

# Tinnitus & Hyperacusis

# GLOSSARY

**The American Tinnitus Association (ATA) is pleased to provide our readers** with a glossary of terms pertaining to tinnitus and hyperacusis. It has been adapted with permission from a document published with the *Progressive Tinnitus Management* program developed by researchers and clinicians at the Veterans Health Administration. The ATA Tinnitus & Hyperacusis Glossary was edited by members of the *Tinnitus Today* Editorial Advisory Panel.

The terminology used to describe any condition is of vital importance to diagnosis and treatment of the condition. Without a commonly understood set of terms, we could not effectively communicate a diagnosis, direct treatment for conditions, or expect patients to understand and follow those treatments accurately.

**Acceptance and Commitment Therapy (ACT):**

A psychotherapeutic approach similar to Cognitive Behavioral Therapy (CBT), and sometimes is referenced as part of the third wave of CBT approaches. *ACT* involves mindfulness, which is aimed at reducing psychological distress, depressive symptoms, and anxiety by focusing on the present moment. Effects of *ACT* have been investigated in different populations, including patients with different psychological disorders (e.g., anxiety and depression), and chronic health conditions (e.g., chronic fatigue and chronic pain), as well as with otherwise healthy individuals. Third-wave CBT approaches have been making their way into tinnitus intervention research as well.

**acute tinnitus:** Also referred to as “recent-onset” or “new-onset” tinnitus, *acute tinnitus* has been experienced either persistently or recurrently for less than six months. Most clinicians and researchers identify six months as the point in time when *acute tinnitus* becomes chronic tinnitus, although there is a range of opinion regarding the point at which tinnitus becomes chronic, from three to 24 months.

**aminoglycoside antibiotics:** Any of a group of antibiotics derived from various species of *Streptomyces* that inhibit bacterial protein synthesis and are active against gram-negative bacteria, in particular. *Aminoglycosides* include streptomycin, gentamicin, amikacin, kanamycin, tobramycin, and neomycin, among others. All can be highly toxic and should require monitoring for early signs of toxicity—particularly ototoxicity and nephrotoxicity.

**annoyance:** An unpleasant nuisance that causes irritation and word that often is used to describe negative emotional reactions to tinnitus. *Annoyance* level can be rated on a scale of, e.g., 1-10, where one represents no *annoyance* and 10 represents the most *annoyance* imaginable.

**audiobook:** Audio recording of a book or magazine that can be listened to as an alternative to visual reading. *Audiobooks* can be used as sound-based therapy for tinnitus management, especially for distracting attention away from the tinnitus. *Audiobooks* may be accessed as CDs, MP3 files, or downloaded from various subscription services.

**auditory gain:** The auditory system has “gain control,” similar to the volume control on a stereo, and the level of *gain* determines the degree to which environmental sounds are amplified, or enhanced. The level of *gain* changes automatically to adjust to the level of sound. As the sound level decreases, the *gain* increases, and vice versa. *Gain* is controlled partially by the outer hair cells of the inner ear, which mechanically amplify sounds, and partially

by neural networks that respond to different levels of sound.

**auditory hallucinations:** Usually perceived as voices or music (and sometimes as environmental sounds, e.g., a barking dog), and have been studied primarily in the context of mental health. Some individuals who experience *auditory hallucinations* do not have discernible mental illness. The prevalence of *auditory hallucinations* is unknown, although small studies have reported rates of 2- to 32-percent. *Auditory hallucinations* without mental illness are more common in women than men and increase with age and with hearing loss. The most common manifestation is hearing repetitive musical patterns, with or without lyrics (musical hallucinations).

**auditory imagery:** A normal phenomenon that occurs for all people that generally refers to the imagination of sound, such as repeating a phone number in one’s head or recalling a musical song or passage.

**augmentative sound:** Any sound used therapeutically for tinnitus management, exclusive of sound from ear-level devices.

**augmentative sound device:** Any device (other than ear-level device) that produces sound that can be used therapeutically for tinnitus management. These can include TV, radio, MP3 player, fan, satellite radio, smartphone, and tabletop sound generators.

