Can you hear me?

If you are having technical problems, please stay logged on and call Audiology Online at 1-800-753-2160

This session is available for 1.1 CEU. Must stay logged on for the full session. Must successfully complete a short quiz.

Agenda
- Types of Tinnitus
- Causes of Tinnitus
- Tinnitus Patients and How They Are Affected
- Evaluation and Options for Treatment

Learning Objectives
After this course, participants will be able to:
- Identify patient populations likely to experience tinnitus.
- Identify causes and/or triggers of tinnitus.
- Describe different methods of tinnitus treatment.
TIN·NI·TUS
["TIN-it-us", "tin-ÊTÉ-us"]
noun Pathology
a constant or intermittent sound heard in the ears and/or head that does not have an outside source, often described as ringing, humming, or buzzing.

Classifying Tinnitus
Traditionally classified by whether it could be heard by the clinician

**Objective**
- Audible to another person
- Internal acoustic source
- For example, muscle spasms or vascular tumor
- Detected via human ear, stethoscope, or microphone
- Represents less than 1% of cases

**Subjective**
- Only heard by the patient
- May be idiopathic or caused by various disorders involving the head/neck or other systems
- 99% of all cases

Causes
**Ear? Brain? Both? Other?**
Many models and theories:
- Peripheral
- Central
- Psychological
- Non-auditory contributions
Causes

The exact physiological mechanism of tinnitus is unknown.

BUT, research has consistently shown there are several likely causes or triggers.

**Disease & Health Problems**

Association between a number of conditions and tinnitus, including:
- Cardiovascular Disease
- Hypo/Hyperthyroidism
- Diabetes
- Hypertension
- Fibromyalgia

**Noise Trauma**

- Single traumatic experience or repeated exposure over time
- Tinnitus often first indicator of over exposure
- Onset may be sudden or gradual

**Head & Neck Injury**

- Skull fracture, whiplash, blow to face/head, TMJ/jaw related problems
- Report onset shortly after injury/trauma

**Disease & Health Problems**

Association between a number of conditions and tinnitus, including:
- Cardiovascular Disease
- Hypo/Hyperthyroidism
- Diabetes
- Hypertension
- Depression
- Fibromyalgia

**Medications**

500+ prescription and OTC drugs, supplements associated with tinnitus:
- Antibiotics
- Painkillers
- Cancer drugs
- Diuretics

**Hearing Loss**

Almost any form or disorder involving the outer, middle, or inner ear or the auditory nerve may be associated with tinnitus

*Brummett 1980; Shaq, 1981*
Tinnitus is more prevalent among individuals with impaired hearing than it is among the normal hearing population.

Davis & Amr Rafaie, 2000

Tinnitus & Hearing Loss

- Can occur with any:
  - degree of hearing loss
  - type of hearing loss
  - cause or type of onset
- Changes in hearing loss and changes in tinnitus tend to occur independently of one another

No correlation between tinnitus severity and hearing threshold

Tsai et al., 2012

For all age categories, as hearing loss increases, the prevalence of tinnitus increases

Borchgrevink et al., 2001

There are many causes of tinnitus, and as a result, there are likely many different mechanisms of tinnitus.

Aggravators

- Caffeine
- Alcohol
- High doses of Aspirin
- Salt
- Noise Exposure
- Stress/Anxiety
How Many Suffer?

100 participants with normal hearing and no reported tinnitus were each asked to sit in an anechoic chamber for a period of time…

Heller & Bergman, 1953

How Many Suffer?

- Brief spontaneous tinnitus, lasting seconds to minutes, is nearly a universal sensation.

- Temporary tinnitus, lasting minutes to hours, occurs routinely after noise exposures and is also extremely common.

50 Million have experienced tinnitus

Data from the 1999-2004 National Health and Nutrition Examination Survey, conducted by the Centers for Disease Control and Prevention

20 Million seek medical attention

2 Million debilitated by tinnitus

Data from the 1999-2004 National Health and Nutrition Examination Survey, conducted by the Centers for Disease Control and Prevention
Who Experiences Tinnitus?

People from all walks of life but certain groups are more susceptible
• Men (especially in professions that expose them to noise)
• Senior Citizens
• Caucasians
• People with certain common health problems


Other At Risk Populations

Veterans & Military Personnel
• Over 157,000 Veterans began receiving compensation benefits for tinnitus in 2015
• Over 1.5 million veterans with an auditory system disability

“...tinnitus became a major political issue in the U.S. since tinnitus and hearing loss are the most frequent health complaint of soldiers returning from Afghanistan and Iraq resulting in yearly compensation payments of over 2 billion US dollars per year.”
- Yankaskas, 2011

Other At Risk Populations
• Workers in loud environments
• Musicians and music lovers
• Motorsports and hunting enthusiasts

What Is The Impact?

