where tinnitus is bothersome
  - Thoughts and beliefs about tinnitus
  - Feelings about tinnitus

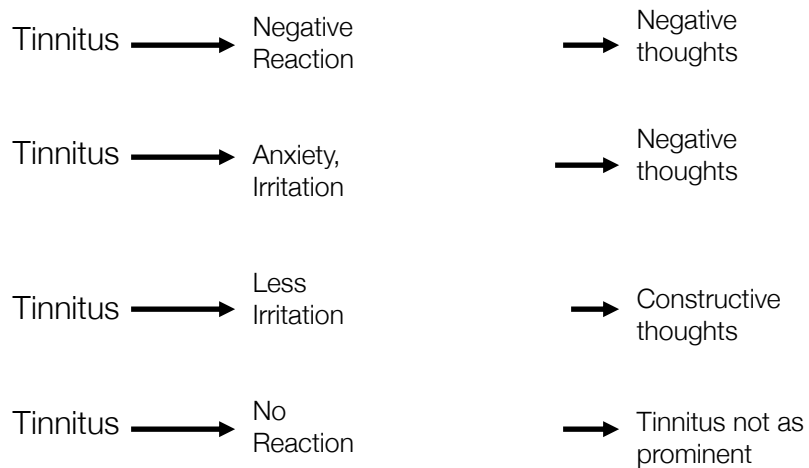
## How to Change Our Reaction to Tinnitus

1. Change Interpretation of Importance
2. Change Emotional Reaction
3. Refocus on Other Activities
4. Reduce Contrast Between Background Sound and Tinnitus

## 1. Change Interpretation of Importance

- Tinnitus is likely the result of increased spontaneous nerve activity
- Many people have tinnitus – you are not alone
- Tinnitus is not threatening your health or hearing
- Tinnitus and **YOUR REACTION** to tinnitus are two different things

## 2. You Can Unlearn/Change Your Emotional Reactions



continued

### 3. Refocus on Other Activities

- What hobbies do you have?
- What activities help you ignore your tinnitus?
- What new activities could you become involved in?


continued

### 4. Reduce the Contrast Between Tinnitus and Background Sounds

continued

continued

Low level noise makes tinnitus more difficult to detect

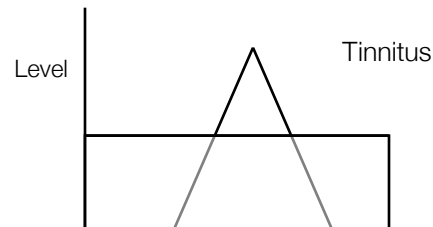
Tinnitus 

Low Level Noise 

Tinnitus in Low Level Noise 

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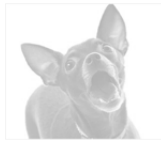
Decrease Prominence of Tinnitus



continued

continued

Background sound masks unwanted sounds



continued

## Ways to Add Low Level Background Sound

- Listen to recorded material:
  - Relaxation CDs
  - Smartphone apps
  - Nature sounds
  - Music

continued

continued

Do Any Sounds Make Your Tinnitus Less Noticeable?

Rain

Music

Waterfall

Static

continued

PART 5:  
ACTION PLAN

continued



## Activities

1. Practice focusing your attention on your tinnitus, and then on something else
2. Identify alternative activities you enjoy
3. Try different low-level background sounds

## Example Tinnitus Diary

1. Write down your thoughts and worries about tinnitus
  - *My tinnitus will get worse over time.*
2. Check to see if these thoughts match what actually happens
  - *Though some days can be worse, my tinnitus is about the same.*
3. List the alternative ways of thinking about tinnitus that you find helpful
  - *I have tinnitus, but it is really a small part of my life.*
4. We will discuss your thoughts at your next visit.

## Tinnitus Diary, cont'd

1. List the things that reduce your tinnitus
2. List the things that worsen your tinnitus
3. List activities you enjoy
4. List sounds you enjoy
5. List alternative activities to engage in when you find tinnitus bothersome
6. List any low level sounds you used, and their effect on your tinnitus

## Example Tinnitus Diary – Week 1

- Make changes in your daily life so you are doing more activities where your tinnitus is better and fewer activities where your tinnitus is worse. List the new activities and how your tinnitus was affected.