**autonomic nervous system:** Controls basic bodily functions, such as heartbeat, blood pressure, breathing, body temperature, sweating, etc. These are automatic functions that we cannot normally control; to an extent,



these functions can be modified by exercising or relaxing; also, techniques such as biofeedback and hypnosis can provide a certain amount of control over the *autonomic nervous system*; the method of Tinnitus Retraining Therapy (TRT) describes the *autonomic nervous system* as part of the neurophysiologic model of tinnitus, which is essential to TRT counseling.

**Baroque music:** Style of classical music composed between 1600 and 1750. A commercial wearable device uses *Baroque music* configured specifically for tinnitus management.

**Bluetooth:** Utilization of shortwave radio frequencies to permit wireless communication between computers, cell phones, printers, audio devices, and a variety of other applications. It enables wireless streaming of audio signals from *Bluetooth*-enabled devices to some hearing aids.

**broadband noise:** Wide band of sound, configured such that each frequency within the band produces comparable output. It often is referred to as masking noise for purposes of delivering sound-based therapy for tinnitus.

**brown noise:** A broadband noise where the sound pressure level drops as the frequency rises; with *brown noise* the sound pressure level drops faster than it does with pink noise. *Brown noise* is perceived by a normal human ear to have more low-frequency than high-frequency energy and sometimes is used to manage reactions to tinnitus.

**Cognitive Behavioral Therapy (CBT):** Method of psychotherapy that has undergone three decades of development based on theoretical and

clinical research. Its earliest use was to treat mood disorders, such as depression and anxiety. *CBT* for tinnitus was first described by an audiologist who adapted *CBT*, as used for pain management. Since then, numerous studies of *CBT* for tinnitus have been published, as well as a detailed text outlining the components and relevant exercises for implementing *CBT* for tinnitus. *CBT* now is viewed as a psychotherapy offered only by mental health clinicians specifically trained to provide this particular intervention. The primary components of *CBT* for tinnitus include education, cognitive restructuring, attention control, and training in the use of imagery and relaxation techniques.

**chronic tinnitus:** Tinnitus experienced either persistently or recurrently over a long duration of time is considered *chronic*. The VA and numerous entities define *chronic* as lasting more than six months, although the transitional time point from acute to *chronic tinnitus* lacks consensus. See acute tinnitus.

**cisplatin:** A chemotherapeutic drug used to treat a variety of cancers, which has the highest ototoxic potential of all the platinum compounds in clinical use. See ototoxic drug.

**combination instrument:** An ear-level device, either custom in-the-ear or behind-the-ear, containing both an amplification circuit and a separate circuit for production of a generally broadband or filtered noise. These instruments are used when patients require amplification for hearing loss and also experience tinnitus. The noise may usually be shaped and can be beneficial to patients for tinnitus management.

### complete masking of tinnitus:

Use of sound to completely suppress the perception of tinnitus. Although *complete masking* was originally the intent of Dr. Jack Vernon's method of Tinnitus Masking, it soon became clear that partial masking also was effective for patients.

**copied skills:** Any strategy, such as using soothing sound, designed to benefit a person with respect to reducing reactions to tinnitus; *copied skills* that are taught in CBT include stress management, distraction, and cognitive restructuring (changing thoughts and feelings).

**decreased sound tolerance:** Inability to tolerate everyday sounds that most people tolerate easily. See related terms hyperacusis, misophonia, and phonophobia.

**distraction:** General approach of directing one's attention away from a disturbing symptom or problem and is a technique that can be helpful in managing reactions to tinnitus.

**ear-level device:** In-the-ear or behind-the-ear instrument used for amplification and/or tinnitus management. An *ear-level device* may be a hearing aid, masker, or combination instrument.

**fight-or-flight response:** The autonomic nervous system becomes strongly activated when there is danger or fear; specifically, the



sympathetic part of the autonomic nervous system induces changes in the body that prepare it for *fight or flight*. These changes include release of adrenaline into the bloodstream, increased muscle tension, increased heart rate, increased rate of respiration, and shutting down of digestive processes. Tinnitus Retraining Therapy (TRT) refers to the *fight-or-flight* phenomenon as part of its structured counseling.

