Tinnitus Activities Treatment and Mindfulness

Richard Tyler
The University of Iowa

• What is it like to have tinnitus?
What if you heard a sound that wasn’t supposed to be there?

- Unpleasant
- No control over it
- No cure!
- Nobody understands!
- Sign of serious illness?
- There for life?

DEFINITION OF TINNITUS
(AFTER McFadden, 1982)

- PERCEPTION OF SOUND
  - must be heard
- INVOLUNTARY
  - not produced intentionally
- ORIGINATES IN HEAD
  - not super hearing of an external sound

- Tinnitus is a symptom, like hearing loss

Other Considerations

- FREQUENCY OF PERCEPTION
  - Needs to be ‘often’ to be a problem
- MAGNITUDE OF DISTRESS
  - Degree of impact on life
Categories of Tinnitus

- Middle ear
  - Originates in the middle ear
- Sensorineural
  - Originates in the sensorineural system
- Parallels how we diagnose and treat hearing loss

Other Categories of Tinnitus

- Objective (really means Middle ear)
  - “objective” because it can be heard, but some spontaneous otoacoustic emissions from cochlear can be objectively measured
- Subjective (really means Sensorineural)

SENSORINEURAL TINNITUS

- COCHLEAR
  - VASCULAR
  - MECHANICAL
  - SENSORY
  - NEURAL
- RETROCOCHLEAR
  - NEURAL
  - BRAINSTEM
  - CENTRAL
Physiological Models of Tinnitus

- Perception, must be in Temporal Lobe
  - Increased spontaneous activity
    - fed by increase, decrease, or edge
  - Cross-fiber correlation
    - normal or increased spontaneous activity (Eggermont, Moller)
    - More fibers with similar best frequency following hearing loss (Salvi et al.,)
- Reaction to Tinnitus
  - Amygdala, autonomic nervous system

Theories of Tinnitus

- Increased spontaneous activity

<table>
<thead>
<tr>
<th>Hearing Nerve</th>
<th>Normal Spontaneous Activity</th>
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<tbody>
<tr>
<td>'Table'</td>
<td>Normal Perception of Sound</td>
</tr>
<tr>
<td>Quiet with lots of random activity</td>
<td>Activity is heard (tinnitus)</td>
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</table>

  | No external sound - Tinnitus |

Theories of Tinnitus – cross fiber correlation

  | Normal Unrelated Activity |
  | Related Activity Across Nerve Fibers |
**Auditory Brain Reorganization After Hearing Loss**  
*(AFTER SALVI, LOCKWOOD AND BURKARD)*

- Hair cells destroyed
- Corresponding silent regions in brain
- After months, silent neurons respond in normal way, but to same frequencies as adjacent regions
- Over-representation of these frequency regions in brain

*after Salvi, 2000*
Tinnitus Perceived
Stouffer and Tyler, 1990

• Unilateral 37%
• Bilateral 52%
• Head 10%
• Outside 0.6%

Davis and Rafiee (2000)

Table 3.1: Prevalence of Self-Reported Tinnitus in Adults by Decade of Life from Several Population-Based Epidemiologic Studies

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<td>9.0</td>
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<td>5.1</td>
<td>5.7</td>
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<td>6.9</td>
<td>5.2</td>
<td>5.1</td>
<td>5.7</td>
<td>6.2</td>
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No. in Study: 54,930

Hoffman and Reed (2004)
PREVALENCE OF TINNITUS
(Medical Research Council, 1987)

- 15% lasting more than five minutes
- 8% interferes with getting to sleep
- 0.5% severe ability to lead normal life
- Presence of noise exposure doubles likelihood of tinnitus at any age and for both genders

![Pie chart showing tinnitus population](Kochkin, Tyler & Born (2011))

Patients who adapt to tinnitus

- Initially
  - concern and distress
- Short term
  - Questions, coping strategies
- Long term
  - Attentiveness declines
  - Focus on other aspects of life
  - Occasional awareness
  - Maybe older, gradual onset, known cause
Current Medical Treatments

- At this time, there are no widely accepted cures for tinnitus,
- There are no studies that have shown a cure that have used appropriate research designs and have been replicated by others

Medications OK for

- Anxiety
- Depression
- Sleep
The Measurement of Tinnitus

- Tinnitus
  - Pitch, Loudness, Masking
- Reaction to tinnitus
  - Primary and secondary

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**TINNITUS ANNOYANCE**

**TINNITUS CHARACTERISTICS**
- Pitch
- Loudness
- Duration
- Quality

**PSYCHOLOGICAL CHARACTERISTICS**
- Familiarity of sound
- Stress
- Health
- Habituation

Dauman, R. and Tyler, R.S. (1992)

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**PITCH**

- Adjust my tone so that it has the same pitch as the most prominent pitch of your tinnitus
- Method of limits, or adjustment or an adaptive method
- Test in ipsilateral or contralateral ear
- Test with monaural stimuli
- Can be highly variable
LOUDNESS

- Adjust my tone so that it has the same loudness as your tinnitus
- Methods of limits, adjustment or an adaptive method
- Test in ipsilateral with monaural stimuli

- Sensation level is not loudness

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Vernon and Meikle (2000)

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MASKING

• Adjust my noise so that it just covers your tinnitus
• Methods of limits, adjustment or an adaptive method
• Can test with monaural or binaural stimuli
• Can test in ipsilateral or contralateral ear

CLINICAL APPLICATIONS OF MEASUREMENTS

• patient knows you understand
• quantify change
• pitch, loudness, minimum masking level

