Tinnitus

Tinnitus is an abnormal perception of a sound which is reported by patients that is unrelated to an external source of stimulation. Tinnitus is a very common disorder. It may be intermittent, constant or fluctuant, mild or severe, and may vary from a low roaring sensation to a high pitched type of sound. It may or may not be associated with a hearing loss. It is also classified further into subjective tinnitus (a noise perceived by the patient alone) or objective (a noise perceived by the patient as well as by another listener). Subjective tinnitus is common; however, objective tinnitus is relatively uncommon. The location of tinnitus may be in the ear(s) and/or in the head.

Tinnitus is a symptom much like a headache, pain, temperature, hearing loss or vertigo. With tinnitus, the reported distress is usually subjective and difficult to record and appreciate by others.

The quality of the tinnitus refers to the description by the patient of the tinnitus: It may be a ringing, buzzing, cricket, ocean, etc., type of sound. The quality may be multiple sounds or a singular sound.

Tinnitus may be produced in one or more locations, called its site of lesion. The cause of tinnitus may be singular or multiple. A peripheral (i.e., auditory nerve or cochlea) site of lesion includes dysfunction established within the auditory system that extends up to but not involving the brainstem. A central site of lesion refers to involvement of the central auditory pathways, beginning at the brainstem and involving other portions of the central nervous system.

Tinnitus is, therefore, a symptom of neurotologic disease. It may occur with a hearing loss, vertigo or pressure symptoms in the ear or it may occur alone.

Tinnitus must always be thought of as a symptom and not a disease, just as pain in the arm or leg is a symptom and not a disease. Because the function of the auditory (hearing) nerve is to carry sound, when it is irritated from any cause it produces head noise. This phenomenon is similar to the sensation nerves elsewhere. If one pinches the skin, it hurts because the nerves stimulated carry pain sensation.

A complete cochleovestibular evaluation is necessary in all patients with severe disabling tinnitus. The test battery is used to attempt to establish the site of lesion and to rule out any significant pathology which may require further treatment. There are many causes just related to the ear which would result in tinnitus. Such things as simple ear wax in the ear canal to other middle ear abnormalities may result in tinnitus.

Otosclerosis (fixation of the stapes bone in the middle ear) can cause tinnitus as well as

fluid in the middle ear. There are many other ear abnormalities which may cause tinnitus. A more common example would be Meniere's disease. Sudden trauma to the inner ear such as exposure to excessively loud sounds may result in tinnitus. Tumors on the hearing nerve or other problems in the brainstem or central nervous system may also cause tinnitus. In addition, other vascular abnormalities in the skull or base of the skull may result in tinnitus.

Measurement of Tinnitus

Since tinnitus often has high pitch, frequency judgments in this region normally are poor. Frequency discrimination up to approximately 16,000 Hz (which is the upper limit of hearing) is far less exacting than the middle frequency region. In addition, patients suffering from high pitched tinnitus often have a high frequency hearing loss which may impair their frequency discrimination. Therefore, test-retest reliability in matching the frequencies of audiometer tones to the pitch of tinnitus may be poor. An attempt is occasionally made, however, to do pitch-matching and loudness-matching. In addition, an attempt may be made to determine the maskability of the tinnitus (which is unrelated to its loudness) and a determination of residual inhibition can be made (i.e. when tinnitus is temporarily reduced after a masking sound has been turned off; the reduction is termed "residual inhibition.")

A Summary of the Causes of Tinnitus

Tinnitus may originate from various lesions and from different sites. The auditory system involves highly complicated inner ear structures, many afferent and efferent nerve pathways and a great amount of nuclei that
form a complex meshwork. To pinpoint tinnitus to a certain structure becomes questionable. This is demonstrated by patients who have had intractable tinnitus after having surgery on their ear or incurring severe diseases of the ear. In an attempt to relieve the tinnitus, cutting the auditory nerve has been done and yet the tinnitus was persistent, indicating the site of lesion causing the tinnitus must have shifted into the central nervous system.

Tinnitus could be explained by abnormal neural activity in the auditory nerve fibers, which may occur if there is a partial breakdown of the myelin covering of individual fibers. A defect in the hair cell would trigger the discharge of connected nerve fibers. For chronic cochlear disorders, there may also be increased spontaneous activity in the hair cells and neurons resulting in tinnitus. In the auditory nerve there are two different kinds of afferent fibers: Inner hair cell fibers with large diameters and outer hair cells fibers

with small diameters. Thus, loss of signals from the cochlea might trigger tinnitus as a manifestation of a functional imbalance between the two sets of fibers. In addition, other abnormal changes of the cochlear fluids may result in tinnitus.

There is not one type, one site or one origin of tinnitus, but a multitude of types, sites, and origins. It is also unlikely that one hypothesis on the cause of tinnitus could explain all the features.

Treatment of Tinnitus

Generally, most patients will not need any medical treatment for their tinnitus. For patients who are greatly bothered by tinnitus, they may use some masking techniques such as listening to a fan or radio which would mask some of their tinnitus. In addition, other sound source generators can be obtained and be adjusted to sound-like environmental sounds and this is also effective in masking tinnitus. This generally is more advantageous if one is attempting to go to sleep. A tinnitus masker is utilized in some patients. It is a small electronic instrument built into a hearing aid case. It generates a noise which prevents the wearer from hearing his own head noise. It is based on the principle that most individuals with tinnitus can better tolerate outside noise than they can their own inner head noise.

Biofeedback training is effective in reducing the tinnitus in some patients. It consists of exercises in which the patient learns to control the various parts of the body and relax the muscles. When a patient is able to accomplish this type of relaxation, tinnitus generally subsides. Most patients have expressed that the biofeedback offers them better coping skills.

Other measures to control tinnitus include making every attempt to avoid anxiety, as this will increase your tinnitus. You should make every attempt to obtain adequate rest and avoid over fatigue because generally patients who are tired seem to notice their tinnitus more. The use of nerve stimulants is to be avoided. Therefore, excessive amounts of coffee and smoking should be avoided. Tinnitus will not cause you to go deaf and statistically, 50 percent of patients may express that their tinnitus with time decreases or is hardly perceptible.

There are other medications which have been utilized to suppress tinnitus. Some patients benefit with these drugs and others do not. Each patient has an individual response to medication, and what may work for one patient may not work for another. Some of these medications have been proven, however, to decrease the intensity of the tinnitus and make it much less noticeable to the patient. There is, however, no drug anywhere which will remove tinnitus completely and forever. There are some drugs

which will also cause tinnitus. If you have tinnitus and are on medication, you should discuss the symptom of tinnitus with your physician. In many instances, once the drug is discontinued the tinnitus will no longer be present.