**habituation:** Conscious or unconscious decrease in response to a stimulus after being repeatedly exposed to it. The stimulus can be auditory, visual, or tactile. The main goal of treatment with Tinnitus Retraining Therapy (TRT) is *habituation* of the reactions to tinnitus, while the secondary goal is *habituation* of the perception of tinnitus.

**Hyperacusis:** Condition of physical discomfort or pain in response to sound at levels that are easily tolerated by most people. People with *hyperacusis* find all sounds uncomfortable once they reach a certain level of loudness. The level at which sound becomes uncomfortable for someone with *hyperacusis* varies from person to person.

**limbic system:**

A group of interconnected deep brain

structures, common to all mammals, and involved in olfaction, emotion, motivation, behavior, and various autonomic functions. The *limbic system* is explained as part of the structured counseling for Tinnitus Retraining Therapy (TRT). Bothersome tinnitus is thought to activate the *limbic system*, which further activates the autonomic nervous system.

**loudness contrast:** Relative difference in loudness between different acoustic percepts in a particular acoustic environment. With respect to tinnitus, there may be a clear *loudness contrast* between the tinnitus and the ambiance of a quiet environment. Adding any sound to the environment will reduce the *contrast* between the sound of the tinnitus and the ambient sound, and is often accomplished simply by the use of hearing aids.

**loudness discomfort level (LDL):**

The level at which sound becomes uncomfortably loud. Commonly measured clinically in a sound booth using pure tones and/or speech as the stimuli, although there is no standardized procedure for measuring *LDLs*. This can be problematic, because procedures for measuring *LDLs* can significantly affect test results. Of note, patients often find this testing to be aversive, and no research evidence supports *LDL* test results as a good indicator of a patient's ability to tolerate everyday sound outside of the test environment.

**loudness matching:** A perceptual task, usually administered by an audiologist, in which patients are asked to match the *loudness* of an externally presented tone to the

perceived *loudness* of their tinnitus. Although this testing is commonly performed, the results of *loudness matching* are of little value with respect to assessment of the problem, determining a course of therapy for tinnitus management, or outcomes of intervention.

**loudness recruitment:** Condition that naturally results from sensorineural (cochlear) hearing loss. With sensorineural hearing loss, sound becomes just-perceptible (i.e., hearing threshold) at a louder level than it does for people with normal hearing. However, the level at which sound becomes uncomfortably loud usually remains within the same range as for people with normal hearing. This means that the range in perceived loudness between the hearing threshold and the level at which sound becomes uncomfortably loud is narrowed. Consequently, the perception of loudness grows more rapidly in this range than for people with normal hearing. Thus, *loudness recruitment per se* does not indicate decreased tolerance to sound.

**masker:** Most generally refers to an ear-level sound-generating device; the method of Tinnitus Masking can utilize any device that presents sound to the ear, and, if such a device provides relief—whether or not it totally eliminates that patient's perception of tinnitus—it is referred to as a *masker*. Thus, even hearing aids and combination instruments are each referred to as *maskers*, when their main purpose is to provide relief for the tinnitus patient.

**masking of tinnitus:** Conventional (sound-on-sound) *masking* obeys a number of rules that are consistent between individuals; such effects





have received extensive investigation and the rules are well defined. Many studies have been conducted to determine if these same rules apply to the *masking of tinnitus*, and these studies have generally concluded that there are many dissimilarities between *masking* a tinnitus signal and conventional sound-on-sound *masking*. Patients vary widely with respect to their tinnitus *maskability*. For some, almost any sound will *mask* their tinnitus, while for others almost no sound will produce *masking*; some patients do apparently experience optimal *masking* when the *masking* sound approximates the sound of their tinnitus. See complete masking of tinnitus and partial masking of tinnitus.

**mindfulness:** See Acceptance and Commitment Therapy.

**minimum masking level (MML):**

In the clinic, *minimum masking level* refers to the minimum level of broadband noise required to render a patient's tinnitus inaudible. Clinical measurement of *minimum masking level* has involved bands of noise, primarily because tonal maskers are not well tolerated by most patients. Clinical data suggest that tinnitus is easily masked for most patients; other reports, however, suggest that many patients with bothersome tinnitus perceive it most of the time, even in loud environments.

