

6.8.4 Ultrasonic stimulation

Following chance observations that tinnitus improved following the use of ultrasound for the diagnosis of sinus disease, a trial of ultrasound applied to the ear was performed. In an initial study (Carrick *et al.*, 1986) of 40 patients, 40% improved with ultrasound and only 7% with a dummy stimulator. A further study (Rendell *et al.*, 1987) failed to confirm these benefits. With 40 subjects in a double-blind controlled trial, there was no difference between ultrasound and placebo and very little change in tinnitus was observed in any subject in either group. Recently, this idea was rekindled by the introduction of two new devices: one producing high-frequency sound (specifically processed music) that still is within hearing range (UltraQuiet™) and the other offering real ultrasound stimulation (HiSonic®) in low 20 kHz range together with high-frequency sounds from the hearing range. Presently, there are no clear results regarding their effectiveness.

6.8.5 Magnetic stimulation

In 1987, Takeda reported prolonged reduction of tinnitus a few days after placing powerful magnets near to the tympanic membrane (see Coles, 1998). A subsequent double-blind trial on 50 patients did not reveal any effects (Coles *et al.*, 1991).

6.8.6 Lasers

Several studies of laser treatment in patients and studies on temporal bones to examine the possibility of laser-activated repair mechanisms within the cochlea have shown consistently negative results (Partheniadis-Stumpf, Maurer & Mann, 1993; Shiomi *et al.*, 1997; von Wedel *et al.*, 1995). The controlled human study showed no improvement in tinnitus, and evaluation of the light intensity in the temporal bone study showed that the laser light did not penetrate in the intact ear (Mirz *et al.*, 1999a; Walger *et al.*, 1996).

6.8.7 Hyperbaric oxygen

Hyperbaric oxygen has been used for a long time as an empirical treatment for sudden sensorineural deafness, with the reasoning that increasing cochlear blood flow and concentration of oxygen in the perilymph might induce and facilitate recovery of damaged hair cells (Fattori *et al.*, 1996; Vavrina & Muller, 1995). In Germany, it is also being used extensively for “acute sensorineural tinnitus,” with similar justification. While uncontrolled trials have suggested improvement in about 60% of patients, other studies have shown it is much less effective, if at all, and there are no long-term studies. There is no evidence that the emergence of troublesome tinnitus relates to changes in cochlear blood flow, which hyperbaric oxygen therapy is supposed to improve. An attempt to evaluate effectiveness of this method to treat Ménière’s syndrome showed no difference between patients receiving hyperbaric oxygen and a control group (Fattori *et al.*, 1996).

6.8.8 Various herbal therapies

For years, a variety of herbal mixtures with attractive names implying their effectiveness for tinnitus have been introduced on the market. The recent explosion of web-based trade has made it easier to reach desperate tinnitus patients. Lack of studies supporting the claims of high effectiveness did not discourage people from buying. The problem is that these products are actually making tinnitus worse, as patients receive another confirmation that “nothing works for tinnitus” once the temporary placebo effect disappears. Furthermore, as these products are not the subject of normal governmental control, their composition is frequently unknown and it often does not match description of contents. Consequently, it is impossible to predict what potential negative interaction there might be with medications that patients may be taking for other conditions, or the effect it might have on tinnitus or decreased sound tolerance.

6.8.9 Music therapies

Music-based therapies have a long tradition in psychology and medicine (Cabrera & Lee, 2000; Good, 1996; Lipe, 2002; Watkins, 1997) and recently elements were proposed for tinnitus treatment. As with any treatment decreasing general stress levels and inducing relaxation, this therapy could be used as an adjunct to TRT but, on their own, would be predicted to have only a temporary effect by altering autonomic activity. Systematic studies are needed, however, to determine if the introduction of music may have any additional beneficial effect.

6.8.10 Reflexology, hypnosis, aromatherapy, craniosacral therapy

Reflexology, hypnosis, aromatherapy and craniosacral therapy are non-specific treatments (in terms of conventional medicine) that are widely used for the reduction of stress and stress-related conditions such as a headache, anxiety, digestive problems, etc. Having the scalp muscles or the soles of the feet massaged, or pleasant-smelling oil applied over the body, may produce significant feelings of relaxation and well-being. The treatments are typically applied by therapists without any specialist knowledge of audiology, or the neurophysiology of tinnitus, making diagnosis of these conditions a haphazard process. Tinnitus patients have sometime reported improvement, particularly in feelings of anxiety, following these therapies.

6.8.11 Alternative treatments for hyperacusis: ear protection, pink noise, auditory integration

Compared with tinnitus, the number of treatments that have been proposed for hyperacusis is limited. The most common approach is to encourage ear protection, typically by ear-plugs. In some cases, tightly fitted hearing aids set for minimal gain and with high compression are recommended. These hearing aids are acting as earplugs with sound intensity-dependent attenuation. So called “pink-noise

therapy,” in which patients are exposed to relatively high levels of sound but with certain frequencies removed, is also recommended. Note that the term “pink noise” is not related to acoustical pink noise, which is a noise with energy decreasing inversely with frequency. Auditory integration, which with varying degrees of success is used for autistic children (Mudford *et al.*, 2000), is used as well. So far there are no clear data supportive of any of these approaches. As presented elsewhere in the book, TRT provides a high level of success for hyperacusis, including a cure for some patients.

6.9 Conclusions

Tinnitus is a common and troublesome condition. Therefore, it is not surprising that many attempts have been made to find a cure, or at least a treatment that could reduce the symptoms. The studies presented in the literature, and outlined here, show that the proportion of patients reported to improve is close to the placebo effect, which makes claims of their effectiveness doubtful.

There are rare causes of tinnitus where medical or surgical treatment of underlying pathology can benefit the patient. However, it is always necessary to consider that many of these treatments may have significant side effects and to select an optimal approach adjusted for the individual patient.