### Activity

- Day 1: *Walking*
- Day 2:
- Day 3:
- Day 4:
- Day 5:
- Day 6:
- Day 7:

### Effect on Tinnitus

- Day 1: *Heard birds chirping, did not notice tinnitus*
- Day 2:
- Day 3:
- Day 4:
- Day 5:
- Day 6:
- Day 7:

continued

# Tinnitus Activities Treatment Hearing and Communication Session

continued

## Overview

1. Goals of treatment
2. Hearing and communication difficulties
3. Factors that affect hearing and communication
4. How tinnitus can affect hearing
5. How to improve your hearing
6. Activities for home

continued

continued

## 1. Goals of Treatment

- Reduce communication difficulties:
  - What difficulties do you have with hearing loss?
  - What difficulties do you have with tinnitus?
- Reduce stress associated with communicating

continued

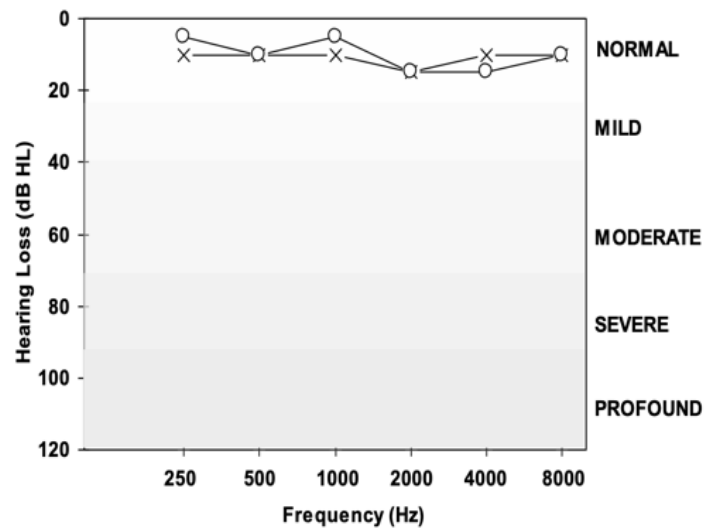
## 2. Your Hearing

Understanding your  
audiogram

continued

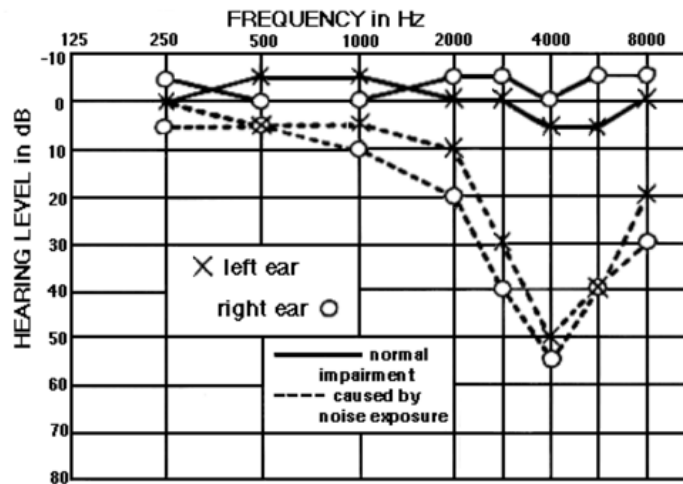
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### Normal Hearing thresholds on an Audiogram