4 possible primary areas involved

—What are they???
4 possible primary areas involved

– Emotional
4 possible primary areas involved
- Emotional
- Hearing

4 possible primary areas involved
- Emotional
- Hearing
- Sleep

4 possible primary areas involved
- Emotional
- Hearing
- Sleep
- Concentration
**Tinnitus Questionnaires**

**Open-ended questionnaire**
(Tyler and Baker, 1983)

- Please list the difficulties you have as a result of your tinnitus
- List them in order of importance
- Allows them to list what is important to them

**Tinnitus Handicap Questionnaire**
(Kuk, Tyler, Russell, & Jordan, 1990)

- Validated n= 275
- 27 items, scored from 0-100
- Used worldwide, translated in many languages (Google Iowa tinnitus)
- Validity & reliability independent verified by Newman et al (1996) and Dauman et al. (1998) in French
- Designed to test treatment effectiveness
Tinnitus Functional Index

• Meikle et al. (2012)
• Validated on 30 questions
  – Recommended 25
• Scored 0-10
• 8 factors
• Over past week
• Includes 4 questions on Quality of Life

Tinnitus Functional Index

• General question
  – Do you feel in control in regard to your tinnitus?
• Quality of Life
  – How much has your tinnitus interfered with
    • your enjoyment of social activities?
    • Your relationships with family, friends and other people?

Problems Resulting from Tinnitus
Tinnitus Primary Activities Questionnaire

- Four categories (5 questions per area)
  - Thoughts and emotions, hearing, sleep, concentration
- e.g. “I have difficulty focusing my attention on some important tasks because of tinnitus”
- Currently under review
- Scoring form available
  - Search “Iowa Tinnitus"

Evaluation Strategy

1. Be a good listener
2. Understand individual patient needs and expectations.
3. Nurturing patient expectations
Be a good listener

- Understand the whole patient
- Overall well being
  - Where is the patient at
- External circumstances
  - Support system, lack of understanding?
- General emotional and physical health

Understand individual patient needs and expectations.

- Reasonable to have strong negative reaction
- Previous therapies tried?
- Expectations from you?

- Individuals experience different difficulties...

Three responses to tinnitus

- Defeat
  - overwhelmed
- Control
  - Some habituation
  - Wishing for it’s cessation
- Accept
  - habituate
Nurturing Expectations to Help Tinnitus Patients


Expectations

• Negative
  – Less likely to seek and benefit from treatment
• Positive
  – More likely to engage in treatment and be helped
• Patient expectations are influenced by YOU

Being Perceived as a Knowledgeable Professional

• confidence in therapist and self-confidence
• well educated, degree
Demonstrate That You Understand Tinnitus

- articulate, professional, well educated with respect to tinnitus
- knowledgeable about tinnitus
- has previous successful experience with tinnitus patients

Provide a Clear Therapy Plan

- feelings of mastery - can influence outcome
- hope that patient can be helped
- provide a plan to reduce effects of tinnitus
- make patient key part of the plan
- have patient participate in designing plan

Be Sympathetic Towards the Individual

- Understand their tinnitus and the personal problems that have resulted from it
Show that You Sincerely Care

• Take time to listen
• Schedule follow-up visit
• Call if questions or difficulties arise

Counseling for Tinnitus

Rich Tyler, Ph. D.

Theoretical approaches to counseling for tinnitus

• Cognitive
  – inappropriate ways of thinking about tinnitus
    • Sweetow (1984a,b), Andersson and Kaldo (2006), Hallam and McKenna (2006)
• Attention
  – Failure to shift attention away from tinnitus
• Learning
  – Responses to tinnitus are learned
• Fearfulness
  – Afraid it will never go away (continuous anxiety)
• Loss of locus of control
  – Patient has no control over tinnitus and life
• Acceptance
  – Tinnitus is part of me, I own it (Mohr, 2006)
Counseling Therapies for Tinnitus

• Lindberg et al. (1984) coping
• Hallam (1987) habituation
• Sweetow (1984) cognitive behavior therapy
• Henry and Wilson (2000) cognitive behavior therapy
• Tyler et al. (1999) Patient Expectation Nurturing
• Tyler & Erlandsson (2002) Refocus Therapy

Changing Thoughts

• reassurance
• common problem
• many known causes (e.g. noise exposure)
• not a health risk
• lots of people have enjoyable lives with it
• follow-up care available

Changing behavior

• Refocus
• Activities replacement
• Managing stress
  – Relaxation
Differences Among Procedures

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Tyler and Babin (1986, 1993)

- Counseling and Sound Therapy
  - Consider all difficulties of that patient
  - Information about tinnitus
  - Provide reassurance
  - Include family members
  - Sleep counseling
  - Hearing aids, partial and total masking

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Cognitive Behavioral Therapy
Henry and Wilson (2000, 2001)

- Reducing general arousal, tension or discomfort
- Cognitive restructuring
- Attention direction processes
- Stress management
- Coping
  - Modification of avoidance behavior

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Event | Belief | Result
--- | --- | ---
Waiting for a friend who is late | She doesn’t care | Depressed
Can’t wait to see her | Excited
Hope she is OK | anxious

Counseling for Tinnitus

- Patient expectation nurturing
- Counseling
  - Providing information
  - Changing thoughts about tinnitus
  - Changing behavior

Providing information

- Hearing
- Hearing loss
- Tinnitus epidemiology
- Tinnitus mechanisms
- Central nervous system
- Habituation
- Attention
- Learning
- Sleep
- Concentration
- Auditory training
- Lifestyles
- Self image
- Treatment options for hearing loss
- Treatment options for tinnitus
### Counseling beyond information