Stouffer JL, Tyler RS, 1990

Why Are Some More Bothered Than Others?

• Research shows that there is no difference in psychoacoustic characterization of tinnitus when comparing groups of people who experience tinnitus and those who suffer from it.

• The REACTION to tinnitus creates the distress, not the tinnitus itself.

Reaction #1
Reaction #2

High Level of Arousal → Negative Reactions
→ Escalating Tinnitus

Make it STOP!

“The problem with Tinnitus, is that because there is still no cure, people are told they just have to live with it. Most of them do, but that doesn’t mean they like it.”

- Dr. Richard Tyler

So, what can we do?
Tinnitus Evaluation

- Case History
- Tinnitus Questionnaire
- Audiologic Testing
  - Otoscopy
  - Acoustic Immittance
  - Pure Tone Audiometry
  - MCL & UCL
  - Speech Recognition Threshold
  - Speech Discrimination Scores: quiet and noise
  - Optional: Tinnitus Loudness Match, Pitch Match

Tinnitus Evaluation

- How long have you had your tinnitus?
- What does your tinnitus sound like?
- When did you first experience your tinnitus?

Tinnitus Questionnaire

- Identify problems or specific areas of a patient’s life that are affected by tinnitus
- Quantify the magnitude of impact
- Counseling tool
- Monitor a patient’s progress with a particular treatment

Optional Tinnitus Testing

- Pitch Matching
- Loudness Matching

- May be useful for
  - Counseling
  - Programming tinnitus devices
  - Validation and acknowledgement of tinnitus symptoms

Steps for Success

1. Tinnitus Evaluation
2. Counseling & Education
3. Treatment Plan
4. Follow-up Care
**Tinnitus Evaluation**

**Optional Tinnitus Testing**
- Can use a conventional audiometer
- May get better accuracy
  - Extended high frequencies
  - Inter-octave frequencies
  - Output in 1-2 dB increments

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**Pitch Matching**

**Instructions to Patient:**

“I want to get a close estimation of the pitch of your tinnitus. I’m going to present two sounds to you, and I want you to tell me which one sounds more like your tinnitus. Try to ignore how loud the sound is and focus on the pitch.”

**Pitch Matching Stimulus**
- *Pure tone* when tinnitus reported as tonal (ringing, chirping, etc.)
- *Narrowband* when tinnitus reported as broadband (roaring, whooshing, etc.)

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**Pitch Matching Procedure**
- Two alternative forced-choice method
- Ascending comparisons starting at 1000 Hz
- Inter-octave frequencies should be used when available
1. Present each tone for 3-5 seconds
2. Ask patient which is closest/most similar
3. Based on response, present next series of comparison tones
4. Repeat until closest approximation is achieved
5. Record the measured pitch

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**Loudness Matching**

**Instructions to Patient:**

“Now that we know what your tinnitus sounds like, I want to get an idea of how loud it is. I’m going to present you with the sound we matched your tinnitus to and gradually increase the loudness. I want you to let me know when my sound equals the loudness of your tinnitus.”

**Loudness Matching Stimulus**
- Use stimulus identified during pitch matching
Tinnitus Evaluation

Loudness Matching Procedure
- Two alternative forced-choice method
- Start at threshold (if narrowband, first find threshold)
  1. Present stimulus at threshold
  2. Gradually increase loudness
  3. As you near the perceived loudness, you may have to toggle up and down to accurately match
  4. Record the level

Tinnitus Evaluation

Emergency Referral
- Physical trauma
- Facial palsy
- Sudden hearing loss

Tinnitus Evaluation

Emergency Referral
- Patient who demonstrates any of the following:
  - Suicidal ideation
  - Or if you are concerned about the patient’s well-being

It is not within the scope of practice for a hearing healthcare provider to treat mental health issues.

Tinnitus Evaluation

Urgent Referral
- Pulsatile tinnitus
- Unilateral tinnitus
- Ear pain and/or drainage
- Symptoms related to head or neck movement
- Vestibular symptoms (dizziness/vertigo)

Counseling and Education

Review all test results:

Counseling and Education

Provide information:
- How the hearing system works
- What is tinnitus
- Why hearing loss and tinnitus are often linked
- Prevalence of tinnitus
- Common known triggers
- Known aggravators
- Treatment is available
Counseling and Education

You don’t have to be a “trained counselor” to provide effective counseling...listening to the patient and addressing his/her concerns and questions is considered counseling!