continued

### Hearing thresholds after noise exposure



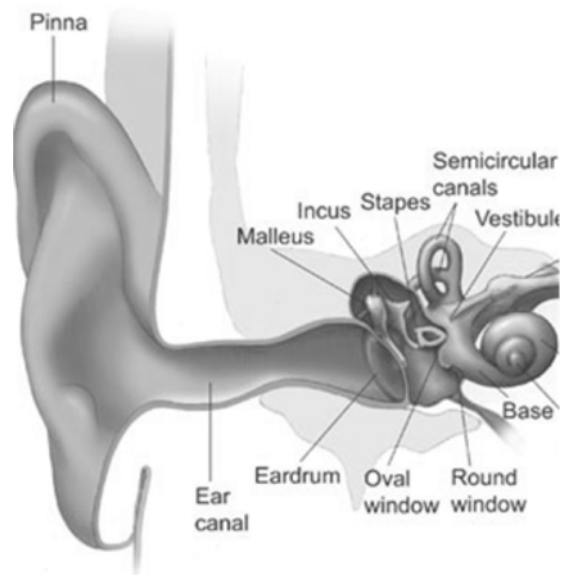
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### 3. Factors that Affect Communication

- Hearing loss
- Background noise
- Ability to see the talker
- Familiarity with talker
- Familiarity with topic of discussion
- Stress level

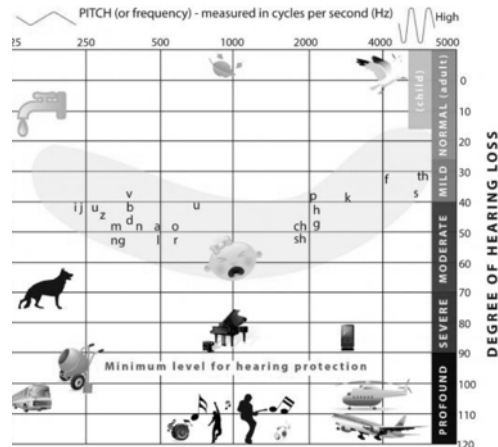
### Hearing Loss

- Types of hearing loss:
  - Conductive
  - Sensorineural
  - Mixed



## How Hearing Loss Affects Communication

- Some sounds are not heard at all (high pitches)
- Some sounds may be distorted and less clear
- Low-pitched sounds are usually louder, so a high-pitched loss often is not noticeable
- May experience fatigue from struggling to communicate



## Background Noise

- Difficult situation for many people
- Noise covers up speech
- Remove noise source if possible
- Move away from noise or re-position yourself so that the noise source is away from the talker

continued

## Ability to See the Talker

- Lip reading
- Facial cues
- Body language

continued

## Your Situation!

- What situations cause you difficulty?
- What techniques have you tried to improve your communication?
- What techniques have been successful?
- What techniques have been unsuccessful?
  - *Thinking what to say next instead of listening attentively*
  - *Getting others to communicate for you*

continued



#### 4. How Tinnitus Can Affect Hearing

- Tinnitus is not damaging your hearing
- Tinnitus can make it harder to hear sounds and distract one from listening
- Tinnitus can also mask some sounds

#### 5. Strategies to Improve Hearing and Communication

1. Use of Amplification
2. Reduce background noise
3. Watch faces
4. Use 'repair' strategies
5. Use an effective communication style

## Benefits of Hearing Aids

- Better hearing of sounds and speech
- More opportunity to interact in conversation because communication is easier
- Localization of sound—important for safety
- What is your experience with hearing aids?

## Watching Faces

- Good lighting
  - Avoid light shining directly behind the talker
  - You need enough light to see talker's face
- Positioning
  - Face the talker
  - Position yourself close to the talker
  - Minimize noise
  - Minimize visual distractions

## Ask the talker to make changes:

- Slow down and speak more clearly
- Face you while talking
- Refrain from chewing gum
- Remove hand from in front of mouth
- Don't shout

## 6. Activities

- Keep track of what strategies you use and how they help you hear and communicate better.
  - Can you see the talker's face?
  - Where was the lighting?
  - Can you move to see the talker's face?
  - If a new hearing aid user, try to distinguish different sounds.
  - Rehearse repair strategies.