- Listening to the patient
- Individual patient needs
- Nurturing expectations
- Consider emotional problems related to tinnitus
- Sleep management
- Change attitude and self-esteem
- Diversionary tactics (attention)
- Coping strategies

- Relaxation
- Modifying the environment
- Consideration all problems (e.g. relationships)
- Reassurance
- The use of diaries
- Activities
- Lifestyle changes (being positive and active)
- Stress management

### Simple Reassurance

- Common problem
- Many known causes (e.g. noise exposure)
- Not a health risk
- First 6-12 months are worst
- Distressed reaction is normal/OK
- Lots of people have enjoyable lives with it
- Follow-up care available

### Changing behavior

- Refocus
- Activities replacement
- Managing stress
  - Relaxation, meditation, yoga, mindfulness…
Tinnitus Activities Treatment

- Collaborative
  - Determine needs and understanding individual patient
- Uses Tinnitus Masking Therapy
  - Low levels of partial masking
- Include Activities, Coping / Management Strategies
- Programmatic counseling in 4 areas
  - Thoughts and emotions, Hearing, Sleep, Concentration

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Picture-Based Tinnitus Activities Treatment Counseling (provided on our website)

- A series of pictures that can help with your counseling session
- Provide orderly fashion
- Not overlook important concepts
- Easier for the patient to understand concepts

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Counseling Sessions

- Introduction
- Session 1
  - Thoughts and Emotions
  - Give Activities (e.g. diary)
- Session 2
  - Review of Session 1 Activities
  - Hearing and Communication
  - Give Activities

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Counseling Sessions

- Session 3 (optional)
  - Review of Session 2 Activities
  - Sleep
  - Give Activities (e.g. diary)

- Session 4 (optional)
  - Review of previous Session Activities
  - Concentration
  - Give Activities

Counseling Sessions

- Summary Session
  - Review of previous Session Activities
  - General overview
  - Questions?
  - Relapse prevention

Emotional Well-Being
Overall Plan

1. Your story
2. Information about hearing loss, tinnitus, and attention
3. Ways to make tinnitus less prominent
4. Changing things to manage better
5. Review of action plan

Where do you want to start?

What do you think caused your tinnitus?
How has tinnitus influenced your life?

![Illustration of a person with a chart]

How do you think we might be able to help you?

![Illustration of a doctor helping a patient]

Tinnitus is an Increase in Spontaneous Nerve Activity

<table>
<thead>
<tr>
<th>Condition</th>
<th>Activity Level</th>
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<tbody>
<tr>
<td>Normal Hearing</td>
<td>![Silence Chart]</td>
</tr>
<tr>
<td>Hearing Loss</td>
<td>![Silence Chart]</td>
</tr>
<tr>
<td>Tinnitus</td>
<td>![Sound Chart]</td>
</tr>
</tbody>
</table>
3. Factors that Affect Communication

- Hearing loss
- Background noise
- Ability to see the talker
- Familiarity with talker
- Familiarity with topic of discussion
- Stress level
4. How Tinnitus Can Affect Hearing

- Tinnitus is not damaging your hearing
- When you focus on your tinnitus, it is harder to attend to your communication partner
- Tinnitus might make some sounds difficult to hear

5. Strategies to Improve Hearing and Communication

1. Amplification
2. Reducing background noise
3. Watching faces
4. Using ‘repair’ strategies
5. Positively influencing the communication situation

Activities

- Utilize the strategies discussed to improve hearing and communication.
  - List the most difficult listening situations for you
    1. ____________________________
    2. ____________________________
    3. ____________________________
  - What can you do to improve those listening situations?
    1. ____________________________
    2. ____________________________
    3. ____________________________
  - What can you do to reduce the background noise?
    1. ____________________________
    2. ____________________________
    3. ____________________________
Sleep

Normal Sleep Patterns

- Adults need an average of 8 hours a night
- Amount of sleep varies from one individual to another
- The best sleep consists of uninterrupted sleep

Things That Affect Sleep

- Stress and emotions (e.g. depression, anxiety)
- Environmental factors
  - Noise
  - Light
  - Temperature
- Irregular work schedules
- Jet lag/time zone changes
Progressive Muscle Relaxation (PMR)

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

Concentration

C. Things That Affect Concentration

- The environment
  - Noise
  - Distractions
  - Lighting
  - Temperature
- Your physical state
  - Hunger
  - Tiredness
  - Current health status
E. Strategies to Improve Concentration

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

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 (e.g. object, sensation, thought, activity) to another at will
• Allows you to refocus your attention from your tinnitus onto other stimuli, external or internal
Visual Attention Example

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

Sound Example

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

Self Help books for Tinnitus
homework assignments

• Give at least one example of the link between a situation–thought–emotion

  Event: waking up in the middle of the night
  Thought: I’ll be exhausted tomorrow!
  Emotion: worry, frustration

  Event: waking up in the middle of the night
  Thought: I’ve only had 4 hours of sleep, but I used to do this in college/when my children were young, I’ll survive
  Emotion: less uptight

GROUP SESSION

• Sample slides form our
• Once a month
• Partners welcome
• 6-10 people
• Leader (you) must be in charge!

Overview

• Introductions
• Hearing
• Hearing loss
• What is tinnitus
• Treatments for tinnitus
• Our options – counseling and sound therapy, hearing aids, tinnitus devices
• Self help
Introductions

• Your first name
• What your tinnitus sounds like
  – (e.g. ringing, humming)?
• How long have you had tinnitus?

