

THE INTERNATIONAL TINNITUS JOURNAL (ITJ): A NEW PLATFORM FOR CLINICAL AND SCIENTIFIC “TINNITOLOGY”

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An International Tinnitus Journal (ITJ) is being brought to life by a group of otologists, neurootologists, neurologists, and other clinicians and scientists for representing and recording the results of the transactions of modern medical sciences and clinical experiences in the field of tinnitus and related diseases.

This journal, from its beginning, shall be a first source of information for both clinical specialists and general practitioners who deal with tinnitus patients. Here analysis and theory, as well as practice shall be joined together as closely as possible. As founders, members of the board, and editors of the ITJ, we want to raise and to maintain the interest and progress of tinnitus research and treatment for the benefit of our patients. Many of the papers in this field hopefully will be published here initially.

This journal of experimental and clinical reports on tinnitus research will connect observations and influence the intellectual development of modern ideas upon tinnitus.

As with vertigo, tinnitus belongs to the focus of interest of the international Neurootological and Equilibrimetric Society (NES) with its members living in 48 nations all around the world. As current president of the NES, I hope the ITJ shall reinforce the clinical and scientific bridge between the two areas of spontaneous and irritative statoacoustic symptoms, that is tinnitus and vertigo.

The NES was founded on May 25, 1974, during a meeting of physicians interested in neurotology, medical staff personnel, and medical engineers at Würzburg, Germany, where one century earlier otology was developed by Dr. von Troeltsch, an ophthalmologist.

The NES has especially focused on the possibilities of modern neurootologic differential diagnostics for vertigo, as well as for tinnitus. Several disease patterns have been newly formulated. The new frontiers in neurootology have shown that we depend upon a close cooperation with other medical branches, such as otology, neurology, ophthalmology, internal medicine, cardiology, occupational medicine, orthopedic surgery, and others.

Having considered the focus of various professional medical associations, Dr. Tato and I have proposed as early as 1974 that the NES should remain always an open society, where scientists, doctors, technicians, and engineers interested in the field of neurootology should

have the chance to present and discuss their knowledge, results, questions, and hypotheses in the field of neurotology openly and independent of national, ethnic, or cultural backgrounds. The aims of this scientific association should not only be reached through oral communications during congresses, meetings, and training courses, however, but also through written communications in the transactions of the society.

The term *tinnitus* does not describe a concise entity of fixed symptomatology. At very least, the complaint of tinnitus has to be differentiated into bruits, tinnitus aurium, and tinnitus cranii sive centralis. The term *bruit* denotes a physically objectively measurable noise created in the upper part of the body. *Tinnitus aurium* indicates a subjective experience of a noise which originates in the inner ears. A subjective noise which has its wellspring from intracranial acoustic pathway disturbances is called *tinnitus cranii sive cerebri*. The latter, for instance, may occur as an aura of an epileptic seizure.

Tinnitus is a neural network phenomenon. It needs, at minimum, the functional integrity of the cortex to be perceived. On the other hand, it is well known from neurology that acoustical sensations (e.g., hallucination or tinnitus) frequently occur as an aura of a temporal lobe epilepsy.

Patients with tinnitus are clinically divided into those with maskable and with unmaskable tinnitus.

Tinnitus belongs to the most important group of conditions in neurotology excepting vertigo, nausea, and hearing loss. In most patients, the origin of the tinnitus is not yet explicable. It is well known that tinnitus may arise from lesions in any part of the hearing pathways, between the cochlea and the temporal lobe.

Among our neuro-otologic patients we frequently find multi-sensorial syndromes, for instance, with combinations of tinnitus, hearing impairment, vertigo, and nausea.

Especially in patients over age 40, tinnitus is increasingly prevalent. The minimal ages of the patients, however, in the various dysequilibrium groups show that several rather young patients also complain of tinnitus. They have acquired this disorder for instance from a posttraumatic syndrome, noise exposure at work, or in a discotheque, among other causes.

Most of the audiological approaches for tinnitus studies until now have been based on a psychometric methodology.

The discovery of the presence of spontaneous cochlear acoustic emissions has led to speculation that this may be responsible for certain forms of cochlear tinnitus. However, attempts in some studies to show a relationship between the measured spontaneous acoustical emissions in the external meatus and the subjective pitch matching of a tonal

tinnitus have not been very successful. On the other side, the use of simultaneous brainstem acoustic evoked potentials (BAEP) for recording of the responses in tinnitus patients to broad-band click stimulation and tones has revealed the role of either peripheral and central auditory structures as the origin of the condition of tinnitus.