# Tinnitus Activities Treatment Sleep Session

## Overview

1. Normal sleep patterns
2. Things that affect sleep
3. Daytime activities to facilitate sleep
4. Evening activities to facilitate sleep
5. Preparing for sleep
6. Waking up at night
7. Waking up in the morning
8. Activities

## 1. Normal Sleep Patterns

- The amount of sleep varies greatly from one individual to another
  - 6.5-9 hours/night
- Normal sleep includes several periods of light sleep or awakenings
  - Older adults have more awakenings
- Tinnitus doesn't usually wake people

## 2. Things That Affect Sleep

- Stress and emotions
- Environmental factors
  - Noise
  - Light
  - Temperature
- Irregular work schedules
- Learned sleeplessness patterns
- Jet lag/time zone changes

## Things That Affect Sleep, continued

- Physical conditions (sleep apnea, restless leg)
- Medications
- Caffeine (coffee, tea, cola, chocolate)
- Nicotine (smoking)
- Alcohol (excessive)
- Tinnitus

## 3. Daytime Activities to Facilitate Sleep

- Avoid napping
  - Don't modify behavior after a poor night of sleep
- Get regular exercise
  - 3-4 hours prior to sleep
- Lead life as normally as possible, even if tired

## 4. Evening Activities to Facilitate Sleep

- Create a curfew separating day and night
  - At least 1 ½ hours before bedtime
- After that time, avoid:
  - Stress
  - Exercise
  - Eating
  - Alcohol
  - Caffeine

## 5. Preparing for Sleep

- Listen to low-level background sound
  - Fan, humidifier
  - Smartphone App
  - CDs, radio
  - Sound generator
- Helpful to control the level

continued

Choose soft,  
pleasant sounds  
you enjoy

- Music
  - Calm, soothing, steady, classical
- Sounds of nature
  - Waves, rain
- Broadband noise
  - 'ssshhh'

continued

## Sound and Your Sleeping Partner

- Play sound that you both agree is pleasant
- Use a pillow loudspeaker that only you will hear
- You can go to sleep first listening to sound that turns off with a timer

continued



continued

## 5. Preparing for Sleep with Relaxation

- Techniques:
- Progressive muscle relaxation
- Visual Imagery

continued

## Progressive Muscle Relaxation

- Learn to systematically tense and relax groups of muscles
- With practice, you will recognize a tensed muscle vs. a relaxed muscle
- This skill allows you to produce physical muscular relaxation at the first signs of tension

## Progressive Muscle Relaxation- Practice Exercise

1. Start with your arms
2. Make a fist and tense your arms for 15 seconds
3. Release the tension
4. Breathe deeply and pay attention to the sensation of your arms relaxing

## Visual Imagery - Practice Exercise

1. Close your eyes
2. Think of a relaxing scene (the beach)
3. Try to imagine the scene as clearly as you can
4. The smell of the water, warm sand on feet, sound of ocean
5. Allow yourself to relax as you imagine the location in your mind

## 8. Activities

- What things may be affecting your sleep?
- Could you change your activities or arrange your bedroom differently to improve sleep?
- Utilize the daytime and evening activities to facilitate sleep
- Prepare for sleep using relaxation techniques and background sounds
- Maintain a sleep diary if problems persist

## Tinnitus Activities Treatment Concentration Session

## Overview

1. Things that affect concentration
2. How tinnitus affects concentration
3. Strategies to improve your concentration

## 1. Things That Affect Concentration

- The environment:
  - Noise
  - Distractions
  - Temperature
  - Lighting

## Your Concentration

- What problems with concentration do you have?
- How do you feel about not being able to concentrate?

Concentration

101

## 2. How Tinnitus Affects Concentration

- We perform best when we focus on one thing at a time
- We can multi-task, but we are less efficient
- When we focus attention to our tinnitus, it is harder to concentrate on other things

### 3. Strategies to Improve Concentration

1. Interpret tinnitus as not important
2. Eliminate distractions
3. Stay focused
4. Adjust work habits
5. Decrease prominence of tinnitus
6. Take control of your attention

### 1. Interpret Tinnitus as Not Important

- Tinnitus is not threatening your health or hearing
- Tinnitus is the result of increased spontaneous activity
- If tinnitus is important, it will be monitored
- When you decide tinnitus is not important, you can begin to not attend to it