**minimum suppression level**

**(MSL):** Dr. Pawel Jastreboff coined the term *minimum suppression level* (as a replacement for minimum masking level) to describe the suppression of neural activity that results in elimination of the perception of tinnitus as a result of an external sound. The

term *masking*, however, continues in common use.

**misophonia:** Term coined by Dr. Pawel Jastreboff to describe dislike of sound. In cases of *misophonia*, it is not the loudness of a sound that dictates whether or not the listener finds the sound to be uncomfortable (as is the case with hyperacusis), but, rather, it is an emotional reaction to the sound that causes it to be experienced as uncomfortable. With *misophonia*, it is common for a patient to find particular sounds to be uncomfortable at a relatively low level, but to find other sounds at the same level to be acceptable.

**musical hallucinations:** See auditory hallucinations.

**musicians earplugs:** Custom or non-custom hearing protective earplugs that also permit perception of clear sound to enable verbal communication or accurate musical perception. Custom-fit *musicians earplugs* may be the optimal choice of protection from loud sound, especially for people with hyperacusis, because they allow for near-normal hearing while providing protection from aversive or dangerous sounds. If properly cared for, they will last for years.

**neurophysiological model of tinnitus:**

Developed by Dr. Pawel Jastreboff; the model depicts tinnitus as neural activity in the auditory nervous system, with other parts of the central nervous system (cortical, limbic, and autonomic nervous systems) involved in those persons for whom tinnitus becomes annoying or intrusive. The *neurophysiological model* is the focus for TRT counseling.

**New Age music:**

Umbrella term for style of various down-tempo music intended to induce relaxation, in which the melodies are often repetitive to create a hypnotic feeling, and sometimes recordings of nature sounds are used as an introduction to a track or throughout the piece. *New Age music* is sometimes used in sound-based therapy tinnitus devices and used for relaxation as part of a tinnitus treatment process.

**new-onset tinnitus:** See acute tinnitus.

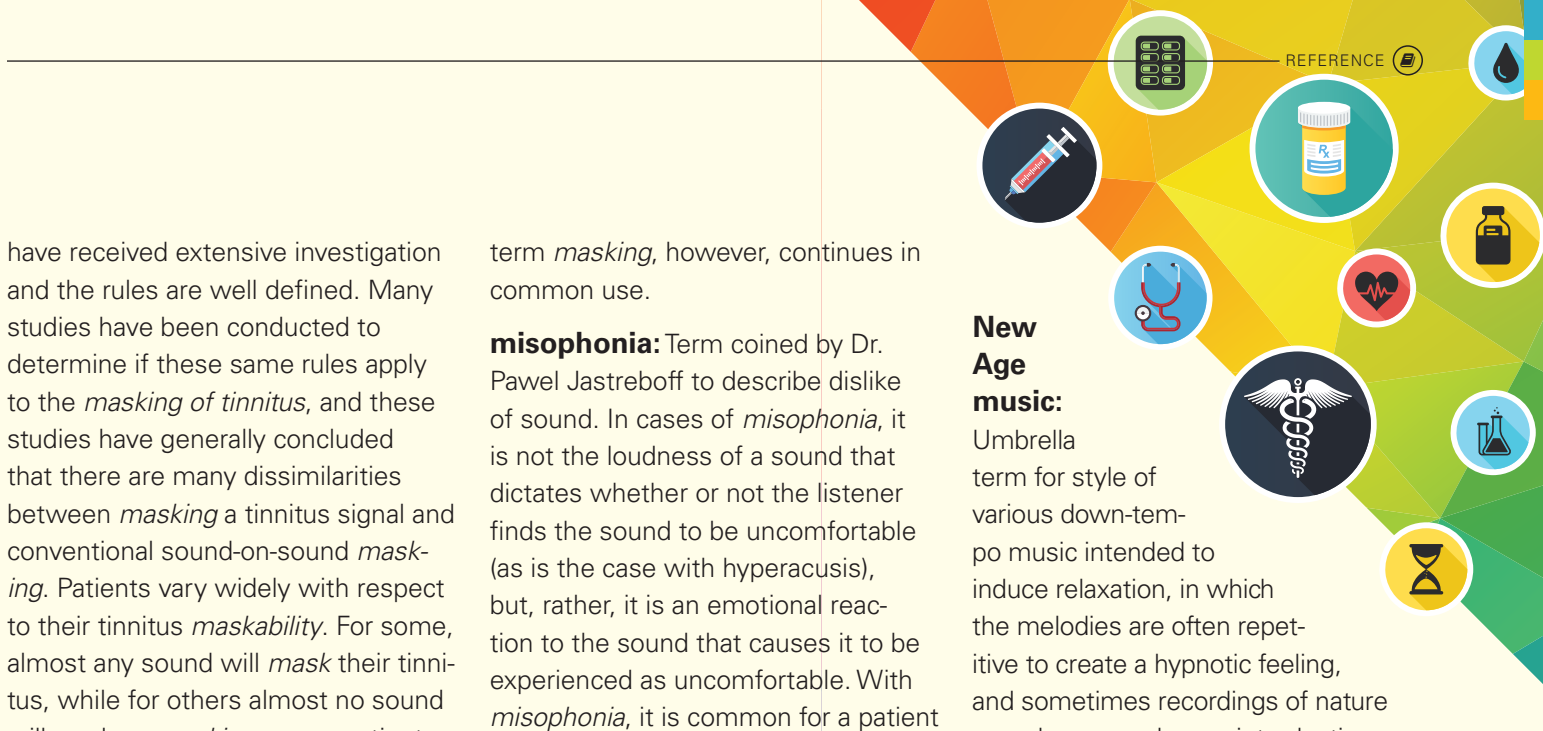
**noise generators:** See sound generating devices.