Nerve activity carries information to the brain
What is tinnitus

- Causes
- Prevalence
- Mechanisms
What do you think caused your tinnitus?

There are many different causes of tinnitus:
- Head Injury
- Medications
- Noise
- Age
- Unknown?
- Disease

Tinnitus is Common
- 10 in 100 (10%) people have tinnitus
- 1 in 100 (1%) people are bothered by their tinnitus
- 20 in 100 (20%) people over 60 years old have tinnitus
Nerve activity carries information to the brain

Tinnitus is likely the result of an increase in spontaneous nerve activity

Tinnitus Does Not

- Make you deaf
- Lead to senility
- Imply a sign of mental illness
Reactions to tinnitus

- What is the biggest problem you have that you believe has resulted from your tinnitus?

- Thoughts and emotions
- Hearing difficulties
- Sleep
- Concentration

Treatments for tinnitus

- What have you tried?
- What has been successful?
Treatments

- At this time, there are no widely accepted cures for tinnitus,
- There are no studies that have shown a cure that have used appropriate research designs and have been replicated by others

Excellent options –

- Counseling and Sound Therapy
- Individualized Tinnitus Activities Treatment
- Hearing Aids
- Tinnitus Devices
Tinnitus Activities Treatment

• Individualized
• Focus in areas of
  – THOUGHTS AND EMOTIONS,
  – HEARING,
  – SLEEP,
  – CONCENTRATION
• Activities reviewed, homework assigned

Our Thoughts and Emotions

Do any sounds make your tinnitus less noticeable?
**Sound Therapy**

- **Hearing Aids**
  - Improve hearing
  - Improve communication
  - Reduce stress of intensive listening
  - Hearing aids often help tinnitus
    - Less stress, facilitates positive reactions to tinnitus
    - Background noise creates partial masking
  - Our hearing aid center provides excellent service

**Sound Therapy Options**

- **Non-wearable sound**
  - demonstration

- **Wearable options**
  - Hearing aids
  - Noise generators
  - Tonal sound generators
  - Processed music

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Low level noise makes tinnitus more difficult to detect

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<tr>
<th>Tinnitus</th>
<th>Tinnitus in Low Level Noise</th>
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Summary

- Hearing loss and tinnitus are related
- Tinnitus is a change in spontaneous activity
- There is no cure for tinnitus
- Options include
  - counseling and sound therapy,
  - hearing aids,
  - tinnitus devices
How do you want to manage your tinnitus?

1. Focus on other areas of your life and put tinnitus in the background.
2. Use low level sound in your environment (sound machine, CDs, television, etc)
3. Use wearable tinnitus noise generators
4. Undertake tinnitus counseling with an expert
5. Use hearing aids (in the case of tinnitus and hearing loss)

HEARING AIDS FOR TINNITUS

Rich Tyler

Hearing Aids for tinnitus

First recommended by
SALTZMAN & ERSNER (1947)
Surr et al. (1985)

- 124 new hearing-aid users
- Tinnitus
  - Reduced 25%
  - Eliminated 29%
  - Became Worse 5%
- 7% Benefit after turning aid off

Kochkin, 2007

Reasons people have not obtained hearing aids

Kochkin, Tyler & Born (2011)
Figure 3. Impact of tinnitus on quality of life (n=3,431)

Kochkin, Tyler & Born (2011)

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

Kochkin, Tyler & Born (2011)

Direct Query
How often hearing aids are effective in mitigating effects of tinnitus (n=553)

Kochkin, Tyler & Born (2014)

1. Audiologically proven hearing loss presenting to a tinnitus clinic before and after hearing aid provision
3. 2153 consecutive patients attending a consultant-delivered specialist tinnitus clinic

MAIN OUTCOMES MEASURES:
1. A visual analogue scale

RESULTS:
1. 1440 patients were given hearing aids (826 unilateral and 614 bilateral)
2. No difference in tinnitus perception
3. 554 (67 per cent) of unilaterally aided patients
4. 424 (69 per cent) of bilaterally aided patients reported some improvement in tinnitus

Searchfield GD, Kaur M, Martin WH. 2010

Figure 4. Change in THQ scores for each factor and the total THQ (consulting group: open bars; HA group: filled bars). The scores for the treatment groups were statistically similar across the THQ scales.

Kochkin, Tyler & Born (2011)

Figure 6. Tinnitus mitigation with hearing aids segmented by best practice hearing aid fitting score in quintiles where Q1=bottom 20% of practices and Q5=top 20% of practices (n=732)
Hearing Aids could help tinnitus because:

• Improve Communication
  • Therefore Reduce Stress
• Amplify Background Sound
  • external low-level sounds
    (distraction/partial masking)
• Produce Noise,
  • therefore Partial Masking

Typical assumption for hearing aid fitting

• 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)

General assumptions

• Tinnitus
  – Low-level noise desirable
  • Amplify low level everyday sounds
  • Do not attenuate low-level sounds
• In contrast to hearing loss without tinnitus
  – Low-level noise undesirable
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 aid to enable environmental sound to partially mask
- Use Open ear molds to allow background sound
- Widely focused directional microphones
- Higher gain at low levels
- No noise reduction
- Consider Extending Low Or High Frequency Range Of Amplification
  – Perhaps have a “tinnitus program” in multi-memory hearing aids

Hearing aids for those with mild hearing loss

• Many experience tinnitus reaction benefit when using hearing aids
• Marginal hearing aids candidate often consider hearing aids for tinnitus
• Many report benefit
• Good to get patients experienced using hearing aids
Occasional Dilemma:

Maskers or hearing aids plus maskers?