In neurootology we are using brain electrical activity mapping (BEAM) together with optokinetic, caloric, prerotatory, and postrotatory nystagmus tests as well as a projection of olfactory and gustatory stimulations. Furthermore, we apply BEAM for the classical evoked potentials of visual or acoustic origin. By means of this new functional imaging and synoptic technique, we describe a variety of response structures, which can be used for diagnostic purposes. The principles of BEAM, that is, the technique to accomplish the test and the information which can be clinically gained, are also showing promise in tinnitusology.

For over 9 years, we have been investigating the cortical phenomena during vestibular stimulation by means of BEAM in humans. In typical pathologic cases of disabling tinnitus, for instance, remarkable deviations from the normal responses were demonstrated.

We still assume that tinnitus originates within the neural auditory elements within the whole extent of the acoustic pathway from the cochlea up to the auditory cortex. Now, when discussing the nature and basic mechanisms of the phenomenon tinnitus, it should be pointed out that the experimental neurophysiologic data, as well as our vestibular evoked potentials (VsEP)-findings in tinnitus patients suggest a high level of the spontaneous activity in the central nervous system. Most likely, however, this is an abnormal form of increased spontaneous brain activity.

By assuming that tinnitus may arise at various parts of the hearing pathways between the receptor and the cortical end projection, the therapy must, of course, be adapted to the typical sites of this form of functional irritation of the central nervous system.

It must be understood, however, that tinnitus is only a symptom of functional disturbances in the hearing pathways from the inner ear receptors to the acoustic cortex. A broad spectrum of genuine diseases may afflict these structures and thereby cause tinnitus. Therefore, underlying diseases, for instance, hypotension, hypertension, diabetes mellitus, kidney failure, untoward side effects of various drugs, and so forth must be treated at the same time. This has become very difficult in patients with a multimorbidity.

A broad spectrum of therapeutic agents has been tested to cure, or at least to give relief, to tinnitus patients.

Classic tinnitus therapy is performed through masking. This physical therapy by maskers nowadays follows two routes. One uses small-band or broad-band noise generators through earphones. Recently

we have learned, however, that some patients may also benefit even more from using a hearing aid, even though not exhibiting pronounced hypoacusia that they would need a hearing aid.

The latter statement especially holds true for the group of patients whom we diagnose as having syndrome of the hypersensitive ear because of their reduced audiometric dynamics between pure tone threshold and discomfort level with unpleasant loudness.

Recently, studies attempting to combine the physical tinnitus masker with a hearing aid have been successful in certain patients. However, between 40 % and 50 % of tinnitus patients do not respond to either of these techniques, which must be individually and empirically adapted to every patient.

Because of modern developments in the field of cochlear implants, some authors also try to influence or suppress tinnitus with electrostimulation of the inner ear. This method is still in the stage of scientific investigation, however.

Several methods for psychotherapy are used nowadays in tinnitus patients, including psychotherapy, biofeedback, and autogenous training. The patient learns to live with the unpleasant noise and maybe even to control it, so that the patient does not become desperate. Many susceptible patients formerly have been classified as depressive. Thus they are additionally treated with tranquilizers, which can be very beneficial in some of the cases. A guideline for the use of tranquilizers is the presence of positive responses by patients asked about sleeping disorders.

A broad spectrum of pharmacotherapeutic agents has been tried as a cure, or at least as a relief, for tinnitus patients. Among these agents, lidocaine plays an important role. In patients susceptible to this measure, tinnitus may cease within a few minutes. However, this effect only lasts for several hours to 1 day. During this period, however, the patient may recover from longstanding periods of sleeplessness. It is therefore indicated for patients in danger of suicide. Lidocaine is also used through application in the external meatus of the ear with skin penetration induced through electrical direct current in so-called iontophoresis. It must be understood, however, that lidocaine carries severe risks of untoward side effects.

Frequently, tinnitus arises after trauma, in relation with hyperlipidemia, hypertension, or arteriosclerosis. In these patients, drugs which enhance the central blood flow or the penetration through the blood brain barrier or those which scavenge the free radicals from the circulating blood are applied. Hyperbaric oxygenation nowadays is also used in special compression chambers.

In old age, tinnitus of the type of the slow brainstem syndrome with late vestibulo-ocular and late acoustic brainstem responses, we have found a homotoxicologic and phytotherapeutic drug to be specifically

rather successful. The brainstem stimulation through this compound drug leads to a resynchronization of the statoacoustic pathways. In peripheral inner ear tinnitus, use of furosemide has recently been revitalized. In cortical tinnitus, antiepileptic drugs can be beneficial, for instance, tegretol. Sometimes diagnosis can be led by acoustic late evoked potentials.

A wide variety of drugs is known to give some relief to some tinnitus patients but they must still be scientifically investigated for improving and enriching our therapeutic toolbox.

In tinnitology the future just has started, and we are inviting our authors and readers to join us and to participate in this thrilling development, which fullfills an enormous demand in our patients.

Bad Kissingen

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