**non-psychiatric auditory hallucinations:**

Auditory hallucinations that are not associated with psychopathology; *non-psychiatric auditory hallucinations* are typically experienced by those who are hard of hearing or are socially isolated, as well as elderly people who also may have tinnitus. See auditory hallucinations.

**objective tinnitus:** See secondary tinnitus.

**ototoxic drug:** A drug that has the capability of damaging the eighth cranial (vestibulocochlear) nerve or the organs of hearing and balance. The most common *ototoxic drugs* that can cause irreversible hearing loss and/or tinnitus are the aminoglycoside antibiotics and the cancer chemotherapeutic cisplatin.



**overuse of hearing protection (overprotection):**

Some patients who have reduced tolerance to sound (hyperacusis and/or misophonia) will begin using hearing protection even when unnecessary—often due to a fear that environmental sound will become uncomfortably loud (i.e., phonophobia). Wearing hearing protection when sounds are not uncomfortably loud is very likely to make a sound tolerance problem worse. Therefore, it is important for patients with decreased sound tolerance to understand the importance of using hearing protection only when needed either to protect from dangerously loud sound or to allow oneself to be around sounds that otherwise would be uncomfortably loud.

**parasympathetic nervous system:**

Part of the involuntary nervous system that serves to slow the heart rate, increase intestinal and glandular activity, and relax the sphincter muscles. The *parasympathetic nervous system*, together with the sympathetic nervous system, constitutes the autonomic nervous system.

Tinnitus Retraining Therapy (TRT) counseling includes descriptions of the sympathetic and *parasympathetic nervous* systems to help explain the neurophysiological model.

**partial masking of tinnitus:**

Occurs when external sound causes spectral changes in the tinnitus and/or the external sound reduces the perceived loudness of tinnitus (consistent with psychoacoustics, i.e., presentation of one sound can reduce the perceived loudness of a second sound).

**permanent tinnitus:** Persistent tinnitus experienced for a duration of at least six to 12 months, at which time it is not expected to resolve. Similar to chronic tinnitus, although the point at which tinnitus becomes *permanent* cannot be known with any certainty. The longer a person has had tinnitus, the more likely it is to be a *permanent* condition.

**personal listening device:** Generally portable, electronic audio devices include devices like an iPod, MP3 player, smartphone, or any *personal listening device* that potentially can be used for sound-based therapy for tinnitus.