Hearing aids can make tinnitus worse!!

- Does not happen very often
  - 1 in 100?
- Amplified sound exacerbates tinnitus
- Turn gain down, reduce maximum output
- Tactile sensation around ear could make tinnitus worse
  - Try alternative aid/earmold strategies

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)
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

Other hearing assistance strategies

• use assistive listening devices, Frequency Modulation (FM) or loop system to provide background sound to patient but not to others in room
• Improve hearing ability and might help with tinnitus

Summary- Hearing aids for tinnitus

• All benefits of hearing aids!!!!
  – Improve communication
  – Stress reduction
• Amplification of background sounds can reduce tinnitus
• Possible relief after hearing aid use
Suggested Readings


Tinnitus Sound Therapy

Rich Tyler

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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)

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Psychological Mechanisms

- Attention Model
  - Distract from tinnitus
  - Compete with tinnitus
  - Decrease prominence
- Habituation Model
  - Continuous, unimportant

Copyright Richard S. Tyler

Tinnitus Activities Treatment

- Decrease the prominence
  - For thoughts and emotions
  - For sleep
  - For concentration
    - e.g. in office, when reading
- Broadband noise easier to listen to than narrowband noise, single steady-state tones
Treatment developed

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

Coles et al., 1987

- Tinnitus Masking Therapy relies greatly upon the major element of psychological support
- Use masker about 6 hours/day whether or not tinnitus audible
- Start before it becomes the usual most troublesome time

Masker counseling

- Always combine with counseling
- Beneficial long-term effects
  - During masking - less attention on tinnitus
  - After masking – less troublesome
  - Helps to break ‘vicious cycle’
    - Can move on to life without focus on tinnitus
  - Not just immediate effects, some adapt 2-3 months later
Determine who is appropriate for Tinnitus Sound Therapy

- Do not use Tinnitus Sound Therapy
  - If noise makes tinnitus worse (try to acclimatize to noise first)
  - If have hyperacusis (treat first)
  - If do not have troublesome tinnitus

Differences among Sound Therapies

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

Wearable Devices

- portable music PLAYER
  e.g. IPod, mobile phone
- sound generators for tinnitus
- Hearing aids
- Combined sound generators + hearing aids
Tinnitus Activities Treatment

- Developed in 1990s
- Combines Cognitive Behavior Therapy, Existentialism, Acceptance, Relaxation
  1. Emotions
  2. Hearing
  3. Sleep
  4. Concentration


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

Partial Masking

- Tyler and Babin (1986) “both the noise and tinnitus are heard but the tinnitus is reduced in loudness”. Patients should “use the lowest level masker that provides adequate relief.
- Bentler and Tyler (1987) “urge the patient to use the lowest level of masker level that provides adequate relief”
• Tyler and Bentler (1987)
  • “sometimes a masker can reduce the tinnitus loudness or annoyance, even though the tinnitus remains audible.”
  • “partially mask the tinnitus yet produce the lowest SPLs and the least interference with speech.”

“Mixing Point”

• Coles (1987) “the masker can be turned up until its loudness is equal to that of the tinnitus, when the patient will often have to listen hard to hear the tinnitus.”
• Hazell (1987) tinnitus “just audible through the masking sound”.
• Jastreboff (1995) “where the patient perceives that the tinnitus sound and the external sound start to mix or blend together” (Tinnitus Retraining Therapy).
• Jastreboff and Hazell (2004)
  – Added ….“below the level creating annoyance or discomfort”

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
Complete/Total Masking

Partial Masking

Strength of Perception Depends on Contrast
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

Broadband Noise and Speech Shaped Noise

Noise to inversely match the audiogram
Amplitude Modulation (tones or noise)

Frequency Modulation

Adding tones – spa tones, Zen tones
Stage 1 – Processed Music inversely matched to audiogram + noise

Stage 2 – Processed Music inversely matched to audiogram

Okamoto H et al. PNAS 2010;107:1207-1210

frequency band 1-octave
centered at tinnitus pitch-match frequency removed

Background Music

- Easy to ignore
- Pleasant to listen to
- Avoid vocals
- Avoid loud background beating
- not captivating / interesting
- Music at low levels
Fitting considerations

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

Long-term benefit

• Masker benefit not just while using the maskers
• Relief provided by the masker helps to break the vicious cycle of tinnitus-stress
• Able to attend to other rehab strategies more easily even while the tinnitus masker is not worn
• Many can discontinue masker use after few months
26th Annual International Conference on Management of the Tinnitus and Hyperacusis Patient

June 14-15 2018

The University of Iowa

Diagnosis, Treatments, Medications, Psychiatry, Imaging, Surgery, Sound Therapy, Manufacturer Forum, Future
History (and Evolution) of Mindfulness

Purpose
• To find peace

Evolution of finding Peace
• Buddhism
• Hinduism
• Mantra
• Meditation
• Yoga
• Mindfulness
The problem

• We all have challenges

• Trouble !! – work, relationships, illness, stress,
• incessantly thinking about our issues, evaluating stress, planning defenses, projection,
• what went wrong in the past
• What can I do in future,

• What can we do to help ourselves?
• To reduce our stress....... 
• To help us relax 
• To help us manage 
• ............or....................

