TINNITUS:
LEARNING TO APPRECIATE THE PRESENCE OF SOUND
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DISCLAIMER
The views expressed in this presentation are those of the author and do not necessarily reflect the official policy or position of the Department of the Navy, Army nor the US Government.

DEFINED

- Perception of sound in the absence of an external sound source
  - Unilateral or Bilateral
  - Constant or Intermittent
    - Lasting > 5 minutes in duration

- Common otologic problem
  - can manifest as a psychological disorder affecting a person’s quality of life (QoL)
- Reactions involve responses from limbic and autonomic nervous system (ANS)
  - ultimately can affect mood, sleep, concentration, and speech understanding in absence of hearing loss

Abnormal neuronal activity at the subcortical level of the auditory pathway

- Hearing loss
  - otitis media, impacted cerumen, Meniere's
- Head and Neck Injuries
- Neurological Disorders
  - Multiple Sclerosis, acoustic neuroma, syphilis
- Side effects of medication
  - NSAIDs, aminoglycosides, loop diuretics, chemotherapeutic agents
- Dental disorders including temporomandibular joint dysfunction

EXACERBATION

- Stress
- Sleep deprivation
- Noise exposure
- Alcohol consumption
- Sodium
- Quinine
INCIDENCE

• approx. 10-15% of global population
• approx. 3-5% suffer tinnitus severe enough to seek medical attention

SOUND THERAPY DEFINED

• The use of an external sound to alter a person’s perception and/or reaction
  - facilitates habituation at a subconscious level by reducing contrast between intensity of tinnitus and the listener’s environment
• Goal: teach the brain to reclassify tinnitus as an unimportant stimuli
  - promotes a positive reaction

SOUND OPTIONS

• Qualities can influence effectiveness of specific sounds
  - Temporal
  - Spectral
  - Emotion-evoking characteristics
• Variety in sound preferences used for tinnitus relief
• Preferences vary person-to-person
  - Mood
  - Time of day
  - Location, etc

MASKING

• Uses an external sound set at an intensity level which fully covers/“masks” tinnitus
• Umbrella term used by various disciplines
• Protocol:
  - Tinnitus Masking (Hazell, 1981)
HABITUATION

- Helps the brain reclassify tinnitus as an unimportant sound
- Promotes conscious disregard
- Reduces tinnitus-evoked reactions from limbic system and ANS
- Utilizes "mixing point" for sound presentation
  - An intensity level at or below the level where the listener can perceive the tinnitus and external sound separately
  - (Jastreboff & Jastreboff, 2000)
- Popular Protocols:
  - Tinnitus Retraining Therapy (Jastreboff, 1996)
  - Progressive Tinnitus Management (Henry et al., 2010)
  - Neuromonics (Davis, 2005)

DISTRACTION

- Uses an external sound to divert a patient's attention
  - Requires active listening
- Popular Protocol:
  - Progressive Tinnitus Management (Henry et al., 2010)

NEUROMODULATION

- Uses specialized sounds to minimize neural hyperactivity thought to be the underlying cause of tinnitus
- Popular Protocol:
  - Neuromonics (Davis, 2005)
    - Customized ear-level sound generator
      - Relaxing musical signal with broad frequency range
      - Intermittently masks tinnitus
      - Used during periods of distress

DEVICE SELECTION

HEARING AIDS

- 1st intervention for those with hearing loss
- Can permanently reduce neural activity responsible for tinnitus generation
- Augment external sounds as a way of increasing auditory stimuli and diverting attention
  - Speech acts as an interesting sound
  - Ambient sounds act as a background sound to partially mask tinnitus

SOUND GENERATORS

- Provide background/ambient sounds
  - Often white or pink noise, nature sounds, or other subtle sounds
- Typically have multiple sound types for added flexibility

COMBINATION DEVICES

- Combine benefits of hearing aid with integrated sound generators
- Newer technology allows for streaming with smart devices
**DEVICE SELECTION**

**MODIFIED-SOUND DEVICES**

- Notched music or algorithmically-modified sounds in which specific frequencies are emphasized in a way not to be consciously perceived by the listener
- Intermittent wear-time typically

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**CONSIDERATIONS**

- Cost
- Lifestyle
- When is tinnitus bothersome?
- Sound Sensitivity
- Time Commitment

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**EDUCATION & SUPPORT**

- Sound therapy works best with education and/or counseling
  - Informed explanation of tinnitus
  - Non-threatening, neutral sound
- Length of management varies from person-to-person
  - Average of 6-18 months
  - Patience and commitment are needed to succeed

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**WRAP UP**

- Numerous therapeutic management protocols
  - No consortium re: 1 particularly effective technique
- Sound therapy goals:
  - Modify thoughts and reactions from tinnitus being a negative signal to being neutral in nature
  - Improve QoL
- Regardless of management protocol, counseling remains an essential component

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**TINNITUS APPS**

- Simply Noise
- Relax Melodies
- Tao Mix
- Simply Noise
- White Noise Lite
- Sleep Machine Lite
- VR 3D - Tinnitus Relief
- Oticon Tinnitus Sound
- Relax & Sleep
- Sleep Bug
- Hypnosis
- Starry Night

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**REFERENCES**