**phantom auditory sensation (PAS):**

An internally generated sound can be termed a *phantom auditory sensation*, because no corresponding sound source exists in the listener's environment. A *PAS* can include all manifestations of auditory hallucinations and tinnitus.

**phonophobia:** Fear that normal levels of sound will be uncomfortably loud, damage hearing, make tinnitus louder, or cause other problems. People with *phonophobia* may use hearing protection in anticipation of loud sound (even when loud sounds are not present). Such overprotection can result in increased tinnitus

awareness and increased sensitivity to everyday sounds.

**pink noise:** Broadband noise in which the intensity of sound decreases as a function of increasing frequency. Because of how the human auditory system processes sound, *pink noise* is perceived by normal human ears to have relatively equal energy across the frequency range when compared to white noise that is perceived to have more high-frequency energy. *Pink noise* sometimes is recommended for use by people with hyperacusis to improve the condition. It also is sometimes used to manage reactions to tinnitus.

**pitch matching:** Perceptual task in which patients match the pitch of an externally presented tone to the perceived pitch of their tinnitus. There is no standardized clinical method for obtaining a *pitch match*, and research has shown that very often when *pitch match* procedures are repeated, substantial variability in the *pitch match* is seen within a single patient (typically over a range of two-to-three octaves).

**podcast:** A multimedia digital file made available on the internet for downloading to a portable media player, computer, etc. Examples of *podcasts* include ATAs *Conversations in Tinnitus*, talk radio programs, audio books, web TV shows, and web movies.

**primary tinnitus:** Tinnitus that is idiopathic (has no known cause); may or may not be associated with sensorineural hearing loss; *primary tinnitus* is by far the most common type of tinnitus (relative to secondary tinnitus).

**Progressive Tinnitus Management (PTM):**

A stepped-care



approach designed to be maximally efficient to have the least impact on clinical resources, while still addressing the needs of all patients who complain about tinnitus. *PTM* consists of five levels that offer a systematic framework for providing only the level of services required by the individual patient: Level 1 *Referral*; Level 2 *Audiologic Evaluation*; Level 3 *Skills Education*; Level 4 *Interdisciplinary Evaluation*; Level 5 *Individualized Support*. The *PTM* method was developed by researchers and clinicians who work for the Veterans Health Administration, but is adaptable to any clinic that provides tinnitus services.

**psychiatric auditory hallucinations:** Auditory hallucinations that are associated with psychopathology. They are a sign of mental illness and have nothing to do with the auditory system. See auditory hallucinations.

**post-traumatic stress disorder (PTSD):** Also known as shell shock and combat stress. People who have experienced severe trauma or a life-threatening event may develop *PTSD*. If *PTSD* is comorbid with tinnitus, it can exacerbate reactions to tinnitus.

**pulsatile tinnitus:** Perception of abnormal pulsing sounds in the ears or head. *Pulsatile tinnitus* usually is caused by blood flow disturbance, a blood vessel abnormality, or, more uncommonly, a vascular tumor. *Pulsatile tinnitus* pulses in synchrony with the heartbeat, and is the most common type of secondary tinnitus. Patients suspected of having *pulsatile tinnitus* should be referred for an assessment by an otologist or otolaryngologist.

**quinine:** An ototoxic drug primarily used as an antimalarial agent, *quinine* is therapeutically available as sulfate or hydrochloride. It can cause temporary hearing loss and/or tinnitus, but these effects are generally reversible once the *quinine* delivery is stopped.

**recent-onset tinnitus:** See acute tinnitus.

**recruitment:** See loudness recruitment.

**reduced contrast:** Tinnitus in a very quiet environment would represent maximum contrast, while tinnitus in a background of sound that decreases perception of tinnitus would be described as *reduced contrast*. The commonly used visual analogy is a light source in a dark room as compared with a light source in a brightly lit room, an idea that may have originated with the counseling for Tinnitus Retraining Therapy (TRT) that describes “the candle in the dark room.”

**reduced sound tolerance:** See decreased sound tolerance.

**residual inhibition (RI):** Phenomenon in which prolonged exposure to broadband noise (clinically one minute of broadband noise is presented at 10 dB above the minimum masking level) results in complete or partial elimination of the perception of tinnitus for a short period of time after cessation of the broadband noise. The effect usually lasts less than one-to-three minutes.