• To help us manage
  – Therapy

  OR

• To just relax, find peace, think about other things
Dalai Lama, 82-year-old Buddhist monk
Buddhism

- around 400-500 B.C. by Siddhartha Gautama in India
- Buddhism (4th largest religion)
- the path to enlightenment
- Now: Theravada Buddhism, Zen Buddhism, Tibetan Buddhism
- Dalai Lama, an enlightened teacher of Tibetan Buddhism.
- Mindfulness (Sati) is first step towards enlightenment in Buddhism.
Buddhism

• taking refuge in the Buddha,
• study of scriptures,
• observance of moral precepts, renunciation of craving and attachment,
• the practice of meditation (including calm and insight)
• ritual prayer and chanting

Hinduism
Hinduism

- Perhaps the oldest extant religion in the world
- Arose more than 4,000 years ago in the Indus Valley (now Pakistan).
- Evolved from Vedic writings
- Diverse roots
- Broad range of philosophies
- World’s third largest religion

Hindu beliefs

- Goals of life
  - Dharma (ethics/duties)
  - Artha (prosperity/work)
  - Kama (desires/passions) and
  - Moksha (liberation/freedom/salvation)
- Karma (action, intent and consequences)
- Samsara (cycle of rebirth)
- Yogas (paths or practices to attain liberation of soul from, ordinary mortal world)

Hindu practices

- Puja
  - Worship
  - Recitations
  - Meditation
Meditation

Meditation
• written or spoken discourse expressing carefully considered thoughts
• stress and tiredness can make us unhappy, impatient and frustrated; and result in ill health.
• We are so busy we feel there is no time
• Need to make our mind calmer and more focused.
• 10-15 minutes of breathing meditation can help overcome stress and find inner peace and balance
Transcendental Meditation

• for inner peace and wellness
• ''Simple, natural, effortless''
Maharishi Mahesh Yogi at Lake Louise, Canada 1968

- https://www.youtube.com/watch?v=RK1kbjiisLk
- Maharishi Mahesh Yogi at Lake Louise, Canada 1968

- students of Transcendental Meditation
• students of Transcendental Meditation

• John

• students of Transcendental Meditation

• John, Paul

• students of Transcendental Meditation

• John, Paul, George
• students of Transcendental Meditation

• John, Paul, George, Ringo
Mantra

- derived from the Sanskrit ‘manas’ -mind and ‘tra’ -vehicle or instrument.
- the awareness from the surface into the subtle, and then into the transcendent.
- vedic tradition -different mantras for very specific things.
- mantras with no meaning, just sounds, ... ‘sweet-flowing’ sounds

- the mantra
- causes your mind to gravitate towards it
- effortless
  — the mantras are doing the work.
- begin to silently repeat it inside your mind
- spontaneously get fainter, subtler,
- mind is focused inward into subtler states of awareness, deeper levels of mind and consciousness.
Vedic meditation

- one of the oldest, most effortless, and natural forms of meditation.
- Vedic ... knowledge.
- The Vedas are ancient Indian body of knowledge that is the source of Ayurvedic medicine, yoga, and Indian philosophy.
## meditation practices

- Contemplative
- concentrative
- some form of visualization or imagination or memory, evocation.
- concentrative technique will involve focusing or directing the awareness on something. It could be a candle. It could be the breath. Or it could just be being exclusively silent and watching against thoughts as they come into the mind.

## Meditation:

**concentrative**

- focusing or directing the awareness on something.
- a candle.
- the breath.
- Be silent

## effortless transcendence

- not trying to make the mind settle down.
- allowing it to spontaneously do so
- not thinking about thinking,
- transcending thinking
meditation

- sports,
  - Michael Jordan and his Chicago Bulls teammates “to meditate and win NBA championships”
  - NFL’s Seattle Seahawks, “won the Super Bowl in 2013 after spending spring training focusing on mantras like “Quiet your mind,” “Focus your attention inwardly,” and “Visualize success.””
Yoga

- physical, mental, and spiritual practices originated in India.
- Related to Hinduism, Buddhism, and Jainism.
- 1980s, yoga became physical exercise in the Western world.
- But... Yoga in Indian tradition,
  - more than physical exercise;
  - meditative and spiritual
Yoga

• awareness of one's body
• combination of physical and mental exercises
• the power to calm the mind and strengthen the body
• Poses
• move slowly through each pose
• Focus on breathing as you move.
• Pause after any pose
• hold each pose for a few seconds,
• slow breaths before moving on to the next.
And more...

- Animal Assisted Interventions,
- Therapeutic horse riding
- Sonic meditation

Mindfulness
Mindfulness
• a practice involved in various religious and secular traditions,
• from Hinduism and Buddhism to yoga and, more recently, non-religious meditation.

Mindfulness
• "Paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally"
Deep Breathing

Mindfulness

- paying attention in a particular way;
- on purpose,
- Without judgement
- in the present moment,
- bringing one’s attention to internal and external experiences

- keeping thoughts focused on the present moment
- choosing the thoughts I wish to think.
Mindfulness is a tradition

- history steeped in religious and, more recently, secular institutions.
- both the East and the West shows the universality of its teachings
- Can choose your starting point -- Hindu or Western

Mindfulness in daily practice

- noticing the little things.
- eat mindfully
  - savoring each bite, not eating quickly without truly tasting and exploring the food.
- During commute to work.... Listen – feel..
- Walking - intentionally notice details of buildings, people, flowers.....

Practice of mindfulness

- yoga practice that involves mindfulness.
- mindfulness in meditation sessions
- practicing mindfulness during every day activities
Mindfulness

- slow down and EXPERIENCE life.
- We CANNOT AVOID NEGATIVE ASPECTS
- fully live those experiences to learn to cope/exist with them in a healthy way.
- We cannot avoid challenges in life
- be aware of all our emotions,
- feel good and challenge parts of life
- Existing (coping) WITH what we first tried to avoid.
- Learn skills for dealing with the present and future negative challenges in all in our lives.

