

Tinnitus

What is tinnitus?

Tinnitus is defined as the perception of sound when no external sound is present. The common vernacular is "ringing in the ears"; however, the quality of the tinnitus can range from roaring to hissing and chirping to clicking. Tinnitus can pulsate or be constant. It can be a single tone or multiple tones, and its amplitude can vary from background noise to an excruciating experience.

What causes tinnitus?

Tinnitus has a variety of causes. The most common causes include wax in the ear canal, noise trauma or temporomandibular joint (TMJ) dysfunction. It can also be caused by Meniere's disease, endolymphatic hydrops, allergies, destruction of the middle ear bones, infection, nutritional deficiency, cardiovascular disease, thyroid disorders, certain medications, head injury and cervical disorders. Recently, migraine disorders have also been listed as a culprit.

Regardless of the inciting etiology, it has been shown that it is within the brain that the sound resides, persists, evolves and propagates. Tinnitus may begin with damage to the peripheral auditory system (the cochlea and auditory nerve), but its persistence is a function of the attention that it receives parietal cortex and frontal cortex), the importance that it is given (cingulate cortex, anterior insula) and its maintaining residence in the limbic system (the amygdala, hippocampus and thalamus). Ongoing research is being aggressively pursued to stop this feed-forward cycle in its tracks.

Medications that may exacerbate tinnitus (adapted from Bailey's Otolaryngology - Head and Neck Surgery 4th ed.) include aspirin and aspirin-containing compounds, aminoglycoside antibiotics, nonsteroidal antiinflammatory drugs and heterocycline antidepressants. For a complete list, please visit <http://www.hearinglosshelp.com/articles/pdf/TinnitusDrugList2013.pdf>

Please never stop taking a medication until after discussing it with your prescribing physician.

☐ Medications that May Worsen Tinnitus ☐ (adapted from Bailey's Otolaryngology - Head and Neck Surgery 4th ed.) ☐

Aspirin and aspirin-containing compounds

- Percodan
- Darvon
- Bufferin
- Ecotrin

Aminoglycoside antibiotics

- Gentamicin
- Kanamycin
- Neomycin
- Streptomycin
- Tobramycin
- Amikacin

Nonsteroidal antiinflammatory drugs

- Fenoprofen
- Ibuprofen
- Indomethacin

- Ketoprofen
- Naproxen
- Phenylbutazone
- Sulindac
- Tolmetin

Heterocycline antidepressants

- Amitriptyline
- Amoxapine
- Desipramine
- Doxepin
- Imipramine
- Maprotiline
- Nortriptyline
- Protriptyline
- Trazodone
- Trimipramine

Current therapeutic options

*Please note that the doctor does not endorse or recommend any one tinnitus treatment over another. Consult with the physician regarding which treatment might be best for you.

Alternative Therapy

- Magnesium or B12
- Accupuncture
- Cranio-sacral therapy
- Hyperbaric Oxygen
- Hypnosis

Amplification

- Return of ambient sounds by the use of hearing aids may provide a natural masker for tinnitus

Biofeedback

- Relaxation technique that teaches people to control certain autonomic body functions in order to change the body's reaction to stress and their tinnitus

Cochlear Implants / Electrical Stimulation

- For Deaf or near-Deaf individuals with tinnitus

Cognitive Behavioral Therapy

- Counseling to identify and change negative behaviors and thought patterns associated with their tinnitus. This is oftentimes is most effective when coupled with other tinnitus treatments, including masking or medication.

Medication

- Apart from the supplements listed above, certain medications can diminish the severity of tinnitus in certain patients. These medications include anxiolytics (i.e., Alprazolam, Clonazepam) and anti-depressants (i.e., selective serotonin reuptake inhibitors or tricyclic antidepressants), amongst others. Please ask your doctor if a medication might be appropriate for you.

Sound Therapy

- Hearing aids
- Masking devices (i.e., ear level, sound machines, etc)

TMJ Treatment

- Tinnitus may be a symptom of dysfunction of the jaw (temporomandibular) joint because many of the nerves and muscles controlling this joint are closely connected with the ear.
- The joint can be addressed with a variety of methods including a soft diet and dental treatments

References

- <http://www.ncbi.nlm.nih.gov/pubmed/23543524>
- <http://www.ncbi.nlm.nih.gov/pubmed/22249877>
- <http://www.ncbi.nlm.nih.gov/pubmed/23598691>
- <http://www.ncbi.nlm.nih.gov/pubmed/23076907>

Estimated Sound Levels of Common Noise Encounters (Adapted from the American Tinnitus Association)	
Sound Level (dB)	Encounter
180 dB	Rocket launch
170 dB	Shotgun blast
157 dB	9mm pistol (sound for shooter)
157 dB	Balloon popping
156 dB	Toy cap gun
150 dB	Jet engine (at take off)
150 dB	Rock music (at peak levels)
140 dB	Deploying car airbag
140 dB	Average firecrackers

130 dB	Stock car races
130 dB	Drum high-hat
125 dB	Electric guitar
120 - 130 dB	Symphonic music
125 dB: Noise at or above this level causes pain	
117 dB	F-18Fighter jet in flight
114 dB	Abrams tank, internally, 30 mph
110 dB	Flute (at shoulder)
110 dB	Chainsaw
106 dB	Blackhawk helicopter, in cockpit
90-115 dB	Subway train
100-110 dB	MP3 player, CD player
90-110 dB	MRI (magnetic resonance imaging)
90-105 dB	Leafblower
90-100+ dB	Dog bark (outdoors)
90 dB	Average motorcycle
90 dB	Power lawn mower
85 dB: Time for Earplugs	
<input type="checkbox"/> Regular, sustained exposure may cause permanent damage to hearing	
84-103 dB	Violin at close range
80 dB	Telephone dial tone
70-80 dB	Electric coffee grinder
72-76 dB	Inside car, windows open, 30 mph
60-85 dB	Vacuum cleaner
60-70 dB	Normal conversation at 3 feet
60 dB	Home washing machine

50 dB	Moderate rainfall
40 dB	Humming refrigerator
30 dB	Soft whisper
20 dB	Ticking wristwatch