**salicylate:** Class of pain relief drug that can be ototoxic in large doses. Aspirin is an example of a *salicylate*, and auditory effects can include reduced hearing sensitivity and tinnitus. These effects, however, are generally temporary.

## secondary tinnitus:

Also referred to as somatosounds (sometimes historically referred to as *somatic tinnitus*), *secondary tinnitus* refers to the perception of sound that originates within the body—in vascular, muscular, skeletal, or respiratory structures, or in the temporomandibular joint. These “body sounds” have an internal acoustic source, and patients suspected of having *secondary tinnitus* should undergo an assessment by an otologist/otolaryngologist.

**self-management:** Deliberate use of learned methods, skills, and strategies to maintain or modify one’s own attitudes and actions. Strategies include goal setting, self-monitoring, self-correction, and self-solicitation of feedback toward the achievement of objectives. In terms of tinnitus, the goal of *self-management* is to provide tools and education to patients to effectively *self-manage* their reactions to tinnitus.

## sensorineural hearing loss:

Hearing loss that is caused by loss or damage of the hair cells in the inner ear (cochlea). Exposure to loud sound is the most common cause of *sensorineural hearing loss*.

**somatosounds / somatic tinnitus:** See secondary tinnitus.

**sound generating devices:** Wearable, portable, or stationary devices capable of producing various types of

sound and mitigating tinnitus awareness by (1) reducing contrast between tinnitus and the acoustic environment, (2) providing interesting sound, or (3) providing soothing sound. Examples include (but are not limited to) electric fan, tabletop fountain, radio, CD player, MP3 player (e.g., iPod), smartphone (e.g., iPhone), sound machine, and/or sound pillow. Note: any of these devices are suitable for tinnitus sound therapy depending on the particular tinnitus-problem situation.

**sound-based therapy:** Also referred to as sound therapy and acoustic therapy, this is any use of sound to mitigate negative reactions to tinnitus. *Sound-based therapy* can include any type of sound that is presented at a safe and comfortable level and that does not cause any degree of annoyance or discomfort. Increasing numbers of companies provide devices that utilize a very specific sound-stimulus protocol. Other methods that primarily use sound as therapy are Tinnitus Masking and Tinnitus Retraining Therapy (TRT). In addition, Progressive Tinnitus Management teaches how to use sound in a variety of ways to address specific situations when tinnitus is problematic.

**stationary listening devices:** Also referred to as tabletop devices. See sound generating devices.

**stress response:** Constellation of physiological responses on a continuum of intensity, with fight or flight being the extreme of these combined responses. The physical effects of severe tinnitus are best understood in the context of the *stress response*.

**sympathetic nervous system:** The autonomic nervous system becomes strongly activated when there is danger or fear. Specifically, the *sympathetic* part of the autonomic nervous system induces changes in the body that prepare it for fight or flight, including release of adrenaline into the bloodstream, increased muscle tension, increased heart rate, increased rate of respiration, and shutting down of digestive processes. The fight-or-flight response is so powerful it can be sustained for only a brief period of time.

**systematic desensitization:** The key to treating hyperacusis is to *desensitize* the auditory system to sound, which involves systematic exposure to sounds that cause no annoyance. Over time, this process results in the ability to listen comfortably to sounds that are gradually louder. In fact, improvement in loudness tolerance can be observed in as little as a few weeks.

**temporary tinnitus:** Tinnitus induced, usually by loud sound or ototoxic drugs, that is reversible. *Temporary tinnitus* usually lasts up to one week following the exposure. With repeated

exposure to loud sound, however, *temporary tinnitus* can become permanent tinnitus.

**timbre:** Combination of qualities of a sound that distinguish it from other sounds of the same pitch and volume; tinnitus can be described as having acoustic parameters of loudness, pitch, and *timbre*, which also can be thought of as the spectral quality of tinnitus.

**tinnitus:** The perception of sound in the ears or head where no external source is present. It is distinguished from transient ear noise and auditory hallucinations, and it can be primary or secondary.