Mindfulness-Based Cognitive Therapy

- aimed at treating Major Depressive Disorder.
  - Mindfulness-Based Stress Reduction
  - mindfulness meditation

- can be practiced in many different ways for many different uses
• mindfulness-based cognitive therapy (MBCT)
• mindfulness-based relapse prevention (MBRP)
• mindfulness-based trauma therapy (MBTT),
• mindfulness-based eating awareness training (MB-EAT).

Mindfulness Fitness Training Institute
• provides courses to military personnel, law-enforcement officers, intelligence analysts and agents, firefighters, and emergency responders.
• “soldiers learning how to fire M-16s are being given mindfulness training to synchronize their breathing with squeezing the trigger”

https://www.pocketmindfulness.com/6-mindfulness-exercises-you-can-try-today/
Mindfulness

• "Paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally"
“A Unique Tinnitus Approach: Applying Mindfulness”

Richard Tyler
University of Iowa

Mindfulness

• "Paying attention in a particular way:
• on purpose,
• in the present moment, and
• nonjudgmentally"

Tinnitus Primary Functions Questionnaire
Mindfulness, the guided experience of focusing full consciousness,
• can often help tinnitus patients accepting their tinnitus experience.
• important to separate tinnitus from the reactions to tinnitus (Tyler and Dauman, 2000)
• The tinnitus is a sound, not a good or bad sound.

Mindfulness -change is not the issue,
• Perhaps indirectly change the attitude towards tinnitus;
✓ from being terrible or uncontrollable
✓ to background, OK and acceptance
• if patient can change their attitude to life
  – tinnitus could move to the background and be less disturbing

Mindfulness
• help all of us cope with the difficult thoughts and emotions that we all have to experience in our daily life
• Use regular mindfulness exercise
• Peace in the present moment
• Perhaps translated to our life in general
Tinnitus Activities Treatment:
Mindfulness

• Sensations
  • Hearing, Seeing, Feeling, Smelling, Tasting

• Applied to four Primary Functions…
  • Thoughts and Emotions, Hearing, Sleep and Concentration

TAT Mindfulness

• Focused attention on one sensory system,
  – one sense only
  – nonjudgmentally

Sensations

• Feel
• Smell
• See
• Hear
• Taste
Mindfulness

- a guided experience of focusing all your attention/consciousness,
- help some tinnitus patients accepting their tinnitus experience.
- It is important to separate tinnitus from the reactions to tinnitus. The tinnitus is a sound, not a good or bad sound.

Mindfulness for Tinnitus

- Can help some focus on other sensations, or experiences,
- their tinnitus will not be present during that time
- Can focus on tinnitus without judging it.
- can be aware of the tinnitus, and attend to it, and then not attend to it.

Experience 1 sensation at a time

- turn off the other sensations !
- VISION - close your eyes
- SOUND - background monotonous sound
Mindfulness

• "Paying attention in a particular way:
  • on purpose,
  • in the present moment, and
  • nonjudgmentally"

Concentration

Sensations

• Feel
• Smell
• See
Concentration

Seeing

Observation

• Focus on a cloud
• What do you see
• What shape – face – animal….?
• No shape
• A peaceful cloud
• Drifting
• A peaceful cloud
Mindful Observation

- connect with nature
- A flower, a leaf, a tree
- Focus…details…carefully…closely
- Only focus on the flower
- Relax,
- Examine every detail

Concentration

Feeling
Mindful Awareness

• Close your eyes
• Rub your fingers
• Sense your feet and shoes
• Feel them
• Stop for a moment, when you go to put on your hearing aids in the morning.
• When you touch the hearing aid, how do you feel?
• What can you appreciate about your hearing aid?

Concentration

Smelling

Concentration

Tasting…
• 3 different strong herbal teas
• Close your eyes
• taste… focus…appreciate… enjoy…
• taste #2…focus…appreciate… enjoy……
6. TAT
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

TAT.
Attention Control Exercises
- Learn to switch attention from one stimulus (e.g. object, sensation, thought, activity) to another at will
- Allows you to refocus your attention from one stimuli, external or internal to another
TAT.
Visual Attention Example

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

Sleep

Sensations

- Touch
- Hearing
Sensations

• Touch
• Close your eyes
• Touch your hearing aids
• Feel them
• They help you, they are on your side
• appreciate about your hearing aids
• Thanks them
• Touch them

Mindful Breathing

• Getting ready to sleep, lie on back, be still
• Close your eyes
• Breath….. Breath…… Breath
• focus on your breath
• SLOWLY, … breath in ….. Breath out
• Breathe in through your nose and out through your mouth,
• Breath, easy, peacefully
• Focus on your breath, Let go of other thoughts.
• Breathe

Touch
Mindful Breathing

• Focus on your breathe
• Let go of thoughts.
• Let go of the stuff

• Breath... In ......out .......in......out

Sleep - Sensations

Hearing

• Pick a background sound during the day- pleasant, easy to ignore

Bedtime- hearing

Play the sound.
Lie down and relax
Close your eyes
Focus on the sound relax
relax
Focus on the background sound
pause
pause
Focus on the background sound

Focus on the background sound
pause
Focus on the tinnitus
It is a sound
• Pick a background sound during
  the day- pleasant, easy to ignore

Focus on the background sound
pause
Focus on the tinnitus
Pause
Relax, relax
TAT. Progressive Muscle Relaxation