### 3. Stay Focused

- Actively participate
- Take notes
- Ask questions
- Repeat information
- Organize and categorize important points

### 5. Decrease Prominence of Tinnitus

- Use background sound in the environment
- If you have difficulty concentrating at work, try playing background music or sounds

## 6. Take Control of Your Attention

- The focus of our attention is largely under voluntary control
- You can learn to control the focus of your attention under various conditions
- By bringing the focus of attention under control, tinnitus-related distress will be reduced at certain times

## Attention Control Exercises

- Learn to switch attention from one stimulus to another (e.g. object, sensation, thought, activity) at will
- Allows you to refocus your attention from your tinnitus onto other stimuli



## Visual Attention Example

- Focus on a nearby object (pen, book)
- Study that object
- Now switch your attention to looking in the distance (e.g. out the window, down the hall)
- Switch back and forth between the two several times
- Notice that you can choose which item you visually pay attention to while ignoring other things around you

## Sound Attention Example



1. Listen for a prominent sound around you (e.g. people talking, heater noise)
2. Now listen to a different sound in the room
3. Continue to try and focus on certain sounds while ignoring other sounds around you

## Sound and Tinnitus Example

1. Pay attention to a sound in the room (e.g. background music, heater noise, etc.)
2. Now switch your attention to listening to your tinnitus
3. Switch back to listening to the sound in the room and ignore your tinnitus
4. Practice paying attention to other sounds while ignoring your tinnitus

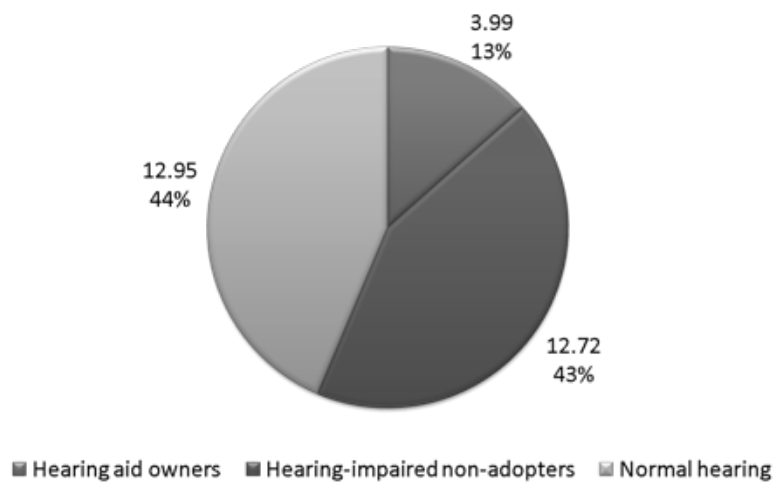
## Activities

- Remember to use background sound to make tinnitus less prominent
- Practice attention control exercises
  1. Visual
  2. Sound
  3. Sound plus tinnitus
  4. Sound plus reading

# HEARING AIDS FOR TINNITUS

Rich Tyler

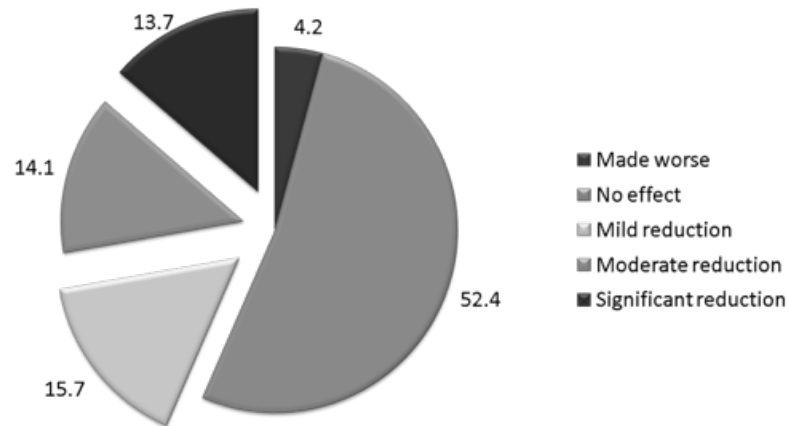
Tinnitus population (millions, 2008)