Steps for Success

1. Tinnitus Evaluation
2. Counseling & Education
3. Treatment Plan
4. Follow-up Care

Treatment Options

Medical

Alternative

Amplification

Sound Therapy

Counseling

Treatment Options

Medical

• No FDA approved method
• No medications have been shown to reliably reduce tinnitus perception
• Tinnitus caused by a treatable medical condition may be eliminated or drastically reduced by addressing the underlying condition

Tinnitus, 2008; Langguth et al., 2009

Alternative

• Acupuncture
• Mindfulness-based stress reduction
• Biofeedback techniques
• Relaxation exercises
• Lifestyle modifications

Tunkel et al 2014

Tinnitus, 2008; Langguth et al., 2009

• No FDA approval
• No conclusive evidence to support any alternative treatment
• AAO-HNS specifically recommends against dietary supplements due to lack of evidence and potential harm

Tunkel et al 2014
Treatment Options

Amplification

- Can provide total or partial relief for some patients
- Researchers have attributed this benefit/relief to a number of possible reasons


Treatment Options

Amplification

- Possible reasons for benefit
  - Reduction of communicative difficulties caused by hearing loss but attributed to tinnitus
  - Less social isolation
  - Reduce stress and fatigue
  - Stimulate deprived auditory system
  - Divert attention from tinnitus
  - Masking effect


Treatment Options

Sound Therapy

- Use of sound to decrease the loudness or prominence of tinnitus
- Sound types
  - Music
  - Noise (pink, white, broadband, etc.)
  - Relaxation
  - Environmental
  - No one type of sound has been shown to be more effective than another

Dobie, 2004; Tyler et al., 2012; Newman & Sandridge, 2012

Sound Therapy Options

- Environmental/Tabletop
- Mobile apps
- Special purpose devices
- Sound generators
- Hearing aids
- Combination devices

Sound Therapy Options

Environmental/Table Top Devices

11/7/2016
Sound Therapy Options

Mobile Apps

Sound Therapy Options

Special Purpose

Sound Therapy Options

Sound Generators

Sound Therapy Options

Combination Devices

Multiflex Tinnitus

Now standard in all styles and technology levels

10 kHz bandwidth for tinnitus stimulus
16 channels of adjustability
Indicators for tinnitus stimulus level adjustments
SoundPoint Tinnitus

Treatment Options

Counseling

• Educate on the basics of tinnitus
  • Improve management of symptoms and associated discomfort
• Counseling & Therapy
• Cognitive Behavioral Therapy

Henry et al, 2015
Henry & Wilson, 1996; Dobie RA, 1999; Tyler et al., 2004
Treatment Options

Medical
Alternative
Amplification
Sound Therapy
Counseling

Treatment Plan

Normal Hearing + Tinnitus
• Counseling
• Sound therapy
• Follow-up care

Treatment Plan

Hearing Loss + Tinnitus
• Counseling
• Hearing aid + sound therapy
• Follow-up care

< 70dBHL (at least 1 threshold below 4000Hz)

Treatment Plan

Hearing Loss + Tinnitus
• Counseling
• Hearing aid
• Sound therapy - external
• Follow-up care

> 70dBHL at all frequencies

Well-Known Protocols

• Tinnitus Retraining Therapy
  - Dr. Pawell Jastreboff
• Progressive Tinnitus Management
  - National Center for Rehabilitative Auditory Research
• Tinnitus Activities Treatment
  - Dr. Richard Tyler at the University of Iowa
Under Investigation

- New forms of auditory stimulation
- Pharmaceuticals
- Brain stimulation techniques
- Implantable medical devices

Tinnitus Resources

- American Tinnitus Association: www.ata.org
- Tinnitus Research Initiative: www.tinnitusresearch.net
- American Academy of Audiology: www.audiology.org
- Tinnitus Retraining Therapy: www.tinnitus-pjj.com
- University of Iowa Tinnitus & Hyperacusis Research: www.medicine.uiowa.edu/oto/research/tinnitus-and-hyperacusis

Tinnitus 101

- Types of Tinnitus
- Causes of Tinnitus
- Tinnitus Patients and How They Are Affected
- Evaluation and Options for Treatment

Thank you!

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