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

Progressive Muscle Relaxation

- Two steps
  1. Deliberately apply tension to certain muscle groups
  2. Stop the tension and focus on how the muscles feel as they relax

Preparing for Sleep with Relaxation

Techniques:
- Progressive muscle relaxation
- Visual Imagery
**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

**Practice Exercise (continued)**

5. Continue tensing and relaxing the following muscle groups:
   - Face
   - Shoulders
   - Stomach
   - Legs and feet
6. When finished, release any remaining tension in your body

**Hearing**
Hearing

• Sensations
  –Hear, feel

Hear

• Recording of book reading
• Story, poetry….
• Recoding of easy listening music…

• Close your eyes
• Listen to the music
• Listen… listen
• Listen to the music
• Listen… listen
• Peace
• Just listen, no judgement…
• Listen to your tinnitus..
• Pause…
• No judgement…
• Listen to the music…
• No judgement…
• pause

• Try some background music you do not like
• Listen to some music
• Close your eyes
• Do not judge the music
• get lost in the sound
• Do not judge the music
• just listen,
• Pause
• …. And now your tinnitus
• Just listen
Mindful Listening

- Listen to a background sound that you would not normally attend to—sound of a fan, motor, traffic….
- Turn on instrumental music, perhaps something you are NOT familiar with
- Close your eyes, listen carefully
- Do not judge the sound
- Experience the sound, get lost in the sound
- Listen - do not judge the sound as pleasant or unpleasant
- Listen to the sound, let it take you over
- just listen, …. Listen

Mindful Listening

- Listen to instrumental music
- unfamiliar music.
- Listen to one instrument
- Listen to another
- Listen to another
- Listen to your tinnitus
- Listen to an instrument……..

Mindfulness wants to be in the moment
- Do not ignore tinnitus
- Accept it in a friendly way
- without engaging in an inner debate on how to ignore it
TAT. Sound and Reading Example
1. Read with noise or music in the background
2. Focus on your reading
3. Now focus on the noise or music
4. Switch your focus back to your reading
5. Continue to switch back and forth
6. Practice so you are able to pay attention to your reading while ignoring the noise or music

Sound Example
1. Listen for a prominent sound around you (e.g. talking, heater noise, etc.)
2. Now listen to a different sound in the room
3. Continue to try and focus on certain sounds while ignoring others 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
• Listen to your tinnitus

• focus on tinnitus in the moment,
• without judging it.
• be aware of the sound,
• attending to it,
• and then not attending to it..
• It is a sound, do not judge

Thoughts and Emotions

• Sensations
  – See, Feel, Smell, Taste
Thoughts and Emotions

- Sensations
  - See
Feeling

• Pick something that happens every day
• Touching a mug, a glass, sitting
• when you touch the doorknob,
• Pause
• Feel, explore, be mindful of the touch, the feeling
Thoughts and Emotions

• Sensations
  – Smelling

smell

• Close your eyes
• smell the tea (food)
• Stop, focus, appreciate
• Smell
• Smell a pleasant smell
• Smell a tea, a food, you don’t like
• Just smell it, don’t judge smell… focus
Sensations - Tasting

• Teas, cheese..... different flavors
TAT. Visual Imagery Exercise

1. Close your eyes
2. Think of a relaxing scene (e.g. the beach)
3. Try to imagine the scene as clearly as you can
4. Pay particular attention to your favorite things in the scene
5. Allow yourself to relax as you imagine the location in your mind

TAT. Visual Imagery

• Similar to daydreaming
• Attention is focused on some type of sensory experience
  – Creating novel mental images
  – Recalling past places and events
TAT. Visual Imagery Exercise

1. Close your eyes
2. Think of a relaxing scene (e.g. the beach)
3. Try to imagine the scene as clearly as you can
4. Pay particular attention to your favorite things in the scene
5. Allow yourself to relax as you imagine the location in your mind

Mindfulness:
When ??

Mindfulness - when
- We are all too busy !!!
- Our mind is constantly occupied
- We often are stressed, overwhelmed and anxious.
- Not easy to make time to just relax
  - (no time for 30 minutes of meditation)
- Can YOU make time ?????
- WHEN ????
Airplane, Taxi, Train, Bus

- Not in control
- Activities you can do are limited.
- Maybe bumpy ride, maybe stress on your mind

 Maybe not – mindfulness ??

- Mindfulness – focus on present and "now" instead of being anxiously preoccupied with the future
- This should make you less stressed
- But…. being present in the now can be stressful because Life is continuously knocking at our door and we have to be able to deal with it. This includes looking into, and preparing for the future.

Existential Phenomenological Approach (after Mohr)

- there is no escaping the difficult conditions of Life
- instead of trying to overcome these conditions ---how can one have a meaningful life with the condition?
- even if some conditions are very limiting
- this invariably involves reality experiences, including - sadness.
• Picture your tinnitus – happy picture

• Can you draw a picture of your tinnitus??
• Can you draw a
  – happy picture of your tinnitus ??

Alternatives to find peace/distraction

• Mindfulness
• Yoga
• Meditation
• Tai chi
• Art Therapy
• Horse Riding therapy
• WHAT DO YOU DO ??
Summary

Mindfulness

- "Paying attention in a particular way:
  - on purpose,
  - in the present moment, and
  - nonjudgmentally"

Reactions to Tinnitus

Tinnitus Primary Functions
Summary

• Focus on one sensory experience at a time (reduce other sensations)
• Explore, explore carefully in great detail
• Do not judge
• Provides time when we do not have to experience the stress in our life (including our tinnitus)
• We have control
• We can create time when we are at peace
• We can experience life with our tinnitus