**Tinnitus Activities Treatment (TAT):** A clinical management program for tinnitus developed at the University of Iowa; it utilizes counseling and sound therapy to provide habituation and decrease in negative reactions to tinnitus; *TAT* provides education in four areas: 1) thought and emotion; 2) hearing and communication; 3) sleep; and 4) concentration. *TAT* uses partial masking of tinnitus at the lowest level that provides relief.

**tinnitus impact:** The influence or effect that tinnitus has on an individual's quality of life.

**tinnitus instrument:** Another term for a combination instrument (hearing aid that contains a sound generator); this term was used by proponents of the Tinnitus Masking method.

**Tinnitus Masking (TM):** Method of tinnitus management developed by Dr. Jack Vernon and colleagues in the 1970s and '80s that involves the use





of wearable ear-level devices (maskers) that deliver sound to a patient's ear(s). The objective of the sound presentation is to produce a sense of relief from the annoyance caused by the tinnitus sound; the relief is accomplished by covering up the tinnitus sound or by changing the sound of the tinnitus in some way, usually by reducing its perceived loudness. These two objectives are referred to respectively as complete and partial masking. The sense of relief from tinnitus technically can be accomplished using any form of sound that the patient chooses to provide the greatest degree of relief. Ideally, the sound should be presented to the ears on a continual basis, which can only be accomplished by wearable tinnitus maskers, hearing aids, or combination hearing aids/maskers (the latter termed tinnitus instruments by Vernon and his group).

**tinnitus pitch match:** See pitch match.

**tinnitus psychoacoustic assessment:** Battery of measures intended to characterize the percept of tinnitus and to assess the effects of sound on tinnitus. A *tinnitus psychoacoustic assessment* commonly includes pitch matching, loudness matching, measuring minimum masking levels, and testing for residual inhibition.

**tinnitus questionnaires:** A generic term describing quantitative or qualitative self-reported measures designed to determine the subjective impact that tinnitus has on an individual and whether tinnitus-specific intervention is warranted. *Tinnitus questionnaires* can be used for pre- and post-treat-

ment evaluation to determine efficacy of a particular intervention and are commonly used for clinical research purposes.

**Tinnitus Retraining Therapy (TRT):** Method of clinical management for tinnitus, developed by Dr. Pawel Jastreboff in the late 1980s. *TRT* is a clinical implementation of his neurophysiological model of tinnitus, which conceptualizes tinnitus as a neural signal that can have varying effects on the central nervous system. The major components of this technique involve structured *TRT* counseling and sound enrichment to accomplish habituation to the tinnitus signal and habituation to the tinnitus reaction and to mitigate any activating effects to the limbic system.

**transient ear noise:** A normal auditory event experienced by almost everyone that is typically described as a sudden whistling sound accompanied by the perception of hearing loss. A transient auditory event—or *transient ear noise*—is unilateral and seems to occur completely at random without anything precipitating the sudden onset of symptoms. Often the ear feels blocked during the episode, and all symptoms generally dissipate within about a minute. Although sometimes referred to as “spontaneous tinnitus,” *transient ear noise* should not be confused with tinnitus.

**uncomfortable loudness level (UCL):** See loudness discomfort level.

**unilateral tinnitus:** Tinnitus that is perceived only in one ear or tinnitus that is lateralized to one side of the

head. Sometimes patients are aware of tinnitus in one ear only, but upon masking the tinnitus, they notice it at a lower level in the contralateral ear.

**vestibular schwannoma:** Also known as acoustic neuroma, acoustic neurinoma, or acoustic neurilemoma, *vestibular schwannoma* is a benign, usually slow-growing tumor that develops from the balance and hearing nerves supplying the inner ear. The tumor comes from an overproduction of Schwann cells, which are the cells that normally wrap around nerve fibers like onion skin to help support and insulate nerves.

**wearable listening devices:** See sound generating devices.

**white noise:** Broadband noise with equal sound pressure levels across the frequency range. Because of the way the human auditory system processes sound, true *white noise* is perceived by a normal human ear to have more high-pitched than low-pitched energy. The term *white noise* often is used to describe broadband noise that isn't technically *white noise*, which is commonly used to manage reactions to tinnitus.

**wideband noise:** See broadband noise.