Kochkin, Tyler & Born (2011)

continued

Direct Query on Hearing Aids.  
Effectiveness in mitigating effects of tinnitus (n=1,314)



Kochkin, Tyler & Born (2011)

continued

## Hearing Aids

Could help tinnitus because:

- Improve Communication
  - Therefore Reduce Stress
- Amplify Background Sound
  - distraction/partial masking

continued

## Typical assumption for hearing aids

- Background noise is undesirable
- Therefore
  - Noise reduction circuits
  - Focused directionality microphones
  - Do not amplify low level sounds as much as high level sounds (input output function)

## But : HA Fitting with tinnitus patients

- Tinnitus
  - Low-level noise likely desirable
    - Amplify low level everyday sounds
    - Do not attenuate low-level sounds

## General approach for fitting hearings for tinnitus

- Best fitting possible for communication
  - Reduce stress, enjoy life
- Low-level noise desirable
  - Amplify low level everyday background sounds
  - Do not attenuate low-level everyday background sounds
- **Cannot Determine Effectiveness In Sound Proof Room**

## Fit hearing aids to enable environmental sound to partially mask

- Open ear molds to allow background sound
- No directional microphones
- Higher gain at low levels
- No noise reduction
- Consider Extending Low Or High Frequency Range Of Amplification
- Different programs for
  1. tinnitus reduction
  2. maximizing speech understanding

continued

## Post Masking Effects of Hearing Aids (and maskers)

- Acoustic stimulation can reduce the magnitude of the tinnitus after the hearing aids are turned off!!!
- Can be for minutes or hours in different patients

continued

## 1 or 2 hearing aids for tinnitus?

- two hearing aids almost always better hearing
- Increase chance of benefit for tinnitus, even in unilateral tinnitus
  - (Erdman and Sedge, 1981; Coles, 1987)

continued

continued

## Hearing aids can make tinnitus worse !!

- Does not happen very often
  - 1 in 100 ???
- During HA use or after removal
- Amplified sound exacerbates tinnitus
- Turn gain down, reduce maximum output
  - Over several months, increase gain
- Tactile sensation around ear could make tinnitus worse
  - Try alternative aid/earmold strategies

continued

## Tinnitus Sound Therapy

Rich Tyler

continued



## Treatment developed

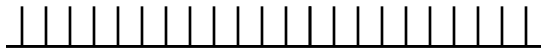
- Vernon (1984)
  - wearable devices
  - Total masking; but patient must decide on actual level so not disturbing

## Neurophysiological Models

- Tinnitus result of changes in spontaneous activity
- Can reduce prominence of abnormal spontaneous activity by adding noise

Low level noise makes tinnitus more difficult to detect  
(from Tinnitus Activities Treatment)

Tinnitus



Low Level  
Noise



Tinnitus in  
Low Level  
Noise



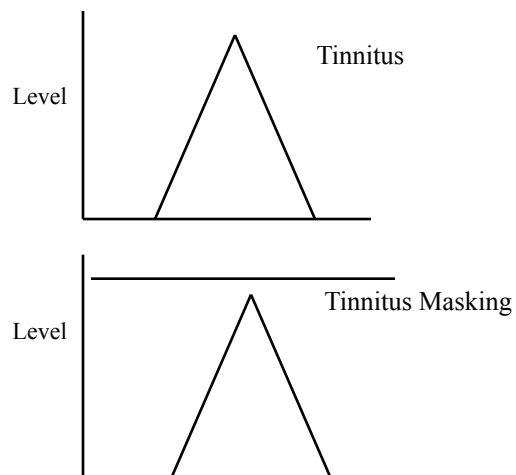
## Differences among Sound Therapies

- Level
- Sound quality
- Philosophy
  - Tinnitus or reaction to tinnitus
- Mechanisms
  - Line-busy, brain remapping....

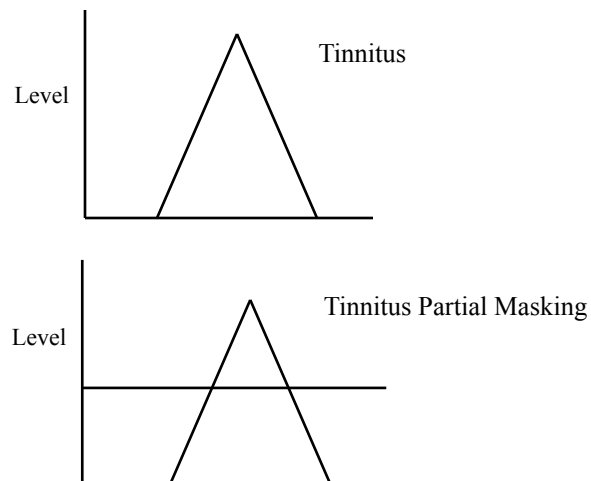
## Level of the background sound

- Total masking
  - covers tinnitus completely
  - person hears a 'masker' instead of their tinnitus
  - Effective for some
- Partial masking
  - tinnitus and the acoustic sound can be heard
  - reduces the prominence and/or loudness

## Complete/Total Masking



## Partial Masking

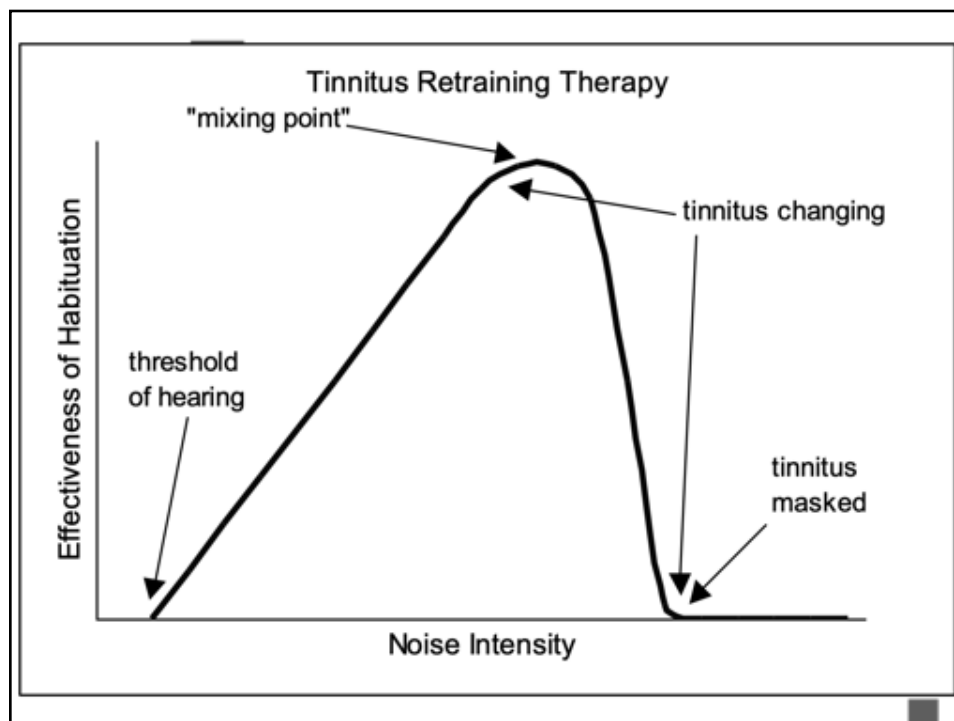


## Partial Masking

- good if bothered by higher-level noise or if complete masking requires high levels
- Caution, perception of noise often adapts, don't want the patient 'chasing after the noise' and raising the level

## “Mixing Point”

- Jastreboff (1995) “where the patient perceives that the tinnitus sound and the external sound start to mix or blend together” (Tinnitus Retraining Therapy).



## Tinnitus Activities Treatment

- Mixing point too loud for most patients
- Mixing point should **not** be the goal in Partial Masking
- Use lowest level that is effective
- Some prefer total masking
- Mixing point is not superior to total masking
- Tyler, R., Noble, W., Coelho, C., & Ji., H. (2012). Tinnitus Retraining Therapy: Mixing Point and Total Masking Are Equally Effective. **Ear Hear** 33(5):588–594

## Sound Therapy Stimulus Options

- Broadband noise
- Noise modifying spectrum
- Noise modifying envelope
- Combined tones, modulated tones
- Music, processed music
- Spectrally adjusted sounds to account for the audiogram
- Notch noise or music around pitch match

continued

## Fitting considerations

- Broadband noise easier to listen to than narrowband noise
- Sound usually does not have to overlap the tinnitus pitch
- Can present in contralateral ear in some patients
- Try monaural and binaural fittings
- Use low-level stimuli to reduce speech interference, less likely to enhance tinnitus

continued

## Do NOT use Tinnitus Sound Therapy

- If noise makes tinnitus worse
- (acclimatize to noise first at low level for brief interval )
- If have hyperacusis (treat first)
  - Hyperacusis Activities Treatment

continued

## ONE OR TWO MASKERS?

- If only 1 device
  - Fit worst tinnitus ear first
  - Consider trying both ears
- 2 devices
  - Likely if tinnitus in the head or binaural
  - Might need even with unilateral tinnitus
- try all possible combinations, noting levels that are effective

## TINNITUS HEARING-AID MASKER COMBINATIONS

- fit hearing aid first
- add in just the amount of noise needed
- re-adjust hearing aid or start over again if needed
- inform for patient always to turn on hearing aid first



## Non-wearable maskers

- Locations
  - Office/workspace/home
  - Bedroom for sleep – leave on all night
    - Including in or under the pillow
- Device options
  - Specialty instrument
    - Plays ocean waves, rain on leaves, etc
  - Music player
    - Radio, cell phone, compact disc player
  - Household appliances
    - Fan, detuned radio

## Conclusions

- Wide variety of sound therapies
- Should always be combined with counseling
  - e.g. Tinnitus Activities Treatment
- Low levels partial masking best for most patients
- Preference for quality of sound varies widely across patients (give them options!)

# “Hyperacusis Activities Treatment”

Richard Tyler  
University of Iowa

## Terminology

- Loudness Hyperacusis
  - Some moderately loud sounds are very loud
- Annoyance Hyperacusis
  - Some sounds are annoying (not always loud)
- Fear Hyperacusis
  - Patients are afraid of some sounds (not always loud)
- Pain Hyperacusis
  - Sounds evoke pain sensation

## Other Terms

- Hypersensitivity
- Select-sound sensitivity
  - Sensitivity refers to threshold
- Misophonia
  - Dislike of sounds

## Less confusion if

- Choose simple terms with clear distinct definitions
- Avoid temptation for everyone to make up new terms

## Terminology

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## Hearing Aids

- Hearing aids (with closed canal earmolds) can reduce sound by (at most) ~ 30 dB
  - Reduce maximum output of hearing aids so that high level sounds are peak-clipped or compressed
  - Adjust input/output (gain) so that low-level sounds are amplified, but not high-level sounds
  - Followed by gradual transition (over months) to 'normal'
- 
- Sammeth, C. A., Preeve, D. A., and Brandy, W. T. (2000). Hyperacusis: Case studies and evaluation of electronic loudness suppression devices as a treatment approach. *Scandinavian Audiology*. 29, 28-36.

## Sound Therapy Treatments

- Hazell & Sheldrake (1989, 1992)
  - Continuous bilateral exposure to low level background noise
- Vernon & Press (1998)
  - Gradual exposure to noise, 2 hours/day under earphones
- Tyler et al. (2000, 2009)
  - Successive approximations of individual bothersome sounds

## Tyler et al. (2000, 2009)

- Record specific sounds bothering an individual
- Play sounds at low level under controlled, peaceful environment
- Over time, increase level and duration
- use successive approximation to move toward actual realistic situation where bothersome sounds occur